United Nations

FCCC/ARR/2020/JPN

Framework Convention on Climate Change

Distr.: General
17 March 2021

English only

Report on the individual review of the annual submission of Japan submitted in 2020*

Note by the expert review team

Summary

Each Party included in Annex I to the Convention must submit an annual inventory of emissions and removals of greenhouse gases for all years from the base year (or period) to two years before the inventory due date (decision 24/CP.19). Parties included in Annex I to the Convention that are Parties to the Kyoto Protocol are also required to report supplementary information under Article 7, paragraph 1, of the Kyoto Protocol with the inventory submission due under the Convention. This report presents the results of the individual review of the 2020 annual submission of Japan, conducted by an expert review team in accordance with the "Guidelines for review under Article 8 of the Kyoto Protocol". The review took place from 7 to 12 September 2020 remotely.

* In the symbol for this document, 2020 refers to the year in which the inventory was submitted, not to the year of publication.

Contents

Abbreviations and acronyms

AAU	assigned amount unit
AD	activity data
AR	afforestation and reforestation
Article 8 review guidelines	"Guidelines for review under Article 8 of the Kyoto Protocol"
BOD	biochemical oxygen demand
C	confidential
CER	certified emission reduction
CHF_3	fluoroform
CH_4	methane
CM	cropland management
Convention reporting adherence	adherence to the "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"
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
CPR	commitment period reserve
CRF	common reporting format
C_2F_6	hexafluoroethane
EF	emission factor
ERT	expert review team
ERU	emission reduction unit
FM	forest management
FMRL	forest management reference level
FOD	first-order decay
GCV	gross calorific value
GHG	greenhouse gas
GM	grazing land management
HFC	hydrofluorocarbon
HWP	harvested wood products
IE	included elsewhere
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
IPPU	industrial processes and product use
k	methane generation rate constant
KP-LULUCF	activities under Article 3, paragraphs 3–4, of the Kyoto Protocol
KP reporting adherence	adherence to the reporting guidelines under Article 7, paragraph 1, of the Kyoto Protocol
LULUCF	land use, land-use change and forestry
MSW	municipal solid waste
N	nitrogen
NA	not applicable
NCV	net calorific value
NE	not estimated
Nex	nitrogen excretion
NF_3	nitrogen trifluoride
NIR	national inventory report
NO	not occurring
N_2O	nitrous oxide

PFC	perfluorocarbon
QA/QC	quality assurance/quality control
RMU	removal unit
RV	revegetation
SF_6	sulfur hexafluoride
TiO_2	titanium dioxide
UNFCCC Annex I inventory reporting guidelines	"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"
UNFCCC review guidelines	"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"
WDR	wetland drainage and rewetting
Wetlands Supplement	*2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands*
2006 IPCC Guidelines	*2006 IPCC Guidelines for National Greenhouse Gas Inventories*

I. Introduction

1. This report covers the review of the 2020 annual submission of Japan, organized by the secretariat in accordance with the Article 8 review guidelines (adopted by decision 22/CMP.1 and revised by decision 4/CMP.11). In accordance with the Article 8 review guidelines, this review process also encompasses the review under the Convention as described in the UNFCCC review guidelines, particularly in part III thereof, namely the "UNFCCC guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention" (annex to decision 13/CP.20). The review took place from 7 to 12 September 2020 remotely[1] and was coordinated by Nashib Kafle, Vitor Góis Ferreira and Davor Vesligaj (secretariat). Table 1 provides information on the composition of the ERT that conducted the review for Japan.

Table 1
Composition of the expert review team that conducted the review for Japan

Area of expertise	*Name*	*Party*
Generalist	Mark Hunstone	Australia
Energy	Giorgi Mukhigulishvili	Georgia
	Hongwei Yang	China
IPPU	Julien Jabot	Norway
	Eva Krtková	Czechia
Agriculture	Olga Gavrilova	Estonia
	Joel Gibbs	New Zealand
LULUCF and KP-LULUCF	Mattias Lundblad	Sweden
	Harry Vreuls	Netherlands
Waste	Qingxian Gao	China
	Igor Ristovski	North Macedonia
Lead reviewers	Qingxian Gao	
	Mark Hunstone	

2. The basis of the findings in this report is the assessment by the ERT of the Party's 2020 annual submission in accordance with the UNFCCC review guidelines and the Article 8 review guidelines.

3. The ERT has made recommendations that Japan resolve identified findings, including issues[2] designated as problems.[3] Other findings, and, if applicable, the encouragements of the ERT to Japan to resolve related issues, are also included. The assessment by the ERT takes into account that Japan does not have a quantified emission limitation or reduction commitment for the second commitment period of the Kyoto Protocol inscribed in the third column of Annex B in the Doha Amendment to the Kyoto Protocol.

4. A draft version of this report was communicated to the Government of Japan, which provided comments that were considered and incorporated, as appropriate, into this final version of the report.

5. Annex I presents the annual GHG emissions of Japan, including totals excluding and including LULUCF, indirect CO_2 emissions, and emissions by gas and by sector, and contains background data on emissions and removals from KP-LULUCF, if elected by the Party, by gas, sector and activity.

[1] Owing to the circumstances related to the coronavirus disease 2019, the review had to be conducted remotely.
[2] Issues are defined in decision 13/CP.20, annex, para. 81.
[3] Problems are defined in decision 22/CMP.1, annex, paras. 68–69, as revised by decision 4/CMP.11.

II. Summary and general assessment of the Party's 2020 annual submission

6. Table 2 provides the assessment by the ERT of the Party's 2020 annual submission with respect to the tasks undertaken during the review. Further information on the issues identified, as well as additional findings, may be found in tables 3 and 5.

Table 2
Summary of review results and general assessment of the 2020 annual submission of Japan

Assessment			*Issue/problem ID#(s) in table 3 or 5*[a]
Date of submission	Original submission: NIR, 14 April 2020; CRF tables (version JPN_2020_1), 14 April 2020; standard electronic format tables, 14 April 2020		
Review format	Centralized review conducted remotely		
Application of the requirements of the UNFCCC Annex I inventory reporting guidelines and the Wetlands Supplement (if applicable)	Have any issues been identified in the following areas:		
	(a) Identification of key categories?	No	
	(b) Selection and use of methodologies and assumptions?	Yes	I.26
	(c) Development and selection of EFs?	Yes	I.7, W.6
	(d) Collection and selection of AD?	Yes	I.14, A.1
	(e) Reporting of recalculations?	Yes	A.1
	(f) Reporting of a consistent time series?	No	
	(g) Reporting of uncertainties, including methodologies?	No	
	(h) QA/QC?	QA/QC procedures were assessed in the context of the national system (see supplementary information under the Kyoto Protocol below)	
	(i) Missing categories, or completeness?[b]	Yes	L.17
	(j) Application of corrections to the inventory?	No	
Significance threshold	For categories reported as insignificant, has the Party provided sufficient information showing that the likely level of emissions meets the criteria in paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines?	Yes	
Description of trends	Did the ERT conclude that the description in the NIR of the trends for the different gases and sectors is reasonable?	No	I.27, A.2, A.5, L.3, L.5, L.7
Supplementary information under the Kyoto Protocol	Have any issues been identified related to the following aspects of the national system:		
	(a) Overall organization of the national system, including the effectiveness and reliability of the institutional, procedural and legal arrangements?	No	
	(b) Performance of the national system functions?	No	
	Have any issues been identified related to the national registry:		
	(a) Overall functioning of the national registry?	NA	
	(b) Performance of the functions of the national registry and the adherence to technical standards for data exchange?	NA	

Assessment			*Issue/problem ID#(s) in table 3 or 5*[a]
	Have any issues been identified related to the reporting of information on AAUs, CERs, ERUs and RMUs and on discrepancies in accordance with decision 15/CMP.1, annex, chapter I.E, in conjunction with decision 3/CMP.11, taking into consideration any findings or recommendations contained in the standard independent assessment report?	NA	
	Have any issues been identified in matters related to Article 3, paragraph 14, of the Kyoto Protocol, specifically problems related to the transparency, completeness or timeliness of the reporting on the Party's activities related to the priority actions listed in decision 15/CMP.1, annex, paragraph 24, in conjunction with decision 3/CMP.11, including any changes since the previous annual submission?	No	
	Have any issues been identified related to the following reporting requirements for KP-LULUCF:		
	(a) Reporting requirements of decision 2/CMP.8, annex II, paragraphs 1–5?	No	
	(b) Demonstration of methodological consistency between the reference level and reporting on FM in accordance with decision 2/CMP.7, annex, paragraph 14?	Yes	KL.2
	(c) Reporting requirements of decision 6/CMP.9?	No	
	(d) Country-specific information to support provisions for natural disturbances in accordance with decision 2/CMP.7, annex, paragraphs 33–34?	NA	
CPR	Was the CPR reported in accordance with decision 18/CP.7, annex; decision 11/CMP.1, annex; and decision 1/CMP.8, paragraph 18?	NA	
Adjustments	Has the ERT applied any adjustments under Article 5, paragraph 2, of the Kyoto Protocol?	NA	
	Has the Party submitted a revised estimate to replace a previously applied adjustment?	NA	Japan does not have a previously applied adjustment as it does not have a quantified emission limitation or reduction commitment for the second commitment period of the Kyoto Protocol
Response from the Party during the review	Has the Party provided the ERT with responses to the questions raised, including the data and information necessary for assessing conformity with the UNFCCC Annex I inventory reporting guidelines and any further guidance adopted by the Conference of the Parties?	Yes	
Recommendation for an exceptional in-country review	On the basis of the issues identified, does the ERT recommend that the next review be conducted as an in-country review?	No	
Question of implementation	Did the ERT list any questions of implementation?	No	

[a] Further information on the issues identified, as well as additional findings, may be found in tables 3 and 5.
[b] Missing categories for which methods are provided in the 2006 IPCC Guidelines may affect completeness and are listed in annex III.

III. Status of implementation of recommendations included in the previous review report

7. Table 3 compiles the recommendations from previous review reports that were included in the most recent previous review report, published on 27 September 2019,[4] and had not been resolved by the time of publication of the review report of the Party's 2018 annual submission. The ERT has specified whether it believes the Party had resolved, was addressing or had not resolved each issue or problem by the time of publication of this review report and has provided the rationale for its determination, which takes into consideration the publication date of the most recent previous review report and national circumstances. The ERT noted that the individual review of Japan's 2019 annual submission did not take place in 2019 owing to insufficient funding for the review process.

Table 3
Status of implementation of recommendations included in the previous review report for Japan

ID#	*Issue/problem classification*[a, b]	*Recommendation made in previous review report*	*ERT assessment and rationale*
General			
G.1	QA/QC and verification (G.2, 2018) Convention reporting adherence	Ensure that documentation is available during the review to justify the country-specific EFs, including descriptions of the used methodologies, measurements and interpretation of results, to ensure the transparency and accuracy of the inventory.	Addressing. The ERT considers that the recommendation has not yet been fully addressed. See ID#s E.6, I.7, I.9 and I.15 below for specific sectoral findings.
Energy			
E.1	Fuel combustion – reference approach – all fuels – CO_2 (E.1, 2018) (E.1, 2016) (25, 2014) Transparency	Include in the NIR detailed information on the conversion factors used to convert GCV to NCV for all fuels.	Addressing. The Party reported the ratio of NCV to GCV in its NIR (table A 4-26) only for selected fuels (26 fuels). The ERT considers that the recommendation has not yet been fully addressed because Japan has not yet reported the ratio of NCV to GCV for the remaining fuels. Japan should make efforts to report this ratio for all fuels to substantiate the comparison between the reference approach and the sectoral approach and improve the transparency of its emission estimates.
E.2	Feedstocks, reductants and other non-energy use of fuels – solid and gaseous fuels – CO_2 (E.4, 2018) (E.15, 2016) Transparency	Provide greater transparency in the NIR and CRF tables (e.g. documentation boxes) and justification for the application of the "NE" notation key when fuels are used for non-energy purposes to demonstrate that there are no omissions of any potential emissions.	Resolved. Japan did not report "NE" in CRF table 1.A(d), but explained in its NIR (p.10-14) that it changed the notation key for other oil from "NE" to "NO" because refinery gas is used as feedstock (benzene, toluene and xylene).
E.3	1.A Fuel combustion – sectoral approach – other fossil fuels – CO_2, CH_4 and N_2O	Report emissions from the non-biomass fraction of waste in the reference approach (CRF table 1.A(b)).	Resolved. In response to recommendations made by the ERT during the review, Japan reported in its NIR (table 10-11) that emissions from waste (non-biomass fraction) are now reported under the reference approach in

[4] FCCC/ARR/2018/JPN. The ERT notes that the report on the individual inventory review of Japan's 2019 annual submission has not been published yet. As a result, the latest previously published annual review report reflects the findings of the review of the Party's 2018 annual submission.

ID#	Issue/problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
	(E.11, 2018) Convention reporting adherence		CRF table 1.A(b). The emissions from the non-biomass fraction of waste are reported for the entire time series in CRF table 1.A(b), contributing between 10,877.60 and 18,199.88 kt CO_2 eq.
E.4	1.A.1.a Public electricity and heat production – other fossil fuels – CO_2 (E.5, 2018) (E.16, 2016) Transparency	Increase the transparency of reporting regarding the composition of other fuels for public electricity and heat production in order to justify the CO_2 IEF and ensure comparability of reporting.	Resolved. The Party has performed a recalculation for this category and confirmed that there is no other fossil fuel reported in this category. The AD are reported as "IE" and are included under "biomass". All emissions for this subcategory were reported as "IE" in CRF table 1.A(a)s1. The Party reported in its NIR (p.3-74) that for the biomass fraction in solid waste (e.g. plastics and waste tyres), it is difficult to distinguish the AD on a calorie basis for the energy sector from the fossil fuel derived fraction because there is no appropriate way to separate the calorimetric data of mixed solid waste. Hence, the AD (fuel consumption) are reported as "IE" and included under "other fossil fuels". Likewise, for the fossil fuel derived fraction in "paper/cardboard", it is difficult to distinguish the AD on a calorie basis for the energy sector from the biogenic fraction.
E.5	1.A.1.b Petroleum refining – gaseous fuels – CH_4 and N_2O (E.12, 2018) Transparency	(a) Explain in the NIR that the reported CH_4 and N_2O IEFs from 2012 to 2015 increased when the new data from the General Survey of the Emissions of Air Pollutants (conducted in 2014) were implemented in the inventory because the survey identified an increase in the number of furnaces with higher EFs (based on furnace type and fuel consumption) for the period 2012–2015; (b) Explain in the NIR the reasons for the significant decline observed in the CH_4 and N_2O IEFs between 2010 and 2011.	Resolved. Japan reported in its NIR (pp.3-37–3-39) that the fluctuations in the CH_4 and N_2O IEFs were the result of emission estimates that were updated to take into account more reliable data from the annual General Survey of the Emissions of Air Pollutants. During the review, the Party explained that: (a) The increase in the CH_4 and N_2O IEFs from 2012 to 2015 was due to the significant increase in the consumption of some gaseous fuels by furnaces with high EFs, such as gas turbines and other industrial furnaces, during this period; (b) The decline in the CH_4 and N_2O IEFs between 2010 and 2011 was due to the substantially different results of the survey conducted in 2011 compared with that in 2008. Japan used data from 2008 for 2010 instead of applying linear interpolation using the 2008 and 2011 survey results, as the influence of the 2011 earthquake off the Pacific coast of Tōhoku rendered the linear interpolation approach inappropriate.
E.6	1.B.1.a Coal mining and handling – CH_4 (E.13, 2018) Transparency	Describe in the NIR verification information consistent with the 2006 IPCC Guidelines (vol. 2, chaps. 4.1.7.1–4.1.7.2) and ensure that documentation is available during the review to justify the decrease in the CH_4 EF for category 1.B.1.a.i.	Not resolved. The Party reported CH_4 emissions from coal mining and handling in its NIR (table 3-64), which continue to show a significant decline in CH_4 EFs since 2005 for underground mines. During the review, Japan clarified that it estimated emissions from coal mining and handling on the basis of annual survey data from the Japan Coal Energy Center and provided links to two reference documents in Japanese (https://www.jstage.jst.go.jp/article/journalofmmij/134/8/134_99/_pdf/-char/en and

ID#	*Issue/problem classification*[a, b]	*Recommendation made in previous review report*	*ERT assessment and rationale*
			https://www.jstage.jst.go.jp/article/shigentosozai/122/10_11/122_10_11_542/_pdf/-char/en). The documents showed some changes in coal mining activities. For example, coal is now mined in shallower areas and therefore emits less CH_4. The ERT considers that the recommendation has not yet been fully addressed because the Party has not yet included these explanations or referred to these documents in its NIR.
E.7	1.B.2.b Natural gas – gaseous fuels – CH_4 (E.10, 2018) (E.12, 2016) (45, 2014) Transparency	Clarify the text of the NIR regarding fugitive emissions from natural gas distribution to industrial consumers.	Resolved. Japan provided more comprehensive information on how it estimated fugitive emissions from natural gas distribution to industrial consumers in figure 3-7 of the NIR, explaining that the emissions from both natural gas and city gas distribution to industrial consumers are included in the estimates.
IPPU			
I.1	2. General (IPPU) – CO_2, CH_4 and N_2O (I.1, 2018) (I.6, 2016) Comparability	Reallocate emissions from the consumption of reducing agents for the production of soda ash, iron and steel, ferroalloys, lead and zinc to categories 2.B.7, 2.C.1, 2.C.2, 2.C.5 and 2.C.6, respectively, in line with the UNFCCC Annex I inventory reporting guidelines and the 2006 IPCC Guidelines.	Not resolved. The Party continued to report on the emissions from the consumption of reducing agents for the production of soda ash, iron and steel, ferroalloys, lead and zinc under the energy sector in its 2020 submission (NIR sections 4.3.7, 4.4.1, 4.4.2, 4.4.5 and 4.4.6). Japan reported CO_2 emissions as "IE" in CRF table 2(I).A-H for categories 2.B.7 soda ash production, 2.C.1.d sinter, 2.C.1.e pellet, 2.C.2 ferroalloys production, 2.C.3 aluminium production, 2.C.4 magnesium production, 2.C.5 lead production and 2.C.6 zinc production, and explained the allocation of the emissions in CRF table 9. During the review, Japan explained that it considers the methodology it currently applies to be a more accurate way of avoiding double counting or omitting emissions. The methodology takes into account all uses of energy and reducing agents, derived from the General Energy Statistics, collectively, because it is difficult for Japan to fully distinguish between uses of energy and reducing agents. Japan also indicated that it included information on the categories to which emissions are allocated in the NIR (table 3-10). The ERT considers that the recommendation has not yet been addressed, noting that the Party's reporting is not comparable with the reporting of other countries because the methodology applied by the Party is not in line with the 2006 IPCC Guidelines (vol. 3, chaps. 3–4). Taking into consideration the conclusions from the 17th meeting of GHG inventory lead reviewers, the ERT considers that Japan should include in the NIR the explanation provided during the review to ensure the transparency of the reporting and demonstrate the accuracy of the estimates.

ID#	Issue/problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
I.2	2.A.2 Lime production – CO_2 (I.3, 2018) (I.8, 2016) Completeness	Provide justification for the information that lime production does not lead to CO_2 emissions in sugar mills owing to subsequent recarbonation, or provide an estimation of these emissions in line with the 2006 IPCC Guidelines.	Resolved. The Party provided more comprehensive information on lime production in sugar mills in its NIR (section 4.2.2.b), in line with recommendations made in previous reviews. Japan explained that, in the sugar cane industry, all slaked lime for producing lime milk in the country is acquired from outside, and therefore no CO_2 emissions arise from this process. In addition, for beet sugar, in cases where limestone is calcined, emitted CO_2 is reabsorbed into the lime cake. This information is documented in a 2010 report by the Ministry of the Environment.
I.3	2.A.2 Lime production – CO_2 (I.4, 2018) (I.8, 2016) Completeness	Work with the aluminium industry to obtain information to confirm that lime is not produced by aluminium manufacturers. If this is not possible, estimate and include in the inventory the CO_2 emissions related to the non-marketed lime that is consumed in aluminium production.	Resolved. The Party confirmed with the Japan Aluminium Association and reported in its NIR (section 4.2.2.b) that lime was not produced by aluminium manufacturers in Japan in 1990–2014. In 2014, domestic aluminium operations were ceased.
I.4	2.A.3 Glass production – CO_2 (I.5, 2018) (I.9, 2016) Completeness	Estimate and include in the inventory the CO_2 emissions associated with the consumption of minor CO_2-emitting raw materials for glass manufacturing or provide information demonstrating that the carbonate is not consumed.	Resolved. Japan estimated emissions from barium carbonate, potassium carbonate, strontium carbonate and lithium carbonate, applying a methodology based on the molecular weight ratio of each carbonate. These emissions are reported in CRF table 2(I).A-Hs1, while information on the methodology applied is provided in the NIR (p.4-9). The recalculation resulted in a 9 per cent increase in estimated CO_2 emissions from glass production across the time series.
I.5	2.B.1 Ammonia production – CO_2 (I.23, 2018) Transparency	Include in the NIR the reasons for the inter-annual variation in the CO_2 IEF for 2004/2005 (–9.6 per cent), 2011/2012 (8.0 per cent) and 2015/2016 (–11.1 per cent).	Resolved. The Party explained in the NIR (p.4-19) that inter-annual changes in the CO_2 IEF for 2004/2005 (–9.6 per cent), 2011/2012 (8.0 per cent) and 2015/2016 (–11.1 per cent) are primarily caused by a decrease, an increase and a decrease in emissions from oil coke consumption, respectively. Further details on oil coke consumption are provided in NIR table 4-16.
I.6	2.B.6 Titanium dioxide production – CO_2 (I.24, 2018) Transparency	Add a sentence to the NIR clarifying that the CO_2 EF for rutile TiO_2 is lower than the IPCC default in addition to the text already provided in the NIR (p.4-30).	Resolved. The Party added the sentence clarifying that the CO_2 EF for rutile TiO_2 is lower than the IPCC default EF value of 1.43 t CO_2/t and provided further clarification in the NIR (p.4-30) justifying the country-specific value used.
I.7	2.B.8 Petrochemical and carbon black production – CO_2 (I.8, 2018) (I.12, 2016) Accuracy	Justify that the country-specific CO_2 EF has been developed in a manner consistent with the 2006 IPCC Guidelines, covering the total CO_2 emissions from the steam cracking process, and is considered to be more accurate than the IPCC default EF; or recalculate the CO_2 emissions from ethylene production by applying the default EF provided in the 2006 IPCC Guidelines (vol. 3, chap. 3.9.2.2).	Addressing. Japan updated its explanation in the NIR (section 4.3.8.2.b) on its confidential CO_2 EF for ethylene production. The country-specific CO_2 EF was established on the basis of CO_2 emissions from decoking, for example, and ethylene production data. CO_2 emissions from the energy use of off-gases from industrial processes obtained from feedstocks are accounted for in the energy sector under category 1.A.2.c chemicals. The ERT noted that, according to the 2006 IPCC Guidelines (vol. 3, chap. 3,

ID#	Issue/problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
			p.3.57), combustion emissions from fuels obtained from feedstocks should be allocated to the source category under the IPPU sector. During the review, Japan explained that CO_2 emissions from the energy use of industrial process off-gases obtained from feedstocks during ethylene production (steam cracking process) are accounted for as emissions from the use of refinery gas under petrochemical energy use in the General Energy Statistics. The ERT considers that the recommendation has not yet been fully addressed because the Party has not yet justified that the country-specific EF is accurate in accordance with the 2006 IPCC Guidelines.
I.8	2.B.8 Petrochemical and carbon black production – CH_4 (I.25, 2018) Transparency	Include in the NIR the reasons provided during the review (in 2018) for the lower CH_4 IEF (compared with the IPCC default) for production of ethylene dichloride and for vinyl chloride monomer.	Resolved. The Party provided an explanation for the lower CH_4 IEF in the NIR (p.4-35). CH_4 emissions are calculated by multiplying the production amount by Japan's country-specific EF, which is based on plant-specific data. According to the Vinyl Environmental Council, CH_4 emissions are reported as "NO" for 2001 onward because "equipment installation for exhaust gas combustion was completed for all plants, and the CH_4 contained in the tail gas is below detectable levels".
I.9	2.B.8 Petrochemical and carbon black production – CH_4 (I.26, 2018) Transparency	Describe in the NIR how fugitive emissions from the steam cracking of naphtha from flanges, valves and other process equipment are considered in the calculation of the country-specific EF or recalculate emissions by considering these sources (fugitive emissions from the steam cracking of naphtha from flanges, valves and other process equipment) in the country-specific CH_4 EF.	Addressing. The Party did not update its explanation in the NIR. During the review, Japan explained that there are virtually no fugitive emissions from the steam cracking of naphtha from flanges, valves and other process equipment. The inventory team has acquired information from the Japan Petrochemical Industry Association and has been informed that fugitive emissions in plants have been controlled to be below detectable levels (nearly zero) based on the High Pressure Gas Safety Act. The ERT considers that Japan providing the above explanation in its NIR would resolve this issue.
I.10	2.C.1 Iron and steel production – CO_2 (I.27, 2018) Transparency	Include in the NIR the sum of CO_2 emissions from categories 1.A.2.a and 2.C.1 and provide a qualitative explanation on how this sum is comparable to the emissions that are calculated in line with the 2006 IPCC Guidelines and include in the NIR an explanation on why the country-specific CO_2 EF for category 2.C.1 is higher than the IPCC default values.	Resolved. The Party provided in its NIR (table 4-43) the sum of CO_2 emissions reported under categories 1.A.2.a and 2.C.1, and also provided a qualitative explanation on how the sum of CO_2 emissions under categories 1.A.2.a iron and steel and 2.C.1 iron and steel production is comparable to the emissions that are calculated in line with the 2006 IPCC Guidelines.
I.11	2.C.1 Iron and steel production – CO_2 (I.28, 2018) Comparability	Correct the notation key from "NA" to "NO" for the AD in CRF table 2(I).A-Hs2 (production/consumption quantity) for category 2.C.1.c.	Resolved. Japan corrected the notation key from "NA" to "NO" for the AD in CRF table 2(I).A-Hs2 for category 2.C.1.c direct reduced iron, because there is no such production in Japan.

ID#	Issue/problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
I.12	2.C.1 Iron and steel production – CO_2 (I.29, 2018) Transparency	Include in the NIR a description (or table) indicating all reducing agents used in iron and steel production and make a cross reference to the NIR sections where information about the reducing agents can be found.	Addressing. Japan included a cross reference in section 4.4.1 of its NIR to table 3-10, where information about reducing agents can be found. During the review, the Party explained that a description of the reducing agents used in iron and steel production is reported in its NIR (sections 3.2.3 and 4.4.1 and tables 3-10 and 3-62). Table 3-10 provides aggregated information on the processes (iron and steel reduction, pig iron, direct reduced iron, sinter, pellet) and feedstocks (coke, pulverized coal, waste plastics, coke oven gas, blast furnace gas) without further explanation. The ERT considers that the recommendation has not yet been fully addressed because the Party has not yet included a transparent explanation in the NIR (section 4.4.1) on the types of reducing agents used under category 2.C.1 iron and steel production.
I.13	2.C.1 Iron and steel production – CO_2 (I.30, 2018) Transparency	Include information on pulverized coal injection in NIR table 3-10 to demonstrate its use as fuel for non-energy purposes (e.g. as feedstock).	Resolved. The Party provided information on the allocation of CO_2 emissions from pulverized coal in NIR table 3-10 to demonstrate its use as fuel for non-energy purposes (e.g. as feedstock).
I.14	2.C.2 Ferroalloys production – CO_2 (I.31, 2018) Accuracy	Estimate CO_2 emissions related to the other carbon-containing materials (such as ore and slag forming).	Addressing. The Party added an explanation of its methodology for estimating CO_2 emissions for category 2.C.2 in its NIR (p.4-56). During the review, Japan clarified that the distributed amount of carbonate ores for ferroalloys production is likely to be low for primary raw materials such as imported manganese ores, imported nickel ores and imported chromium ores for ferroalloys production, and therefore the resulting CO_2 emissions are not estimated. Further, there are no data on the distribution amounts of the above primary raw materials as carbonates in the 2019 Mineral Resources Material Flow of the Japan Oil, Gas and Metals National Corporation. However, Japan did not provide any evidence that emissions from carbon-containing materials are below the threshold in accordance with paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines.
I.15	2.C.2 Ferroalloys production – CH_4 (I.32, 2018) Transparency	Provide a more detailed explanation of how CH_4 emissions and the country-specific CH_4 EF are calculated and explain the reasons for not producing a country-specific EF on the basis of t CH_4/t ferroalloy produced (as in CRF table 2(I).A-Hs2 and in the 2006 IPCC Guidelines), considering that the quantity of CH_4 emissions from ferroalloys depends on the operation of the furnaces and on the type of ferroalloy produced and is based on the amount of coke consumed in the furnaces. If the Party measures the	Addressing. The Party included an explanation of how it calculated the CH_4 EF in its NIR (p.4-57). However, it was not clear to the ERT how dividing measured CH_4 emissions by the consumption of electricity in electric furnaces can provide a reliable country-specific CH_4 EF, considering that the quantity of CH_4 emissions from ferroalloys depends on the operation of the furnaces and on the type of ferroalloy produced and is based on the amount of coke consumed in the furnaces. During the review, Japan explained that the EF was established using measured CH_4 concentrations, measured dry gas emissions per hour and calories per hour (electricity). Further, it explained that the EF needs to be

ID#	Issue/problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
		CH_4 emissions directly, provide information in the NIR in accordance with the 2006 IPCC Guidelines (vol. 1, chap. 2.2.2, p.2.8, and chap. 6.7.1, pp.6.12–6.14).	per electricity unit (in TJ), since CH_4 emissions fluctuate depending on electricity consumption, which in turn depends on the operation of the furnaces and the type of ferroalloy produced. Therefore, it considered AD on electricity consumption, and not production, to be more accurate. Japan also reported that some of the parameters for calculating the CH_4 EF were established using measurements which were generally conducted in line with the 2006 IPCC Guidelines, for instance with making efforts to cover a representative sample. The ERT considers that the above explanations provided during the review should be included in the NIR.
I.16	2.D.1 Lubricant use – CO_2 (I.33, 2018) Accuracy	Verify and correct the units reported in CRF table 2(I).A-Hs2 and include in the NIR the reasons for the lower (or higher) CO_2 IEF (compared with the IPCC default) for this category. If the Party is not able to justify the lower (or higher) IEF, apply the IPCC default value.	Resolved. The Party updated the units reported in CRF table 2(I).A-Hs2 for category 2.D.1 and presented the AD (consumption of lubricants and grease) in kt. As a result, the IEF (e.g. 0.595 t CO_2/t in 2018) increased by more than 4,000.0 per cent across the time series and is now in the IPCC default range (0.238–0.958 t CO_2/t).
I.17	2.E.1 Integrated circuit or semiconductor – HFCs, PFCs, SF_6 and NF_3 (I.10, 2018) (I.14, 2016) Transparency	Report in the NIR information about the "use rate" per specific gas and "by-production rate" of C_2F_6.	Resolved. Japan added tables 4-57–4-58 to its NIR indicating the "use rate" per specific gas and "by-production rate" for C_2F_6 for category 2.E.1.
I.18	2.E.2 Thin-film transistor flat panel display – HFCs, PFCs, SF_6 and NF_3 (I.13, 2018) (I.15, 2016) Transparency	Report in the NIR information about the "use rate" per specific gas and "by-production rate" of CHF_3.	Resolved. The Party added tables 4-60–4-61 to its NIR indicating the "use rate" per specific gas and "by-production rate" for each gas used. Japan also provided a reference to the 2006 IPCC Guidelines (vol. 3, chap. 6, table 6.4) for the specific EFs used.
I.19	2.F Product uses as substitutes for ozone-depleting substances – PFCs (I.34, 2018) Transparency	Provide documentation in the NIR to support the claim that PFC emissions from the manufacturing, stocks and disposal of commercial refrigeration are not occurring at any time during the time series. If this is not possible, make efforts to collect data on PFCs imported in products under commercial refrigeration and report the emissions in CRF table 2(II)B-Hs2.	Addressing. Japan reported in its NIR (p.4-74) that, according to the results of surveys on fluorocarbons in imported products, PFCs have not been used in imported products over the past three years, and it is unlikely that PFCs are refilled into such products. As such, it reported PFC emissions as "NO" in the NIR. However, Japan did not provide information on the possible use of PFCs in previous years. During the review, the Party explained that companies in the industrial association for commercial refrigeration confirmed that PFCs were not used in imported commercial refrigeration, including in previous years. The ERT considers that Japan including the above explanation with relevant references in its next NIR would resolve this issue.

ID#	Issue/problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
I.20	2.F.1 Refrigeration and air conditioning – HFCs (I.17, 2018) (I.17, 2016) Transparency	Report in the NIR that the parameters "refrigerant contained per operated device" and "refrigerant contained per disposed device" are equal to "refrigerant charged per device at production" since these types of equipment are sealed tight.	Resolved. Japan reported in its NIR (note to table 4-63) that refrigerators are sealed tight, meaning the "refrigerant contained per disposed device" in the estimation model is considered equal to "refrigerant charged per device at production".
I.21	2.F.1 Refrigeration and air conditioning – HFCs (I.19, 2018) (I.19, 2016) Comparability	Report transparently the emissions from domestic refrigeration, stationary air conditioning and mobile air conditioning and the AD and recovery of all subcategories of category 2.F.1 in CRF table 2(II)B-Hs2 for all phases of the lifetime of the equipment (i.e. manufacturing or assembly, operation, disposal and recovery).	Resolved. CRF table 2(II)B-Hs2 includes AD for all phases of the lifetime of the equipment (i.e. manufacturing or assembly, operation, disposal and recovery) and the information is disaggregated to the subcategories of category 2.F.1 (i.e. commercial, domestic and transport refrigeration, stationary air conditioning and mobile air conditioning).
I.22	2.F.1 Refrigeration and air conditioning – HFCs (I.35, 2018) Comparability	Reallocate the AD and emissions relating to railways and vessels from commercial refrigeration to transport refrigeration.	Resolved. The emissions and AD relating to railways and vessels were reallocated from subcategory 2.F.1.a commercial refrigeration to subcategory 2.F.1.d transport refrigeration in CRF table 2(II)B-Hs2.
I.23	2.F.2 Foam blowing agents – HFCs (I.21, 2018) (I.21, 2016) Comparability	Improve the transparency of the reporting of AD for foam blowing agents in open and closed cells in CRF table 2(II)B-Hs2 using data currently reported in the NIR, where possible.	Resolved. The Party adjusted the data entered in the open and closed cells for HFC-134a in CRF table 2(II)B-Hs2 to "amount filled into new manufactured products".
Agriculture			
A.1	3.C Rice cultivation – CH_4 (A.4, 2018) Transparency	Include in the NIR verification information in line with the 2006 IPCC Guidelines (in accordance with para. 41 of the UNFCCC Annex I inventory reporting guidelines), including a comparison of new and previous estimates with a discussion of the results to explain why the new data for rice cultivation are more accurate and suitable for inclusion in the national inventory.	Addressing. The Party reported on emissions from rice cultivation and provided a parameter for the EF on organic matter application in its NIR (section 5.4). In addition, some information (including on QA/QC activities and documentation) was provided on the recalculations applied to the estimates of organic matter application in the 2017 submission. During the review, Japan clarified that it is currently reviewing or verifying the parameter for the EF on organic matter application and will provide more information in the NIR once this investigation is complete. The ERT considers that the recommendation has not yet been fully addressed because Japan has not yet provided a comparison of new and previous estimates (which could be provided in a new table showing the effect of any changes on emissions). The ERT also suggests that the Party comprehensively explain why the new parameter for the EF on organic matter application is more accurate.
A.2	3.D.a Direct N_2O emissions from managed soils – N_2O	Include information in the NIR on the reasons behind the decreasing trend in the total N for fertilizers	Addressing. The Party reported limited information on N fertilizer use in its NIR (sections 5.5.1.1–5.5.1.2). During the review, Japan provided

ID#	Issue/problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
	(A.5, 2018) Transparency	(organic and inorganic) under categories 3.D.a.1 and 3.D.a.2.	more information on its data sources for fertilizer use and a brief explanation of the reasons behind the changes in fertilizer use. The ERT considers that the recommendation has not yet been fully addressed because the Party has not yet provided in the NIR comprehensive information on the use of N fertilizers, or explanations of the reasons behind the decreasing trend in fertilizer use. For example, Japan could include a row in table 5-53 confirming a decline in the total cropping area over time, or a reference substantiating the statement "reducing the usage of fertilizer has been recommended to mitigate nitrogen pollution" on page 5-40.
A.3	3.D.a.6 Cultivation of organic soils (i.e. histosols) – N_2O (A.6, 2018) Transparency	Clarify in the NIR the areas reported under category 3.D.a.6, including an explanation of the area of organic soils excluded from category 3.D.a.6 and how grazed meadow, pasture and unrenewed area are considered and defined in the inventory; and make a cross reference to the relevant parts of the reporting on the LULUCF sector.	Resolved. The Party reported on the area of organic soils in NIR section 5.5.1.6.b and included a reference to section 6.7.1, in the LULUCF section of the NIR. The Party included an explanation of the area of organic soils excluded from category 3.D.a.6 and how grazed meadow, pasture and unrenewed area are considered and defined in the inventory.
A.4	3.D.a.6 Cultivation of organic soils (i.e. histosols) – N_2O (A.7, 2018) Accuracy	Include a description of the QA/QC procedures undertaken to justify the use of the country-specific EF for N_2O for the cultivation of histosols on intended paddy fields and, if the value cannot be justified, revise the EF applying the IPCC default value of 8 kg/N_2O-N/ha/year.	Resolved. Japan provided in the NIR (section 5.5.1.6.d) a description of the QA/QC procedures undertaken and also provided detailed information on the research used to generate the country-specific EFs for the cultivation of histosols, including specific references and uncertainty information.
LULUCF			
L.1	4. General (LULUCF) – CO_2, CH_4 and N_2O (L.4, 2018) (L.11, 2016) Transparency	Include in the NIR a clear explanation for the difference between areas reported for cultivated histosols under the agriculture sector and cropland and grassland organic soils reported under the LULUCF sector using a similar rationale to the one provided during the review and which was reported in the 2014 and 2015 NIRs.	Resolved. The Party included in its NIR (section 6.6.1) an explanation for the difference between areas reported for cultivated histosols under the agriculture sector and under the LULUCF sector.
L.2	4.A.1 Forest land remaining forest land – CO_2, CH_4 and N_2O (L.15, 2018) Transparency	Verify the value for the carbon stock of deadwood and include in the NIR an explanation of the reasons why this value is high.	Not resolved. The ERT considers that the recommendation has not yet been resolved because Japan did not provide an explanation in the NIR, and the value for the carbon stock of deadwood reported in NIR table 6-9 is still high (14.65 t carbon/ha). During the review, the Party provided some relevant information to the ERT, including a table detailing carbon stock in living biomass, deadwood and litter reported under deforestation by Parties included in Annex I to the Convention, which shows that some other Parties reported large dead organic matter stocks in deforestation as

ID#	Issue/problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
			Japan did. However, this did not sufficiently explain the high value for carbon stock per ha deadwood in Japan. The Party further clarified that deadwood is calculated using a model based on values from literature. Japan also explained that it discussed with experts the appropriateness and potential improvement of the ratio of the amount of deadwood to living biomass in deforested areas, taking into account knowledge from a recent monitoring survey.
L.3	4.A.1 Forest land remaining forest land – CO_2 (L.16, 2018) Transparency	Include in the NIR explanations of the major drivers for the changes in carbon stock, as well as information on the FM practices that have been applied to intensively managed forests and semi-natural forests that caused the increase in carbon stock.	Addressing. Japan explained in the NIR (p.6-10 and figure 6-1) how the age structure of forests affected the growth rate. Japan also briefly stated that net removals are also affected by harvest rates. However, the NIR did not describe the evolution over time of demand for forest biomass and associated fellings. This information is essential to understanding the trend in carbon stock change since this reflects the difference between carbon gains and carbon losses. Japan provided the information on FM practices in NIR sections 11.3.2 and 11.4.2.4. However, the ERT noted that it could also be reported in section 6. During the review, the Party clarified that the trend in the supply and demand of domestic timber decreased in the first half of the whole reporting period (i.e. 1990–2018). The supply of domestic timber fell to its lowest level around 2000, but has since increased owing to an increase in the number of forests reaching their cutting period and an increase in domestic timber demand.
L.4	4.A.2 Land converted to forest land – CO_2 (L.17, 2018) Accuracy	Provide in the NIR an explanation or justification on why no biomass stock in living biomass is removed when cropland is converted to other land uses, including forest land. If this is not possible, include estimates for losses of living biomass for cropland to other land uses, including the relevant estimation of AR for 2013–2016 in category 4(KP-I)A.1.	Resolved. A country-specific parameter of annual crop biomass stock before and after conversion in cropland was introduced in the 2020 submission for estimating carbon stock changes associated with land-use conversions from and to annual cropland (NIR tables 6-8a–6-8b).
L.5	4.B.1 Cropland remaining cropland – CO_2 (L.6, 2018) (L.12, 2016) Transparency	Clearly explain in the NIR the resulting estimates from the Roth-C model and their trends, considering that the background data and information provided in the CRF tables, the NIR and the interactions during the 2016 review were not sufficient for the ERT to assess the accuracy and time-series consistency of the estimates of carbon stock changes in cropland mineral soils.	Addressing. Japan provided in the NIR (section 6.6.1.b.2) descriptions of the background and parameters of the Roth-C model used for estimating carbon stock changes in mineral soils without elaborating in the NIR on the drivers of the trends. During the review, the Party clarified that it has been evaluating the calculations derived from the Roth-C model, including input data, on an ongoing basis in order to better understand the drivers of the trends in estimates, and plans to improve the estimates in its 2021 submission.

ID#	Issue/problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
L.6	4.B.1 Cropland remaining cropland – CO_2 (L.18, 2018) Transparency	Provide a clear explanation in the NIR of the reduction of organic soil in rice fields, including information on the conversion rate and land types to which rice fields are converted (e.g. to settlements (60 per cent) and upland fields (20 per cent)).	Resolved. Information on the reduction of organic soil in rice fields is included in the NIR (section 6.6.1.b.2, p.6-34 and table 6-26).
L.7	4.C.1 Grassland remaining grassland – CO_2 (L.8, 2018) (L.14, 2016) Transparency	Clearly explain in the NIR the resulting estimates from the Roth-C model and their trends, considering that the background data and information provided in the CRF tables and the NIR and in the responses of the Party to the questions of the ERT were not sufficient for the ERT to assess the accuracy and time-series consistency of the estimates for grassland mineral soils.	Addressing. In a similar manner to cropland remaining cropland, and as in the 2019 NIR, Japan included in the 2020 NIR (section 6.6.1.b.2) descriptions of the background and parameters of the Roth-C model used for estimating carbon stock changes in mineral soils (see also ID# L.5 above). During the review, the Party clarified that it reviews the calculations derived from the Roth-C model, including input data, on an ongoing basis in order to better understand the drivers of the trends in estimates, and plans to improve estimates in its 2021 annual submission. The ERT considers that the recommendation has not yet been fully addressed because the Party has not yet included an explanation of the drivers of the trends in the NIR.
L.8	4.E.2 Land converted to settlements – CO_2 (L.19, 2018) Transparency	Clarify and justify the use of "NO" for net carbon stock change per area for organic soils under category 4.E.2.2, considering that it is unclear how the organic soils used to conduct embankment activities, remove defective soils and solidify soils are handled.	Resolved. Emissions from drainage of organic soils under category 4.E.2 land converted to settlements were calculated and reported with values in CRF table 4.E in the 2020 submission.
L.9	4(III) Direct N_2O emissions from N mineralization/ immobilization – N_2O (L.11, 2018) (L.17, 2016) Transparency	Improve the consistency of the reporting for the sector across categories 4.B, 4.C and 4(III).	Resolved. The Party included explanations in the NIR (pp.6-39–6-43) on the consistency of the reporting for categories 4.B, 4.C and 4(III).
L.10	4.G HWP – CO_2 (L.14, 2018) (L.20, 2016) Transparency	Improve the documentation in the NIR of what is included in each HWP commodity reported under category 4.G by better describing how the methods used account for carbon losses due to destruction and renovation of buildings.	Resolved. The Party included information in the NIR (section 6.11.1) on the method used to estimate carbon losses due to the destruction and renovation of buildings, provided the equation for the inflow and the outflow of carbon to the HWP pool and described the parameters used.
Waste			
W.1	5. General (waste) – CH_4 and N_2O (W.4, 2018) Transparency	Improve the justification for the use of the country-specific EF in the NIR by including short descriptions of the type of information the country-specific EFs are based on.	Resolved. The Party provided in its NIR (sections 7.2–7.6) descriptions of its chosen country-specific EFs and the references used for determining the country-specific EFs for each subcategory. The ERT considers the general issue resolved and raised specific recommendations for determining EFs for each subcategory, their results

ID#	Issue/problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
			or interpretations, or sufficiently justifying its use of BOD in industrial wastewater (see ID#s W.5, W.6 and W.8 in table 5).
W.2	5.A Solid waste disposal on land – CH_4 (W.5, 2018) Accuracy	Provide a justification for the use of the country-specific half-life of biodegradation k to calculate CH_4 emissions from solid waste disposal, or calculate CH_4 emissions from solid waste disposal assuming the IPCC default half-lives of biodegradation from table 3.4 in the 2006 IPCC Guidelines (vol. 3, chap. 3).	Resolved. The Party reported in its NIR (p.7-14) that it conducted several measurements at the Central Breakwater landfill site in Tokyo in 1992 and obtained a set of half-lives that are representative of managed disposal sites in Japan for its temperate/boreal wet climate. The Party stated that these results were comprehensive for the managed disposal sites and can be used as country-specific EFs. The half-life of tsunami sediment is applied on the basis of expert judgment and is well documented in the NIR.
W.3	5.B.2 Anaerobic digestion at biogas facilities – CH_4 (W.6, 2018) Transparency	Report CH_4 emissions from anaerobic digestion of solid waste as "NE" in CRF table 5.B and justify the use of this notation key in annex 5 to the NIR on the basis of the threshold of significance in accordance with paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines.	Resolved. The Party reported in its NIR (p.7-24) that biogas facilities in Japan for municipal and industrial waste leak small amounts of CH_4. By assuming a biogas leakage fraction of 2 per cent in a given facility and a CH_4 concentration in biogas of 60 per cent, CH_4 emissions from this source category were tentatively estimated as no more than 1.4 kt CO_2 eq per year. The emissions for this source category are therefore reported as "NE" and the Party provided justification in the NIR (annex 5) that the likely level of emissions meets the criteria in paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines.
W.4	5.D.1 Domestic wastewater – CH_4 (W.7, 2018) Accuracy	Calculate the CH_4 emissions from Gappei-shori Johkasou units assuming a more realistic scenario for the impact on the CH_4 EF, such as by incorporating in the calculation a more gradual replacement of the older generation (pre-2001) Johkasou units with the new anaerobic–aerobic Johkasou units, which comply with the new building standards.	Resolved. Japan reported in its NIR (p.7-74) that domestic and commercial wastewater generated in Japan is treated at various wastewater treatment facilities (e.g. sewage treatment plants, domestic sewage treatment plants and human waste treatment plants) and GHG emissions from these sources are reported under category 5.D.1 domestic wastewater. Further, Japan reported that each facility uses a different method for estimating the emissions. The most suitable wastewater treatment systems are selected for each area in Japan. Domestic sewage treatment plants (Johkasou systems) are being promoted as an effective way of supplementing sewerage systems in smaller municipalities with low population densities and little flat land. In 2018, Johkasou systems were used by 20.3 per cent of the population, with the remaining wastewater being treated after collection or on site. For the 2019 submission, Japan revised its method for estimating CH_4 emissions, re-examined its EFs and the fraction of N removal for the new Johkasou units currently being used, and recalculated CH_4 and N_2O emissions from Johkasou units for 2001 onward.

ID#	*Issue/problem classification*[a, b]	*Recommendation made in previous review report*	*ERT assessment and rationale*
KP-LULUCF			
KL.1	CM – CO_2 (KL.1, 2018) (KL.4, 2016) Transparency	Improve the description of the different sources of land-use data used as inputs for soil carbon estimates for cropland in the Roth-C model and how these are harmonized to ensure consistent representation of land areas and to prevent the over- or underestimation of AD and net emissions or removals.	Resolved. The Party included explanations on the representation of land areas in its 2019 and 2020 submissions (2020 NIR, section 6.6.1.b.2).

[a] References in parentheses are to the paragraph(s) and the year(s) of the previous review report(s) in which the issue or problem was raised. Issues are identified in accordance with paras. 80–83 of the UNFCCC review guidelines and classified as per para. 81 of the same guidelines. Problems are identified and classified as problems of transparency, accuracy, consistency, completeness or comparability in accordance with para. 69 of the Article 8 review guidelines in conjunction with decision 4/CMP.11.

[b] The report on the review of the 2019 annual submission of Japan was not available at the time of this review. Therefore, the recommendations reflected in this table are taken from the 2018 annual review report. For the same reason, 2019, 2017 and 2015 are excluded from the list of review years in which issues could have been identified.

IV. Issues and problems identified in three or more successive reviews and not addressed by the Party

8. In accordance with paragraph 83 of the UNFCCC review guidelines, the ERT noted that the issues and/or problems included in table 4 have been identified in three or more successive reviews, including the review of the 2020 annual submission of Japan, and had not been addressed by the Party at the time of publication of this review report.

Table 4
Issues and/or problems identified in three or more successive reviews and not addressed by Japan

ID#	*Previous recommendation for the issue*	*Number of successive reviews issue not addressed*[a]
General	No issues identified.	
Energy		
E.1	Include in the NIR detailed information on the conversion factors used to convert GCV to NCV for all fuels.	4 (2014–2020)
IPPU		
I.1	Reallocate emissions from the consumption of reducing agents for the production of soda ash, iron and steel, ferroalloys, lead and zinc to categories 2.B.7, 2.C.1, 2.C.2, 2.C.5 and 2.C.6, respectively, in line with the UNFCCC Annex I inventory reporting guidelines and the 2006 IPCC Guidelines.	3 (2016–2020)
I.7	Justify that the country-specific CO_2 EF has been developed in a manner consistent with the 2006 IPCC Guidelines, covering the total CO_2 emissions from the steam cracking process, and is considered to be more accurate than the IPCC default EF; or recalculate the CO_2 emissions from ethylene production by applying the default EF provided in the 2006 IPCC Guidelines (vol. 3, chap. 3.9.2.2).	3 (2016–2020)
Agriculture	No issues identified.	

ID#	*Previous recommendation for the issue*	*Number of successive reviews issue not addressed*[a]
LULUCF		
L.5	Clearly explain in the NIR the resulting estimates from the Roth-C model and their trends, considering that the background data and information provided in the CRF tables, the NIR and the interactions during the 2016 review were not sufficient for the ERT to assess the accuracy and time-series consistency of the estimates of carbon stock changes in cropland mineral soils.	3 (2016–2020)
L.7	Clearly explain in the NIR the resulting estimates from the Roth-C model and their trends, considering that the background data and information provided in the CRF tables and the NIR and in the responses of the Party to the questions of the ERT were not sufficient for the ERT to assess the accuracy and time-series consistency of the estimates for grassland mineral soils.	3 (2016–2020)
Waste	No issues identified.	
KP-LULUCF	No issues identified.	

[a] Reports on the reviews of the 2015, 2017 and 2019 annual submissions of Japan have not yet been published. Therefore, 2015, 2017 and 2019 were not included when counting the number of successive years for this table.

V. Additional findings made during the individual review of the Party's 2020 annual submission

9. Table 5 presents findings made by the ERT during the individual review of the 2020 annual submission of Japan that are additional to those identified in table 3.

Table 5
Additional findings made during the individual review of the 2020 annual submission of Japan

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
General			
G.2	QA/QC and verification	Japan reported in its NIR (p.1-11) that it uses emission data obtained under the Mandatory GHG Accounting and Reporting System – which aims to reduce emissions from entities by requiring them to estimate and understand the amount of GHG emissions originating from their own activities – to verify GHG emissions in the NIR. However, the Party did not provide any additional information on this reporting system in its NIR. During the review, Japan provided further information on the system, including that it was established in 2006 under the Act on Promotion of Global Warming Countermeasures and generally covers all sectors excluding LULUCF and a portion of the energy sector (relating to residential and transportation (non-commercial use passenger vehicles)). Further, entities using the system are required to report the following information: GHG emissions by gas, including CO_2 emissions related to electricity and heat supplied from other entities; EFs for the CO_2 emissions relating to electricity; and EFs employed other than those provided by the ministerial ordinance on the calculation of GHG emissions. The methods used to calculate emissions under this system are generally consistent with those used in compiling the GHG inventory.	Not an issue/problem

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
		The ERT encourages Japan to include this information in the NIR (section 1) in order to enhance understanding of the Mandatory GHG Accounting and Reporting System and its use as a verification tool for the GHG inventory.	
G.3	Article 3, paragraph 14, of the Kyoto Protocol	Japan reported that since its previous annual submission there have been changes in its reporting on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol. The Party described the following changes in its NIR (pp.15-1–15-2): reference to the outcomes of the 2019 Osaka Summit; the Japanese Cabinet decision on Japan's long-term low GHG emission development strategy; continued technical assistance in the energy and environmental sectors; and continued development of carbon dioxide capture and storage technologies. The ERT concluded that, taking into account the confirmed changes in the reporting, the information provided is complete and transparent.	Not an issue/problem
Energy			
E.8	1.A.1.b Petroleum refining – liquid fuels – CO_2	Japan reported in the NIR (table 3-11) the carbon EFs used for estimating CO_2 emissions from fuel combustion for all fuels across the time series, expressed in GCV. The ERT noted that the carbon EFs for residual and straight-run fuel oil for refinery use reported under category 1.A.1.b declined by 8.4 per cent between 2012 (21.5 t carbon/TJ) and 2013 (19.7 t carbon/TJ), and have remained lower (19.4–19.7 t carbon/TJ) since 2013. The EF for 2018, the latest reported year, is 19.4 t carbon/TJ, 8.9 per cent lower than the EF for 1990. During the review, the Party clarified that (1) the GCVs were revised during the 2013 survey and, as a result, increased by around 8.3 per cent between 2012 and 2013, as indicated in NIR table 3-20 and (2) the crude oil for refinery use is major (99.9 per cent of input volume to atmospheric distillation units in 2018), and the straight-run fuel oil for refinery use is minor (0.1 per cent) and it is not used for direct combustion. The ERT recommends that the Party include in the NIR the explanation provided during the review regarding the revision of the GCVs and regarding the use of crude oil for refinery.	Yes. Transparency
IPPU			
I.24	2.A.2 Lime production – CO_2	The ERT noted that the CO_2 IEF of 0.428 t/t for this category for 1990–2018 is below the IPCC default range of 0.59–0.86 t/t provided in the 2006 IPCC Guidelines (vol. 3, chap. 2, table 2.4). During the review, the Party explained that it uses an EF based on unit of raw material (in this case consumption of limestone, as reported in CRF table 2(I).A-Hs1), which cannot be directly compared with the IPCC default EF value based on unit (t) of lime production. Japan provided the reference calculation as 0.428 (t CO_2/t material)/(1 – 0.428) (t lime/t material) = 0.748 (t CO_2/t lime). When converted and reported per unit of lime production, it is 0.748 t CO_2/t production, which is within the IPCC default range. The ERT considers that the methodology proposed by the Party during the review to calculate the emissions per unit of raw material is acceptable; however, this information is not provided in the NIR. The ERT recommends that the Party include in its NIR the reference calculation 0.428 (t CO_2/t material)/(1 – 0.428) (t lime/t material) = 0.748 (t CO_2/t lime) provided during the review.	Yes. Transparency
I.25	2.B.4 Caprolactam, glyoxal and	Japan reported "C" in CRF table 2(I).A-Hs1 for category 2.B.4.b glyoxal for 2010 and 2011, which indicates that some production of glyoxal took place in these years. However, the NIR (p.4-24) reports that no glyoxal production has taken place in the country since 2010.	Yes. Transparency

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue/problem?[a]
	glyoxylic acid production – N_2O	During the review, the Party clarified that it reported "C" because the value reported for N_2O emissions for category 2.B.4 is an aggregated value of emissions from caprolactam, glyoxal and glyoxylic acid production, and emissions from glyoxylic acid production are confidential. Therefore, the Party reported emissions for category 2.B.4.b glyoxal as "C" and not as "NO". The ERT recommends that Japan include in the NIR the explanation provided during the review for its use of "C" for reporting category 2.B.4.b glyoxal.	
I.26	2.C.2 Ferroalloys production – CO_2 and CH_4	The Party reported emissions from ferroalloys production on the basis of electricity consumption, as reported in the NIR (p.4-57) and CRF table 2(I).A-Hs2. The ERT noted that this is not in accordance with the 2006 IPCC Guidelines (vol. 3, chap. 4), since emissions are to be calculated on the basis of the quantity of ferroalloys produced (under tier 1) or consumption of reduction agents (under higher tiers). During the review, Japan provided the amounts of each ferroalloy produced (ferromanganese, silicomanganese, ferrochromium, ferronickel), and the ERT noted that the resulting increased estimated emissions after applying the methodology from the 2006 IPCC Guidelines (vol. 3, chap. 4.3, table 4.5) are below the threshold of significance for "NE". The ERT recommends that Japan apply the methodology from the 2006 IPCC Guidelines in order to enhance the comparability of its reporting on ferroalloys production, or justify in its NIR that the country-specific methodology used better reflects the national situation and is compatible with the 2006 IPCC Guidelines and scientifically based (see ID#s I.14 and I.15 in table 3).	Yes. Accuracy
I.27	2.F.1 Refrigeration and air conditioning – HFCs	The ERT noted outlying inter-annual fluctuations in the IEF (disposal loss factor) for HFC-125 under category 2.F.1.f stationary air conditioning for 2009/2010 (−9.9 per cent) and 2014/2015 (5.6 per cent). During the review, the Party explained that the fluctuation is caused by a change in the amounts collected at disposal. Emissions are determined on the basis of the number of devices disposed of, the average amount of refrigerant contained per device and the collection amount at disposal, which is then divided by the AD (number of devices disposed of multiplied by the average amount of refrigerant per device) to yield the IEF. The ERT recommends that the Party include in the NIR the above explanation provided during the review for the fluctuation in the IEF (disposal loss factor) for HFC-125 for 2009/2010 and 2014/2015.	Yes. Transparency
I.28	2.G.1 Electrical equipment – SF_6	The ERT noted outlying inter-annual fluctuations in the IEF (product life factor) for SF_6 for category 2.G.1 electrical equipment for 1996/1997 (27.8 per cent), 2002/2003 (46.8 per cent), 2005/2006 (30.6 per cent) and 2008/2009 (32.5 per cent). During the review, Japan explained that the SF_6 emission data were entered incorrectly in CRF table 2(II)B-Hs2 and that it will correct these data in its next annual submission. The ERT recommends that the Party correct the AD in CRF table 2(II)B-Hs2 for category 2.G.1 electrical equipment and enhance its QA/QC procedure for checking these data.	Yes. Convention reporting adherence

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
Agriculture			
A.5	3.B.3 Swine – N_2O	Japan reported in its NIR (table 5-26) on the trends in excretion (in kg/head/day) and Nex (in g N/head/day) for swine since 1990. The table shows that Nex rates per head have decreased since 1990, but information was not provided on why this decline occurred. During the review, Japan clarified that the decreasing Nex rates were due to a changeover time in the typical pig diet (e.g. decrease in soybean meal content), leading to a lower intake of crude protein and less N being excreted. The ERT recommends that Japan explain in the NIR why the Nex rates for swine have declined since 1990.	Yes. Transparency
A.6	3.D.a.1 Inorganic N fertilizers – N_2O	The Party provided information in its NIR (table 5-50) on the use of N fertilizer with a nitrification inhibitor at five-yearly intervals, starting in 1990. However, the ERT noted that, according to data from surveys commissioned by the Ministry of Agriculture, Forestry and Fisheries, shipping data on nitrification inhibitors date back to 1996. The ERT asked Japan to provide additional information on the use of the nitrification inhibitor given that N fertilizer with a nitrification inhibitor has lower EFs than more conventional fertilizers (table 5-48). However, the ERT noted that while the NIR (p.5-42, para. 4) states that data on the use of nitrification inhibitors were collected from 1996, it does not explicitly state that the use of nitrification inhibitors in Japan started in 1996. During the review, Japan provided a spreadsheet to the ERT containing information on the annual use of nitrification inhibitors, noting that this information should be treated as confidential. The ERT recommends that the Party provide more clarity on its use of nitrification inhibitors, while maintaining appropriate data confidentiality, either by providing rounded annual figures or by clarifying in the NIR that the use of nitrification inhibitors started in 1996 (e.g. stating in the NIR "the use of synthetic fertilizer with nitrification inhibitor in Japan started in 1996").	Yes. Transparency
A.7	3.D.a.6 Cultivation of organic soils (i.e. histosols) – N_2O	Japan reported in CRF table 3.D that the area of cultivated organic soils was 186,075 ha in 2018. N_2O emissions from cultivated organic soils were described in the NIR (section 5.5.1.6). During the review, the ERT noted that the area reported did not include managed organic soils from the land-use categories grazed meadow and pasture land (areas reported in CRF table 4.C.1). During the review, the Party clarified that it considered these areas (grazed meadow and pasture land) as not meeting the definition of cultivated/managed organic soils because they are uncultivated and undrained. Japan used the definitions from the 2006 IPCC Guidelines (vol. 4, chap. 2, section 2.3.3, and chap. 11, section 11.2.1.3) to outline its interpretation. The ERT recommends that Japan provide further details on the area included under cultivated organic soils; clarifying that organic soils from the land-use categories grazed meadow and pasture land are not considered in this category and providing evidence that these areas are undrained or uncultivated.	Yes. Transparency
LULUCF			
L.11	4. General (LULUCF) – CO_2	The Party reported CO_2 emissions from organic soils in forest land as "NO" in CRF table 4.A for all subdivisions excluding semi-natural forests, and provided explanations in the NIR (table 6-13 and p.6-19). Likewise, the NIR reports that CO_2 emissions from organic soils in orchards and abandoned areas in cropland were reported as "NO" because tillage and drainage of organic soils in orchards and cultivation of abandoned agricultural land are not	Yes. Transparency

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue/problem?[a]
		implemented (NIR, p.6-27). In addition, only a small share of organic soils in grassland was included in the estimate of CO_2 emissions from organic soils (38.80 kha reported as pasture land). In NIR sections 6.5.1.b.2, 6.6.1.b.2 and 6.7.2.b.2, and during the review, Japan explained that this is because drainage and tillage do not occur on all organic soils. Noting equation 2.26 from the 2006 IPCC Guidelines (vol. 4, chap. 2), which applies to drained organic soils, in particular the required AD, the ERT recommends that the Party include in its NIR information that CO_2 emissions do not occur from organic soils that are currently not included in the estimates.	
L.12	4.A.1 Forest land remaining forest land – CO_2	Japan provided information on the yield tables used to calculate carbon stock changes in forest land in its NIR (table 6-14). A net increase in carbon was reported for the forest types intensively managed forests (e.g. net removals of 32,472,19 kt CO_2 eq in 2018) and semi-natural forests (e.g. net removals of 25,649.34 kt CO_2 eq in 2018) in CRF table 4.A, while a net loss was reported for cutover forests and lesser stocked forests (28.99 kt CO_2 eq). The NIR did not transparently explain how net losses of carbon were calculated. During the review, the Party explained that forests with a lower number of standing trees were estimated using the same equations as those used for intensively managed forests, as explained in the NIR (section 6.5.1.b), and clarified that the parameters used for calculating carbon stock changes were applied on the basis of expert judgment. The ERT recommends that Japan improve the description of the methodology used to calculate carbon stock changes, including by adding specific information in the NIR on the parameters used to calculate carbon stock changes in living biomass for cutover forests and lesser stocked forests on the basis of expert judgment.	Yes. Transparency
L.13	4.A.1 Forest land remaining forest land – CO_2	Japan reported carbon stock changes in dead organic matter and mineral soils using carbon stock change per unit of area, as obtained from the CENTURY-jfos model (NIR, p.6-17). The emissions estimated under this model take into account the types of FM, trees and soils. However, it is not clear if and how observed changes in FM are taken into account by this model. During the review, the Party explained that thinning and harvesting lead to carbon stocks transitioning from living biomass to dead organic matter and to carbon stock losses due to decomposition of the transmitted dead organic matter, which is reflected by the model. The ERT recommends that Japan explain in the NIR how observed changes in FM are taken into account in the CENTURY-jfos model on an ongoing basis.	Yes. Transparency
L.14	4.A.2 Land converted to forest land – CO_2	Japan reported in its NIR (p.6-24) that areas of other land and settlements converted to forest land were estimated on the basis of the ratio between those areas in AR survey. However, it was not clear to the ERT how Japan derived this approach (i.e. what statistical information was involved). The ERT also noted that identical values for the areas under other land and under settlements converted to forest land were reported for each year prior to 2006 (NIR table 6-20 and CRF table 4.A). During the review, the Party clarified that areas of other land and settlements converted to forest land were estimated on the basis of the ratio between those areas in AR survey. The ERT recommends that the Party include in the NIR information on how it estimated the areas of wetlands, settlements and other land converted to forest land across the time series.	Yes. Transparency

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
L.15	4.A.2 Land converted to forest land – CO_2	Japan reported information on carbon stocks before and after conversion to forest land in its NIR (tables 6-8–6-12). The ERT noted that clear information on the sources of data used was provided in some cases but not in others, making it difficult to fully understand how the carbon stocks were estimated. The ERT also noted that the Party referred to the use of the CENTURY-jfos model and the National Forest Resources Database. During the review, the Party clarified that the biomass stock for cropland originates from AD for category 3.D.a.4 (NIR, pp.5-49–5-52) and that the biomass increment for forest land in NIR table 6-8b is based on data on carbon stock changes estimated for the AR area for 2008–2010. The data on deadwood, litter and soil carbon stocks per area of forest land before conversion are based on the time series applied by the CENTURY-jfos model and National Forest Resources Database. The ERT recommends that Japan improve the transparency of its reporting on carbon stocks before and after conversion by providing additional information in its NIR on the sources of data on biomass stocks for cropland (table 6-8a); increments for forest land (table 6-8b); and deadwood, litter and soil on forest land (tables 6-9, 6-10 and 6-12).	Yes. Transparency
L.16	4.A.2 Land converted to forest land – CO_2	In CRF table 4.A, the Party reported carbon stock change in living biomass as an aggregate value reported under rice fields converted to forest land. The ERT noted that area data are available at the subcategory level for all subcategories (rice field, upland field and orchard) in NIR table 6-20 for cropland converted to forest land. During the review, Japan clarified that accumulated carbon is calculated aggregately for all subcategories, but that it could feasibly report this information at the subcategory level. The ERT encourages the Party to report in CRF table 4.A emissions and removals from cropland converted to forest land at the subcategory level.	Not an issue/problem
L.17	4.E.2 Land converted to settlements – CO_2 and N_2O	The ERT noted that emissions from drainage of organic soils reported under land converted to settlements were recalculated and that the EF for N_2O (0.297 kg N_2O-N/ha) from drained organic soils in NIR table 6-58 is not consistent with the IEF in CRF table 4(II) (0.189 kg N_2O-N/ha). Further, CH_4 and N_2O emissions are reported for cropland converted to settlements in CRF table 4(II), but the corresponding CO_2 emissions are reported in CRF table 4.E as "NO" for organic soils under the same land conversion. During the review, Japan explained that the emissions from land converted to settlements in CRF table 4(II) were reported incorrectly, caused by it not multiplying the estimates from N_2O-N to N_2O using the conversion factor 44/28. The Party also noted that the new CO_2 emission estimates from drainage of organic soils under cropland converted to settlements were not reflected in CRF table 4.E. The ERT recommends that the Party correct the estimate of N_2O emissions for land converted to settlements in CRF table 4(II) and include CO_2 emissions from drainage of organic soils under cropland converted to settlements in CRF table 4.E or provide transparent information in the NIR to justify not reporting those emissions in CRF table 4.E.	Yes. Completeness
L.18	4(II) Emissions/ removals from drainage and rewetting and other management	The Party did not report CH_4 and N_2O emissions from organic soils in forest land and CH_4 emissions from orchards and abandoned areas in cropland. In addition, only a small share of organic soils in grassland was included in the estimate of CH_4 emissions from organic soils. In the NIR (sections 6.5.1.b.2, 6.6.1.b.2 and 6.7.2.b.2), Japan explained that drainage and tillage do not occur on all organic soils, which was also emphasized by the Party during the review.	Yes. Transparency

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue/problem?[a]
	of organic/mineral soils – CH_4 and N_2O	Noting that CRF table 4(II) requires that emissions from drained or rewetted soils be reported and noting the methods available in the 2006 IPCC Guidelines and the Wetlands Supplement, the ERT recommends that the Party include in its NIR its assumption that no N_2O emissions occur from organic soils in forest land currently not included in the estimates. It also encourages the Party to include in its NIR its assumption that no CH_4 emissions occur from organic soils (forest land, cropland and grassland) currently not included in the estimates.	
L.19	4(II) Emissions/ removals from drainage and rewetting and other management of organic/mineral soils – CH_4	Japan reported in CRF table 4(II) CH_4 emissions from grassland as 0.09 kt for 2018 and the area used to calculate these emissions as 40.56 kha, resulting in an IEF of 2.20 kg CH_4/ha, but reported the CH_4 EF for grassland (including emissions from ditches) as 74.25 kg CH_4/ha in its NIR. During the review, Japan explained that the estimates of emissions from drainage of organic soils in grassland were calculated considering the renewal ratio of pasture lands by prefecture, which means that the actual area used to calculate CH_4 emissions for 2018 was 1.20 kha and not 40.56 kha as reported in CRF table 4(II). No transparent information is provided in the NIR (p.6-88). The ERT recommends that the Party explain in its NIR which areas are included in the estimate of CH_4 emissions from grassland and correct the actual area used to calculate these emissions in CRF table 4(II).	Yes. Transparency
L.20	4(III) Direct N_2O emissions from N mineralization/ immobilization – N_2O	The ERT noted that Japan reported an area for 2018 of 24,852.31 kha for category 4.A.1 forest land remaining forest land in CRF table 4(III), which is not consistent with the area of mineral soils (24,785.69 kha) reported in CRF table 4.A. The ERT believes that the total area of 24,852.31 kha also includes organic soils (66.62 kha), as reported in CRF table 4.A. During the review, Japan confirmed that it incorrectly included the area of organic soils in CRF table 4(III) and clarified that the area of forest land remaining forest land reported in CRF table 4(III) was not directly taken into account in the calculation of direct N_2O emissions from N mineralization/immobilization because the gross carbon loss of mineral forest soil was the AD of the calculation and therefore the mistake in the AD provided in CRF table 4(III) did not lead to the inaccurate estimation of N_2O emissions. The ERT recommends that the Party correct the area reported in CRF table 4(III) to bring it into line with the area of mineral soils included in the estimate of direct N_2O emissions from N mineralization/immobilization associated with losses or gains in soil organic matter resulting from a change of land use or management of mineral soils.	Yes. Convention reporting adherence
Waste			
W.5	5.A Solid waste disposal on land – CH_4	Japan reported in its NIR (p.7-7) that it used the revised FOD method with country-specific parameters (tier 3) to estimate emissions from managed disposal sites. The ERT noted that the description of this method was not clearly documented in the NIR. It was not clear to the ERT whether the revised FOD method deviates from the methodology in the 2006 IPCC Guidelines in order to accommodate its country-specific circumstances or whether it only uses country-specific parameters. During the review, the Party clarified that its FOD method employs country-specific parameters and differs slightly from the methodology set out in the 2006 IPCC Guidelines, for example in that it specifically defines EFs in NIR table 7-7 for consistency with its domestic estimation methodology under the Mandatory GHG Accounting and Reporting System. However, there are no substantial differences between Japan's method and the methodology in the 2006 IPCC Guidelines (vol. 5, chap. 3, equation 3.1).	Yes. Transparency

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
		The ERT recommends that the Party provide in its NIR the description provided during the review explaining the difference between the FOD methodology in the 2006 IPCC Guidelines and Japan's FOD method, thus confirming that the country-specific FOD method is in accordance with the 2006 IPCC Guidelines (vol. 5, chap. 3, equation 3.1).	
W.6	5.B.1 Composting – N_2O	The Party reported in its NIR (table 7-20) the country-specific EFs for CH_4 and N_2O emissions from composting, which were obtained from actual measurements taken on a half-yearly basis at nine facilities. The ERT noted that the N_2O EF for wood (garden and park waste) is 0.0015 kg N_2O/t, which is lower than the range of default values (0.06–0.6 kg N_2O/t) in the 2006 IPCC Guidelines (vol. 5, chap. 4, table 4.1). During the review, Japan provided two references for this EF (Ministry of the Environment, 2018a; Ministry of the Environment, 2018b). However, the ERT noted that the N_2O EF for wood (garden and park waste) is provided for only one facility, and the country-specific N_2O EF is lower than the IPCC default value. The ERT recommends that the Party justify in its NIR how the N_2O EF for wood can be deemed as a representative country-specific value when it was derived from only one facility, or revise the calculation using the IPCC default value.	Yes. Accuracy
W.7	5.B.1 Composting – CH_4 and N_2O	In NIR table 7-22 on amounts of composted waste (wet basis), Japan reported that 80 kt wood (garden and park waste) was composted in 2018. However, although the CH_4 and N_2O EFs for wood were reported in the NIR (p.7-21), the Party did not report AD and emissions from wood in CRF table 5.B. Also, Japan reported in its NIR (tables 7-18 and 7-22) the MSW categories (food waste, paper/cardboard, textile, wood and human waste) and industrial solid waste (food waste and sewage sludge). The total amount of composted MSW (wet basis) reported in NIR table 7-22 was 233 kt in 2018, which differs from the figure in CRF table 5.B (77.1 kt dry matter). Food waste was reported as 1,163.29 kt dry matter under the subcategory other in CRF table 5.B, but as 132 kt (wet basis) in NIR table 7-22, which also specified industrial food waste amounting to 3,421 kt (wet basis). The ERT noted that the subcategories reported in CRF table 5.B differ from those reported in the NIR (tables 7-18 and 7-22), that CRF table 5.B does not list industrial solid waste as a subcategory, and that no explanation is provided on where the AD and emissions are allocated. The ERT also noted that Japan did not sufficiently explain that human waste is treated separately from MSW. NIR table 7-19 shows that the human waste was treated as special waste and excluded from MSW. The ERT recommends that the Party report enhanced and comparable information on the AD for this category, including information on subcategories and AD on MSW and industrial waste in both the NIR and CRF table 5.B.	Yes. Transparency
W.8	5.D Wastewater treatment and discharge – CH_4 and N_2O	Japan reported in its NIR (p.7-75) the use of a country-specific method for calculating CH_4 and N_2O emissions from wastewater treatment on the basis of the decision tree in the 2006 IPCC Guidelines (vol. 5, chap. 6, figure 6.2). The Party estimated CH_4 and N_2O emissions from sewage treatment plants, human waste treatment plants and natural decomposition of domestic wastewater and provided different EFs for each subcategory (table 7-74). However, it did not provide sufficient documentation or justification for its choice of EFs. For example, the CH_4 EFs were based on research studies from 8 plants and the N_2O EFs on research studies from 42 plants (table 7-74), but the Party did not describe the location or size of these plants, specify time frames or outline how the research was conducted (i.e. sample analysis or survey). For subcategory 5.D.2 industrial wastewater, Japan used BOD-based AD to estimate emissions on the basis that these are more appropriate than data based on chemical oxygen demand (NIR pp.7-86–7-	Yes. Transparency

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue/problem?[a]
		87) but did not sufficiently justify this. Organics in industrial wastewater are often expressed in terms of chemical oxygen demand, in accordance with the 2006 IPCC Guidelines (vol. 5, chap. 6, equation 6.6). During the review, Japan clarified that the country-specific method and EFs were used for estimating emissions on the basis of the plant measurements. The ERT recommends that the Party provide additional information in its NIR describing the procedures for choosing EFs and clarify that the BOD-based AD are suitable for industrial wastewater treatment and in accordance with the 2006 IPCC Guidelines (vol. 5, chap. 6.2.3).	
KP-LULUCF			
KL.2	FM – CO_2	Japan reported in the NIR (section 11.7.5) and CRF table 4(KP-I)B.1.1 a technical correction to the FMRL for HWP (projection). The ERT noted that Japan used the approach "Zero at 1 January 2013" to establish its original FMRL. It then added HWP using a projection for the technical correction, which is not consistent with the elected approach for the original FMRL. In accordance with decision 2/CMP.7, annex, paragraph 15, and footnote (a) to the table in the appendix, on technical corrections, the ERT considers that, when adding a pool to the FMRL, the same approach should be used as for other carbon pools already included in the FMRL. This means that the approach chosen by Japan (i.e. "Zero at 1 January 2013") should be used if adding HWP to the FMRL. During the review, the Party did not specify how the selected approach for the HWP pool was undertaken in accordance with decision 2/CMP.8, annex II, paragraph 5(e–f), and whether it is consistent with the approach used for the FMRL. The ERT recommends that the Party reassess the technical correction to its FMRL with regard to the inclusion of HWP for all reported years for the second commitment period, ensuring that all pools included in the FMRL use the same approach in accordance with decision 2/CMP.7.	Yes. KP reporting adherence
KL.3	FM – CO_2, CH_4 and N_2O	The Party reported in the NIR (p.11-19) that soil drainage activities for organic soils in forest land are not generally carried out. However, the ERT noted that, although the soil is not actively drained, emissions may also occur from undrained soils. In accordance with decision 2/CMP.7, Parties may choose not to account for a given pool in a commitment period if it provides transparent and verifiable information demonstrating that the pool is not a net source. Since no method for estimating emissions from undrained organic soils is provided in the 2006 IPCC Guidelines, this requirement is not valid for undrained organic soils. However, to improve the transparency of the reporting of activities under the Kyoto Protocol, the ERT encourages the Party to include in its NIR information that GHG emissions do not occur from organic soils currently not included in the estimates.	Not a problem
KL.4	FM – CO_2	Japan reported in its NIR (section 11.3.2) that FM was elected for the second commitment period of the Kyoto Protocol. However, the ERT noted that FM is a mandatory activity in accordance with decision 2/CMP.7. The ERT recommends that the Party correct the text in the NIR to reflect the correct status of FM in the second commitment period of the Kyoto Protocol in accordance with decision 2/CMP.7.	Yes. Transparency
KL.5	CH_4 and N_2O emissions from	The Party reported in its NIR (p.11-22) that it does not use the method in the Wetlands Supplement for reporting N_2O emissions from organic soils in deforested land (forest land converted to settlements).	Not a problem

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
	drained and rewetted organic soils – N_2O	According to the Wetlands Supplement, non-CO_2 emissions from deforested land that are not captured under any other activity should be reported under deforestation. Since N_2O emissions are reported for the related category under the Convention, the ERT considers that the Party should have reported these emissions under deforested land using the same method. During the review, the Party clarified that it is technically possible to calculate these N_2O emissions but expressed concerns that emissions from other land categories (cropland and grassland converted to settlements) would not be captured, which would make the reporting inconsistent. The ERT agreed that it may not be possible to report these emissions, but does not see this as a reason not to include N_2O emissions from organic soils in deforested land (conversions to settlements). The ERT encourages the Party to include N_2O emissions from organic soils in deforested land, using the same method applied for forest land converted to settlements under the Convention.	

[a] Recommendations made by the ERT during the review are related to issues as defined in para. 81 of the UNFCCC review guidelines or problems as defined in para. 69 of the Article 8 review guidelines.

VI. Application of adjustments

10. Japan does not have a quantified emission limitation or reduction commitment for the second commitment period of the Kyoto Protocol and therefore the application of adjustments does not apply.

VII. Accounting quantities for activities under Article 3, paragraph 3, and, if any, activities under Article 3, paragraph 4, of the Kyoto Protocol

11. Japan does not have a quantified emission limitation or reduction commitment for the second commitment period of the Kyoto Protocol and does not account for KP-LULUCF.

VIII. Questions of implementation

12. No questions of implementation were identified by the ERT during the individual review of the Party's 2020 annual submission.

Annex I

Overview of greenhouse gas emissions and removals and data and information on activities under Article 3, paragraphs 3–4, of the Kyoto Protocol, as submitted by Japan in its 2020 annual submission

1. Tables I.1–I.4 provide an overview of the total GHG emissions and removals as submitted by Japan.

Table I.1

Total greenhouse gas emissions for Japan, 1990–2018

(kt CO_2 eq)

	Total GHG emissions excluding indirect CO_2 emissions		*Total GHG emissions including indirect CO_2 emissions*[a]		*Land-use change (Article 3.7 bis as contained in the Doha Amendment)*[b]	*KP-LULUCF (Article 3.3 of the Kyoto Protocol)*[c]	*KP-LULUCF (Article 3.4 of the Kyoto Protocol)*	
	Total including LULUCF	*Total excluding LULUCF*	*Total including LULUCF*	*Total excluding LULUCF*			*CM, GM, RV, WDR*[d]	*FM*
FMRL								0.00
1990	1 207 821.34	1 270 039.97	1 213 303.65	1 275 522.27	NA		11 023.60	
1995	1 297 427.40	1 374 505.10	1 302 119.39	1 379 197.09				
2000	1 287 016.25	1 374 774.03	1 291 249.18	1 379 006.96				
2010	1 232 102.37	1 302 549.97	1 234 512.01	1 304 959.61				
2011	1 283 944.63	1 353 603.93	1 286 263.87	1 355 923.17				
2012	1 323 599.20	1 396 323.77	1 325 839.71	1 398 564.28				
2013	1 341 785.87	1 407 809.07	1 344 029.50	1 410 052.70		491.04	2 276.13	–51 149.26
2014	1 294 005.77	1 358 344.55	1 296 173.98	1 360 512.76		492.37	3 238.78	–51 449.41
2015	1 260 428.71	1 319 800.19	1 262 579.90	1 321 951.38		712.00	3 076.04	–49 215.52
2016	1 248 565.94	1 302 842.08	1 250 674.00	1 304 950.15		712.95	3 514.21	–46 649.87
2017	1 230 699.60	1 289 239.53	1 232 776.23	1 291 316.16		75.53	2 704.24	–46 469.11
2018	1 180 952.64	1 238 342.71	1 183 015.66	1 240 405.73		163.38	2 189.17	–45 360.92

Note: Emissions and removals reported in the sector other (sector 6) are not included in the total GHG emissions.

[a] The Party reported indirect CO_2 emissions in CRF table 6.

[b] The value reported in this column relates to GHG emissions from conversion of forests (deforestation) in 1990 as contained in the report on the review of the report to facilitate the calculation of the assigned amount for the second commitment period of the Kyoto Protocol of the Party.

[c] Activities under Article 3, para. 3, of the Kyoto Protocol, namely AR and deforestation.

[d] In accordance with decision 3/CMP.11, para. 8, the Party previously reported that it would report emissions from CM, GM and RV under Article 3, para. 4, of the Kyoto Protocol. The base year for those activities is 1990.

Table I.2
Greenhouse gas emissions by gas for Japan, excluding land use, land-use change and forestry, 1990–2018
(kt CO_2 eq)

	CO_2[a]	*CH_4*	*N_2O*	*HFCs*	*PFCs*	*Unspecified mix of HFCs and PFCs*	*SF_6*	*NF_3*
1990	1 163 873.62	44 418.49	31 875.88	15 932.31	6 539.30	NO, NA	12 850.07	32.61
1995	1 244 620.15	41 926.42	33 178.79	25 213.19	17 609.92	NO, NA	16 447.52	201.09
2000	1 269 077.19	37 981.98	29 905.55	22 852.00	11 873.11	NO, NA	7 031.36	285.77
2010	1 216 478.20	34 783.60	22 195.35	23 315.04	4 249.54	NO, NA	2 398.14	1 539.74
2011	1 266 474.37	33 776.17	21 789.83	26 104.83	3 755.45	NO, NA	2 222.14	1 800.38
2012	1 307 673.36	32 903.96	21 470.79	29 360.71	3 436.33	NO, NA	2 207.27	1 511.85
2013	1 316 946.63	32 533.42	21 496.23	32 103.86	3 280.06	NO, NA	2 075.25	1 617.24
2014	1 265 218.16	31 886.89	21 101.09	35 783.47	3 361.43	NO, NA	2 038.86	1 122.87
2015	1 224 932.51	31 064.69	20 737.14	39 262.80	3 308.10	NO, NA	2 075.11	571.03
2016	1 205 275.08	30 736.22	20 195.80	42 574.74	3 375.33	NO, NA	2 158.54	634.44
2017	1 189 738.08	30 237.19	20 417.80	44 891.10	3 512.15	NO, NA	2 070.07	449.78
2018	1 137 751.02	29 854.90	19 999.98	46 987.67	3 486.79	NO, NA	2 042.88	282.50
Percentage change 1990–2018	**–2.2**	**–32.8**	**–37.3**	**194.9**	**–46.7**	**NA**	**–84.1**	**766.3**

Note: Emissions and removals reported in the sector other (sector 6) are not included in this table.
[a] Including indirect CO_2 emissions as reported in CRF table 6.

Table I.3
Greenhouse gas emissions by sector for Japan, 1990–2018
(kt CO_2 eq)

	Energy	*IPPU*	*Agriculture*	*LULUCF*	*Waste*	*Other*
1990	1 092 977.42	115 400.17	37 412.70	–62 218.63	29 731.99	NA
1995	1 168 203.52	140 957.75	36 978.94	–77 077.70	33 056.87	NA
2000	1 198 788.16	112 471.27	35 265.03	–87 757.78	32 482.50	NA
2010	1 163 152.26	82 564.73	35 897.79	–70 447.60	23 344.83	NA
2011	1 213 830.18	84 401.83	35 336.57	–69 659.29	22 354.59	NA
2012	1 254 279.46	86 839.51	34 777.14	–72 724.57	22 668.17	NA
2013	1 261 695.46	91 189.89	34 756.14	–66 023.20	22 411.21	NA
2014	1 211 021.20	93 746.77	34 240.67	–64 338.78	21 504.12	NA
2015	1 172 110.72	94 911.73	33 625.43	–59 371.48	21 303.51	NA

	Energy	*IPPU*	*Agriculture*	*LULUCF*	*Waste*	*Other*
2016	1 153 218.58	97 885.04	33 479.48	–54 276.14	20 367.04	NA
2017	1 137 473.58	100 588.42	33 381.37	–58 539.93	19 872.79	NA
2018	1 086 175.46	101 711.13	33 252.43	–57 390.07	19 266.71	NA
Percentage change 1990–2018	**–0.6**	**–11.9**	**–11.1**	**–7.8**	**–35.2**	**NA**

Notes: (1) Japan did not report emissions or removals in the sector other (sector 6); (2) totals include indirect CO_2 emissions reported in CRF table 6.

Table I.4

Greenhouse gas emissions and removals from activities under Article 3, paragraphs 3–4, of the Kyoto Protocol by activity, 1990[a]–2018, for Japan

(kt CO_2 eq)

	Article 3.7 bis as contained in the Doha Amendment[b]	*Activities under Article 3.3 of the Kyoto Protocol*		*FM and elected activities under Article 3.4 of the Kyoto Protocol*				
	Land-use change	*AR*	*Deforestation*	*FM*	*CM*	*GM*	*RV*	*WDR*
FMRL				0.00				
Technical correction				1 820.67				
1990	NA				10 265.40	840.17	–81.97	NA
2013		–1 558.42	2 049.45	–51 149.26	3 693.26	–189.55	–1 227.59	NA
2014		–1 562.77	2 055.14	–51 449.41	4 475.96	9.46	–1 246.64	NA
2015		–1 562.41	2 274.41	–49 215.52	4 413.01	–69.51	–1 267.46	NA
2016		–1 561.77	2 274.72	–46 649.87	4 916.91	–117.74	–1 284.96	NA
2017		–1 535.62	1 611.15	–46 469.11	4 139.15	–127.20	–1 307.71	NA
2018		–1 441.91	1 605.29	–45 360.92	3 720.57	–209.20	–1 322.21	NA
Percentage change 1990–2018					**–63.8**	**–124.9**	**1 513.1**	**NA**

Note: Values in this table include emissions from land subject to natural disturbances, if applicable.

[a] The base year for CM, GM and RV under Article 3, para. 4, of the Kyoto Protocol is 1990. For activities under Article 3, para. 3, of the Kyoto Protocol, and FM under Article 3, para. 4, only the inventory years of the commitment period must be reported.

[b] The value reported in this column relates to 1990.

2. Table I.5 provides an overview of key relevant data from Japan's reporting under Article 3, paragraphs 3–4, of the Kyoto Protocol.

Table I.5
Key relevant data for Japan under Article 3, paragraphs 3–4, of the Kyoto Protocol from its 2020 annual submission

Parameter	*Data values*
Periodicity of accounting	NA
Elected activities under Article 3, paragraph 4, of the Kyoto Protocol	CM, GM and RV
Election of application of provisions for natural disturbances	No
3.5% of total base-year GHG emissions, excluding LULUCF and including indirect CO_2 emissions	NA
Cancellation of AAUs, CERs and ERUs and/or issuance of RMUs in the national registry for:	
1. AR	NA
2. Deforestation	NA
3. FM	NA
4. CM	NA
5. GM	NA
6. RV	NA
7. WDR	NA

Annex II

Additional information to support findings in table 2

Missing categories that may affect completeness

The categories for which estimation methods are included in the 2006 IPCC Guidelines that were reported as "NE" or for which the ERT otherwise determined that there may be an issue with the completeness of the reporting in the Party's inventory are the following:

(a) 4.E.2 land converted to settlements (CO_2) (see ID# L.17 in table 5);

(b) KP-LULUCF – FM (CO_2, CH_4 and N_2O) (see ID# KL.3 in table 5).

Annex III

Reference documents

A. Reports of the Intergovernmental Panel on Climate Change

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

IPCC. 2014. *2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands*. T Hiraishi, T Krug, K Tanabe, et al. (eds.). Geneva: IPCC. Available at https://www.ipcc.ch/publication/2013-supplement-to-the-2006-ipcc-guidelines-for-national-greenhouse-gas-inventories-wetlands/.

B. UNFCCC documents

Annual review reports

Reports on the individual reviews of the 2014, 2016 and 2018 annual submissions of Japan, contained in documents FCCC/ARR/2014/JPN, FCCC/ARR/2016/JPN and FCCC/ARR/2018/JPN, respectively.

Other

Aggregate information on greenhouse gas emissions by sources and removals by sinks for Parties included in Annex I to the Convention. Note by the secretariat. Available at https://unfccc.int/sites/default/files/resource/AGI%202020_final.pdf.

Annual status report for Japan for 2020. Available at https://unfccc.int/sites/default/files/resource/asr2020_JPN_0.pdf.

C. Other documents used during the review

Responses to questions during the review were received from Midori Yanagawa (National Institute for Environmental Studies of Japan), including additional material on the methodology and assumptions used. The following references have been reproduced as received:

Journal of MMIJ. 2018. *Recovery of Coal Mine Methane and Its Utilization with a Newly Developed Gas Concentration System*. H Matsumoto, S Kawashima, K Uchida, Y Ichihara and Y Suzuki. Available at https://www.jstage.jst.go.jp/article/journalofmmij/134/8/134_99/_pdf/-char/en.

Ministry of Economy, Trade and Industry and Ministry of the Environment. 2006. *Ministerial Ordinance on Calculation of Greenhouse Gas Emissions Emitted by Specified Emitters.* Ordinance No.3. Available at https://elaws.e-gov.go.jp/document?lawid=418M60001400003.

Ministry of the Environment. 2018a. *Survey for the Development of Emission Factor to Estimate Effect of the Mitigation Measures for GHG Emissions from the Waste Sector.*

Ministry of the Environment. 2018b. *Committee for the Greenhouse Gases Emissions Estimation Methods, Review of Greenhouse Gases Emissions Estimation Methods, Waste Sector, Part 2.*

The Mining and Materials Processing Institute of Japan. 2006. *Technical and Human Exchange between Kushiro Coal Mine and Asian Coal producing Countries*. H Matsumoto. Available at https://www.jstage.jst.go.jp/article/shigentosozai/122/10_11/122_10_11_542/_pdf/-char/en.