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Report on the individual review of the annual submission of the Russian Federation 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 the Russian Federation, 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 26 to 31 October 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.

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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"
AWACS	airborne warning and control system
BCEF	biomass conversion and expansion factor
C	carbon
CaO	calcium oxide
CCF	carbon content factor
c-C_4F_8	octafluorocyclobutane
CER	certified emission reduction
CF	carbon fraction of dry matter
CF_4	perfluoromethane
CH_4	methane
CM	cropland management
COF	carbon oxidation factor
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"
COPERT	computer programme to calculate emissions from road transport
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
CPR	commitment period reserve
CRF	common reporting format
C_2F_6	perfluoroethane
C_3F_8	perfluoropropane
DOC	degradable organic carbon
DOC(x)	weighted average of biodegradable organic carbon
EF	emission factor
ERT	expert review team
ERU	emission reduction unit
FM	forest management
FMRL	forest management reference level
GE	gross energy
GHG	greenhouse gas
GM	grazing land management
HCFC	hydrochlorofluorocarbon
HFC	hydrofluorocarbon
HWP	harvested wood products
ICSCF	implied carbon stock change factor
IE	included elsewhere
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
IPPU	industrial processes and product use
k	methane generation rate
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

Kyoto Protocol Supplement	*2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol*
LCD	liquid crystal display
LULUCF	land use, land-use change and forestry
MAP	mean annual precipitation
MCF	methane conversion factor
MSW	municipal solid waste
N	nitrogen
NA	not applicable
NE	not estimated
NEU	non-energy use
Nex	nitrogen excretion
NF_3	nitrogen trifluoride
NIR	national inventory report
NO	not occurring
N_2O	nitrous oxide
PET	potential evapotranspiration
PFC	perfluorocarbon
QA/QC	quality assurance/quality control
R	refrigerant
RMU	removal unit
Rosstat	Russian Federal State Statistics Service
RV	revegetation
SEF	standard electronic format
SF_6	sulfur hexafluoride
SIAR	standard independent assessment report
SOC	soil organic carbon
SWDS	solid waste disposal site(s)
TOW	total organics in wastewater
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"
VS	volatile solids
WDR	wetland drainage and rewetting
Wetlands Supplement	*2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands*
Y_m	methane conversion rate
2006 IPCC Guidelines	*2006 IPCC Guidelines for National Greenhouse Gas Inventories*

I. Introduction[1]

1. This report covers the review of the 2020 annual submission of the Russian Federation, 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 26 to 31 October 2020 remotely[2] and was coordinated by Javier Hanna Figueroa, Claudia do Valle and Lisa Hanle (secretariat). Table 1 provides information on the composition of the ERT that conducted the review for the Russian Federation.

Table 1
Composition of the expert review team that conducted the review for the Russian Federation

Area of expertise	*Name*	*Party*
Generalist	Tomas Gustafsson	Sweden
	David Kuntze	Germany
Energy	Giorgi Machavariani	Georgia
	Yves Marenne	Belgium
	Takashi Morimoto	Japan
IPPU	Kristina Gonchar	Belarus
	Valentina Idrissova	Kazakhstan
	Kakhaberi Mdivani	Georgia
Agriculture	Shaidatul Azdawiyah Abdul Talib	Malaysia
	Braulio Pikman	Brazil
	Janka Szemesova	Slovakia
LULUCF and KP-LULUCF	Markus Didion	Switzerland
	Eray Özdemir	Turkey
	Iordanis Tzamtzis	Greece
	Marina Vitullo	Italy
Waste	Fatma Betül Demirok	Turkey
	Erick Wamalwa Masafu	Kenya
	Hans Oonk	Netherlands
Lead reviewers	Fatma Betül Demirok	
	David Kuntze	

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.

[1] At the time of publication of this report, the Russian Federation has not submitted its instrument of ratification of the Doha Amendment. The Amendment entered into force on 31 December 2020.

[2] Owing to the circumstances related to the coronavirus disease 2019, the review had to be conducted remotely.

3. The ERT has made recommendations that the Russian Federation resolve identified findings, including issues[3] designated as problems.[4] Other findings, and, if applicable, the encouragements of the ERT to the Russian Federation to resolve related issues, are also included. The assessment by the ERT takes into account that the Russian Federation 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 the Russian Federation, 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 the Russian Federation, 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.

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 the Russian Federation

Assessment			*Issue/problem ID#(s) in table 3 or 5*[a]
Dates of submission	Original submission: NIR, 15 April 2020; CRF tables (version 2), 15 April 2020 Revised submission: CRF tables (version 3), 26 May 2020 Unless otherwise specified, values from the most recent submission are included in this report		
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?	Yes	L.27
	(b) Selection and use of methodologies and assumptions?	Yes	I.3, I.5, I.17, A.5, A.14, L.3, L.4, L.7, L.11, L.12, L.28, L.29, L.40, W.12, W.13
	(c) Development and selection of EFs?	Yes	E.6, E.15, E.20, I.4, A.8, L.14, L.21, L.39, L.43
	(d) Collection and selection of AD?	Yes	I.8, I.16, A.6, L.5, L.9, L.26, L.30, L.31, L.37, W.5, W.11, KL.7, KL.8, KL.11
	(e) Reporting of recalculations?	Yes	E.15
	(f) Reporting of a consistent time series?	Yes	L.2, L.15
	(g) Reporting of uncertainties, including methodologies?	Yes	L.1, L.41
	(h) QA/QC?	QA/QC procedures were assessed in the context of the national	

[3] Issues are defined in decision 13/CP.20, annex, para. 81.
[4] Problems are defined in decision 22/CMP.1, annex, paras. 68–69, as revised by decision 4/CMP.11.

Assessment			*Issue/problem ID#(s) in table 3 or 5*[a]
		system (see supplementary information under the Kyoto Protocol below)	
	(i) Missing categories, or completeness?[b]	Yes	I.7, I.10, I.12, I.14, I.25, L.17, L.23, L.33, L.35, L.38, L.42, KL.4, KL.13
	(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?	No	I.10
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	E.10, E.11, W.3
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?	Yes	G.5, G.11
	Have any issues been identified related to the national registry:		
	(a) Overall functioning of the national registry?	Yes	G.8
	(b) Performance of the functions of the national registry and the adherence to technical standards for data exchange?	NA	
	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?	Yes	G.1
	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?	Yes	KL.9, KL.14, KL.15
	(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.14
	(c) Reporting requirements of decision 6/CMP.9?	Yes	KL.15
	(d) Country-specific information to support provisions for natural disturbances in accordance with decision 2/CMP.7, annex, paragraphs 33–34?	NA	

Assessment			*Issue/problem ID#(s) in table 3 or 5*[a]
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	The Russian Federation 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?	No	G.11
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	
Questions 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 II.

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 19 July 2019,[5] 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 the Russian Federation'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 the Russian Federation

ID#	*Issue/problem classification*[a, b]	*Recommendation made in previous review report*	*ERT assessment and rationale*
General			
G.1	Article 3, paragraph 14, of the Kyoto Protocol (G.7, 2018) (G.7, 2017) KP reporting adherence	Report in the NIR any changes that have occurred to the information provided on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol, compared with the information reported in the previous submission, in accordance with decision 15/CMP.1, annex, paragraph 25.	Addressing. The Party reported in section 10.4 of the NIR (pp.444–447) information on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol. The ERT noted that this information contained changes with respect to the information reported in the previous annual submission and that the Party did not provide explicit information on what these changes entailed. During the review, the Russian Federation provided a summary of the changes, which related, for example, to updated information on humanitarian assistance, disaster relief assistance and food aid provided by the Party to Parties not included in Annex I to the Convention.
G.2	National system (G.5, 2018) (G.6, 2017) KP reporting adherence	Implement the necessary improvements to the functions of the national system, ensuring that all information required under Article 7 of the Kyoto Protocol is submitted no later than the due date in the next annual submission.	Resolved. The Party reported on progress made towards implementing the necessary improvements to the functions of the national system in appendix 6 to the annex to the NIR of its 2019 and 2020 annual submissions. The ERT noted that the Party reported the CRF tables, the NIR containing information required under Article 7 of the Kyoto Protocol and the SEF tables on 13, 14 and 15 April 2019, respectively, for its 2019 annual submission and on 15 April 2020 for its 2020 annual submission.
G.3	National system (G.6, 2018) (G.6, 2017) KP reporting adherence	Report on progress made regarding the detailed action plan.	Resolved. The Russian Federation reported on progress made regarding the detailed action plan with a timeline to demonstrate that the Party has the necessary capacity in place to ensure the timely performance of the national system in the NIR of its 2019 and 2020 annual submissions (appendix 6 to the annex).

[5] FCCC/ARR/2018/RUS. The ERT notes that the report on the individual inventory review of the Russian Federation'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*
G.4	QA/QC and verification (G.2, 2018) (G.2, 2017) (G.5, 2016) Convention reporting adherence	Adjust the QA/QC plan to ensure timely submission of the NIR.	Resolved. The Party reported information on the implemented adjustments made to the QA/QC plan to ensure timely submission of the NIR in its 2019 and 2020 annual submissions (appendix 6 to the annex).
G.5	QA/QC and verification (G.3, 2018) (G.5, 2017) Convention reporting adherence	Improve the QA/QC process undertaken on the NIR and report on the improvements made in the NIR.	Addressing. The Party reported information on improvements made to the functions of the national system in appendix 6 to the annex to the NIR of its 2019 and 2020 annual submissions, including to the QA/QC process, and corrected the previously incorrect sequence of tables in that appendix. However, the ERT noted that there were still inconsistencies between the NIR and CRF table 3; for example, for estimates of CO_2 emissions for subcategory 2.B.5.a silicon carbide production, the NIR reported the use of the tier 2 method, while CRF table 3 reported the use of tier 1 and 3 methods (for category 2.B chemical industry as a whole); for PFC emissions for category 2.C metal industry, the NIR reported the use of the tier 2 method, while CRF table 3 reported the use of tier 2 and 3 methods; and for CO_2 emissions for category 2.D non-energy products from fuels and solvent use, the NIR reported the use of the tier 1 method, while CRF table 3 reported the use of tier 1 and 2 methods. During the review, the Russian Federation explained that it implemented additional internal checks of the CRF tables and NIR and provided the correct information for the aforementioned inconsistencies.
G.6	Uncertainty analysis (G.12, 2018) Transparency	Provide in the NIR details on how the re-evaluation of the uncertainty values is periodically accomplished, including after the implementation of improvements (see FCCC/ARR/2018/RUS, ID#s L.6 and L.7).	Not resolved. In the NIR, the Party did not include information on how the re-evaluation of the uncertainty values is periodically accomplished, in particular after the implementation of improvements. During the review, it explained that uncertainties are re-evaluated at the individual category level when changes are made to EFs or other parameters used in the emission estimates or occur in the nature of AD or its source. Re-evaluated uncertainty values may be revised further if questioned by ministries, federal agencies or independent reviewers during the process of national review of the draft annual inventory. Therefore, uncertainty values may be re-evaluated once or twice a year, as necessary.
G.7	National registry (G.4, 2018) (G.3, 2017) (G.6, 2016) (G.6, 2015) KP reporting adherence	Include 2014 and 2015 SEF tables for the second commitment period of the Kyoto Protocol in the annual submission, as recommended in the SIAR.	Resolved. The Party reported the SEF tables for 2014 and 2015 for the second commitment period of the Kyoto Protocol in the 2019 annual submission.
G.8	National registry (G.8, 2018) KP reporting adherence	Prepare and submit the SEF tables for the years 2013, 2014 and 2015 for the second commitment period of the Kyoto Protocol in accordance with decision 3/CMP.11, paragraph 14.	Addressing. The Russian Federation submitted the 2014 and 2015 SEF tables for the second commitment period of the Kyoto Protocol with its 2019 annual submission. However, the ERT considered that the recommendation has not yet been fully addressed because the Party has not yet reported the SEF tables for 2013 for the second commitment period of the Kyoto Protocol. During the

ID#	Issue/problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
			review, the Party provided a draft version of the 2013 SEF tables for the second commitment period of the Kyoto Protocol.
G.9	Other (G.10, 2018) Transparency	Improve the reporting of indirect CO_2 and N_2O emissions in CRF table 6 by using the appropriate notation keys and providing relevant information in the NIR.	Not resolved. The Party has not yet improved the reporting of indirect CO_2 and N_2O emissions in CRF table 6 by using the appropriate notation keys and providing relevant information in the NIR. During the review, the Russian Federation indicated that it will fill in the blank cells in CRF table 6 in the next annual submission and it would further consider the estimation and reporting of indirect CO_2 and N_2O emissions in future annual submissions (see ID# G.13 in table 5). The ERT considered that the recommendation has not yet been addressed.
Energy			
E.1	1. General (energy sector) (E.1, 2018) (E.1, 2017) (E.1, 2016) (E.1, 2015) (19, 2014) (21, 2013) (33, 2012) Convention reporting adherence	Review the use of notation keys for all categories in the energy sector and ensure the appropriate selection of notation keys for the complete time series.	Addressing. The ERT noted that the Party reviewed the use of notation keys in the CRF tables of the 2020 annual submission for some categories in the energy sector and made some progress in using the correct notation keys. The Party included a general statement in the NIR (p.68) that it had reviewed and corrected the use of notation keys for the complete time series. For example, the Party correctly used the notation key "NO" in CRF table 1.A(a) (sheet 3) for subcategory 1.A.3.e.i pipeline transport (solid fuels, other fossil fuels and biomass), instead of the previously reported notation key "NA". However, the ERT noted that the Party did not fully ensure the appropriate use of notation keys across categories and subcategories of the energy sector, as there were still some subcategories for which the notations keys used were not fully appropriate and require further adjustment across the time series. This is the case, for example, for subcategories 1.A.3.b.i cars, 1.A.3.b.ii light duty trucks and 1.A.3.b.iii heavy duty trucks and buses (gaseous fuels, biomass and other fossil fuels), reported using the notation key "NA" in terms of AD and "NO" in terms of emissions, for which the notation key "NO" (or "NE", if that is the case) would be more appropriate for both the AD and emissions, and for subcategory 1.A.3.c railways (gaseous fuels and biomass) the notation key "NA" was still applied incorrectly for the AD and emissions, while it seems that the notation key "NO" would be more appropriate. During the review, the Party stated that it implemented the recommendation in its 2020 annual submission and that related information was provided in the NIR (pp.67–68); however, the ERT noted, as indicated above, that in this part of the NIR the Party included a general statement on the review and correction of the use of notation keys for the complete time series, and it referred specifically only to subcategory 1.A.3.e.i pipeline transport.
E.2	Fuel combustion – reference approach – all fuels – CO_2 (E.9, 2018)	Correct the labelling of the units used in CRF table 1.A(b) to reflect the actual reporting unit for all fuels and clarify in the NIR that owing to confidentiality,	Addressing. The Russian Federation confirmed in the NIR (p.36) the labelling of the units used in CRF table 1.A(b) to reflect the reporting of AD for all fuels in energy units (TJ). However, it did not clarify in section 3.2.3 of the NIR on the reference approach (pp.33–41) that the values of fuel consumption in mass units

ID#	*Issue/problem classification*[a, b]	*Recommendation made in previous review report*	*ERT assessment and rationale*
	Convention reporting adherence	the mass value of fuels consumption available in the energy balance is not public.	were not available for confidentiality reasons; therefore, the ERT considered that the recommendation has not yet been fully addressed. During the review, the Party stated that it implemented the recommendation from the previous review report and explanations on improvements made in this regard were provided in the NIR (pp.67–68). The ERT noted that in this section of the NIR the Party referred to the correction of AD units in CRF table 1.A(b), which were expressed consistently in energy units (TJ) for the complete time series, but did not refer to the confidentiality issues concerning data expressed in mass units.
E.3	Fuel combustion – reference approach – other fossil fuels – CO_2 (E.10, 2018) Transparency	Disaggregate the quantity of bitumen, petroleum coke and any other oil fuels which are listed in CRF table 1.A(b) from other oil, and if this cannot be done in the next annual submission, use the notation key "IE" for bitumen, petroleum coke and any other relevant fuels in CRF table 1.A(b), instead of "NO", and indicate in both the NIR and CRF tables 1.A(b) that these fuels are included under other oil.	Addressing. The ERT noted that the Party did not disaggregate the quantity of bitumen, petroleum coke and other oil fuels, which were reported in CRF table 1.A(b) under other oil. However, the Party correctly reported emissions from bitumen and petroleum coke, as well as emissions from naphtha and lubricants, using the notation key "IE" in CRF table 1.A(b) for the years in which disaggregate values were not available. The ERT also noted that the Party did not indicate in CRF tables 9 or 1.A(b) whether these fuels were included under other oil or explain the use of "IE". Therefore, the ERT considered that the recommendation has not yet been fully addressed. During the review, the Russian Federation stated that it implemented the recommendation in the 2020 annual submission, referring to related information in the NIR (pp.67–68) on changes to CRF table 1.A(d) for bitumen, petroleum coke, naphtha and lubricants. However, the Party did not refer to the lack of provision of relevant explanations on the use of "IE" in both the NIR and CRF tables 9 or 1.A(b).
E.4	Fuel combustion – reference approach – liquid fuels – CO_2 (E.11, 2018) Convention reporting adherence	Ensure consistency between CRF tables 1.A(b) and 1.A(d), and between CRF table 1.A(d) and the NIR by correcting the identified errors on the amount of carbon stored/excluded from fuels used for NEU and the quantities of fuels used for NEU.	Resolved. The Russian Federation reported in the NIR (p.68) that it reviewed and corrected its reporting on the NEU of fuels in CRF tables 1.A(b) and 1.A(d). The ERT noted that the amounts of carbon stored/excluded from these fuels were reported consistently between CRF tables 1.A(b) and 1.A(d) and between CRF table 1.A(d) and the NIR (p.31). During the review, the Party confirmed that it implemented the recommendation in its 2020 annual submission, referring to related general information in the NIR (pp.67–68) on the revision and correction of data on the quantities of fuels used for NEU in CRF tables 1.A(b) and 1.A(d).
E.5	1.A Fuel combustion – sectoral approach – solid and gaseous fuels – CO_2 (E.2, 2018) (E.6, 2017) Transparency	Include in the NIR a summary of the main findings of the studies (RAO Energy Systems of Russia (1999) and Uvarova et al. (2015)), with references and a column in table 3.8 of the NIR for the oxidation factor (or fraction of carbon not oxidized) for every fuel listed.	Resolved. The Party included in the NIR (pp.38–39) references and a summary of the main findings of the study by RAO Energy Systems of Russia (1999) and added a column to table 3.8 of the NIR (pp.37–38) for the oxidation factor (or fraction of carbon not oxidized) for every fuel listed. The ERT noted that the NIR did not contain a summary of the main findings of the study by Uvarova et al. (2015), but did contain a brief summary of the main findings of two more recent studies by Uvarova et al. (2017a) (in Russian) and Uvarova et al. (2017b) on country-specific CO_2 and CH_4 EFs and parameters used to estimate emissions from oil and gas activities (pp.94–97), as well as more detailed information on the findings of these studies in appendix 3.6 to the annex to the NIR. Therefore,

ID#	Issue/problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
			the ERT considered that the recommendation has been addressed. During the review, the Party indicated that it implemented the recommendation in its 2020 annual submission, referring to related information in the NIR (pp.67–68); however, the ERT noted that this part of the NIR only referred to the study by RAO Energy Systems of Russia (1999).
E.6	1.A Fuel combustion – sectoral approach – liquid fuels – CO_2 (E.12, 2018) Accuracy	Develop a country-specific value for the carbon content for liquid fuels, or, in accordance with paragraph 11 of the UNFCCC Annex I reporting guidelines, until this can be achieved, provide a justification in the NIR explaining the reasons why this was not possible.	Not resolved. The Party reported net calorific values and CO_2 EFs for all liquid fuels used in the country in table 3.8 of the NIR (p.37). The CO_2 EFs for liquid fuels correspond to the default values from the 2006 IPCC Guidelines (vol. 2, chap. 1, table 1.4, pp.1.23–1.24), leading the ERT to conclude that the Party did not develop country-specific values for the carbon content of liquid fuels. In the NIR (p.68) the Russian Federation indicated that it plans to develop country-specific CO_2 EFs for liquid fuels in the future, but did not explain why this was not possible for the 2020 annual submission. During the review, it confirmed that the plan to develop country-specific values for the carbon content of liquid fuels forms part of its future improvements.
E.7	1.A Fuel combustion – sectoral approach – liquid fuels – CO_2, CH_4 and N_2O (E.13, 2018) Transparency	Include a table in the NIR showing the redistribution of diesel oil among categories in the GHG inventory of the energy sector, at least for the five latest inventory years, if such a redistribution is a result of the reconciliation of the output results of the COPERT model and the national statistics reported in the energy balance.	Resolved. The Party reported in table 3.19 of the NIR (p.57) the redistribution of diesel oil among subcategory 1.A.3.b road transportation, category 1.A.2 manufacturing industries and construction and category 1.A.5 other for 2012–2018, which resulted from the reconciliation of the output results of the COPERT model and the statistics reported in the energy balance. Therefore, the ERT considered that the recommendation has been fully addressed.
E.8	1.A Fuel combustion – sectoral approach – liquid fuels – CO_2, CH_4 and N_2O (E.13, 2018) Transparency	Provide a clear justification on why it is considered necessary to make a redistribution among categories of the fuel consumption for road transportation reported in the national statistics, which is the main source of data, as a result of the reconciliation of the output results of the COPERT model, and how it is ensured that this approach results in the application of the appropriate technology-specific CH_4 and N_2O EFs to the emission estimates for subcategory 1.A.5.a and other categories. If the appropriateness of the CH_4 and N_2O EFs applied cannot be demonstrated, reconsider the redistribution of the fuels.	Addressing. The Party clearly justified in the NIR (pp.56–57) why it considered necessary to make a redistribution among categories and subcategories of gasoline and diesel oil consumption for road transportation reported in the national statistics as a result of reconciling the output results of the COPERT model. However, it did not explain or justify how it ensured that this approach resulted in the use of appropriate technology-specific CH_4 and N_2O EFs for the emission estimates for subcategory 1.A.5.a stationary. During the review, the Russian Federation indicated that it implemented the recommendation in its 2020 annual submission, referring to related information in the NIR (pp.67–68); however, the ERT noted that this part of the NIR only referred to the inclusion of a new table 3.19 in the NIR (p.57) containing information on the redistribution of fuel consumption and to a detailed description of this redistribution among categories and subcategories in section 3.2.4.3.5 of the NIR (pp.55–58). The ERT therefore considered that the recommendation has not yet been fully addressed.
E.9	1.A Fuel combustion – sectoral approach – solid fuels – CO_2	As the oxidation factor is closely related to combustion conditions and the type of fuel used, identify and apply the COF by combustion equipment and by coal type or grade for coal	Resolved. The Party reported in table 3.8 of the NIR (pp.37–38) the oxidation factors (or fraction of carbon not oxidized) for each coal type classified by coal basin used for combustion activities, specifying in the NIR (p.39) that the different oxidation factors reported in table 3.8 had already been taken into

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	(E.14, 2018) Accuracy	combustion activities, instead of applying a uniform oxidization rate for coal combustion in all categories.	account in the corresponding country-specific CO_2 EFs for each coal type used in the emission estimates. Therefore, the ERT considered that the recommendation has been fully addressed by the Party.
E.10	1.A.1.a Public electricity and heat production – 1.A.1.b petroleum refining – liquid fuels – CO_2 (E.15, 2018) Transparency	Provide in the NIR clear explanations on the inter-annual changes of the CO_2 IEFs for liquid fuels between 2004 and 2005 for subcategory 1.A.1.a public electricity and heat production and subcategory 1.A.1.b petroleum refining.	Addressing. The Party reported in its NIR (p.43) information on the changes made in the national energy statistics between 1990–2004 and from 2005 onward, indicating that starting in 2005 the aggregated information on fuel consumption under category 1.A.1 energy industries became available in the national statistics disaggregated into subcategories 1.A.1.a public electricity and heat production, 1.A.1.b petroleum refining and 1.A.1.c manufacture of solid fuels and other energy industries. Information on the average consumption of liquid, solid and gaseous fuels for subcategories 1.A.1.a, 1.A.1.b and 1.A.1.c available for 2005–2013 was used to disaggregate the consumption of these fuels for 1990–2004 using the splicing techniques recommended in the 2006 IPCC Guidelines (vol. 1, chap. 5.3.3, pp.5.8–5.14). However, the Party did not explain in its NIR the reasons for the inter-annual changes of the CO_2 IEFs for liquid fuels between 2004 and 2005 for subcategories 1.A.1.a public electricity and heat production (5.8 per cent) and 1.A.1.b petroleum refining (–11.0 per cent), which were also identified in the 2020 annual submission, or, for example, the inter-annual change of the CO_2 IEF for liquid fuels between 2016 and 2017 (19.6 per cent) for subcategory 1.A.1.b petroleum refining identified in the 2020 annual submission. During the review, the Russian Federation indicated that it implemented the recommendation in its 2020 annual submission, referring to related information in the NIR (pp.67–68); however, the ERT noted that this part of the NIR only mentioned in general that the NIR included more detailed information on the reasons for the inter-annual changes of CO_2 IEFs for different fuels and categories, and that the relevant information ultimately was not included in the NIR. Therefore, the ERT considered that the recommendation has not yet been fully addressed.
E.11	1.A.1.c Manufacture of solid fuels and other energy industries – solid fuels – CO_2 (E.16, 2018) Transparency	Provide in the NIR clear explanations on the inter-annual changes of the CO_2 IEFs for solid fuels between 2004 and 2005 and between 2015 and 2016 for subcategory 1.A.1.c.i manufacture of solid fuels.	Addressing. The Russian Federation reported in its NIR (p.43) information on the changes made in the national energy statistics between 1990–2004 and from 2005 onward, indicating that starting in 2005 the aggregated information on fuel consumption under category 1.A.1 energy industries became available in the national statistics disaggregated into subcategories 1.A.1.a public electricity and heat production, 1.A.1.b petroleum refining and 1.A.1.c manufacture of solid fuels and other energy industries. The Party also reported that, in the national energy statistics, data on fuel combustion for coke production are aggregated with data on fuel consumption for petroleum refining. Therefore, to estimate fuel consumption for subcategory 1.A.1.c.i manufacture of solid fuels, it allocated all solid fuel consumption reported in the energy balance under coke production and petroleum refining to subcategory 1.A.1.c.i manufacture of solid fuels for the complete time series. However, the Party did not explain in its NIR the reasons

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			for the inter-annual changes of the CO_2 IEFs for solid fuels between 2004 and 2005 (–53.2 per cent) and between 2015 and 2016 (–25.9 per cent) for subcategory 1.A.1.c.i manufacture of solid fuels, as identified in the 2020 annual submission. During the review, the Party indicated that it implemented the recommendation in its 2020 annual submission, referring to related information in the NIR (pp.67–68); however, the ERT noted that this part of the NIR only mentioned in general that the NIR included more detailed information on the reasons for the inter-annual changes of CO_2 IEFs for different fuels and categories, and that the relevant information ultimately was not included in the NIR. Therefore, the ERT considered that the recommendation has not yet been fully addressed.
E.12	1.A.2.f Non-metallic minerals – all fuels – CO_2, CH_4 and N_2O (E.18, 2018) Convention reporting adherence	Make corrections in the naming convention in the NIR to ensure consistency with CRF table 1.A(a) and the 2006 IPCC Guidelines (vol. 2, table 2.1) when referring to 1.A.2.f non-metallic minerals.	Resolved. The Party made corrections in its NIR (pp.45–46) to the naming convention when referring to subcategory 1.A.2.f non-metallic minerals and ensured consistency with CRF table 1.A(a) and the 2006 IPCC Guidelines. Therefore, the ERT considered that the recommendation has been fully addressed by the Party.
E.13	1.A.2.f Non-metallic minerals – all fuels – CO_2, CH_4 and N_2O (E.19, 2018) Comparability	Estimate and report emissions for subcategory 1.A.2.f non-metallic minerals separately from 1.A.2.g other, based on the existing available data from Rosstat and following the disaggregation of the updated CRF tables as required by the UNFCCC Annex I inventory reporting guidelines.	Addressing. The Party reported CO_2, CH_4 and N_2O emissions for subcategory 1.A.2.f non-metallic minerals separately from subcategory 1.A.2.g other in CRF table 1.A(a) (sheet 2) using available data from Rosstat for 2008–2018 and in accordance with the requirements of the UNFCCC Annex I inventory reporting guidelines. However, the ERT considered that the recommendation has not yet been fully addressed as emission estimates for 1990–2007 for subcategory 1.A.2.f non-metallic minerals were reported as "IE" and still included under subcategory 1.A.2.g other. In addition, no information was provided in the NIR on the allocation of emission estimates for subcategory 1.A.2.f non-metallic minerals for 1990–2007, albeit in CRF table 9 the Party indicated that such emissions were reported under subcategory 1.A.2.g other for these years. During the review, the Party indicated that it implemented the recommendation in its 2020 annual submission, referring to related information in the NIR (pp.67–68); however, the ERT noted that this part of the NIR did not explain why emission estimates for subcategory 1.A.2.f non-metallic minerals were reported using the notation key "IE" for 1990–2007.
E.14	1.A.4.c Agriculture/forestry/ fishing – liquid fuels – CH_4 and N_2O	Use the correct default EFs for CH_4 and N_2O for subcategory 1.A.4.c.ii off-road vehicles and other machinery from the 2006 IPCC Guidelines (vol. 2, table 3.3.1, p.3.36), which correspond to off-road mobile sources and machinery, for the whole time series.	Resolved. The Party used the default EFs for CH_4 and N_2O from the 2006 IPCC Guidelines (vol. 3, chap. 3, table 3.3.1, p.3.36) for estimating emissions for subcategory 1.A.4.c.ii off-road vehicles and other machinery, including gasoline and diesel oil, and reported recalculated CH_4 and N_2O emission estimates in CRF table 1.A(a) (sheet 4). The ERT noted that it seems that for gasoline the CH_4 EF (110.00 kg/TJ) and N_2O EF (1.20 kg/TJ) were estimated as the average of the

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	(E.20, 2018) Accuracy		default EFs for two- and four-stroke motor gasoline engines from the 2006 IPCC Guidelines; however, this was not clarified in the NIR (see ID# E.25 in table 5). The ERT considered that the recommendation has been addressed by the Party.
E.15	1.B.2.a Oil – liquid fuels – CH_4 (E.21, 2018) Accuracy	Use the developed and verified national EFs for subcategory 1.B.2.a oil for the parts of the time series for which they are applicable, provided that it is demonstrated that they are developed in a manner consistent with the 2006 IPCC Guidelines and in accordance with paragraph 12 of the UNFCCC Annex I inventory reporting guidelines (e.g. by documenting in detail in the NIR how these EFs were developed and the results of the verification procedures performed); or, if this cannot be done in time for the next annual submission, include a description of the development of country-specific EFs for oil systems and explain why they cannot be used in that submission. If the default EFs from table 4.2.4 are used instead of data from table 4.2.5 of volume 2 of the 2006 IPCC Guidelines, include a detailed explanation of why these default EFs are considered more appropriate to the specific national circumstances of the Russian Federation and explain for which parts of the time series these EFs were used, in accordance with paragraph 12 of the UNFCCC Annex I inventory reporting guidelines.	Addressing. The Party did not use developed and verified national EFs for subcategory 1.B.2.a oil for the parts of the time series for which they are applicable. Instead, it reported in the NIR (p.95) that that the EFs used for estimating emissions from oil operations were the default values for developed countries provided in the 2006 IPCC Guidelines (vol. 2, chap. 4, table 4.2.4, pp.4.48–4.54) (see ID# E.16 below) and explained why it considered these default EFs more appropriate to its specific national circumstances. However, the Party did not explain in the NIR for which parts of the time series these EFs were used or provide information on the significant decrease in the level of CH_4 emissions (by around 90.5 per cent for all years of the time series) resulting from recalculations undertaken for this subcategory in the 2019 annual submission owing to the use of the default EFs provided in table 4.2.4 of the 2006 IPCC Guidelines and reflected also in the 2020 annual submission. The ERT noted that the Party provided in appendix 3.6 to the annex to the NIR information on the development of country-specific EFs for oil systems to be used for subcategory 1.B.2.a oil in the future. During the review, the Party confirmed that it is in the process of developing such national EFs and its current main task consists in gathering statistical data from companies and governmental institutions. The Party indicated that EFs for subcategory 1.B.2.a oil resulting from this process will be used when full and relevant information is available.
E.16	1.B.2.a Oil – liquid fuels – CO_2 and CH_4 (E.22, 2018) Transparency	Add a new column in table 3.34 of the NIR to indicate clearly the sources of each of the EFs used for emission estimates for each subcategory under 1.B.2.a oil.	Addressing. The Party did not add a new column to table 3.38 of the NIR (p.96) (which corresponds to table 3.34 of the NIR of the 2018 annual submission in the recommendation) indicating the sources of each of the EFs used for emission estimates for each subcategory under 1.B.2.a oil. The ERT noted that the title of table 3.38 indicated that the EFs presented in the table were sourced from the 2006 IPCC Guidelines. In addition, the NIR (p.95) stated that the EFs used for estimating emissions from oil operations were the default values for developed countries from the 2006 IPCC Guidelines (vol. 2, chap. 4, table 4.2.4, pp.4.48–4.54). The ERT also noted that the CH_4 and CO_2 EFs (1.8×10^{-3} $Gg/10^3$ m^3 and 1.3×10^{-4} $Gg/10^3$ m^3, respectively) for production of oil and condensate reported in table 3.38 were the mid-value of the range of default values for conventional oil production (fugitives (onshore)) provided in table 4.2.4 of the 2006 IPCC Guidelines, but the Russian Federation did not clearly explain in the NIR the rationale for selecting this emission source and subcategory among the values for sources and subcategories provided in table 4.2.4. During the review, the Party confirmed that all EFs used for estimating emissions for 1.B.2.a oil were taken

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			from table 4.2.4 of the 2006 IPCC Guidelines. The ERT considered that the recommendation has not yet been fully addressed because the Party has not clearly indicated the sources of each of the EFs used for emission estimates for each subcategory under 1.B.2.a oil.
E.17	1.B.2.b Natural gas – gaseous fuels – CH_4 (E.7, 2018) (E.9, 2017) Transparency	Include in the NIR an explanation of how the country-specific EF for subcategory 1.B.2.b.4 (transmission and storage) was determined, describing the methodology used and making the appropriate reference to the publication by Dedikov et al. (1998).	Resolved. The ERT noted that in appendix 3.6 to the annex to the NIR the Russian Federation provided explanations of how the country-specific EF for subcategory 1.B.2.b.4 transmission and storage was determined, including the methodology used and references to a previous available study (Dedikov et al., 1999) and to two more recent studies (Uvarova et al., 2017a (in Russian) and Uvarova et al., 2017b) describing the methodology for developing the country-specific EF. The NIR (pp.93–95) also provided information on this country-specific EF and clarified the activities and operations of the natural gas system, emissions from which are taken into account in the EF, and included references to the aforementioned studies, as well as a reference to appendix 3.4 to the annex to the NIR that was not included in the 2020 annual submission. During the review, the Party indicated that the recommended explanation was provided in annex 3.4 to the NIR; however, the ERT noted that this annex was not included in the 2020 annual submission.
E.18	1.B.2.b Natural gas – gaseous fuels – CO_2 and CH_4 (E.23, 2018) Transparency	Revise the relevant text in the NIR to reflect the improvement in the development and use of country-specific EFs in estimates for the subcategories under 1.B.2.b natural gas, and add a new column in table 3.35 of the NIR to show clearly the source of each EF used for estimates of emissions for the subcategories under 1.B.2.b natural gas.	Addressing. The Party revised the relevant text in the NIR (pp.93–94) to reflect the improvement in the development and use of country-specific EFs for the subcategories under 1.B.2.b natural gas, and referred to an appendix to the annex to the NIR containing detailed information (see ID# E.17 above). The ERT noted that tables 3.35, 3.36 and 3.39 of the NIR (pp.94, 95 and 96, respectively) provided a general indication of the source of the EFs presented in these tables for the subcategories under 1.B.2.b natural gas (e.g. 2006 IPCC Guidelines or Uvarova et al. (2017a) (in Russian) and Uvarova et al. (2017b)), but did not include more specific references to the sources. The ERT also noted that the Party did not add a new column in table 3.35 or tables 3.36 and 3.39 presenting the source of each EF used for estimating emissions. During the review, the Party clarified that the relevant explanation was provided in section 3.3.4.4 of the NIR (p.99), but the ERT noted that this section did not contain the required information; however, in its response, the Party quoted a correct part of the NIR (p.94), which described the improvements in the development and use of the country-specific EFs for the subcategory 1.B.2.b natural gas. The ERT considered that the recommendation has not yet been fully addressed because the tables mentioned above did not contain a new column clearly presenting the source of each EF used for emission estimates for the subcategories under 1.B.2.b natural gas.

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E.19	1.B.2.b Natural gas – gaseous fuels – CO_2 and CH_4 (E.24, 2018) Transparency	Include in the NIR a clear description of the inclusion of fugitive emissions from transmission of natural gas in transit.	Not resolved. The NIR did not include a description of the inclusion of fugitive emissions from transmission of natural gas in transit (i.e. the emissions related to natural gas produced in neighbouring countries, which use the pipeline system of the Russian Federation to export natural gas to European countries). During the review, the Party explained that such a description was included in annex 3.4 to the NIR, but the ERT noted that annex 3.4 was not included in the 2020 annual submission and this information was not provided elsewhere. In its clarifications to the list of provisional main findings, the Party indicated that the relevant information was provided in section 3.3.2.2 of the NIR (p.94) and in appendix 3.4.4 to the annex to the NIR; however, the ERT noted that this page (located in section 3.3.3.2) did not contain the required information and that appendix 3.4.4 was not included in the 2020 annual submission. The ERT believes that future ERTs should consider this issue further to ensure that emissions are not underestimated owing to the possible omission of estimates of fugitive emissions from transmission of natural gas in transit.
E.20	1.B.2.b Natural gas – gaseous fuels – CO_2 and CH_4 (E.25, 2018) Accuracy	Provide a clear justification and/or verification information in the NIR on the applicability of the country-specific CH_4 and CO_2 EFs for fugitive emissions from gas transmission, including information on the period of the time series for which they apply, in order to justify that they were developed in a manner consistent with the 2006 IPCC Guidelines and are considered to be more accurate than the IPCC defaults, in accordance with paragraph 12 of the UNFCCC Annex I inventory reporting guidelines.	Addressing. The Party did not provide in its NIR a clear justification and/or verification information on the applicability of the country-specific CH_4 and CO_2 EFs for fugitive emissions from gas transmission. During the review, the Russian Federation noted that these EFs were developed and applied in the GHG inventories of the 2019 and 2020 annual submissions, but did not provide further information. The ERT noted that in appendix 3.6 to the annex to the NIR, the Party provided information justifying the applicability of the country-specific CH_4 and CO_2 EFs for fugitive emissions from gas transmission, including the period of the inventory time series during which they apply, indicating that the EFs apply appropriately for 1990–2000 and conservatively for 2001–2017, the latter because the use of these EFs likely results in a slight overestimation of the emission ratio owing to improvements in technologies used in the oil and gas systems of the country. The Party also explained why it considers these EFs more accurate than the IPCC default values. However, the ERT considered that the recommendation has not yet been fully addressed because the Party has not yet provided in the NIR verification information on the applicability of the country-specific CH_4 and CO_2 EFs for fugitive emissions from gas transmission in order to justify that they were developed in a manner consistent with the 2006 IPCC Guidelines.
E.21	1.B.2.b Natural gas – gaseous fuels – CO_2 and CH_4 (E.26, 2018) Transparency	Include a summary of the two key references (Dedikov et al., 1999 and Uvarova et al., 2017b) in the NIR to explain the approach undertaken to develop the country-specific CH_4 and CO_2 EFs for natural gas production (including gas processing) and transmission.	Resolved. The ERT noted that in appendix 3.6 to the annex to the NIR the Russian Federation explained the approach taken to develop the country-specific CH_4 and CO_2 EFs for natural gas production (including gas processing) and transmission, including the methodology used and references to studies by Dedikov et al. (1999), Uvarova et al. (2017a) (in Russian) and Uvarova et al. (2017b). The ERT also noted that in the NIR (pp.93–97) the Party provided information on these country-specific EFs and the related activities and

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			operations of the natural gas system covered by these EFs and included references to the aforementioned studies, but provided a reference to appendix 3.4, which was not included in the annex to the NIR, with information for the energy sector. During the review, the Party indicated that the recommended explanation was provided in section 3.4.2 of annex 3.4 to the NIR; however, the ERT noted that the indicated section and annex to the NIR were not included in the 2020 annual submission.
E.22	1.B.2.b Natural gas – gaseous fuels – CO_2 and CH_4 (E.27, 2018) Accuracy	Provide a clear justification and/or verification information in the NIR on the applicability of the country-specific CH_4 and CO_2 EFs for fugitive emissions from gas production and processing activities, as well as for flaring emissions in these activities, in order to justify that the EFs were developed in a manner consistent with the 2006 IPCC Guidelines, in accordance with paragraph 12 of the UNFCCC Annex I inventory reporting guidelines. In particular, clarify, justify and report in the NIR on the significant differences of the country-specific EFs used in the estimates of emissions from gas production and processing compared with the default EFs from table 4.2.4 and/or 4.2.5 of the 2006 IPCC Guidelines, and in general clarify and justify that the country-specific CH_4 and CO_2 EFs used in the estimates of emissions from gas production and processing are considered to be more accurate than the default values from the 2006 IPCC Guidelines.	Addressing. The Party reported in its NIR (pp.93–95) information on the country-specific CH_4 and CO_2 EFs for estimating fugitive emissions from natural gas production and processing activities, as well as for flaring emissions in these activities, indicating that the overall goal of developing country-specific EFs was to increase the quality of GHG emission estimates, but did not provide a clear justification and/or verification information on their applicability. During the review, the Party clarified that an explicit description of and clear justification for the use of the country-specific CH_4 and CO_2 EFs were provided in section 3.3.3.2 of the NIR (pp.93–94) and made a reference to section 3.4.2 of annex 3.4 to the NIR that was not included in the 2020 annual submission. The section of the NIR referred to described the development and use of the country-specific EFs in accordance with available data, specific circumstances and the technologies used in various natural gas system activities in the country. The ERT noted that in appendix 3.6 to the annex to the NIR, the Party provided information justifying the applicability of these country-specific CH_4 and CO_2 EFs, including the period of the inventory time series during which they apply, indicating that the EFs apply appropriately for 1990–2000 and conservatively for 2001–2017, the latter because the use of these EFs likely results in a slight overestimation of the emission ratio owing to improvements in technologies used in the oil and gas systems of the country, as well as qualitative information on the differences of the country-specific EFs used in the estimates of emissions from gas production and processing compared with the default EFs from the 2006 IPCC Guidelines, explaining why it considers these EFs more accurate than the IPCC default values. In its clarifications to the list of provisional main findings, the Party indicated that verification information on the applicability of country-specific EFs is contained in the study by Uvarova et al. (2017b). The ERT considered that the recommendation has not yet been fully addressed because the Party has not yet provided in the NIR verification information on the applicability of the country-specific CH_4 and CO_2 EFs for fugitive emissions from natural gas production and processing activities, as well as for flaring emissions in these activities, in order to justify that they were developed in a manner consistent with the 2006 IPCC Guidelines.
E.23	1.B.2.b Natural gas – gaseous fuels – CO_2 and	Include explicit descriptions in the NIR and CRF table 9 that explain under which categories are	Addressing. The Party included, in particular in table 3.35 of the NIR and the accompanying text (p.94) and in the documentation box to CRF table 1.B.2,

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	CH_4 (E.28, 2018) Transparency	reported the CO_2 and CH_4 emissions for subcategories 1.B.2.b.3 natural gas – processing and 1.B.2.c.ii venting – gas, for which the notation key "IE" is used.	explicit descriptions explaining the subcategories under which CO_2 and CH_4 emissions for subcategories 1.B.2.b.3 natural gas – processing and 1.B.2.c.ii venting – gas were reported, for which the notation key "IE" was used. However, the ERT noted that such explanations were not included in CRF table 9. Therefore, the ERT considered that the recommendation has not yet been fully addressed. During the review, the Party stated that it included explicit descriptions in table 3.35 of the NIR and comments in the CRF tables, but it did not refer to the inclusion of relevant explanations for the use of "IE" in CRF table 9.
IPPU			
I.1	2. General (IPPU) – CO_2 (I.14, 2018) Completeness	Report in the NIR the final NEU of all fuels reported in CRF table 1.A(d), with a justification indicating whether the final use of these fuels is associated with the release of CO_2 and under which category they have been reported, and, if relevant, report in the CRF tables under category 2.D non-energy products from fuels and solvent use the corresponding CO_2 emissions from the NEU of these fuels, in particular those occurring for gas/diesel oil, liquefied petroleum gas and other oil.	Resolved. The Party included in section 3.2.2 of the NIR (pp.32–33) a description of the NEU of all fuels reported in CRF table 1.A(d) with the required justification indicating whether the final use of these fuels is associated with CO_2 emissions and specified the categories under which these emissions were reported. The Party also reported in the NIR (p.33) that the NEU of gas/diesel oil is not associated with CO_2 emissions as it is used in the leather industry, in the mechanical processing of metals and as an agent for hardening metalworks during heat treatment. In addition, the Party reported in CRF table 2(I).A-H (sheet 2), under category 2.D non-energy products from fuels and solvent use, CO_2 emissions from the NEU of all fuels reported in CRF table 1.A(d), including liquefied petroleum gas and other oil. Nevertheless, the ERT noted some issues with the transparency and accuracy of the reported AD and CO_2 emissions in CRF tables 1.A(d), 2(I).A-H (sheet 2) and 9 (see ID#s I.8–I.9 below).
I.2	2.A.1 Cement production – CO_2 (I.1, 2018) (I.11, 2017) Accuracy	Verify if the country-specific CaO content is still representative of the national context and report on the results in the next annual submission.	Resolved. The Party reported in the NIR (pp.102–103) that it collected plant-specific data for 2017 on the CaO content of clinker from 31 cement plants which, collectively, account for 76 per cent of the total national cement production. It also reported that, for 1990–2008, it used a CaO content of 65.6 per cent, which was established in 2010 as part of a study on CaO content in clinker based on plant-specific data from 19 national cement plants. Since 2010, CaO content has increased slightly, reaching the current value of 65.9 per cent in 2015. The ERT noted that the information reported in the NIR was consistent with the parameters used for the estimation of CO_2 emissions. During the review, the Party provided additional information indicating that, during 2008–2015, new cement plants were constructed and existing plants were modernized, meaning that the use of different CaO content values for 1990–2008 (65.6 per cent), 2009–2015 (increasing from 65.6 to 65.9 per cent) and 2015–2018 (65.9 per cent) is reflective of the technological changes that occurred in the cement industry of the country. Therefore, CO_2 emissions for category 2.A.1 cement production were recalculated for 2010–2017 to take into account the updated CaO content. The ERT considered that the CaO content used by the Party is representative of the

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			national context across the time series and in line with the default values for CaO content in clinker (60.0–67.0 per cent) from the 2006 IPCC Guidelines (vol. 3, chap. 2.2.1.2, p.2.12).
I.3	2.A.3 Glass production – CO_2 (I.15, 2018) Accuracy	Estimate the use of soda ash in the glass production industry and subtract it from the AD used for the estimation of CO_2 emissions from soda ash use in category 2.A.4.b, in order to avoid double counting of CO_2 emissions.	Addressing. The Party reported in the NIR (p.105) on the estimation of the use of soda ash in the glass production industry and described the underlying parameters and methods applied. It also indicated that "CO_2 emissions from soda ash used for glass production were subtracted from CO_2 emissions from glass production calculated using the tier 2 method from the 2006 IPCC Guidelines", apparently suggesting that in its calculations it did not subtract the AD on the use of soda ash in the glass production industry from the AD on soda ash used for the estimation of CO_2 emissions in subcategory 2.A.4.b other uses of soda ash in order to avoid double counting of CO_2 emissions, as recommended in the previous review report. This is not in line with the 2006 IPCC Guidelines (vol. 3, chap. 2.4.1.4, p.2.31); the ERT therefore considered that the recommendation has not yet been correctly addressed. During the review, the Party indicated that it may reallocate CO_2 emissions from the use of soda ash in glass production reported under subcategory 2.A.4.b other uses of soda ash to category 2.A.3 glass production in its next annual submission. The ERT considers that this approach may also be incorrect and not in line with the 2006 IPCC Guidelines, and believes that it is necessary for the Party to implement accurately the recommendation made in the previous review report (see ID# I.16 in table 5).
I.4	2.B.1 Ammonia production – CO_2 (I.16, 2018) Accuracy	Estimate CO_2 emissions from ammonia production by using a COF parameter obtained from producers or from country-specific energy sector information that is consistent with the 2006 IPCC Guidelines.	Not resolved. The Party applied a COF value of 1 from the 2006 IPCC Guidelines (vol. 2, chap. 1.4.2, table 1.4, p.1.23) to estimate CO_2 emissions from ammonia production. The ERT considered that the recommendation has not been addressed because this default COF value was applied in combination with the tier 3 approach for estimating CO_2 emissions for this category, which requires a country-specific or plant-specific COF. The Party did not clarify in the NIR whether the value used is a country-specific parameter obtained from producers or from energy sector information. Moreover, during the review the Party confirmed the use of the default COF value from the 2006 IPCC Guidelines. The ERT considered that using the IPCC default COF value of 1 could lead to a potential overestimation of CO_2 emissions from ammonia production.
I.5	2.B.4 Caprolactam, glyoxal and glyoxylic acid production – N_2O (I.17, 2018) Accuracy	Estimate N_2O emissions from glyoxal production by applying an N_2O EF with a destruction rate that corresponds to the abatement technology used and is consistent with the 2006 IPCC Guidelines.	Resolved. The Party estimated N_2O emissions from glyoxal production by applying the default N_2O generation factor (0.52 t N_2O/t) from the 2006 IPCC Guidelines (vol. 3, chap. 3.5.3, table 3.6, p.3.39). The Party clarified in the NIR that in the absence of national statistical data these emissions were estimated on the basis of existing production capacity information and a capacity utilization factor of 80 per cent for caprolactam production from the 2006 IPCC Guidelines (vol. 3, chap. 3.5.2.1, p.3.37), with appropriate recalculations performed for the whole time series.

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I.6	2.B.5 Carbide production – CO_2 (I.18, 2018) Accuracy	Estimate CO_2 emissions from silicon carbide production by applying CCF and COF parameters that are consistent with the 2006 IPCC Guidelines.	Resolved. The Party estimated CO_2 emissions from silicon carbide production by applying CCF (0.877) and COF (1) parameters for petroleum coke from the 2006 IPCC Guidelines (vol. 2, chap. 1, table 1.4, p.1.23). The Party reported in the NIR (p.117) on the amount of carbon in the final product (35 per cent of carbon in petroleum coke used in the process passes to silicon carbide), and included an appropriate explanation.
I.7	2.B.10 Other (chemical industry) – CO_2 (I.19, 2018) Completeness	Estimate and report CO_2 emissions associated with hydrogen production following the guidance of the 2006 IPCC Guidelines and include in the NIR all background information on method, parameters and data used for the estimates.	Not resolved. The Party stated in the NIR (p.32) that CO_2 emissions from hydrogen production were not estimated owing to lack of required production data for the entire time series and lack of information on technologies used. During the review, the Party explained that the opportunities for collecting relevant AD have been investigated and this work will continue for the next annual submission, also stating that it plans to further elaborate on issues related to CO_2 emissions from hydrogen production in future annual submissions. The ERT considered that not estimating CO_2 emissions from hydrogen production using the general methods provided in the chapter on petrochemical processes in the 2006 IPCC Guidelines (vol. 3, chap. 3.9.2, pp.3.63–3.69) led to the underestimation of CO_2 emissions for category 2.B.10 other (chemical industry).
I.8	2.D Non-energy products from fuels and solvent use – CO_2 (I.9, 2018) (I.7, 2017) (I.13, 2016) (I.13, 2015) Accuracy	Investigate and, as appropriate, resolve the discrepancy in reporting the CO_2 emissions from the NEU of fuels excluded from the energy sector (indicated as reported under non-energy products from fuels and solvent use in CRF table 1.A(d)) and those actually reported in the inventory in the IPPU sector under category 2.D (non-energy products from fuels and solvent use in CRF table 2(I).A-H (sheet 2)); and explain the reporting of NEU for the category 2.D in the NIR.	Addressing. The Party included in section 3.2.2 of the NIR (pp.32–33) a description of the NEU of all fuels excluded from the energy sector and reported related CO_2 emissions under category 2.D. However, the ERT noted that CRF tables 1.A(d) and 2(I).A-H (sheet 2) still contained discrepancies in the reporting of these CO_2 emissions. For example, the Party reported 1,492.35 kt CO_2 for the NEU of lubricants in CRF table 1.A(d) for 2018, but 1,359.18 kt CO_2 from lubricant consumption under category 2.D.1 lubricant use in CRF table 2(I).A-H (sheet 2). There were also inconsistencies in the reporting of the NEU of paraffin wax. During the review, the Party acknowledged these findings and stated that it plans to resolve this issue for the next annual submission. The ERT believes that future ERTs should consider this issue further to ensure that there is not an underestimation of emissions.
I.9	2.D Non-energy products from fuels and solvent use – CO_2 (I.20, 2018) Convention reporting adherence	Report data in CRF table 1.A(d) in line with the UNFCCC Annex I inventory reporting guidelines, in particular regarding NEU of fuels that may be partly or may not be emissive and also report the related data and information in the columns "CO_2 emissions from the NEU reported in the inventory" and "Reported under:…".	Addressing. The Party revised the data regarding the NEU of fuels that may be partly or not emissive and reported corrected estimates of CO_2 emissions from the NEU of gaseous and liquid fuels in CRF table 1.A(d) under column "CO_2 emissions from the NEU reported in the inventory". However, it did not completely fill in the column "Reported under:…" with the relevant information for liquefied petroleum gas and other bituminous coal or clearly explain its use of the notation key "IE" for reporting petroleum coke in CRF table 9, the NIR or the documentation box to CRF table 1.A(d), which is key to understanding the Party's reporting on the NEU of fuels. The ERT noted that the Party reported in CRF table 1.A(d) that the NEU of coking coal is not associated with CO_2 emissions, but did not include an explanation for this in the NIR. During the

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			review, the Russian Federation indicated in a general statement that it reported in CRF table 1.A(d) data on NEU of fuels and explained that it will continue to improve its use of notation keys and provision of documentation. Lastly, the ERT also noted discrepancies in the reporting of CO_2 emissions in CRF tables 1.A(d) and 2(I).A-H (sheet 2) (see ID# I.8 above).
I.10	2.B.1 Ammonia production – 2.D.3 Other (non-energy products from fuels and solvent use) – CO_2 (I.10, 2018) (I.15, 2017) Completeness	Provide an estimate for urea use in selective catalytic reduction (under category 2.D.3) using diesel consumption in road transportation and applying equation 3.2.2 from the 2006 IPCC Guidelines (vol. 2, chap. 3.2.1.1, p.3.12). In case emissions are insignificant, provide a justification for their exclusion in terms of the likely level of emissions, in accordance with the requirements in paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines.	Not resolved. The Russian Federation did not provide an estimate for urea use in selective catalytic reduction in road transportation in CRF table 2(I).A-H (sheet 2) under category 2.D.3 other (under 2.D non-energy products from fuels and solvent use) or a justification in the NIR as to whether emissions from this activity were considered insignificant. During the review, the Party clarified that it will provide a justification in the NIR of the next annual submission regarding the insignificance of CO_2 emissions from urea use in selective catalytic reduction in diesel vehicles.
I.11	2.B.1 Ammonia production – 2.D.3 Other (non-energy products from fuels and solvent use) – CO_2 (I.11, 2018) (I.15, 2017) Transparency	Provide in the NIR a better explanation of which categories' CO_2 emissions from significant uses of urea are reported, including the provision of data on export/import of urea (e.g. as a trade balance).	Not resolved. The ERT noted that the NIR did not contain the requested information on the categories under which CO_2 emissions from significant uses of urea were reported or data on the export or import of urea. During the review, the Party explained that categories under which CO_2 emissions result from significant uses of urea need to be further elaborated and the results of this work will be presented in the NIR of the next annual submission. Further, the ERT noted that the CO_2 IEF (200 t CO_2-C/t urea) for category 3.H urea application reported in CRF table 3.G.1 is 1,000 times higher than the IPCC default value of 0.20 t CO_2-C/t urea (vol. 4, chap. 11.4.2, p.11.34), which could result in other urea uses being allocated incorrectly within the IPPU sector.
I.12	2.E Electronics industry – HFCs, PFCs, SF_6 and NF_3 (I.21, 2018) Completeness	Improve the accuracy of the emission estimates of fluorinated gases (HFCs, PFCs, SF_6 and NF_3) from category 2.E electronics industry in accordance with the 2006 IPCC Guidelines, ensure completeness of the estimates by covering all relevant activities occurring in the Russian Federation under this category, including PFC emissions from heat transfer fluids, and report in the NIR about progress in collecting AD for the complete and reliable implementation of the methodologies of the 2006 IPCC Guidelines.	Not resolved. The ERT noted that the Party did not estimate PFC emissions from heat transfer fluids, resulting in incomplete emissions for category 2.E electronics industry. Also, emissions from semiconductor and LCD manufacturing both continued to be estimated using the EFs for semiconductor manufacturing in table 6.3 of the 2006 IPCC Guidelines (vol. 3, chap. 6.2.2.1, p.6.17). The ERT also noted that using parameters for semiconductor manufacturing to estimate emissions from LCD manufacturing may result in emissions being either underestimated (as HFC-23 emissions do not occur in semiconductor manufacturing) or overestimated (as some of the parameters used to estimate emissions from semiconductor manufacturing are higher than those used for LCD manufacturing). Further, the Party reported in section 4.6.4 of the NIR (p.143) that it performed minor recalculations of the amount of CF_4, C_2F_6 and C_3F_8 used for the estimates in category 2.E electronics industry owing to data corrections; however, the NIR did not provide information on progress in collecting AD, preventing the ERT from assessing whether the AD used were sufficient to

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			enable the complete and reliable implementation of the methodologies from the 2006 IPCC Guidelines. During the review, the Party indicated that it has not yet collected the AD enabling the complete implementation of these methodologies, and that this issue will be explored further in the future.
I.13	2.F.1 Refrigeration and air conditioning – HFCs (I.22, 2018) Completeness	Estimate and report HFC emissions from disposal of stationary air-conditioning equipment.	Resolved. The ERT noted that the Russian Federation reported in the NIR of the 2019 annual submission (p.148) on the provision of estimates of HFC emissions from disposal of stationary air-conditioning equipment for 2014–2016. Appropriate HFC-134a, HFC-32 and HFC-125 emissions (as components of R-407C and R-410A blends) were included in CRF table 2(II).B-H (sheet 2) for 2014 onward in the 2020 annual submission, and the Party correctly reported emissions from disposal of stationary air-conditioning equipment prior to 2014 using the notation key "NO" in CRF table 2(II).B-H (sheet 2).
I.14	2.F.1 Refrigeration and air conditioning – HFCs (I.23, 2018) Completeness	Provide information and documentation in the NIR on the use of fluorinated gases, in particular HFCs, in subcategory 2.F.1.d transport refrigeration and whether the associated emissions are estimated and included in the national GHG inventory and, if relevant, estimate and report emissions from the use of HFCs in transport refrigeration or use the appropriate notation keys.	Addressing. The Party reported in the NIR (p.147) that HFC emissions for subcategory 2.F.1.d transport refrigeration were reported under subcategory 2.F.1.c industrial refrigeration. However, owing to lack of detailed information and documentation in the NIR on the use of HFCs in subcategory 2.F.1.d transport refrigeration, the ERT was not able to assess whether the recommendation from the previous review report had been fully addressed. Also, the ERT noted that CRF table 2(II).B-H (sheet 2) did not contain any notation keys for reporting emissions under subcategory 2.F.1.d transport refrigeration. During the review, the Party clarified that there is no statistical information on different refrigerants used in different types of refrigerating equipment in the country, stating that it is only possible to obtain disaggregated information on the import and export of different refrigerants by analysing customs data. It also clarified that emissions from use of HFC-23, HFC-143a, R-401A, R-401B, R-402A, R-402B, R-407A, R-407B, R-408A and R-413A refrigerants were included under subcategory 2.F.1.c industrial refrigeration, and explained that it has very limited information on refrigerant consumption in transport refrigeration, but considers that by including all HFC refrigerant consumption in the country in the emission estimates, all HFC emissions (including those from transport refrigeration) were accounted for. The Party also stated that R-22 (HCFC-22) is still widely used in refrigeration, and is still the main refrigerant, for example, in marine transport refrigeration. Nevertheless, the ERT noted that, in accordance with the UNFCCC Annex I inventory reporting guidelines, HFC emissions for subcategories 2.F.1.d transport refrigeration and 2.F.1.c industrial refrigeration should be reported separately, while the necessary information, which is normally not found in statistical data, could be gathered via research and surveys.
I.15	2.F.5 Solvents – HFCs and PFCs	Either estimate and include in the inventory the HFC and/or PFC emissions from solvent cleaning	Resolved. The Party explained in the NIR (pp.153–154) that in the Russian Federation only HFC-245fa is used as a solvent and justified that HFC emissions

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	(I.24, 2018) Completeness	activities under category 2.F.5 solvents, or include in the NIR a justification for these emissions being considered insignificant, consistent with paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines and use the appropriate notation keys in the CRF tables.	from solvent use were considered insignificant in accordance with paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines (emissions for subcategory 2.F.5 solvents amounted to a maximum of 1.03 kt CO_2 eq during 2014–2018, thus less than 500 kt CO_2 eq and equivalent to 0.00005 per cent of the national total emissions excluding LULUCF in 2018). The Party used the appropriate notation key ("NE") in CRF table 2(II).B-H (sheet 2) (see ID# I.22 in table 5).
Agriculture			
A.1	3. General (agriculture) – CH_4 and N_2O (A.12, 2018) Transparency	Include in the NIR the definition of a feed unit as used in the national statistics.	Resolved. The Party included a definition of a feed unit as used in the national statistics for estimating feed intake in section 5.3.2 of the NIR (p.167) and values of GE (MJ/head/day) in tables 5.3–5.6 of the NIR (pp.169–177), and provided the following regional data in appendix 3.1 to the annex to the NIR for 2008 onward: GE for dairy cattle (table 3.1.6); trend in CH_4 emissions from dairy cattle (table 3.1.7); regional data on GE for non-dairy cattle (table 3.1.8); and CH_4 emission rates for non-dairy cattle (table 3.1.9). The ERT considered that the recommendation has been fully addressed by the Party.
A.2	3. General (agriculture) – CH_4 and N_2O (A.12, 2018) Transparency	Include in the NIR descriptions of the methodology used to generate the statistics on amount of feed units consumed by animals for enterprises, private farms, households and during grazing.	Addressing. The Russian Federation reported in its NIR (pp.167–177) the methodology and definition used to estimate feed units for dairy and non-dairy cattle and swine. In addition, it reported in table 5.2 of the NIR (p.164) the distribution of livestock by farm category (as a percentage of livestock type in each farm category at the end of 2018). During the review, the Party did not provide additional information, and indicated only a reference to the NIR (p.167) as the place where further information was provided. The ERT considered that the recommendation has not yet been fully addressed because the Party has not included in its NIR a description or detailed explanation of the methodology used to generate statistics on feed units consumed by animals for different types of animal farming in the country, such as enterprises, private farms, households and during grazing. However, in its clarifications to the list of provisional main findings, the Party provided the necessary explanations for the missing information in the NIR and indicated that it used the same methodology for generating statistics on amount of feed units consumed by animals for enterprises, private farms, households and during grazing.
A.3	3. General (agriculture) – CH_4 and N_2O (A.13, 2018) Transparency	Include a table in the NIR showing how the populations of different animal categories are distributed between enterprises, private farms and households, in particular (as a minimum) for cattle and swine categories.	Resolved. The Party reported in table 5.2 of the NIR (p.164) information showing how the populations of dairy and non-dairy cattle, swine and other categories were distributed between large and medium farms, enterprises and households. The ERT considered that the recommendation has been fully addressed by the Party.
A.4	3.A Enteric fermentation –	Perform the QC checks at the disaggregated level (i.e. regions) to ensure that the feed intake in kg of	Addressing. The Russian Federation reported in its NIR (p.178) that it checked feed consumption by ruminants and that, in terms of dry substance (kg/day), this

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	3.B Manure management – 3.D Direct and indirect N_2O emissions from agricultural soils – CH_4 and N_2O (A.14, 2018) Convention reporting adherence	dry mass does not exceed 3 per cent of the body mass in ruminants. Additionally, to avoid false conclusions, evaluate the current food intake limits for dairy cattle (3 per cent) that are used for performing the QC checks to determine whether a higher percentage may be more appropriate (e.g. 4 per cent).	did not exceed 3 per cent of the mass of dairy cattle in any year of the time series at the country level. During the review, the Party provided a calculation sheet showing the results of the QC check for dairy cattle at the regional level. These results showed that the share of dry matter intake per day varied between 2 and 5 per cent depending on the region and animal weight. However, the ERT noted that the Party did not include information in the NIR on the disaggregated results for dairy cattle on feed intake per day and at the regional level. In its clarifications to the list of provisional main findings, the Russian Federation confirmed that the QC check results reported in the NIR related to the average feed intake at the country level and that disaggregated QC checks were performed.
A.5	3.A.1 Cattle – 3.B.1 Cattle – 3.D.a Direct N_2O emissions from managed soils – CH_4 and N_2O (A.15, 2018) Accuracy	Further investigate and clearly justify in the NIR the GE values estimated from the feed unit statistics. If it turns out that feed intake levels are considered unreasonable, carefully examine the cause of the error and make the necessary adjustments in the inventory for all categories affected by the error, revise the related estimates, and describe in the NIR the new assumptions made.	Not resolved. The Party reported in table 5.6 of the NIR (p.173) the GE values for dairy and non-dairy cattle per year at the regional level. The ERT noted that the GE values for dairy cattle in 2018 amounted to 447.31 and 485.19 MJ/head/day for the Leningrad and Moscow regions, respectively, which were the highest values reported by any of the Parties included in Annex I to the Convention. However, the Party did not provide a clear justification for these high GE values in its NIR, or report revised estimates or information on an examination of possible errors of the GE values estimated for these particular regions. During the review, the Russian Federation provided a calculation sheet containing background data for the calculation of GE values and the CH_4 EFs for dairy cattle for the Leningrad and Moscow regions. The ERT was not able to verify these data, but noted that the CH_4 EFs were the highest reported by any of the Parties included in Annex I to the Convention (190.7 and 206.85 kg CH_4/head/year for the Leningrad and Moscow regions, respectively). During the review, the Party also provided information on milk production for the Leningrad and Moscow regions (18.7 and 23.1 kg/day/head, respectively). While these data seem reasonable, the ERT is of the view that these values do not correspond to the CH_4 EFs calculated by the Party. The ERT is therefore of the opinion that the calculated CH_4 emissions may be inaccurate and overestimated in these regions. The Party could consider performing a QC exercise to validate the results of the CH_4 emission estimates, comparing the CH_4 EFs based on milk production and those based on feed units at the regional level and explaining any differences in the NIR.
A.6	3.A.1 Cattle – 3.B.1 Cattle – 3.D.a Direct N_2O emissions from managed soils – CH_4 and N_2O	Revise the accuracy of the AD and, if appropriate, recalculate the corresponding emission estimates of CH_4 and N_2O for non-dairy cattle. Alternatively, include in the NIR clear explanations for the observed decreases in the values for GE, VS daily excretion and Nex between 2015 and 2016.	Addressing. The Party did not recalculate the corresponding emissions of CH_4 and N_2O for non-dairy cattle to address the accuracy of the AD in line with the recommendation in the 2019 or 2020 annual submissions or provide information in the NIR on any plans or action taken to revise the accuracy of the AD used for estimating CH_4 and N_2O emissions for non-dairy cattle. Therefore, the ERT did not consider the explanation concerning the accuracy of the AD for these emission estimates in the NIR (p.176) to be complete. In addition, the Party did

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	(A.16, 2018) Accuracy		not clearly explain in its NIR the observed decreases in the values for GE, VS daily excretion or Nex between 2015 and 2016 or 2016 and 2017. During the review, it explained that the observed inter-annual fluctuations in the values of these parameters in 2015–2017 depend on feed consumption AD. The average GE for non-dairy cattle amounted to 149.16 MJ/head/year in 2015, 136.62 MJ/head/year in 2016 and 149.03 MJ/head/year in 2017. The ERT considered that the explanation provided was not fully transparent. In its clarifications to the list of provisional main findings, the Russian Federation indicated that all data were checked and were considered accurate and confirmed that the observed fluctuations in VS daily excretion and Nex values were due solely to fluctuations in GE, which depends on feed unit statistics. In addition, it specified that inter-annual fluctuations in GE did not exceed 8–9 per cent; however, the amount of concentrates and their share in total GE fluctuated inter-annually by 10–30 per cent, depending on the annual subsidies received by farms.
A.7	3.A.1 Cattle – CH_4 (A.17, 2018) Accuracy	Revise the estimate of CH_4 emissions from enteric fermentation from non-dairy cattle in 2016 by using the correct value of GE in equation 10.21 from the 2006 IPCC Guidelines.	Resolved. The Party corrected the estimation of the CH_4 EF and corresponding estimates of emissions for non-dairy cattle by using the correct GE value for 2016. The ERT noted that CH_4 emission estimates were recalculated for non-dairy cattle for 2016 in the 2019 annual submission and for 2008 and 2010–2016 in the 2020 annual submission, resulting in more accurate CH_4 emission estimates in relation to GE for 2016 in the 2020 annual submission (see ID# A.6 above). The ERT considered that the recommendation has been addressed by the Party.
A.8	3.A.1 Cattle – CH_4 (A.18, 2018) Accuracy	Correct the errors in the feed intake levels and CH_4 EFs and recalculate the emissions from enteric fermentation for non-dairy cattle in the Bryansk region for all the relevant years. Thoroughly investigate the cause of the error to see if there could be other regions of the Russian Federation affected by this mistake.	Not resolved. The ERT noted that in table 3.1.9 of appendix 3.1 to the annex to the NIR, the reported value of the CH_4 EF for enteric fermentation for non-dairy cattle in the Bryansk region increased from 66.09 to 173.41 kg CH_4/head/year between 2014 and 2015 and then decreased to 158.5 kg CH_4/head/year in 2016, and significantly decreased further to 86.97 and 82.73 CH_4/head/year in 2017 and 2018, respectively. The Party reported in its NIR (p.176) that the CH_4 EF for non-dairy cattle dropped sharply between 2015 and 2016 (8.5 per cent), and then increased between 2016 and 2017 (9.0 per cent) at the country level, with these changes particularly happening in the Khabarovsk, Bryansk and Kaluga regions. The NIR stated that these fluctuations were due to additional funding for livestock farming provided by local authorities in the specified years or changes in the overall economic situation in these regions, which were reflected in the feed intake and nutrition concentrates. During the review, the Party provided a calculation sheet containing background parameters for calculating CH_4 emissions for non-dairy cattle for 1998–1999, 2004–2005 and 2015–2017, but only at the country level. The ERT considered this calculation generally correct, but the aggregated AD and parameters did not allow the ERT to assess the regional input data, which were used for obtaining the overall country-level results. The ERT considered that the recommendation has not been addressed

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			because the Party did not revise its CH_4 emission estimates for non-dairy cattle to correct the previously identified errors in the feed intake levels and CH_4 EFs for the Bryansk region and did not support the explanations for the fluctuations in the NIR with sufficient documentation, such as regional statistical data, particularly from the Khabarovsk, Bryansk and Kaluga regions. In addition, the Party did not provide information in the NIR on any investigation into the causes of previously identified errors in the emission estimates at the regional level to determine whether there could be other regions in the Russian Federation affected by the errors.
A.9	3.A.4 Other livestock – 3.B.4 Other livestock – CH_4 (A.19, 2018) Comparability	Reallocate the emissions from reindeer in the CRF tables from subcategory 3.A.4 other livestock – deer to subcategory 3.A.4 other livestock – other – reindeer and from subcategory 3.B.4 other livestock – deer to subcategory 3.B.4 other livestock – other – reindeer.	Resolved. The Party reallocated the relevant CH_4 (and N_2O) emissions from reindeer to subcategories 3.A.4 other livestock – other – reindeer and 3.B.4 other livestock – other – reindeer in CRF tables 3.A and 3.B(a) (and 3.B(b) for N_2O).
A.10	3.B Manure management – CH_4 and N_2O (A.7, 2018) (A.2, 2017) (A.8, 2016) (A.8, 2015) Accuracy	Confirm the assumption that liquid manure is not usually stirred, for example by conducting a small-scale farm survey or asking national agricultural organizations to advise on the appropriateness of the assumption. In the event that the assumption cannot be confirmed, apply an MCF value of 17 per cent (default value in the 2006 IPCC Guidelines, vol. 4, table 10.17 for liquid systems without natural crust cover) in order to ensure that CH_4 emissions from manure management are not underestimated and use an N_2O EF which is applicable to liquid manure management systems without a natural crust cover.	Resolved. The Party reported in section 5.4.2 of the NIR (p.179) that according to consultations with experts from the company APC – Center and on the basis of a survey of small companies, the average moisture content of the liquid fraction of manure from cattle and swine is 99 per cent and therefore does not result in crusts on the surface of liquid systems. There are only a few small regions in the Russian Federation with an average annual mean temperature of over 10 °C (Caucasus, Dagestan and Chechnya), but swine are not farmed in these regions and cattle are kept on pasture all year round. The ERT considered that this explanation is in line with the default MCF value of 17 per cent applied from the 2006 IPCC Guidelines (vol. 4, chap. 10, table 10.17, p.10.44), which prevented a potential underestimation of CH_4 emissions for this type of manure management system. The Party also used an N_2O EF (0 kg N_2O-N/kg N excreted) applicable to liquid manure management systems without natural crust cover in the calculations.
A.11	3.B Manure management – CH_4 (A.20, 2018) Transparency	Update the NIR so that the information about the EFs used for liquid manure (i.e. whether EFs for with or without natural crust cover are applied) is correct and consistent throughout the NIR.	Addressing. The ERT noted that the Party did not report fully correct and consistent information on the EFs used for liquid manure in section 5.4.2 of the NIR (particularly pp.180 and 182). During the review, the Russian Federation indicated that information on the EFs used for liquid manure was provided on page 180 of the NIR and that it used an MCF for liquid storage without natural crust cover. Therefore, the ERT considered that the recommendation has not been fully addressed. In its clarifications to the list of provisional main findings, the Russian Federation indicated that on pages 180 and 182 of section 5.4.2 of the NIR the information on liquid systems without natural crust cover was provided consistently. However, the ERT noted in this regard, for example, the following inconsistent and contradictory information in the NIR: “for other cattle – in

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			addition to pastures and dry storage – systems with liquid manure 'without natural crust' on the surface of the storage facility are used. For swine are also used storage systems with liquid manure (with a natural crust), and, in part, can be used dry storage systems" (p.180), "based on the expert consultation received, only the category 'without natural crust' was chosen for liquid manure" (p.180) and "this can be explained by both the smaller proportion of liquid storage systems in the Russian Federation than that considered for default calculations (IPCC, 2006, table 10A-5) and the different MCF values: in accordance with the use of liquid storage systems with natural crust in the national calculations its value is 10 per cent, and in the default calculation is used the MCF for liquid storage without natural crust (17 per cent)" (p.182).
A.12	3.B.3 Swine – N_2O (A.10, 2018) (A.10, 2017) Convention reporting adherence	Correct the value of crude protein (%) of fresh fodder consumed by swine in NIR table 3.1.2 (annex 3.1) consistently with the information reported in table 5.8.	Resolved. The Party reported consistent values in table 5.9 of the NIR (p.184) and table 3.1.2 of appendix 3.1 to the annex to the NIR for the share of crude protein of fresh fodder consumed by swine. The ERT considered that the recommendation has been fully addressed by the Party.
LULUCF			
L.1	4. General (LULUCF) – CO_2 (L.6, 2018) Convention reporting adherence	Clarify in the NIR the method and references used for performing the uncertainty estimates for the LULUCF sector, in particular by specifying whether sampling error is included in the estimated 13 per cent uncertainty of the EF for deforestation (forest land converted to settlements) and by explaining how the uncertainty of the EF of biomass stock changes in forest land remaining forest land is derived from the reported uncertainty value of 20 per cent for standing volume.	Not resolved. The ERT noted that the Party revised the uncertainty value for biomass stocks for forest land conversion to settlements (deforestation) from 13 to 10 per cent in the NIR (p.339). However, it did not explain whether the EF uncertainty value accounts for the uncertainty resulting from sampling errors or explain the method applied for estimating the EF uncertainty for biomass stock changes in forest land remaining forest land from the uncertainty value for standing volume. During the review, the Party indicated that the necessary information will be provided in the next annual submission.
L.2	4. General (LULUCF) – CO_2, CH_4 and N_2O (L.9, 2018) Consistency	Collect AD on drainage of organic soils in forest land and on peat extraction areas for the years since 2008, and if this is not possible in time for the next annual submission and the current approach needs to be continued, include the impact of this extrapolation on the uncertainty of the inventory, include the collection of AD on drainage of organic soils in forest land and on peat extraction in the improvement plan and report on progress made in the NIR.	Not resolved. The Party continued to estimate emissions from drained organic soils in forest land and peat extraction using extrapolation for 2008 onward. The ERT noted that the uncertainty estimates were not updated to incorporate the uncertainty resulting from such an approach and the Party did not report in the NIR on progress made in relation to the collection of AD for forest organic soils and peat extraction areas, or specify whether it included the collection of AD in its improvement plan. During the review, the Russian Federation explained that drainage in forest land has not been funded since 2008 and that activities leading to re-establishment of the water table take place in the drainage network of forest lands, justifying the Party's conservative assumption of a constant area for drained organic soils in forest land for 2008 onward that led to reporting a larger

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			area than the actual area. The Party indicated further that the collection of AD on peat extraction was included in the improvement plan.
L.3	Land representation – CO_2 (L.8, 2018) Accuracy	List in the NIR all assumptions underlying the establishment of land transition matrices and the land balance, including the transitions occurring prior to 1990, from 1940 or 1970 onward depending on the transition period chosen for each transition.	Addressing. The Party reported in section 6.3 of the NIR (p.227) on several assumptions used underlying the establishment of the land transition matrices and the land balance. In table 6.28 of the NIR (p.275) it reported the cropland conversions to forest land occurring since 1946 and explained in section 6.4.1.2 of the NIR (p.274) that no such conversions occurred in 1941–1945. During the review, the Party explained that all assumptions used were reported in sections 6.4.1.2 and 6.4.3.2 of the NIR (pp.274 and 294, respectively). However, the ERT noted that the Party did not report the land-use changes prior to 1990 for the rest of the land-use categories, including conversions from land other than cropland to forest land and different types of land conversions to wetlands. In its clarifications to the list of provisional main findings, the Russian Federation provided further information, indicating that until 1990 the area of grassland and cropland was assumed to be stable and that a transition period of one year was used for land conversions to settlements and other land, except for deforestation.
L.4	Land representation – CO_2 (L.8, 2018) Accuracy	Describe in the NIR how the original land use for the transition is determined when it is not directly identifiable in existing data sets (e.g. transitions to unmanaged forest land other than from managed forests) and clearly state in the NIR the adjustments made to guarantee a correct land balance.	Not resolved. The Party did not provide in the NIR information on the basis used to select the assumptions for the original land use or how it determined the original land use for the transition in cases where this was not identifiable in existing data sets, for example by providing justification or specifying the logic underlying such assumptions, or report on the adjustments made to ensure a correct land balance. In its clarifications to the list of provisional main findings, the Russian Federation indicated that no adjustments to official statistical data can be made and therefore it used information on net area changes per year obtained from statistical information. However, the ERT noted that since the Russian Federation used information from various sources to develop the land-use matrices, it is very likely that it had to make some adjustments to ensure a correct land balance. For example, by using the other land category as an "offset category" where the remaining land not classified in the other land uses was assigned in order to maintain a constant total country area throughout the time series.
L.5	Land representation – CO_2 (L.8, 2018) Accuracy	If it is not possible to determine whether the original land use was cropland, grassland or other land, attribute land transitions to settlements to either cropland or grassland rather than other land.	Not resolved. The Party continued to report conversions from other land to settlements for the cases when it was unable to determine whether the original land use was cropland, grassland or other land using real data. For example, it reported 50.39 kha of other land converted to settlements in 2018. During the review, the Party explained that this area refers to the cumulative area of conversions that occurred in previous years.
L.6	4.A.1 Forest land remaining forest land – CO_2	Clarify in the NIR the meaning of the values included in table 6.15, including the references to the	Resolved. A note was added to the explanatory notes on parameters to equation 6.1 in the NIR (p.252), clarifying that the "KPij" value (a conversion coefficient) is equal to the expression BCEF × (1 + ratio of below-ground biomass to above-

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	(L.10, 2018) Transparency	parameter names and abbreviations used as defined in the 2006 IPCC Guidelines.	ground biomass (known as "R")) × CF, as presented in equation 2.8 of the 2006 IPCC Guidelines (vol. 4, chap. 2, p.2.12), and references on these values were provided in table 6.15 of the NIR (p.252).
L.7	4.A.1 Forest land remaining forest land – CO_2 (L.11, 2018) Transparency	Describe in the NIR how data on age are collected, specifying in which cases a recorded clear-cut date and in which cases tree coring is used. Also, describe in the NIR how data on standing volume are collected, including the reference for the allometric equations and the year of the last inventory when it comes from ground inventory and explaining the satellite measurement methods, where relevant. Finally, include data in the NIR on the evolution of the distribution of areas per age group.	Addressing. The Party reported information in section 6.4.1.1.2 of the NIR (p.246) on how data on age are collected, specifying that the age of the stands is determined using historical data on previous clear-cuts and forestry activities as part of the previous forest inventory; otherwise, tree coring is used, with cores taken from three to five accounting trees. The Party also described the evolution of the distribution of areas per age group since 1990 in figure 6.13 of the NIR (p.249) and reported that standing volume is determined for each forest floor on the basis of the dominant tree species and average height using allometric equations. However, it did not include references to the allometric equations used and the year of the last forest inventory. The Party also did not explain the satellite measurement methods used, where relevant. During the review, the Party provided references to the growth tables and allometric equations used in the forest inventory, which cover the growth tables for the main species. It also clarified that some regional growth tables and equations were used, but did not provide references thereto. Regarding references to the year of the last forest inventory, the Party explained that the State Forest Register is based on forest inventories taken in different years, but the State Forest Register is updated annually by the Federal Forestry Agency taking into account areas of clear-cuts and areas of forest stand damage caused by various factors (fires, insects, etc.). Finally, the Party explained that it used satellite measurements to estimate the standing volume of some poorly accessible forest areas, with additional test sites on the ground.
L.8	4.A.1 Forest land remaining forest land – CO_2 (L.12, 2018) Transparency	Include in the NIR a description of how data on clear-cut areas are collected.	Resolved. The Party reported a description of how it estimated clear-cut areas on the basis of the methodology described in equation 6.6 of the NIR (p.254).
L.9	4.A.1 Forest land remaining forest land – CO_2 (L.13, 2018) Transparency	Include in the NIR a description of how data on areas subject to fire and other disturbances are collected.	Addressing. The Party reported in the NIR (p.246) that data on areas subject to burning were collected by the Federal Forestry Agency using satellite imagery. However, this information was inconsistent with that provided in relation to equation 6.5 of the NIR (p.254), which referred to a methodology for estimating areas of destructive forest fires. The Russian Federation did not provide any information on data collection for other disturbances. During the review, it explained that the methodology described in equation 6.5 was used to estimate areas of destructive forest fires, and indicated that data on areas subject to other types of fires (ground, underground, ground fires in temporarily unstocked forest areas) were collected and provided by the Federal Forestry Agency prior to 2016.

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			Since 2016 the Federal Forestry Agency has provided information on total areas of fires, differentiating between forest fires and ground fires in temporarily unstocked forest areas. Also since 2016, areas of underground fires have been calculated according to the average ratio of underground fires to total area subject to fires for 2000–2015.
L.10	4.A.1 Forest land remaining forest land – CO_2 (L.14, 2018) Transparency	Clarify and document in the NIR that the reason why deadwood stock change with forest age in the calculations is neither flat nor U-shaped is because the deadwood resulting from slash from clear-cuts is excluded from deadwood stocks.	Not resolved. The ERT noted that the Party did not report in the NIR that the reason why deadwood stock change with forest age in the calculations is neither flat nor U-shaped is because the deadwood resulting from slash from clear-cuts is excluded from deadwood stocks. During the review, the Party explained that it assumes instant oxidation of the total deadwood stock after destructive disturbance, as presented in equation 6.14 of the NIR (p.261); consequently, it did not account for any post-disturbance emissions from decomposition. The ERT agreed with the explanation provided by the Party during the review.
L.11	4.A.1 Forest land remaining forest land – CO_2 (L.15, 2018) Accuracy	Either provide in the NIR documentation supporting the assumption that soil carbon stocks increase with forest age, or use accurate EFs for soil carbon stock changes in forest land remaining forest land, possibly by reverting to a lower-tier method for this carbon pool which, by assuming that soil carbon stocks are constant with age, would be more accurate than the assumption that soil carbon stocks in forests increase with forest age in the Russian Federation.	Not resolved. The Party did not provide documented information in the NIR supporting the assumption that soil carbon stocks increase with forest age, but continued to report the same EFs for soil carbon stock change in forest land remaining forest land in tables 6.23–6.26 of the NIR (p.267) as it did in the 2018 annual submission. During the review, the Party referred to three research publications referenced in the NIR (p.270) to support the assumption that soil carbon stocks increase with forest age (Jandl et al., 2007; Vedrova et al., 2010 (in Russian); Lukina, 2018 (in Russian)). It provided the first two publications to the ERT, but it was not possible to provide the third owing to restricted library access as a result of coronavirus disease 2019 restrictions. The ERT noted that the first study is a publication reviewing experimental evidence for long-term carbon sequestration in soils which utilizes existing information from various European countries, while the second focuses on pine forests in the Eastern Baikal region, thus the ERT did not consider the results of these studies to be adequately and accurately representative of the circumstances of the Russian Federation's diverse forests. In its clarifications to the list of provisional main findings, the Russian Federation indicated that it is trying to use the best available scientific publications to report actual estimates of changes in the soil carbon pool instead of using a notation key for lower-tier method assumptions. The Party also indicated that, while data on carbon stock changes in forest soil are likely not fully representative, it could not find any references showing that soil carbon stock in the Forest Fund does not change or decrease.
L.12	4.A.1 Forest land remaining forest land – CO_2 (L.16, 2018) Accuracy	Use the data available on standing volume or other characteristics available at the local level for a few protected forests in order to verify that protected forests have similar characteristics to the average managed forest of the same region and ensure that	Not resolved. The Party did not report in the NIR information on activities undertaken to verify that protected forests have similar characteristics to the average managed forests in the same region in terms of average age, carbon stocks and carbon stock changes, and consequently did not ensure that no discrepancies in average age, carbon stocks and carbon stock changes occur. The

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		no discrepancy in average age and hence carbon stock and carbon stock changes assumed occur for the estimates for protected forests.	ERT noted that the Party continued to assume that the same average net sequestration per unit of area of managed forests per region applies to protected forests. During the review, the Party explained that data on average age, carbon stock and carbon stock changes for managed forests in protected areas at the local level were not available, but may become available and thus used in the 2022 annual submission (see ID# L.36 in table 5). In its clarifications to the list of provisional main findings, the Russian Federation indicated that it considers its assumption regarding average net sequestration per unit of area of managed forests per region (without carbon losses from clear felling, which is prohibited in protected areas) to be suitable for inventory purposes, considering that the area of forest land in protected areas only accounts for around 2.5 per cent of the total managed forest area and the overall uncertainty for estimates of forest land remaining forest land is around 27 per cent.
L.13	4.A.2.1 Cropland converted to forest land – CO_2 (L.17, 2018) Transparency	Extend tables 6.34–6.35 of the NIR from 30 years to the full 50 years of the transition period for cropland converted to forest land. Correct the titles of these tables and mention carbon stock changes in cropland converted to forest land.	Resolved. The ERT noted that tables 6.34–6.35 of the NIR (pp.280–282) were extended to present information on the full 50 years of the transition period. The ERT also noted that the table titles were not corrected and continued to refer to carbon stocks instead of carbon stock changes; however, the Party clarified during the review that tables 6.34–6.35 do present carbon stocks. The ERT considered that the recommendation has been addressed.
L.14	4.A.2.1 Cropland converted to forest land – CO_2 (L.18, 2018) Accuracy	Use the EFs reported in the table 6.35 of the NIR without the 33 per cent discount of SOC lost by fire in its calculation of soil carbon stock changes under cropland converted to forest land for all years of the time series.	Not resolved. The Party continued to discount a portion of SOC lost by fire from the soil carbon stock changes under cropland converted to forest land. During the review, it explained that in the 2020 annual submission a discount rate of 1.4 per cent, instead of the 33 per cent rate used in the 2018 annual submission, was applied for losses by fire for all carbon pools in order to correct the incomplete coverage of the model used for estimating carbon stock changes and to account for carbon losses. This updated discount rate was based on a national publication (Kulik and Pavlovsky, 2008 (in Russian)). The Party also explained that it assumed that all losses covered by the 1.4 per cent discount rate occur as a result of fires. In response to the request of the ERT for access to the above-mentioned publication, the Party explained that it was unable to access it from the library owing to coronavirus disease 2019 restrictions. As such, the ERT could not assess its appropriateness (see also ID# L.37 in table 5).
L.15	4.A.2.1 Cropland converted to forest land – CO_2 (L.18, 2018) Accuracy	Ensure the consistency of the ICSCFs reported for deadwood, litter and soil carbon in CRF table 4.A for cropland converted to forest land and its subcategories, checking in particular that the ICSCFs for deadwood, litter and soil carbon under cropland converted to forest land equal the weighted average of the ICSCFs of each subcategory weighted by their respective areas.	Not resolved. The Russian Federation did not ensure the consistency of the ICSCFs reported for carbon pools in CRF table 4.A. It reported carbon stock changes in anti-erosion and protective plantations before 1990 as two separate strata under cropland converted to forest land, reporting the area values using the notation key “IE”. This reporting affects the total ICSCF for all pools under cropland converted to forest land and prevented the ERT from assessing whether the total ICSCF reflects the weighted average of the areas corresponding to the different subcategories reported under cropland converted to forest land. During

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			the review, the Party explained that data on areas of plantations before 1990 are available and will be reported in the next annual submission.
L.16	4.B.1 Cropland remaining cropland – 4.C.1 Grassland remaining grassland – CO_2 (L.19, 2018) Accuracy	Use another more accurate estimation method for soil carbon stock changes in mineral soils in cropland remaining cropland and in grassland remaining grassland, possibly reverting to lower tiers and ensuring that the results provide accurate estimates (in accordance with the 2006 IPCC Guidelines).	Resolved. The Party applied a tier 1 method for estimating soil carbon stock changes in mineral soils in cropland remaining cropland and in grassland remaining grassland, thus increasing accuracy in the method applied compared with the previous tier 3 estimation method, which was found to be not sufficiently robust for use in the calculations. However, the ERT noted a new issue in relation to the assumptions used in the methodology currently being applied (see ID# L.38 in table 5).
L.17	4.B.2 Land converted to cropland – CO_2 (L.20, 2018) Completeness	Report area changes in land converted to cropland whenever they occur, and in particular when the total area of cropland increases, and estimate and report the associated emissions or removals.	Not resolved. The Party did not report area changes in land converted to cropland for the years when they occurred, including their associated emissions or removals. During the review, the Party explained that this issue has been resolved. However, the ERT noted that there are still years (e.g. 2008–2009) in which although the total cropland area increased, the corresponding area changes and land-use conversions to cropland, or associated emissions or removals, were not reported in CRF table 4.B.
L.18	4.C.2 Land converted to grassland – CO_2 (L.20, 2018) Completeness	Report area changes in land converted to managed grassland whenever they occur, and in particular when the total area of managed grassland increases, and estimate and report the associated emissions or removals.	Resolved. The Party reported area changes in land converted to managed grassland and the associated emissions or removals in CRF table 4.C for the years in which the total area of managed grassland increased.
L.19	4.C.2 Land converted to grassland – 4.E.2 Land converted to settlements – CO_2 (L.21, 2018) Accuracy	In the estimates, attribute all biomass stock changes in land converted to grassland and land converted to settlements to the first year of the transition period in accordance with the 2006 IPCC Guidelines. Use the average biomass stock of the previous land use rather than zero in the estimates of biomass stock changes in land converted to grassland and land converted to settlements.	Resolved. The Party used the average biomass stock of the previous land use to estimate biomass carbon stock changes in land converted to grassland and land converted to settlements and attributed all biomass stock changes to the first year of the transition period.
L.20	4.C.2.2 Cropland converted to grassland – CO_2 (L.7, 2018) Convention reporting adherence	Estimate the uncertainty of the EF of soil carbon stock change in cropland converted to grassland using correctly equation 3.2 from volume 1 of the 2006 IPCC Guidelines.	Resolved. The ERT noted that the Russian Federation corrected the nominator in equation 6.37 of the NIR (p.303), which was used for estimating the uncertainty of the EF of soil carbon stock change in cropland converted to grassland in order to align it with equation 3.2 from volume 1 of the 2006 IPCC Guidelines (p.3.28) by multiplying the U and x terms instead of adding them; however, it did not apply absolute value to the sum of the x terms in the denominator. In addition, the ERT noted that the same uncertainty estimate of 14.9 per cent for soils was reported in tables 6.77 and 6.78 of the NIR (pp.366–369) as in tables 6.94 and 6.95 of the NIR of the 2018 annual submission. During the review, the Party explained that it correctly calculated the uncertainty estimate of the EF of soil

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			carbon stock change in the 2019 and 2020 annual submissions (including the use of absolute value in the denominator) and stated that the error identified previously referred only to the reporting of equation 6.37. The ERT considered that the recommendation has been addressed by the Party.
L.21	4.C.2.2 Cropland converted to grassland – CO_2 (L.22, 2018) Accuracy	Develop a country-specific value for dead organic matter carbon stocks in cropland to be used for estimating carbon stock changes in dead organic matter in cropland converted to grassland or, if this is not possible, use the default dead organic matter carbon stock value of zero for grassland when estimating carbon stock changes in dead organic matter in cropland converted to grassland.	Not resolved. The ERT noted that the Russian Federation used the IPCC default dead organic matter carbon stock value of zero for cropland when estimating carbon stock changes in dead organic matter in cropland converted to grassland. During the review, the Party explained that this issue has been resolved. However, the ERT noted that the Party did not develop a country-specific value for dead organic matter carbon stocks in cropland before conversion to grassland. It continued to use the IPCC default value of zero for cropland and a dead organic matter stock value in grassland of 5.92 t C/ha for estimating carbon stock changes in the dead organic matter pool in cropland converted to grassland, as reported in section 6.4.3.2.1.2 of the NIR (p.297) and CRF table 4.C. In its clarifications to the list of provisional main findings, the Russian Federation indicated that it used the default dead organic matter carbon stock value of zero because there was no factual evidence that carbon stock in dead organic matter in cropland exceeds zero.
L.22	4.C.2.2 Cropland converted to grassland – CO_2 (L.23, 2018) Transparency	Increase the transparency of the description in the NIR of the tier 3 model used for estimating soil carbon stock changes in cropland converted to grassland, by (1) providing an example of the simulated carbon stock changes over the 50 years of the transition, (2) providing a table with the total carbon stock changes over the 50 years of the transition for each region and (3) describing how the necessary inputs to the model (initial carbon stock, organic matter inputs and pedo-climatic data) are estimated.	Resolved. The Party improved the description of the tier 3 model used for estimating soil carbon stock changes in cropland converted to grassland and reported in section 6.4.3.2.1.2 of the NIR (pp.295–303) an example of simulated carbon stock changes during the 50-year transition period (figure 6.16, p.300) and a description of how the inputs to the model were estimated. Further, the Party provided table 3.3.5 in appendix 3.5 to the annex to the NIR, which included carbon stock changes in cropland converted to grassland over the 50-year transition period in different regions of the country.
L.23	4.C.2.3 Wetlands converted to grassland – CO_2 (L.24, 2018) Completeness	Estimate and report emissions and removals from carbon stock changes for the reported area of organic soils under wetlands converted to grassland.	Not resolved. The Party did not report emissions and removals from carbon stock changes for the reported area of organic soils under wetlands converted to grassland, and instead used the notation key “NO” in CRF table 4.C for the whole time series for carbon stock changes and emissions from organic soils. During the review, the Russian Federation indicated that associated emissions will be reported in the next annual submission.
L.24	4.E.1 Settlements remaining settlements – CO_2 (L.25, 2018) Comparability	Report urban forests as a subcategory under 4.A.1 forest land remaining forest land for reporting under the Convention.	Resolved. The ERT noted that the Party reported urban forests as a subcategory under 4.A.1 forest land remaining forest land for reporting under the Convention in CRF table 4.A.

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L.25	4.G HWP – CO_2 (L.26, 2018) Convention reporting adherence	Report AD on production, imports and exports of sawnwood, wood panels and paper and paperboard from 1960 to 1989 in CRF table 4.G (sheet 2) and report sawnwood as a subcategory of solid wood in CRF table 4.G (sheet 1).	Addressing. The ERT noted that the Party reported sawnwood as a subcategory of solid wood in CRF table 4.G (sheet 1). However, in CRF table 4.G (sheet 2) it still only reported AD on production, imports and exports of sawnwood, wood panels and paper and paperboard for 1990 onward. During the review, the Party explained that this is due to a technical problem with CRF Reporter. The ERT noted that it is possible to report AD on production, imports and exports of sawnwood, wood panels and paper and paperboard from 1960 onward in CRF table 4.G (sheet 2) using CRF Reporter. In its clarifications to the list of provisional main findings, the Russian Federation indicated that it is working to resolve this issue in the future and with the aim of increasing the transparency of the national GHG inventory, it included the data required in section 6.4.7 of the NIR (pp.357–365).
L.26	4.G HWP – CO_2 (L.27, 2018) Accuracy	Improve the consistency between the information on harvest reported under category 4.A forest land and HWP production reported under category 4.G HWP by investigating why wood production represents only about 33 per cent of total harvest (in 1990) and confirming the AD used in the CO_2 estimates for category 4.G HWP, and if necessary, revise the estimates for this category.	Not resolved. The Russian Federation continued to report inconsistent data on HWP quantities under category 4.A forest land, as presented in figure 6.8 of the NIR (p.239), and on production quantities, as reported in CRF table 4.G (sheet 2). During the review, the Party informed the ERT that harvest statistics related to data on actual cutting of wood in forests were obtained from the Federal Forestry Agency, while data on HWP were obtained from Rosstat. It also explained that the reasons for the discrepancies between these two data sets have not still been identified, but the issue is being investigated with the aim of resolving the inconsistencies in the information provided by the two agencies. In its clarifications to the list of provisional main findings, the Russian Federation indicated that the statistical data from Rosstat may have been underestimated, and to ensure consistency, it intends to change the methodology currently used to the methodology used for the accounting in the Kyoto Protocol reporting, as provided in section 10.3.5.3 of the NIR (pp.440–441).
Waste			
W.1	5. General (waste) – CH_4 (W.9, 2018) Convention reporting adherence	Correct all the inaccurate information provided in the NIR regarding the main parameters used in calculations, such as amount of solid waste disposed of at unmanaged SWDS presented in table 7.5 and the population serviced by centralized collection systems reported in table 7.6 and ensure data consistency between the NIR and the CRF tables.	Resolved. The Party reported correct values of the main parameters used in calculations in table 7.6 of the NIR (p.387). The values reported were consistent with the amount of waste deposited in unmanaged landfills reported in CRF table 5.A.
W.2	5. General (waste) – CO_2, CH_4 and N_2O (W.10, 2018) Transparency	Document and provide in the NIR documentation and references to the specific category in the energy sector where emissions from energy recovery for categories 5.C.1 waste incineration and 5.D.1 domestic wastewater are included and reported.	Addressing. The ERT noted that in the NIR (p.393) the Party provided a reference to the specific energy sector subcategory (subcategory 1.A.4.a.i stationary combustion under category 1.A.4 other sectors) where emissions from energy recovery for categories 5.C.1 waste incineration and 5.D.1 domestic wastewater were reported. According to the NIR (p.402), emissions from burning of biogas from sludge digesters under category 5.D.1 domestic wastewater were

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			also reported in the energy sector. However, a clear reference to the specific energy sector category where these emissions were reported was still lacking.
W.3	5.A Solid waste disposal on land – CH_4 (W.11, 2018) Transparency	Increase the transparency of the NIR by documenting the assumptions and expert judgment applied in the determination of the DOC(x) and provide relevant explanations on the decline in the trend of DOC(x) taking into account changes in composition of MSW landfilled over time. Explain in the NIR how time-series consistency of the DOC(x) values was ensured and how splicing techniques were applied for filling the gaps in the time series.	Not resolved. The Party included in the NIR (p.381) references to support its assumption on the composition of MSW reported in table 7.3 of the NIR (p.382). However, the Party did not describe in its NIR the assumptions and additional expert judgment applied in deriving the specific values provided in table 7.3; explain the trend in DOC(x) over time; or mention how time-series consistency was ensured or how splicing techniques were applied for filling the gaps in the time series.
W.4	5.A.2 Unmanaged waste disposal sites – CH_4 (W.12, 2018) Transparency	Transparently explain in the NIR the assumptions used to inform the classification of unmanaged SWDS and open shallow dumps where waste that is not centrally collected is generally deposited and also explain the related AD used in calculations.	Addressing. The Russian Federation specified that a methane correction factor of 0.4 was used to calculate emissions from unmanaged SWDS and open shallow dumps in its NIR (p.381). However, this value was insufficiently justified in the NIR. During the review, the Party indicated that SWDS in which waste was disposed of in a decentralized manner were considered as uncontrolled shallow landfills and thus applied to these SWDS a methane correction factor of 0.4 from the 2006 IPCC Guidelines (vol. 5, chap. 3, table 3.1, p.3.14). In its clarifications to the list of provisional main findings, the Party referred to the information in the NIR (p.381), which indicated that it chose the methane correction factor values used in its calculations on the basis of data on dependency of the depth of landfills on the mass of waste disposed of and the size of the population covered (Abramov, 1991), information on landfills from the State Register of Waste Disposal Facilities (Rosprirodnadzor, 2018) and information on dumps (All-Russian Popular Front, 2018), as well as data based on expert judgment. The Party also indicated that in the absence of accurate data, a conservative approach was used to ensure that emissions were not underestimated. However, the ERT considered that this information did not transparently justify the use of a methane correction factor of 0.4 for unmanaged landfills, as provided for shallow unmanaged landfills in the 2006 IPCC Guidelines (vol. 5, chap. 3, table 3.1, p.3.14).
W.5	5.A.2 Unmanaged waste disposal sites – CH_4 (W.12, 2018) Accuracy	Revise the estimates for 5.A.2 unmanaged waste disposal sites, if necessary, based on the careful consideration of the AD used and a correct classification of unmanaged waste disposal sites and open shallow dumps.	Resolved. The ERT noted that the Party did not revise the estimates for category 5.A.2 unmanaged waste disposal sites. However, in its clarifications to the list of provisional main findings, the Party indicated that it considered using a methane correction factor of 0.4 for category 5.A.2 unmanaged waste disposal sites to be correct. The ERT considered the recommendation addressed, but noted that the related issue of transparency is still not fully resolved (see ID# W.4 above).

ID#	*Issue/problem classification*[a, b]	*Recommendation made in previous review report*	*ERT assessment and rationale*
W.6	5.B.1 Composting – CO_2, CH_4 and N_2O (W.6, 2018) (W.7, 2017) Accuracy	Evaluate the differences observed in the CH_4 and N_2O IEFs used for the period 1990–2014 and 2015, apply the correct value in the emission estimates, as appropriate, and ensure the consistency of the time series.	Resolved. The Party reported constant CH_4 and N_2O IEFs in CRF table 5.B for 1990–2018 (8 g CH_4/kg waste and 0.48 g N_2O/kg waste), thus eliminating the previously identified discrepancies and ensuring a consistent time series of these parameters. The ERT noted that the reported CH_4 and N_2O IEFs differ from the default CH_4 and N_2O EF values (10 g CH_4/kg waste and 0.6 g N_2O/kg waste) specified in the 2006 IPCC Guidelines (vol. 5, chap. 4, table 4.1, p.4.6). During the review, the Party indicated that it assumed moisture content in wet waste to be 50 per cent; however, the ERT noted that the 2006 IPCC Guidelines (vol. 5, chap. 4, table 4.1, p.4.6) provide EF values for dry waste assuming a moisture content in wet waste of 60 per cent. Nevertheless, the ERT noted that the Party calculated emissions using wet waste as AD and correctly applied the IPCC default EF for wet waste from the aforementioned table 4.1 of the 2006 IPCC Guidelines, meaning that the calculated emissions were in line with the 2006 IPCC Guidelines and not underestimated. However, the reported CH_4 and N_2O IEFs in CRF table 5.B, expressed in dry waste, differ from the default EF values owing to the difference in assumed moisture content, which the ERT believes needs to be corrected.
W.7	5.C.1 Waste incineration – CO_2 (W.13, 2018) Transparency	Correct the value used for amount of MSW incinerated for 2000 in the NIR.	Resolved. The Party reported the correct value for the amount of MSW incinerated for 2000 (0.39 Mt) in table 7.5 of the NIR (p.385).
W.8	5.D.1 Domestic wastewater – CH_4 (W.8, 2018) (W.8, 2017) Transparency	Use the notation key "NO" for the reporting of CH_4 flaring in CRF table 5.D and provide an explanation in the NIR that combustion of CH_4 in flares does not occur, and include a more detailed description in the NIR on how the amount of CH_4 combusted for energy recovery is calculated.	Addressing. The Party reported CH_4 flared using the notation key "NO" in CRF table 5.D, but did not explain in the NIR that combustion of CH_4 in flares did not occur in the country. In its NIR (p.402) the Party provided a brief description of how the amount of CH_4 combusted for energy recovery was calculated. The ERT was able to reproduce the amount of CH_4 combusted on the basis of this description.
W.9	5.D.1 Domestic wastewater – CH_4 (W.14, 2018) Accuracy	Collect relevant data on sludge removal since 1998 in Saint Petersburg (consistent with data presented in table 7.10 of the NIR) necessary for applying correctly the general equation 6.1 of the 2006 IPCC Guidelines (vol. 5, chap. 6, p.6.11) to estimate CH_4 emissions for category 5.D.1 domestic wastewater, or if this is not possible for the next annual submission, assume no sludge removal from the Saint Petersburg facility.	Resolved. The Party reported the amounts of sewage sludge removal in Saint Petersburg for 1998 onward in table 7.10 of the NIR (p.396) and used these data to estimate CH_4 emissions for category 5.D.1 domestic wastewater.
W.10	5.D.1 Domestic wastewater – CH_4 and N_2O	Enhance the transparency of the NIR by providing further details of the characterization of the various wastewater treatment systems and discharge pathways in the country in accordance with figure	Addressing. The Party improved its description of the various wastewater treatment systems and discharge pathways in the country in section 7.5.2.1 of the NIR (pp.397–402). The ERT considered that the recommendation has not yet been fully addressed because the Party has not yet specified how the use of these

ID#	Issue/problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
	(W.15, 2018) Transparency	6.1 of the 2006 IPCC Guidelines (vol. 5, chap. 6, p.6.7) and provide information on how the use of these systems has evolved over time, in particular by providing a justification for the declining trend in the population using the fourth type of treatment system presented in table 7.12 of the NIR.	systems has evolved over time or, in particular, justified the decline in the population using the fourth type of treatment system. During the review, the Party indicated that there is an autonomous decrease in the use of latrines owing to an increasing gross domestic product and increasing hygiene standards. The ERT considered the explanation on the trend observed in the use of the fourth type of treatment system to be satisfactory and that this information could be included in the NIR in order to fully address the recommendation.
KP-LULUCF			
KL.1	General (KP-LULUCF) – (KL.1, 2018) (KL.2, 2017) (KL.2, 2016) (KL.2, 2015) KP reporting adherence	Ensure the consistency of the total area in CRF table NIR-2 with the area reported in CRF table 4.1.	Resolved. The Party reported consistently the total land area in CRF tables NIR-2 and 4.1 for all years from 2013 to 2018.
KL.2	Deforestation – CO_2 (KL.4, 2018) (KL.9, 2017) Transparency	Provide in CRF table 4(KP-I)A.2 under "Information items" the correct AD. Specifically: for "total for activity" (cell C21), the total accumulated area as reported for "total activity A.2" (cell C11); and considering that under "forest land" (cell C22) should be reported area subject to past deforestation events, provide under other land-use categories (cells C23 to C27) the area related to destination land-use categories after deforestation.	Resolved. The ERT noted that the correct area values were reported in CRF table 4(KP-I)A.2 under "Information items" for "Total for activity (kha)" (cell C21) for all years from 2013 to 2018, which correspond to the area values reported under "Total for activity A.2" (cell C11). The Party also correctly reported the area under other land-use categories (cells C23 to C27) in relation to the destination land-use categories after deforestation.
KL.3	Deforestation – CO_2, CH_4 and N_2O (KL.6, 2018) KP reporting adherence	Use the detailed data from the Federal Forestry Agency on forest conversion to all types of land for 2008–2016 for each region to identify the area subject to deforestation in all years for which it is available and ensure time-series consistency in order to demonstrate that it meets the requirements of decision 2/CMP.7, annex, paragraph 25, and decision 2/CMP.8, annex II, paragraph 2(b)(i).	Addressing. The Party explained in section 10.3.1.3 of the NIR (p.418) that it used data from both the Federal Forestry Agency and Rosstat on forest conversion to all types of land use for 2008–2016 for each region to identify areas subject to deforestation, and presented these data in table 6.54 of the NIR (p.321). The information on the use of data from the Federal Forestry Agency was confirmed by the Party during the review. However, the ERT identified several inconsistencies in the information on areas reported in CRF table NIR-2 (see ID# KL.7 in table 5) and therefore could not assess whether time-series consistency had been ensured.
KL.4	FM – CO_2, CH_4 and N_2O (KL.7, 2018) Completeness	Continue reporting under FM activities those areas of managed forest that leave the database of the Federal Forestry Agency because of the decision to stop managing them, and estimate emissions and removals associated with these areas. Report in the NIR all such transitions at the regional level to demonstrate compliance with the principle of accounting (i.e. that areas once reported and	Not resolved. The ERT identified several inconsistencies in the information reported in CRF table NIR-2 (see ID# KL.7 in table 5) when taking into account the information reported for FM in CRF table 4(KP-I)B.1. The ERT noted that the Party did not report in the NIR all transitions from managed to "unmanaged" forests at the regional level as a result of being removed from the database of the Federal Forestry Agency. Therefore, the ERT was unable to assess whether FM areas converted to "unmanaged" forests continue to be included under FM activities and comply with the principle of accounting, whether associated

ID#	*Issue/problem classification*[a, b]	*Recommendation made in previous review report*	*ERT assessment and rationale*
		accounted under an activity under Article 3, paras. 3–4, of the Kyoto Protocol must stay and be accounted under that activity), and ensure the correct reporting at the level of the geographical areas defined by the Russian Federation.	emissions and removals were reported and whether the Russian Federation ensured correct reporting at the level of the geographical areas defined by the Party. During the review, the Party explained that emissions and removals associated with FM areas that were removed from the database of the Federal Forestry Agency (change in the "management status") as a result of the decision to stop managing them were included in the GHG inventory. However, the ERT noted that, although an annually increasing FM area was reported in CRF table 4(KP-I)B.1 for all years of the second commitment period of the Kyoto Protocol (2013–2018), this increase is not justified by the new area entering to the accounting under the FM activity and the area transferred from the FM activity to deforestation. For example, the FM area increased by 2,267.15 kha between 2017 and 2018 as reported in CRF table 4(KP-I)B.1, but in CRF table NIR-2 only an area of 1,225.39 kha entered to the accounting under the FM activity in 2018, while an FM area of 5.56 kha was deforested in the same year.
KL.5	FM – CO_2 (KL.8, 2018) Comparability	Report urban forests as a subcategory under FM for reporting under the Kyoto Protocol.	Resolved. The ERT noted that the Party included carbon stock changes from urban forests under FM activities by reporting them as a new stratum named "managed forest (urban forests)" in CRF table 4(KP-I)B.1.

[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 the Russian Federation 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 is 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 the Russian Federation, 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 the Russian Federation

ID#	*Previous recommendation for the issue*	*Number of successive reviews issue not addressed*[a]
General		
G.1	Report in the NIR any changes that have occurred to the information provided on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol.	3 (2017–2020)
G.5	Improve the QA/QC process undertaken on the NIR and report on the improvements made in the NIR.	3 (2017–2020)

ID#	*Previous recommendation for the issue*	*Number of successive reviews issue not addressed*[a]
Energy		
E.1	Review the use of notation keys for all categories in the energy sector and ensure the appropriate selection of notation keys for the complete time series.	7 (2012–2020)
IPPU		
I.8	Investigate and, as appropriate, resolve the discrepancy in reporting the CO_2 emissions from the NEU of fuels excluded from the energy sector (indicated as reported under non-energy products from fuels and solvent use in CRF table 1.A(d)) and those actually reported in the inventory in the IPPU sector under category 2.D (non-energy products from fuels and solvent use in CRF table 2(I).A-H (sheet 2)); and explain the reporting of NEU for the category 2.D in the NIR.	4 (2015/2016–2020)
I.10	Provide an estimate for urea use in selective catalytic reduction (under category 2.D.3) using diesel consumption in road transportation and applying equation 3.2.2 from the 2006 IPCC Guidelines (vol. 2, chap. 3.2.1.1, p.3.12). In case emissions are insignificant, provide a justification for their exclusion in terms of the likely level of emissions, in accordance with the requirements in paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines.	3 (2017–2020)
I.11	Provide in the NIR a better explanation of which categories' CO_2 emissions from significant uses of urea are reported, including the provision of data on export/import of urea (e.g. as a trade balance).	3 (2017–2020)
Agriculture	No issues identified.	
LULUCF	No issues identified.	
Waste		
W.8	Use the notation key "NO" for the reporting of CH_4 flaring in CRF table 5.D and provide an explanation in the NIR that combustion of CH_4 in flares does not occur, and include a more detailed description in the NIR on how the amount of CH_4 combusted for energy recovery is calculated.	3 (2017–2020)
KP-LULUCF	No issues identified.	

[a] The report on the review of the 2019 annual submission of the Russian Federation has not yet been published. Therefore, 2019 was not included when counting the number of successive years for this table. In addition, as the reviews of the Party's 2015 and 2016 annual submissions were conducted together, they are not considered successive reviews and 2015/2016 is counted as one year.

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 the Russian Federation that are additional to those identified in table 3.

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

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
General			
G.10	Further improvements (identified by the Party)	The ERT noted that in the previous review report (FCCC/ARR/2018/RUS, ID# G.9), the Russian Federation was encouraged to report information on the status of previously planned improvements and the timeline for the expected implementation of the reported planned improvements. The Party reported information on both previously and currently planned improvements in the sectoral chapters of the NIR, but did not include a timeline for the expected implementation of the reported planned improvements, nor did it provide such a timeline when requested during the review. The ERT reiterates the encouragement from the previous review report for the Russian Federation to report information on the status of previously planned improvements and the timeline for the expected implementation of the reported planned improvements, as part of its inventory management functions.	Not an issue/problem
G.11	National system	The ERT noted that the energy chapter of the NIR contained, in some cases, incorrect internal references, in particular to annexes to the NIR or appendices to the annex that were not included in the 2020 annual submission. During the review, in some of its comments on the draft assessment report on the GHG inventory of the Russian Federation submitted in 2020 for the energy sector or in its responses to questions from the ERT on energy sector issues, the Party referred to specific pages or sections of the NIR where information related to the findings or questions was provided; however, the ERT noted that the relevant information was not or only partially included in the NIR. In addition, in some responses to questions from the ERT on energy sector issues and in some of its clarifications to the list of provisional main findings for the energy sector, the Party referred to specific annexes to the NIR or appendices to the annex that were not included in the 2020 annual submission (see ID#s E.5, E.8, E.10, E.11, E.13, E.17, E.18, E.19, E.21 and E.22 in table 3). During the review, the Party did not provide further clarification on these issues. The ERT therefore concluded that some specific functions of the national system of the Russian Federation, for instance those related to implementing general QC procedures (tier 1) in accordance with the QA/QC plan and responding to requests for clarifying inventory information resulting from the different stages of the review process for the energy sector, were not fully operational as part of the inventory preparation and inventory management functions of the national system, in accordance with decision 19/CMP.1, annex, paragraphs 14(g) and 16(c), in conjunction with decisions 3/CMP.11 and 4/CMP.11. The ERT recommends that the Russian Federation make fully operational the inventory preparation and management functions of its national system related to implementing general QC procedures (tier 1) and responding to requests for clarifying inventory information resulting from the different stages of the review process for the energy sector, as described in decision 19/CMP.1, annex, paragraphs 14(g) and 16(c), in conjunction with decisions 3/CMP.11 and 4/CMP.11, and provide comprehensive information in the NIR on the specific actions and	Yes. KP reporting adherence

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
		steps taken to ensure that the indicated inventory preparation and management functions are fully operational in the 2021 annual submission. The ERT also recommends that the Party verify and correct the internal references in the energy chapter of the NIR, in particular references to the annex to the NIR or appendices to the annex.	
G.12	Uncertainty analysis	The ERT noted that in the previous review report (FCCC/ARR/2018/RUS, ID# G.12), the Russian Federation was encouraged to expand its use of approach 2 for the uncertainty analysis to cover the entire inventory, instead of only using it for some categories (e.g. in the agriculture sector). The ERT noted, however, that the Party did not make any improvements in this regard in the 2020 annual submission. During the review, the Party clarified that it is currently developing a specialized software application for performing approach 2 for the uncertainty analysis, but did not provide further information. The ERT reiterates the encouragement from the previous review report for the Russian Federation to expand its use of approach 2 for the uncertainty analysis to cover the entire inventory.	Not an issue/problem
G.13	Other	The ERT noted that in the previous review report (FCCC/ARR/2018/RUS, ID# G.10), the Russian Federation was encouraged to report estimates of indirect CO_2 and N_2O emissions, but such estimates were not included in the 2020 annual submission. During the review, the Party clarified that the estimation and reporting of indirect CO_2 and N_2O emissions will be considered further in future annual submissions. The ERT reiterates the encouragement from the previous review report for the Russian Federation to report estimates of indirect CO_2 and N_2O emissions.	Not an issue/problem
Energy			
E.24	Fuel combustion – reference approach – all fuels – CO_2	The ERT noted that in the previous review report (FCCC/ARR/2018/RUS, ID# E.8), the Russian Federation was encouraged to continue investigating and to report on the reasons for the gap between the reference and sectoral approaches. The ERT also noted that the Party reported information on the reference and sectoral approaches in its NIR (pp.29–30), indicating that the difference in reported CO_2 emissions between the reference and sectoral approaches is 5.04 per cent for 2018 and explaining the reasons (e.g. energy losses) for this difference. The ERT noted that the explanation provided was rather general, and in particular it noted that the Party did not provide a further analysis of the differences by fuel type (22.67 per cent for liquid fuels, –7.89 per cent for solid fuels and 7.18 per cent for gaseous fuels). During the review, the Party clarified that it plans to continue investigating and reporting on the causes of possible gaps between the reference and sectoral approaches. The ERT reiterates the encouragement from the previous review report for the Russian Federation to continue investigating the reasons for the difference in reported CO_2 emissions between the reference and sectoral approaches and to report the results in the NIR, in particular analysing the differences by fuel type (e.g. liquid fuels, solid fuels, gaseous fuels, other fossil fuels and peat), paying particular attention to liquid, solid and gaseous fuels, with the aim of reducing gaps as much as possible, and ensuring that the sectoral approach estimates are as accurate as possible.	Not an issue/problem
E.25	1.A.4.c Agriculture/forestry/ fishing –	The ERT noted that the CH_4 and N_2O IEFs for subcategory 1.A.4.c.ii off-road vehicles and other machinery (gasoline) reported in CRF table 1.A(a) (sheet 4) were 110.00 kg/TJ and 1.20 kg/TJ, respectively. The ERT also noted that the Russian Federation seems to have calculated these values on the basis of the average of the default EFs for motor gasoline (two-stroke engines: 80 kg CH_4/TJ and 2 kg N_2O/TJ; and four-stroke engines: 140 kg	Yes. Transparency

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
	gasoline – CH_4 and N_2O	CH_4/TJ and 0.4 kg N_2O/TJ) provided in the 2006 IPCC Guidelines (vol. 2, chap. 3, table 3.3.1, p.3.36), but the rationale used to derive these calculated values was not explained in the NIR (see ID# E.14 in table 3). During the review, the Party confirmed that it used the default EFs for CH_4 and N_2O from the 2006 IPCC Guidelines for estimating emissions for subcategory 1.A.4.c.ii off-road vehicles and other machinery and referred to related information on improvements in the NIR (pp.67–68) for additional explanations. However, the ERT noted that this part of the NIR did not provide further information on the choice and calculation of the CH_4 and N_2O EFs used for this subcategory. The ERT recommends that the Russian Federation provide in the NIR clear explanations and the rationale underlying the choice and calculation of the CH_4 and N_2O EFs used for estimating CH_4 and N_2O emissions for subcategory 1.A.4.c.ii off-road vehicles and other machinery (gasoline).	
E.26	1.B.1.a Coal mining and handling – solid fuels – CH_4	The Party reported in tables 3.26 and 3.28 of the NIR (pp.88–89) the country-specific CH_4 EFs used for estimating emissions from mining and post-mining activities for subcategory 1.B.1.a.i underground mines under subcategory 1.B.1.a coal mining and handling for different districts, including the reference sources for these country-specific CH_4 EFs (Gas Content of Coal Basins, 1979; Malishev and Ayruni, 1999). However, it did not include in the NIR any further information on the development and verification of the country-specific CH_4 EFs for these subcategories and activities. During the review, the Party clarified that explicit explanations on how the country-specific CH_4 EFs for category 1.B.1 solid fuels were developed are provided in the study "Methane Emissions from Coal Mining in Russia" (Tailakov et al., 2009), which was provided to the ERT. The ERT analysed the information provided and concluded that this study does not clearly explain the development process of the country-specific CH_4 EFs and how they were verified for category 1.B.1 solid fuels. The ERT recommends that the Russian Federation include in its NIR a technical summary of the three key references (Gas Content of Coal Basins,1979; Tailakov et al., 2009; Malishev and Ayruni, 1999) explaining the approaches and procedures undertaken to develop the country-specific CH_4 EFs for subcategory 1.B.1.a.i underground mines and its activities, including clear information on the procedures for their verification in order to justify that they were developed in a manner consistent with the 2006 IPCC Guidelines and are considered more accurate than the IPCC default values, in accordance with paragraph 12 of the UNFCCC Annex I inventory reporting guidelines.	Yes. Transparency
E.27	1.B.1.a Coal mining and handling – solid fuels – CH_4	The Party reported in table 3.30 of the NIR (p.90) the country-specific CH_4 EFs for subcategory 1.B.1.a.ii surface mines (mining activities) under subcategory 1.B.1.a coal mining and handling for different districts of the country. The ERT noted that, on average, the country-specific EFs reported in table 3.30 were higher than the corresponding default values from the 2006 IPCC Guidelines for this subcategory (vol. 2, chap. 4.1.4.2, p.4.18). For instance, the average CH_4 EF reported in table 3.30 for surface coal mining is 3.85 m^3/t (with the highest being around 5.5 m^3/t), while in the 2006 IPCC Guidelines the highest CH_4 EF for surface coal mining is 2 m^3/t. Although the NIR reported the sources of the country-specific EFs (Gas Content of Coal Basins, 1979; 2006 IPCC Guidelines), it did not include any explanations of the significant difference between these country-specific CH_4 EFs and the IPCC default values. During the review, the Party clarified that the reason for these differences lies in the mining and geographical conditions of coal production in the Russian Federation, specifically the high gas content values of coal seams in the country's coal basins. In the Siberian Federal District, for example, the average	Yes. Transparency

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
		CH_4 EF value is 7.32 m^3/t. The ERT acknowledged the country-specific characteristics of the coal basins of the Russian Federation, but noted that this detailed information was not reported in the NIR. The ERT recommends that the Russian Federation provide in the NIR a clear explanation for the differences between the country-specific CH_4 EFs for subcategory 1.B.1.a.ii surface mines reported in table 3.30 of the NIR (p.90) and the corresponding default values from the 2006 IPCC Guidelines (vol. 2, chap. 4.1.4.2, p.4.18) and include clear information on the procedures for developing and verifying the country-specific CH_4 EFs for this subcategory in order to justify that they were developed in a manner consistent with the 2006 IPCC Guidelines and are considered more accurate than the IPCC default values, in accordance with paragraph 12 of the UNFCCC Annex I inventory reporting guidelines.	
IPPU			
I.16	2.A.4 Other process uses of carbonates – CO_2	The Party provided information on the calculation of CO_2 emissions for subcategory 2.A.4.b other uses of soda ash in the NIR (pp.106–107). The ERT noted that AD and CO_2 emissions reported under category 2.A.4.b both in the NIR and in CRF table 2(I).A-H (sheet 1) relate to total consumption of soda ash in the country, which the ERT considered not to be fully in line with the 2006 IPCC Guidelines (vol. 3, chap. 2.5.1, p.2.33), according to which emissions from soda ash consumption should be reported under the respective end-use categories in which soda ash is used. The ERT noted that it was not clear from the NIR whether the Party estimated CO_2 emissions from the use of soda ash for glass production and allocated these emissions to subcategory 2.A.4.b or whether it subtracted the estimated CO_2 emissions from the use of soda ash for glass production from the emissions under subcategory 2.A.4.b, and that neither of these approaches meet the requirements of the 2006 IPCC Guidelines (see ID# I.3 in table 3). The ERT also noted that, in the Russian Federation, soda ash may potentially be used in different industries (e.g. chemicals, pulp and paper, non-ferrous metal and ferrous metallurgy, food, petrochemical and oil refining), but the Party did not report in the NIR information on the relevant activities for which soda ash was used, explain whether such soda ash uses were emissive or provide appropriate AD for emissive soda ash applications. During the review, the Party explained that information on soda ash use disaggregated into different industries and applications is not collected by the national statistics system or by professional associations and it did not have sufficient resources to collect this information. In its clarifications to the list of provisional main findings, the Party indicated that it would require a disproportionate amount of resources to collect the AD needed to allocate CO_2 emissions from other uses of soda ash to the correct end-use categories. The ERT recommends that the Party clarify in the NIR which soda ash uses in the country are emissive and which are not, build the capacity needed to collect information on soda ash consumption for the respective end-use categories where soda ash is potentially used (e.g. chemicals, pulp and paper, non-ferrous metal and ferrous metallurgy, food, petrochemical and oil refining) and estimate and report CO_2 emissions from these applications under the respective end-use categories in the CRF tables in accordance with the 2006 IPCC Guidelines (vol. 3, chap. 2.5.1, p.2.33), as well as include transparent information in the NIR on the AD and method used for the estimates and allocation of emissions.	Yes. Comparability
I.17	2.B.8 Petrochemical and carbon black production – CO_2	The Russian Federation estimated CO_2 emissions for category 2.B.8 petrochemical and carbon black production using the tier 1 methodology from the 2006 IPCC Guidelines (vol. 3, chap. 3.9.2.1, pp.3.65–3.66). According to appendix 1 to the annex to the NIR, CO_2 emissions from this category are defined as a key category; the ERT therefore noted that a higher-tier method should be used for estimating emissions as required in the 2006 IPCC	Yes. Accuracy

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
		Guidelines (vol. 1, chap. 4.1.2, pp.4.5–4.6). The ERT also noted that information on technological processes and feedstocks used in petrochemical and carbon black production, except for ethylene dichloride and vinyl chloride monomer, was not provided in the NIR. During the review, the Party clarified that the most significant activities under category 2.B.8 are ethylene production (6,724.08 kt CO_2 in 2018), methanol production (2,939.87 kt CO_2) and carbon black production (2,695.22 kt CO_2) and stated that it plans to collect information on technologies and feedstock used for ethylene production from more than 10 plants in the country, which will require more than one inventory cycle until this improvement is fully implemented. The Party also stated that the CO_2 emissions contributed by other subcategories under category 2.B.8 petrochemical and carbon black production were not significant, therefore CO_2 emissions from these subcategories will continue to be estimated using the tier 1 method. It also clarified that it used default assumptions about technological processes and feedstocks for estimating emissions for all subcategories under category 2.B.8 petrochemical and carbon black production. The ERT recommends that the Russian Federation use higher-tier estimation methods with country-specific EFs to estimate CO_2 emissions for subcategories 2.B.8.a methanol, 2.B.8.b ethylene and 2.B.8.f carbon black, as required by the 2006 IPCC Guidelines (vol. 3, chap. 3.9.2.1, pp.3.63–3.65). The ERT also recommends that the Russian Federation include in the NIR a clear description of the methods, AD and EFs used for estimating emissions for category 2.B.8 petrochemical and carbon black production, in particular for those subcategories estimated using higher tiers, and indicate which subcategories' emissions are estimated using the relevant default assumptions from the 2006 IPCC Guidelines (vol. 3, chap. 3.9.2.2, table 3.11, p.3.72), which country-specific technological processes take place in the country and which feedstocks are used for category 2.B.8 petrochemical and carbon black production.	
I.18	2.E.1 Integrated circuit or semiconductor – PFCs	The ERT noted an inconsistency between the information provided in table 4.58 of the NIR (p.142) and CRF table 2(II).B-H (sheet 1) on AD for c-C_4F_8 consumption under category 2.E.1 integrated circuit or semiconductor for 2018. Upon analysing the IEF reported (3.83 kg/t), the ERT noted that possibly incorrect AD (6.15 t) were reported in CRF table 2(II).B-H (sheet 1). During the review, the Party confirmed the finding. The ERT recommends that the Russian Federation revise for its next annual submission the value of c-C_4F_8 consumption (AD) for 2018 in CRF table 2(II).B-H (sheet 1) under category 2.E.1 integrated circuit or semiconductor and implement or enhance the appropriate QC procedures to avoid such errors in the future.	Yes. Convention reporting adherence
I.19	2.E.2 Thin-film transistor flat panel display – HFCs, PFCs, SF_6 and NF_3	The ERT noted that the Russian Federation reported HFC emissions (and PFC, SF_6 and NF_3 emissions) under category 2.E.2 thin-film transistor flat panel display using the notation key "IE" in CRF table 2(II).B-H (sheet 1). In the NIR (p.141) the Party reported that emissions from semiconductor and LCD manufacturing were estimated together owing to lack of AD. However, the ERT noted that the Party did not clearly explain the notation key used or allocation of emissions in CRF table 9 or the documentation box to CRF table 2(II).B-H (sheet 1). During the review, the Party acknowledged these issues and indicated that it plans to provide consistent and transparent information on its use of notation keys in the next annual submission. The ERT recommends that the Party report in CRF table 9, CRF table 2(II).B-H (sheet 1) and the NIR clear and consistent information on the use of notation keys and allocation of all HFC emissions (and PFC, SF_6 and NF_3 emissions, if relevant) under category 2.E.2 thin-film transistor flat panel display.	Yes. Transparency

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
I.20	2.F.1 Refrigeration and air conditioning – HFCs and PFCs	The ERT noted that the Russian Federation reported emissions of HFC-23, HFC-152a and PFC-218 from manufacturing under subcategory 2.F.1.c industrial refrigeration in CRF table 2(II).B-H (sheet 2) using the notation key "IE", but did not explain the notation key used or allocation of emissions under this subcategory in the NIR and CRF table 9 or in the documentation box to CRF table 2(II).B-H (sheet 2). During the review, the Party acknowledged these issues and indicated that it plans to report consistent and transparent information on its use of notation keys in the next annual submission. The ERT recommends that the Party report in the NIR and CRF table 9, and, if possible, in the documentation box to CRF table 2(II).B-H (sheet 2) clear and consistent information on and explanations of the notation keys used and allocation of emissions of HFC-23, HFC-152a and PFC-218 from manufacturing under subcategory 2.F.1.c industrial refrigeration.	Yes. Transparency
I.21	2.F.1 Refrigeration and air conditioning – HFCs	The ERT noted that the Russian Federation stated in the NIR (p.147) that HFC emissions for subcategory 2.F.1.d transport refrigeration were included under subcategory 2.F.1.c industrial refrigeration. However, the Party did not use any notation keys for reporting emissions for subcategory 2.F.1.d in CRF table 2(II).B-H (sheet 2). During the review, the Party acknowledged this issue and indicated that it plans to revise its use of notation keys in CRF table 2(II).B-H (sheet 2) for subcategory 2.F.1.d for the next annual submission. The ERT recommends that the Party use the appropriate notation keys for subcategory 2.F.1.d transport refrigeration in CRF table 2(II).B-H (sheet 2) and report in the NIR and CRF table 9 clear and consistent information on and explanations of the notation keys used and allocation of HFC emissions under this subcategory.	Yes. Transparency
I.22	2.F.5 Solvents – HFCs	The ERT noted that the Russian Federation reported HFC-245fa emissions under category 2.F.5 solvents using the notation key "NE" in CRF table 2(II).B-H (sheet 2), justifying in the NIR (pp.153–154) that such emissions were insignificant as they did not exceed 1.03 kt CO_2 eq for 2014–2018, which is equivalent to 0.00005 per cent of the national total emissions excluding LULUCF in 2018, thus below the threshold of significance for the Russian Federation (0.05 per cent of the total national emissions in 2018, and not exceeding 500 kt CO_2 eq); however, neither CRF table 9 nor the documentation box to CRF table 2(II).B-H (sheet 2) explained the choice of notation key or the level of significance of HFC-245fa emissions. The ERT recommends that the Party clearly explain in CRF table 9 its use of the notation key "NE" for HFC-245fa emissions under category 2.F.5 solvents, consistently with the explanation reported in the NIR, and include in the documentation box to CRF table 2(II).B-H (sheet 2) a relevant reference to the section of the NIR where this explanation is provided.	Yes. Transparency
I.23	2.G.2 SF_6 and PFCs from other product use – SF_6	The Russian Federation reported in CRF table 2(II).B-H (sheet 2) SF_6 emissions for subcategory 2.G.2.a military applications under category 2.G.2 SF_6 and PFCs from other product use using the notation key "NO". It also reported in the NIR (p.156) that SF_6 is not used in AWACS aircraft equipment, but did not provide any further information supporting this statement in the NIR. During the review, the Party did not provide further information. The ERT recommends that the Party include in the NIR relevant information and documentation justifying the use of the notation key "NO" for SF_6 emissions for subcategory 2.G.2.a military applications.	Yes. Transparency

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
I.24	2.G.2 SF_6 and PFCs from other product use – PFCs and SF_6	The ERT noted that the Russian Federation did not provide information in the NIR on the occurrence of activities (other than AWACS) in the country that use PFCs or SF_6 under subcategory 2.G.2.a military applications, which also includes other military applications that may be associated with PFC and SF_6 use (ground and airborne radars, sonars, stealth aircraft, ships and submarines, etc.), as defined in the 2006 IPCC Guidelines (vol. 3, chap. 8.3.2.1, pp.8.25–8.26). The ERT encourages the Russian Federation to investigate whether PFC or SF_6 emissions occur in the country under subcategory 2.G.2.a military applications (other than AWACS), report this information in the NIR and, if occurring, estimate and report emissions from these applications, as defined in the 2006 IPCC Guidelines (vol. 3, chap. 8.3.2.1, pp.8.25–8.26), as well as include information in the NIR on the methods, AD and EFs used. The ERT also encourages the Party to include in the NIR relevant information and documentation for applications under subcategory 2.G.2.a military applications, as defined in the 2006 IPCC Guidelines, which do not use PFCs or SF_6.	Not an issue/problem
I.25	2.G.2 SF_6 and PFCs from other product use – PFCs and SF_6	The ERT noted that the Russian Federation did not provide information in the NIR on the occurrence of activities in the country that use PFCs or SF_6 under subcategories 2.G.2.c sound-proof windows, 2.G.2.d adiabatic properties: shoes and tyres or 2.G.2.e other (e.g. sound-proof windows, adiabatic applications in shoes and tyres, PFCs used as heat transfer fluids in commercial and consumer applications, gas-air tracers in research and leak detectors), as defined in the 2006 IPCC Guidelines (vol. 3, chap. 8.3.1, p.8.23). During the review, the Party clarified that it found no evidence of SF_6 being used in adiabatic applications or sound-proof windows in the country. The ERT considered that this issue could result in PFC or SF_6 emissions for category 2.G.2 SF_6 and PFCs from other product use being underestimated. The ERT recommends that the Party investigate whether PFC or SF_6 emissions occur in the country under subcategories 2.G.2.c sound-proof windows, 2.G.2.d adiabatic properties: shoes and tyres and 2.G.2.e other from activities defined in the 2006 IPCC Guidelines (vol. 3, chap. 8.3.1, p.8.23), report this information in the NIR, and, if occurring, estimate and report emissions from these activities as recommended by the 2006 IPCC Guidelines, including information in the NIR on methods, AD and EFs used.	Yes. Completeness
Agriculture			
A.13	3.A.1 Cattle – CH_4	The ERT noted that the Party reported in the NIR (p.168) the use of a value for Y_m (0.065 per cent) that is below the range of default values (3–6.5 per cent) provided in the 2006 IPCC Guidelines (vol. 4, chap. 10.3.2, table 10.12, p.10.30). The constant value for Y_m reported in CRF table 3.A (sheet 1) for category 3.A.1 cattle (0.065 per cent) for 1990–2018 is the lowest reported by any of the Parties included in Annex I to the Convention. During the review, the Party confirmed that the Y_m value reported in CRF table 3.A (sheet 1) and in the NIR (p.168) was incorrect and the correct value used in the estimates was 6.5 per cent for 1990–2018, thus not impacting the emission estimates. The ERT recommends that the Party correct the reporting of Y_m values for category 3.A.1 cattle in CRF table 3.A (sheet 1) and in the NIR for all years of the time series for the next annual submission.	Yes. Convention reporting adherence
A.14	3.A.1 Cattle – 3.B.1 Cattle – 3.D.a Direct N_2O	The Party estimated CH_4 emissions from dairy and non-dairy cattle using a country-specific methodology based on feed unit statistical data at the regional level. The ERT noted that according to the tier 2 method from the 2006 IPCC Guidelines (vol. 4, chap. 10.2.4, p.10.23), country-specific EFs should be developed for estimating emissions	Yes. Transparency

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue/problem?[a]
	emissions from managed soils CH_4 and N_2O	from a particular subspecies which is determined to be significant, and a characterization of animals should be performed to support this development. The 2006 IPCC Guidelines also indicate that research for estimating emission levels from non-characterized species is encouraged and that the data and methods used to characterize the animals should be well documented. The ERT also noted that the Party adopted a country-specific method for estimating GE for dairy and non-dairy cattle using equation 5.1 of the NIR (p.168), but the method or the equation were not fully transparently described in the NIR or compared with the results of estimates for this parameter based on net energy components in line with the tier 2 method from the 2006 IPCC Guidelines (vol. 4, chap. 10.2.2, equation 10.16, pp.10.15–10.21) with the aim of demonstrating consistency of the country-specific method with the method from the 2006 IPCC Guidelines. During the review, the ERT was not able to replicate the results of the emission estimates for category 3.A.1 cattle (i.e. estimates of dietary net energy concentration of compound from animal diet at the regional level, calculations of the percentage of daily dry matter intake per head per year from the feed units, calculations of GE per head per year and subsequently estimates of the EFs) (see ID# A.5 in table 3). In addition, the ERT noted that, since CH_4 emissions for category 3.A.1 cattle constitute a key category and enhanced population characterization data are available, a tier 2 method should be used to estimate emissions, as per figure 10.2 of the 2006 IPCC Guidelines (vol. 4, chap. 10.3.1, p.10.25). The ERT also noted that the method used for estimating emissions from enteric fermentation affects CH_4 and N_2O emission estimates for manure management and N_2O emission estimates for direct inputs of manure into soil (see ID#s A.2, A.5, A.6 and A.8 in table 3). In its clarifications to the list of provisional main findings, the Russian Federation acknowledged the issue with feed units and stated that it is working to resolve it. The ERT recommends that the Party provide in the NIR a dimensional analysis of equation 5.1 used to estimate GE with the aim of examining and confirming the relationship between different physical quantities in the equation and measurement units and show how these dimensions are tracked when performing calculations. The ERT also recommends that the Party provide clear information in the NIR demonstrating consistency of the country-specific method for estimating CH_4 emissions from dairy and non-dairy cattle with the tier 2 method from the 2006 IPCC Guidelines, including in particular a calculation of GE that follows the method from the 2006 IPCC Guidelines based on net energy components (vol. 4, chap. 10.2.2, equation 10.16, p.10.21), an analysis of the relationship between GE and the feed unit used in the country-specific method, and information on the sum of the net energy used by cattle. In addition, the ERT recommends that the Party provide in the NIR an analysis of the relationship between GE, CH_4 EFs and milk yield for the most relevant regions of the country, and for the Moscow and Leningrad regions at a minimum.	
A.15	3.B.5 Indirect N_2O emissions – N_2O	The Russian Federation reported indirect N_2O emissions from N leaching and run-off using the notation key "NE" in CRF table 3.B(b), but did not provide any further information on its use of this notation key in the NIR or CRF table 9. During the review, it explained that emissions from N leaching and run-off were not estimated because, according to the 2006 IPCC Guidelines (vol. 4, chap. 10.5.1, p.10.54), the EF for indirect N_2O emissions is assumed to be zero. The ERT noted that the Party indicated in its NIR (p.189) that a tier 2 or higher method would need to be developed to estimate and include indirect N_2O emissions from leaching and run-off for category 3.B.5 indirect N_2O emissions in the inventory. The ERT agreed with the explanation provided by the Party during the review and acknowledged that the 2006 IPCC Guidelines do not explicitly provide default data for the fraction of managed manure N losses due to run-off and leaching (known as "$Frac_{leachMS}$"), as this fraction is highly uncertain and estimating N losses from leaching and run-off should be considered as part of the tier 2 method.	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 include relevant information on the use of the notation key "NE" for indirect N_2O emissions from N leaching and run-off under category 3.B.5 indirect N_2O emissions in the NIR and CRF table 9.	
LULUCF			
L.27	4. General (LULUCF)	The ERT noted that the Russian Federation did not include any information in the NIR on which subcategories and carbon pools were significant for each key category identified and reported in the appendix 1 to the annex to the NIR (pp.3–12) and in CRF table NIR-3. The ERT noted that, according to the 2006 IPCC Guidelines (vol. 1, chap. 4.2, p.4.8; and vol. 4, chap. 1.3.3, pp.1.12–1.13), it is good practice to use the significance of carbon pools and subcategories to determine which tier method should be used to estimate GHG emissions and removals from sources and sinks. During the review, the Party explained that it had not performed a significance analysis.	Yes. Convention reporting adherence
		The ERT recommends that the Russian Federation perform an analysis to determine which carbon pools and subcategories are significant in each key category in accordance with the 2006 IPCC Guidelines (vol. 1, chap. 4.2, p.4.8; and vol. 4, chap. 1.3, pp.1.12–1.13), and report in the NIR detailed information on the results of this analysis.	
L.28	4. General (LULUCF)	The ERT noted that the Russian Federation reported conversions from managed to unmanaged land, both within the same land-use category (e.g. managed forest land to unmanaged forest land) and between different land-use categories (e.g. cropland to unmanaged grassland). During the review, the Party explained that, after a managed land is converted to unmanaged land, associated emissions and removals from unmanaged land are not considered in the GHG inventory. However, the ERT noted that in accordance with 2006 IPCC Guidelines (vol. 4, chap. 1.3.3, pp.1.12–1.13; vol. 4, chap. 2.3.1.1, p.2.13; and vol. 4, chap. 4.1, p.4.7) the default transition period assumed for carbon stocks, especially in the soil carbon pool, to come to an equilibrium after a land-use or management change is 20 years.	Yes. Accuracy
		The ERT recommends that the Party report estimates of carbon stock changes and associated emissions and removals for conversions from managed to unmanaged land for the entire time series, until the managed land under transition reaches the new equilibrium level of carbon stocks of the unmanaged land, after which the associated emissions and removals for unmanaged land do not have to be reported. The ERT also recommends that the Party use either the IPCC default 20-year transition period or, where appropriate, a country-specific transition period according to national circumstances, in the latter case providing supporting evidence in the NIR for its definition.	
L.29	Land representation	The Party reported in section 6.2 of the NIR (pp.224–227) information on the definitions of the different land-use categories, showing in table 6.2 of the NIR (pp.226–227), the correspondence between the national land-use definitions with the IPCC land-use definitions. The ERT noted that in table 6.2, tundra areas were defined as other land. Although the Party reported areas of unmanaged forest land, grassland and wetlands and related land-use changes from and to them in table 6.3 of the NIR (p.228) and CRF table 4.1, no clear information was reported on how unmanaged forest land (types and criteria), grassland and wetlands were defined for the GHG inventory estimates. The ERT also noted that tundra areas are not characterized by insignificant carbon stocks, as the areas under other land are, and that these areas would be more appropriately classified as grassland unless they meet the definition of forest land. During the review, the Party provided detailed information on how unmanaged forest land, grassland and wetlands were defined, explaining that the other land category includes land without	Yes. Comparability

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue/problem?[a]
		vegetation, rocky ground, ice and all unmanaged land that does not fit into any of the other five categories, including tundra and disturbed lands with no significant soil carbon stocks and vegetation. The Party also explained that tundra is located in hard-to-reach regions in the north of the country that lack infrastructure and have very limited human intervention. In its clarifications to the list of provisional main findings, it confirmed that tundra areas were assigned to other land since they do not fall under any other land-use category, indicating that the national reporting of tundra under the other land category is more appropriate than including tundra under the grassland category. It also acknowledged that the soil carbon stocks in tundra reserves are not insignificant and that it considered that they are not involved in carbon stock changes due to conversions. The ERT recommends that the Party report detailed information in the NIR on how unmanaged forest land, grassland and wetlands are defined according to national land-use definitions, including information on how unmanaged land is defined. The ERT also recommends that the Party include detailed information in the NIR on the definition of the other land category, including tundra and disturbed lands with no significant soil carbon stocks and vegetation, and information on the geographical location of tundra in the country and its very limited human intervention. The ERT further recommends that the Party include tundra areas under the grassland category, and further classify tundra areas as unmanaged grassland, if applicable.	
L.30	Land representation	The Russian Federation reported land-use areas and land-use changes in CRF table 4.1 and background CRF tables 4.A–4.F. The ERT identified several inconsistencies in the information reported in these tables: (1) in CRF table 4.1, for many years and land-use categories, the initial area reported in a given year (X) was not equal to the final area in the respective previous year (X–1) (e.g. for cropland there was a discrepancy between X and X–1 of 2,948 kha in 2008; for cropland, grassland, wetlands and other land there were discrepancies in 2009; for grassland there was a discrepancy of 1,781 kha in 2010; for wetlands there was a discrepancy of 217.41 kha in 2014; and for all other land uses there were also discrepancies in 2014); (2) in CRF table 4.1, the total country area reported was not constant throughout the time series (i.e. a total country equal to 1,709,824.20 kha was reported for 1990–2007 and 2010–2013, but 1,712,771.97 kha was reported for 2008, 1,711,605.21 kha for 2009 and 1,712,519.10 kha for 2014–2018); (3) in background CRF tables 4.A–4.F, for all land-use categories the total areas reported in a given year did not match the respective total final areas reported in CRF table 4.1 in the same year (for most of the inventory years) (e.g. there was a discrepancy of 49,772 kha and 2,587 kha for forest land and cropland, respectively, in 2018); (4) in background CRF tables 4.A–4.F, the total country area, obtained as the sum of the land-use categories each year, was not equal to the total country area reported in CRF table 4.1 (e.g. there was a discrepancy of 10,883 kha for 2018); and (5) in background CRF tables 4.A–4.F, the land-use conversion areas reported could not be verified taking into account the transition period chosen by the Party and the annual land-use changes reported in CRF table 4.1 (e.g. for land converted to forest land starting from 1990, the ERT estimated land converted to forest land in 2018 at 120,501.30 kha (using a 50-year transition period), whereas the Party reported 123,127.78 kha; in another case, a difference of 2,626 kha between the value reported by the Party and the value estimated by the ERT (using a 20-year transition period) was found for land converted to wetlands for 2018) (see ID# L.3 in table 3). During the review, the Party indicated that the areas used for estimating GHG emissions and removals from the different land uses and land-use changes were those reported in background CRF tables 4.A–4.F, stating that it will analyse and correct all inconsistencies. Nevertheless, the ERT noted that estimating GHG emissions and removals from land in some cases requires use of annual areas (i.e. data reported in CRF table 4.1). This is the case, for example, in estimating the initial carbon stock change in living biomass in a land-use	Yes. Accuracy

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue/problem?[a]
		change. Therefore, the ERT noted that any inconsistency in land representation will consequently affect the estimates of GHG emissions and removals. The ERT recommends that the Party correct all the inconsistencies identified in the reporting of land representation for the next annual submission by ensuring that: (1) in CRF table 4.1, for all years and land-use categories, the initial area reported in a given year (X) is equal to the final area in the respective previous year (X–1); (2) in CRF table 4.1, the total country area reported is constant throughout the time series; (3) in the background CRF tables 4.A–4.F, for all years and land-use categories, the total areas reported in a given year match the total final areas of the respective categories reported in CRF table 4.1 for the same year; (4) the total country area obtained as the sum of the land-use categories each year from the background CRF tables 4.A–4.F is constant and equal to the total country area reported in CRF table 4.1; and (5) the reported land-use conversion areas are verified from the annual land-use changes reported in CRF table 4.1, taking into account the transition period chosen by the Party. The ERT also recommends that the Party revise its GHG emission and removal estimates as necessary to take into account corrections in the reporting of land representation, and report on the effects of the recalculations made in this regard in the respective sections of the NIR of its next annual submission.	
L.31	4.A.1 Forest land remaining forest land – CO_2, N_2O and CH_4	The Russian Federation reported in section 6.4.1.1.2 of the NIR (p.254) the methodology applied for estimating burned and clear-cut areas in forest land remaining forest land and the equations used (equations 6.5–6.6 of the NIR (p.254)), together with (1) summary estimates of temporarily unstocked forest land areas due to disturbances (felling, fires and other disturbances) obtained from the Federal Forestry Agency; and (2) the average overgrown and recovery time (in years) after the disturbances, broken down by district and disturbance type reported in table 6.17 of the NIR (p.255). During the review, the ERT asked the Party to clarify the approach used in estimating carbon stock losses, in particular (1) whether the summary estimates of temporarily unstocked areas obtained every year were "net" areas; (2) how it separated the disturbance types from the summary information; and (3) whether total living biomass (above- and below-ground) was considered in the carbon stock losses. The Party confirmed that the temporarily unstocked forest land areas obtained each year were "net" areas (i.e. areas affected by a disturbance that took place in the past, including the current year), for which relevant data were collected separately for harvested and for burned areas by local Federal Forestry Agency bodies, and that total living biomass was considered in estimating carbon stock losses, assuming a complete oxidation as a result of the disturbance. The Party also provided a file showing an example on how burned and clear-cut areas were estimated in one region and explained that it will be able to use actual data on disturbed forest land areas collected by the Federal Forestry Agency in the future. The ERT noted that actual emissions were not reported in the year in which they occurred and that the Party's approach, namely accounting of emissions from disturbances in one year based on the "net" summary areas of disturbed lands obtained only in the same year divided by the recovery time, may result in emissions from carbon stock losses due to disturbances in forest land remaining forest land being underestimated (e.g. when the "net" area in the given year is bigger than in the previous year) or overestimated (e.g. when the "net" area in the given year is smaller than in the previous year). The ERT recommends that the Russian Federation collect and use actual data on disturbances (burned and clear-cut) for estimating carbon stock losses in forest land remaining forest land, ensuring emissions are not overestimated or underestimated, and report the actual emissions in the year in which they occur. In the meantime, the ERT also recommends that the Party report in the NIR information indicating that the temporarily unstocked forest land areas obtained each year are "net" areas, for which relevant data are collected separately for harvested	Yes. Accuracy

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
		and for burned areas by local Federal Forestry Agency bodies, and that total living biomass was considered in estimating carbon stock losses, assuming a complete oxidation as a result of the disturbance.	
L.32	4.A.1 Forest land remaining forest land – CO_2	The ERT noted that the Russian Federation reported conversions from unmanaged to managed forest land (see ID# L.28 above), which in some years of the time series were significant. In 2009, for example, 43.17 million ha unmanaged forests was converted to managed forests. The ERT identified in CRF table 4.A a notable increase of 11.3 per cent in net CO_2 removals in forest land remaining forest land in 2009 compared with the level reported in the previous year, found to be driven mainly by carbon stock gains in living biomass (11.3 per cent). Similar notable increases in net carbon stock gains were identified in the deadwood (15.7 per cent), litter (4.0 per cent) and mineral soils (4.8 per cent) pools for 2009 compared with the remaining years in the inventory time series. During the review, the Party explained that the increase in net carbon stock gains was the result of an increase in the area of managed forests in 2009 due to the conversion of unmanaged forest land to managed forest land, but did not elaborate on how carbon stock changes in all carbon pools were calculated in such cases. The ERT was unable to assess whether these increases in carbon stock changes represented actual increases or an artifact, namely appearing incorrectly as a carbon stock increase merely due to the entry of unmanaged forest land to the inventory and the change in the area. In its clarifications to the list of provisional main findings, the Russian Federation indicated that it applied the same methods for estimating carbon stock changes in all carbon pools for unmanaged forest land converted to managed forest land as those applied for managed forest land. The ERT recommends that the Party provide in the NIR a detailed explanation of how carbon stock changes in all carbon pools are estimated for unmanaged forest land converted to managed forest land, in particular in the year of conversion, including information on the equation(s) used, the values of the parameters used in the equations before and after the conversion and their source(s), and how consistency in the treatment of land area used to estimate carbon stock changes is ensured in order to prevent erroneous inferences regarding increases in carbon stock changes merely due to increases in the managed forest land area.	Yes. Transparency
L.33	4.A.1 Forest land remaining forest land – CO_2, N_2O and CH_4	The Party reported in section 6.4.1.1.1 of the NIR (p.234) that forest land used for defence and security was converted to managed forest land in 1993. However, the ERT noted that carbon stock changes in this land were first reported in 1998. During the review, the Party explained that carbon stock changes and associated emissions and removals from these managed forest land areas were reported from 1998 because the data obtained from the Federal Forestry Agency only covered the years from 1998 onward, but the inventory improvement plan includes activities for obtaining data for these forests dating back to 1993. The ERT recommends that the Russian Federation collect data and report carbon stock changes and associated emissions and removals from forest land used for defence and security for 1993 onward, ensuring time-series consistency, and include related relevant data and information in the NIR.	Yes. Completeness
L.34	4.A.1 Forest land remaining forest land – CO_2, N_2O and CH_4	The ERT noted that the Russian Federation's definition of managed forest land included shrub vegetation for the GHG inventory under the Convention, while shrub land areas were excluded from the forest definition under the Kyoto Protocol as reported in section 10.3.1.1 of the NIR (p.417). However, the shrub land area was estimated at approximately 45.9 million ha according to the information reported in CRF tables 4.A and 4(KP-I)B.1 for 2018. The ERT also noted that the information provided by the Party during the review suggested that forest land conversions from shrub land areas did occur in the country. During the review, the ERT asked for more information on the reasons why shrub land areas were not reported as a separate stratum under the forest land	Yes. Transparency

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
		category in order to enhance the transparency of the tracking of this land under the Convention, but also in their treatment under the Kyoto Protocol. The Party explained that although it is currently possible to estimate carbon stock gains in this land, estimating carbon stock losses from disturbances in this land is difficult because data on disturbances are available at the administrative region level and not at the level of vegetation type. The ERT recommends that the Party report shrub land areas as a separate stratum under the forest land category and the associated emissions from disturbances (fires and wood removal) in the relevant CRF tables. The ERT also recommends that the Party estimate carbon stock losses and associated emissions due to disturbances on the basis of the share of these land areas in each region and the area affected by disturbances in each region until better and more accurate data become available.	
L.35	4.A.1 Forest land remaining forest land – N_2O	The ERT noted that the Party reported carbon stock changes from mineral soils in forest land remaining forest land in CRF table 4.A at the level of stratification applied for managed forest land remaining forest land (managed forests, protected areas and land for defence). According to the methodology presented in section 6.4.1.1.2 of the NIR (p.246), carbon stock changes were estimated separately for each of the main forest species in each administrative region at the zone and macroregion level, using the average age-dependent soil carbon stock values for each forest age group as reported in tables 6.23–6.26 of the NIR (pp.267–270). The ERT also noted that the Party did not report direct and indirect N_2O emissions associated with loss of SOC in CRF tables 4(III) and 4(IV), respectively. During the review, the ERT requested more information on this issue, in particular on whether SOC losses occur at the disaggregated level at which the carbon stock change estimates for the mineral soil pool were made, for example when a mature forest is clear-cut and converted to a temporarily unstocked forest land ("transfer" from mature forest to "zero" age group forest). In its response, the Party clarified that such losses of soil organic matter do occur, but are considered to be the result of a disturbance and not a change in management. However, the ERT noted that these types of changes constitute a change between a disturbance or management regime, resulting in a carbon stock change from one equilibrium level to another, and that, in accordance with the 2006 IPCC Guidelines (vol. 4, chap. 2.3.3.1, p.2.29; and vol. 4, chap. 11, equations 11.1 and 11.10, pp.11.7 and 11.21, respectively) associated direct and indirect N_2O emissions have to be reported. The ERT recommends that the Party estimate direct and indirect N_2O emissions associated with the loss of soil organic matter in mineral soils from managed forests, protected areas and land for defence under forest land remaining forest land due to a change in management, in accordance with the 2006 IPCC Guidelines (vol. 4, chap. 2.3.3.1, p.2.29; and vol. 4, chap. 11, equations 11.1 and 11.10, pp.11.7 and 11.21, respectively), and report these emissions in CRF tables 4(III) and 4(IV), respectively.	Yes. Completeness
L.36	4.A.1 Forest land remaining forest land – CO_2	The ERT noted that in the previous review report (FCCC/ARR/2018/RUS, ID# L.16), the Russian Federation was encouraged to include data collection on protected forests in its inventory improvement plan, but the ERT did not find relevant information in the NIR on whether the Party included data collection on these forests in its inventory improvement plan. During the review, the Party clarified that collection of data on managed forests in protected areas will be included in the inventory improvement plan of the 2021 annual submission, considering the possible collection of the data during 2021 for use for the 2022 annual submission. The ERT reiterates the encouragement from the previous review report for the Russian Federation to include data collection on protected forests in the improvement plan of the next annual submission.	Not an issue/problem

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
L.37	4.A.2.1 Cropland converted to forest land – CO_2, N_2O and CH_4	The Party reported in tables 6.34–6.35 of the NIR (pp.280–282) the average carbon stock values in the different carbon pools for anti-erosion and protective forest plantations used to estimate carbon stock changes in cropland converted to forest land. Since the Party's approach to estimating net carbon stock changes was incomplete in terms of estimating carbon stock losses, the Party applied a discount rate of 1.4 per cent to represent carbon losses from the soil organic matter pool, based on a national study (Kulik and Pavlovsky, 2008 (in Russian)), assuming that these losses were due to fires (see ID# L.14 in table 3). During the review, the Party clarified that this approach is traditionally applied to all carbon pools in order to account for carbon stock losses when estimating net carbon stock changes. However, the ERT noted that information on the approach used by the Party to estimate carbon stock losses from all carbon pools was not included in the NIR. Further, the ERT noted that this is an approximate approach, which could result in emissions from disturbances being underestimated or overestimated depending on whether actual annual disturbances affecting cropland areas converted to forest land result in carbon losses occurring to a greater or lesser extent, respectively, in relation to those approximated using a constant discount rate of 1.4 per cent. In its clarifications to the list of provisional main findings, the Russian Federation indicated that actual data on areas of cropland converted to forest land affected by disturbances are not collected on an annual basis. The ERT recommends that the Party collect and report actual data on the areas of cropland converted to forest land affected by disturbances, ensuring time-series consistency in the reported carbon stock changes by using, if necessary, the guidance provided in the 2006 IPCC Guidelines (vol. 1, chap. 5.3, pp.5.8–5.14). The ERT also recommends that the Party provide detailed information in the NIR on how carbon stock losses due to disturbances are estimated in all carbon pools for cropland converted to forest land.	Yes. Accuracy
L.38	4.B.1 Cropland remaining cropland – 4.C.1 Grassland remaining grassland – CO_2	The ERT noted that the Party applied the tier 1 method from the 2006 IPCC Guidelines to estimate CO_2 emissions from mineral soils in cropland remaining cropland as reported in section 6.4.2.1 of the NIR (p.284) and grassland remaining grassland as reported in section 6.4.3.1 of the NIR (p.289) and therefore reported zero carbon stock changes in CRF tables 4.B and 4.C using the notation key "NO" on the basis of the assumption that no management changes occurred in either land-use category. The assumption was not justified further in the NIR. During the review, the ERT requested the Party to provide evidence showing that no management changes occurred in cropland remaining cropland or grassland remaining grassland in the years covered by the inventory time series and prior to 1990, taking into account the transition period applied by the Party. To help clarify the issue, the ERT also provided the Party with references to publications (Hölzel et al., 2002; Latchininsky, 1995; Sorokin et al., 2016) indicating that management changes are likely to occur in cropland remaining cropland and grassland remaining grassland. However, in its response the Party did not provide the evidence requested. The ERT noted that it is very unlikely that no management changes occurred in the Russian Federation during the years covered by the inventory time series, which could include conversion of annual cropland to perennial cropland or vice versa or degradation or improvement of grassland areas. The ERT recommends that the Russian Federation either report clear evidence in the NIR that no management changes occurred in cropland remaining cropland during the years covered by the inventory time series and prior to 1990, taking into account the transition period applied by the Party in order for the carbon stock to reach the new equilibrium level, or estimate and report carbon stock changes in mineral soils in accordance with the 2006 IPCC Guidelines (vol. 4, chap. 5.2.3, p.5.15). The ERT also recommends that the Russian Federation either report clear evidence in the NIR that no management changes occurred in grassland remaining grassland during the years	Yes. Completeness

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
		covered by the inventory time series and prior to 1990, taking into account the transition period applied by the Party in order for the carbon stock to reach the new equilibrium level, or estimate and report carbon stock changes in mineral soils in accordance with 2006 IPCC Guidelines (vol. 4, chap. 6.2.3, p.6.14).	
L.39	4.C.2.2 Cropland converted to grassland – CO_2	The ERT noted that the Party reported in section 6.4.3.2.1.2 of the NIR (p.295) a cropland biomass stock value of 4.2 t C/ha for cropland conversion to grassland. The same section referred to use of an average value of 2.9 t C/ha/year for estimating carbon stock changes in biomass in cropland converted to grassland, which the ERT found reasonable. However, the ICSCF for net carbon stock changes in 1990 reported in CRF table 4.C was 1.33 t C/ha/year. During the review, the Party explained that the value of 1.33 t C/ha/year was an error when filling in the CRF tables, which will be corrected for the next annual submission.	Yes. Accuracy
		The ERT recommends that the Party apply the average value of 2.9 t C/ha/year for estimating biomass carbon stock changes in cropland converted to grassland and revise the carbon stock changes reported in CRF table 4.C for all years of the inventory.	
L.40	4.C.2.2 Cropland converted to grassland – CO_2	The ERT noted that the Party reported carbon stock gains of 9,810.92 kt C in living biomass in cropland converted to grassland in CRF table 4.C for 2011, but did not report any change for cropland to grassland in CRF table 4.1 for the same year. The ERT also noted that carbon stock changes in living biomass in cropland converted to grassland due to abrupt changes in biomass need to be reported only in the years during which cropland conversions to grassland occur. During the review, the Party explained that the identified inconsistency was an error made when filling in the CRF tables, which will be corrected for the next annual submission, but did not provide further details.	Yes. Accuracy
		The ERT recommends that the Party revise the reporting of carbon stocks in CRF table 4.C and report carbon stock changes in living biomass in cropland converted to grassland due to abrupt changes in biomass associated with the land-use change only in the years during which cropland conversions to grassland occur.	
L.41	4.E.2.1 Forest land converted to settlements – CO_2, N_2O and CH_4	The ERT noted that the Party reported in section 6.4.5.2.1.3 of the NIR (p.339) updated uncertainty values for the biomass (+/–10 per cent), deadwood (+/–32 per cent), litter (+/–62 per cent) and mineral soils (+/–65 per cent) pools under forest land conversions to settlements compared with the values reported in the 2018 annual submission, but did not provide a rationale for this update. The ERT noted, however, that although the uncertainty values for different pools have been updated in the 2020 annual submission, the combined uncertainty for forest land conversions to settlements for all gases remained the same as that reported in the 2018 annual submission, namely +/–48 per cent. During the review, the Party clarified that an error had occurred when calculating the uncertainties for forest land converted to settlements and that the uncertainties reported for forest land converted to settlements correspond to those for forest land.	Yes. Convention reporting adherence
		The ERT recommends that the Party revise the combined uncertainty for forest land conversion to settlements for all gases, using the updated uncertainty values for the biomass, deadwood, litter and mineral soil pools, as necessary. The ERT also recommends that the Party explain in the NIR the reasons for updating the uncertainty values for the different pools under forest land converted to settlements.	
L.42	4.E.2.2 Cropland converted to settlements – 4.F.2.2	The ERT noted that the Party reported an area of 438.06 kha for cropland converted to settlements and an area of 120.92 kha for cropland converted to other land for 2009 in CRF table 4.1 and that carbon stock changes in mineral soils due to cropland conversions to settlements and to other land from 2010 to 2018 were reported using the	Yes. Completeness

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue/problem?[a]
	Cropland converted to other land – CO_2 and N_2O	notation key "NO" in CRF tables 4.E and 4.F, respectively, although this period is included in the IPCC 20-year default transition period starting from 2009. In addition, direct and indirect N_2O emissions associated with losses of soil organic matter due to land-use changes were not reported in CRF tables 4(III) and 4(IV), respectively. During the review, the Party explained that the national standards applicable to the construction and improvement of new settlements indicate that changes in soil carbon stocks occur within one year. In the case of other land, it assumed a zero soil carbon stock value after conversion and therefore applied a one-year transition period. The ERT noted that the 2006 IPCC Guidelines (vol. 4, chap. 8.3.3, p.8.23, and chap. 9.3.3, p.9.7) suggest the use of a default 20-year transition period for carbon stock changes in mineral soils for cropland conversions to settlements and cropland conversions to other land. The ERT recommends that the Party consistently apply a 20-year transition period for estimating carbon stock changes in mineral soils in cropland converted to settlements and cropland converted to other land across the time series, and report associated emissions and removals in CRF tables 4.E and 4.F, respectively. The ERT also recommends that the Party estimate and report direct and indirect N_2O emissions associated with losses of soil organic matter due to cropland converted to settlements and cropland converted to other land in CRF tables 4(III) and 4(IV), respectively. If the Party applies a transition period different from the IPCC 20-year default period, the ERT recommends that it provide clear evidence that the country-specific transition period is more appropriate to its national circumstances.	
L.43	4.E.2.2 Cropland converted to settlements – CO_2	The ERT noted that the Party reported in section 6.4.5.2.2.2 of the NIR (p.341) the cropland biomass stock value of 4.2 t C/ha and the average settlements biomass value of 0.8492 t C/ha used for estimating biomass carbon stock changes in cropland conversion to settlements. However, although the difference between those two average values is –3.35 t C/ha/year, the Party reported, for example, an ICSCF of –2.50 t C/ha/year for 1991 in CRF table 4.E, which was the result of double counting the average settlements biomass stock value of 0.8492 t C/ha. During the review, the Party explained that this was due to a mistake when filling in the CRF tables which will be corrected for the next annual submission. The ERT recommends that the Party apply the correct average carbon stock values for cropland and settlements when estimating the carbon stock change in biomass in cropland converted to settlements, and correct the carbon stock changes reported in CRF table 4.E for the entire inventory time series, ensuring that the average settlements biomass stock value is not double counted.	Yes. Accuracy
L.44	4.G HWP – CO_2	The ERT noted that the Party reported in CRF table 4.G (sheet 1) that it used a 25-year half-life value for sawnwood, but did not provide any relevant information on the source of this value in the NIR. The ERT also noted that the default half-life value for solid wood products is specified as 30 years in the 2006 IPCC Guidelines (vol. 4, chap. 12, table 12.2, p.12.17), and that the default half-life value for sawnwood is given as 35 years in the Kyoto Protocol Supplement (chap. 2.8.3.2, table 2.8.2, p.2.123). Further, the ERT noted that the Party reported additional information on the factors used to convert product units to carbon in CRF table 4.G (sheet 2) using the notation key "NA" for both solid wood and paper and paperboard for 1990–2018. During the review, the Party clarified that the 25-year half-life value was reported incorrectly for sawnwood, but that it used the default 35-year half-life value for estimating carbon stock changes from sawnwood and will report information on the factors used to convert product units to carbon in the next annual submission.	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 report the correct half-life value of 35 years for sawnwood in CRF table 4.G (sheet 1) for the whole inventory time series, report in the NIR the source of the half-life values used for the HWP categories, and report the factors used to convert product units to carbon for both solid wood and paper and paperboard in CRF table 4.G (sheet 2).	
L.45	4.G HWP – CO_2	The ERT noted that in the previous review report (FCCC/ARR/2018/RUS, ID# L.27), the Russian Federation was encouraged to improve the transparency of its reporting by providing a flow chart in the NIR describing wood flows from the production of roundwood to final uses, including estimates of each flow, possibly including coarse estimates for the flows that are not constrained by available HWP statistics. The ERT did not find any relevant information in section 6.4.7 of the NIR on HWP (p.357) on a flow chart describing wood flows from the production of roundwood to final uses.	Not an issue/problem
		The ERT reiterates the encouragement from the previous review report for the Russian Federation to improve the transparency of its reporting by providing a flow chart in the NIR describing wood flows from the production of roundwood to final uses, including estimates of each flow, possibly including coarse estimates for the flows that are not constrained by available HWP statistics.	
L.46	4(III) Direct N_2O emissions from N mineralization/ immobilization – N_2O	The ERT noted that the Party reported an area of 32.37 kha for land converted to settlements in CRF table 4(III) for 2018, but in CRF table 4.E reported an area of 949.44 kha for land converted to settlements associated with the loss of SOC matter from mineral soils for the same year. During the review, the Party explained that in CRF table 4(III) it reported the annual area of land converted to settlements and in CRF table 4.E the cumulative area.	Yes. Comparability
		The ERT recommends that the Party report in CRF table 4(III) the cumulative area of land converted to settlements associated with the loss of SOC matter from mineral soils for all years of the inventory time series, in accordance with footnote (3) to CRF table 4(III).	
Waste			
W.11	5.A Solid waste disposal – CH_4	The ERT noted that in table 7.3 of the NIR (p.382) the Party presented the composition of MSW and the weighted average amount of DOC in waste for 1990, 2000, 2004, 2008 and 2012. For 2008 and 2012, the ERT could not reproduce the average amount of DOC reported. In response to a question from the ERT, the Party indicated that the MSW component "other" was omitted from the calculations for 2008 and 2012.	Yes. Accuracy
		The ERT recommends that the Party correctly calculate the weighted average amount of DOC for 2008 and 2012, including the contribution of DOC in the MSW component "other", and subsequently recalculate CH_4 emissions from SWDS under category 5.A solid waste disposal.	
W.12	5.A Solid waste disposal – CH_4	The Party indicated in the NIR (p.382) that it assumed a k value of 0.07 y^{-1} for its calculations, which constitutes the average value for wet and dry bulk waste for the boreal and temperate climate zone. In response to a question from the ERT, the Party clarified that the value for k is actually the average of the value of k for bulk waste for the dry boreal and temperate climate zone (for MAP/PET<1) and the value of k for bulk waste for the wet boreal and temperate climate zone (for MAP/PET>1), as specified in the 2006 IPCC Guidelines (vol. 5, chap. 3, table 3.3, p.3.17). It also indicated that a study is in progress to improve the characterization of the climate zones in the Russian Federation in which most waste disposal takes place, which will allow it to determine a weighted average value for k taking into account the relative amount of waste disposed of in different climates. The ERT noted that,	Yes. Accuracy

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
		considering the geographical and climatic diversity of the Russian Federation, which ranges from arctic zones to humid-subtropical and semi-arid areas, the Party could improve the accuracy of its GHG inventory further by distinguishing between different climate zones and calculating emissions from these zones separately, in accordance with the 2006 IPCC Guidelines (vol. 5, chap. 3.2.1.1, p.3.11). The ERT recommends that the Party improve its assessment of the climate zones where most of its waste is generated and disposed of in order to determine a weighted average value for k, taking into account the relative amount of waste disposed of in different climate zones, and use this value in its estimates for this category. The ERT encourages the Party to evaluate the possibility of distinguishing between waste generated and disposed of by climate zone and calculating emissions from these zones separately.	
W.13	5.A.2 Unmanaged waste disposal sites – CH_4	The ERT noted that for estimating emissions from SWDS, the Party distinguished between CH_4 emissions from centralized SWDS and those from non-centralized SWDS. Non-centralized SWDS were described as shallow uncontrolled SWDS in regions without a waste collection system, and where the population disposes of their waste in a decentralized manner (see ID#s W.1 and W.4 in table 3). However, the ERT also noted that the 2006 IPCC Guidelines (vol. 5, chap. 2, note 2 to table 2.1, p.2.5) indicate that total waste generation in a country should be based on the population whose waste is collected. In response to a question from the ERT, the Party stated that the 2006 IPCC Guidelines (vol. 5, chap. 3.2.2, p.3.12) encourage countries with national data on MSW generation, management practices and composition of waste over a certain period of years (data for tier 2 first-order decay method) to perform analyses of the drivers of solid waste disposal, and indicate that historical data could be estimated as proportional to economic indicators or combinations of population and economic indicators. However, the ERT noted that the preceding sentence to the above-mentioned text in the 2006 IPCC Guidelines indicates that "missing historical data can be estimated to be proportional to urban population". Also, the ERT noted that, according to footnote 4 on the same page of the 2006 IPCC Guidelines, "the choice between urban population and total population should be guided by the coverage of waste collection. When data on coverage of waste collection is not available, the recommendation is to use urban population as the driver". Therefore, in line with the 2006 IPCC Guidelines, the ERT considered that MSW in remote areas without a waste collection system or without clear statistics on waste disposed of at SWDS should be omitted from the inventory. In addition, without a clear indication of whether waste is actually disposed of at non-centralized SWDS, historical data on waste disposal should be based only on the population whose waste is collected. The ERT also considered that including waste from regions in which waste is not collected at non-centralized SWDS could result in emissions in the early years of the time series being overestimated. In response to questions from the ERT during the review, the Party indicated that information on MSW collection from rural areas in recent years has significantly improved, and relevant data will be improved further in the near future. Further, in its clarifications to the list of provisional main findings, it indicated that, on the basis of information on landfills from the State Register of Waste Disposal Facilities (Rosprirodnadzor, 2018) and information on a large number of unofficial landfills throughout the country (All-Russian Popular Front, 2018) and data based on expert judgment, it assumed that MSW generated in rural areas not covered by statistics on waste disposal was disposed of at unmanaged SWDS. The Party also considers that not accounting for emissions from such landfilled MSW is not in line with the principles of completeness and accuracy set out in paragraph 4(d–e) of the UNFCCC Annex I inventory reporting guidelines and that, in particular, excluding MSW disposed of at non-centralized SWDS will lead to emissions being systematically underestimated. The ERT could not evaluate the new information from the sources referred to by the Party as these	Yes. Accuracy

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
		documents were not provided to it. The ERT agreed that omitting waste generated and disposed of by rural populations could lead to emissions being underestimated; however, the principle of accuracy as set out in the UNFCCC Annex I inventory reporting guidelines indicates that emission estimates in the GHG inventory should be accurate in the sense that they are neither overestimated nor underestimated, as far as can be judged. In that sense, applying the urban per capita waste generation rate to the entire rural population as reported in table 7.6 of the NIR (p.387) could result in emissions being overestimated, in particular for the earlier years of the time series, and including rural waste that perhaps was not collected and disposed of at non-centralized SWDS is not likely to increase the accuracy of the emission estimates. Thus, while acknowledging the general principles of completeness and accuracy set out in the UNFCCC Annex I inventory reporting guidelines, the ERT concluded that the specific guidance in the 2006 IPCC Guidelines (vol. 5, chap. 2, note 2 to table 2.1, p.2.5; and vol. 5, chap. 3, p.3.12) does not contradict the general principles of completeness and accuracy. The ERT recommends that the Party revise its data on waste disposed of at non-centralized SWDS, taking into account that waste assumed to be disposed of in rural areas without a waste collection system in general should not be accounted for in the inventory, unless it can justify clearly in the NIR that this waste is actually disposed of at unmanaged SWDS on the basis of improved information and data on waste collection in rural areas. For this purpose, the ERT also recommends that the Party include in the NIR a summary of the information contained in the documents referred to by the Party (Rosprirodnadzor, 2018; All-Russian Popular Front, 2018) and the expert judgment applied to support its assumptions related to rural waste disposed of at non-centralized SWDS. The ERT further recommends that the Party use the revised and improved data to revise and report CH_4 emission estimates for category 5.A.2 unmanaged waste disposal sites, as appropriate, for its next annual submission.	
W.14	5.D.1 Domestic wastewater – CH_4	The ERT noted that the Party quantified CH_4 emissions from aerobic wastewater treatment plants with anaerobic digestion of sludge, assuming an overall methane correction factor of 0.8. The ERT also noted that the 2006 IPCC Guidelines (vol. 5, chap. 6, table 6.3, p.6.13) do not provide guidance on quantifying CH_4 emissions from wastewater treatment plants with anaerobic digestion of sludge, and only provide methane correction factors for aerobic wastewater treatment (0 for well-managed plants and 0.3 for plants that are not well managed or overloaded) and anaerobic digestion of sludge (0.8). During the review, the Party indicated that the use of an overall methane correction factor of 0.8 corresponds to the most conservative case, assuming that no TOW are aerobically removed from the wastewater and all TOW end up in sludge. The ERT agreed with this assumption. The ERT recommends that the Party describe in the NIR the methodology and assumptions used to estimate CH_4 emissions from aerobic wastewater treatment plants with anaerobic digestion of sludge, indicating explicitly that it corresponds to the most conservative case estimate.	Yes. Transparency
KP-LULUCF			
KL.6	General (KP-LULUCF)	The ERT noted that the Party reported (1) the notation key “R” (reported) for carbon changes in HWP for AR in CRF table NIR-1, but emissions and removals from HWP for AR as “NA” in CRF table 4(KP-I)C; (2) the notation key “IE” for carbon changes in HWP for deforestation in CRF table NIR-1, but numerical values of emissions and removals from HWP for deforestation in CRF table 4(KP-I)C; (3) the notation key “NO” for carbon changes in organic soils for deforestation in CRF table NIR-1, but numerical values of emissions from organic soils for deforestation in CRF table 4(KP-I)A.2; and (4) the notation key “NO” for emissions from drained, rewetted and other soils and N mineralization in mineral soils for deforestation in CRF table NIR-1, but numerical values of	Yes. KP reporting adherence

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue/problem?[a]
		emissions from drained organic soils for deforestation in CRF table 4(KP-II)2 and numerical values of emissions from total mineral soils for deforestation in CRF table 4(KP-II)3. During the review, the Party acknowledged these inconsistencies and stated that it will correct the errors identified in CRF table NIR-1 for the next annual submission. The ERT recommends that the Party correct the information reported in CRF table NIR-1, ensuring consistency with the information reported in the background CRF tables, in particular CRF table 4(KP-I)C for carbon changes in HWP for AR, depending on whether HWP from AR activities occur or are included elsewhere; CRF table 4(KP-I)C for carbon changes in HWP for deforestation, depending on whether HWP from deforestation are reported or accounted for assuming instantaneous oxidation; CRF table 4(KP-I)A.2 for carbon changes in organic soils for deforestation; and CRF tables 4(KP-II)2 and 4(KP-II)3 for emissions from drained, rewetted and other soils and N mineralization in mineral soils for deforestation, respectively.	
KL.7	General (KP-LULUCF)	The Russian Federation reported areas and changes in areas for KP-LULUCF in both CRF table NIR-2 and the background CRF tables 4(KP-I)A.1 and 4(KP-I)B.1. The ERT identified several inconsistencies between these tables: (1) in CRF table NIR-2, for FM, for all years of the second commitment period, the "Total area at the end of the previous inventory year" reported in a given year (X) is not equal to the "Total area at the end of the current inventory year" reported in the respective previous year (X–1); (2) in CRF table NIR-2, for 2016 and 2018, the total final FM area at the end of the year decreased in comparison with that reported in the previous reported year (by 604.50 and 323.47 kha, respectively), although the FM area for all reported years in CRF table 4(KP-I)B.1 was increasing; and (3) in CRF table NIR-2, for all years of the second commitment period for FM, and in 2014 for AR, the total area at the end of the given inventory year is not equal to the area reported in the background CRF tables 4(KP-I)B.1 and 4(KP-I)A.1, respectively. During the review, the Party indicated that the areas used for estimating associated GHG emissions and removals from KP-LULUCF are those reported in the background CRF tables 4(KP-I)A.1, 4(KP-I)A.2 and 4(KP-I)B.1, and that all identified errors will be corrected for the next annual submission. The ERT noted that estimating GHG emissions and removals from KP-LULUCF sometimes requires the use of annual areas (i.e. data reported in CRF table NIR-2). This is the case, for example, in estimating the initial carbon stock change in living biomass in deforestation. Therefore, the ERT noted that any inconsistency in the representation of land will consequently affect the estimates of GHG emissions and removals. The ERT recommends that the Party correct all the inconsistencies identified in the reporting of land representation for KP-LULUCF for the next annual submission by ensuring that: (1) in CRF table NIR-2, for FM, for all the years of the second commitment period, the "Total area at the end of the previous inventory year" reported in given year (X) is equal to the "Total area at the end of the current inventory year" reported in the respective previous year (X–1); (2) for all years of the second commitment period, the FM area increase or decrease as calculated from the area reported in year X in CRF table 4(KP-I)B.1 is justified by the total FM area at the end of the year X–1 and the additions to and/or subtractions from FM in year X, as reported in CRF table NIR-2; and (3) for all years of the second commitment period, the total area at the end of the inventory year X reported in CRF table NIR-2 is equal to the area reported for AR, deforestation and FM in the background CRF tables 4(KP-I)A.1, 4(KP-I)A.2 and 4(KP-I)B.1, respectively. The ERT also recommends that the Party revise its GHG emission and removal estimates as necessary to take into account the corrections of the inconsistencies in the reporting of land representation for KP-LULUCF and report on the effects of the recalculations made in this regard in the respective sections of the NIR.	Yes. Accuracy

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
KL.8	AR – CO_2, CH_4 and N_2O	The Party reported in tables 6.34–6.35 of the NIR (pp.280–282) the average carbon stock values in the different carbon pools for anti-erosion and protective forest plantations used to estimate carbon stock changes in AR (see ID# L.37 above). Since the Party's approach to estimating net carbon stock changes was incomplete in terms of estimating carbon stock losses, the Party applied a discount rate of 1.4 per cent to represent carbon losses from the soil organic matter pool, based on a national study (Kulik and Pavlovsky, 2008 (in Russian)), assuming that these losses were due to fires (see ID# L.14 in table 3). During the review, the Party clarified that this approach is traditionally applied to all carbon pools in order to account for carbon stock losses when estimating net carbon stock changes. However, the ERT noted that information on the approach used by the Party to estimate carbon stock losses from all carbon pools was not included in the NIR. Further, the ERT noted that this is an approximate approach, which could result in emissions from disturbances being underestimated or overestimated depending on whether actual annual disturbances affecting AR areas result in carbon losses occurring to a greater or lesser extent, respectively, in relation to those approximated using a constant discount rate of 1.4 per cent. In its clarifications to the list of provisional main findings, the Russian Federation indicated that actual data on areas of cropland converted to forest land affected by disturbances are not collected on an annual basis. The ERT recommends that the Party collect and report actual data on the AR areas affected by disturbances, ensuring time-series consistency in the reported carbon stock changes by using, if necessary, the guidance provided in the 2006 IPCC Guidelines (vol. 1, chap. 5.3, pp.5.8–5.14). The ERT also recommends that the Party provide detailed information in the NIR on how carbon stock losses due to disturbances are estimated in all carbon pools for AR.	Yes. Accuracy
KL.9	Deforestation – CO_2 and N_2O	The Russian Federation reported in table 6.54 of the NIR (p.321) information on forest land areas converted to other land-use categories, including the purpose of the conversion, for 2018 only. In this year, according to the information in table 6.54, the total deforested area was 1,161.8 kha, but the area of deforestation reported in CRF table 4(KP-I)A.2 (cumulative area from 1990) was just 635.37 kha. During the review, the Party explained that table 6.54 contained data not only related to deforestation, but also encompassed information on forest land transfers to specially protected areas (as registered in the Forest Fund), and provided a file to the ERT showing the areas of forest land conversions to settlements with and without shrubs. Further, the Party explained that forest land transferred to specially protected areas remained registered in the Forest Fund, and it was not accounted for as deforestation. The ERT noted that the areas included in the file provided by the Party did not include all types of deforestation (e.g. forest land conversions to other land), and therefore it was not clear whether there were cases where forest land areas that permanently lost their cover and use were not classified as deforested lands, because of being transferred to specially protected areas (they remained registered in the Forest Fund). The ERT recommends that the Party report all forest land conversions to other land uses under deforestation, regardless of their administrative or protection status classification. The ERT also recommends that the Party explain in detail in the NIR whether land areas that meet the forest definition thresholds and change their use (e.g. road construction, facility construction, etc.) are not classified as deforested land when they are transferred to specially protected areas (i.e. they remain registered in the Forest Fund). The ERT further recommends that the Party report in the NIR the gross annual areas of forest land converted to other land uses from 1990 to the latest inventory year, providing separate figures for forest land with and without shrubs, as well as for the final land uses.	Yes. Transparency

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
KL.10	Deforestation – CO_2, CH_4 and N_2O	The ERT noted that the Russian Federation used the reporting method 1 from the Kyoto Protocol Supplement to identify land areas subject to deforestation activities. The geographical areas used in the estimates are the 85 administrative regions of the Russian Federation. Within these regions, forest conversions to cropland and grassland were assumed not to occur, because cheaper land (e.g. unmanaged grassland) was available when new cropland or managed grassland was needed. The ERT also noted that data on total conversions of forest land to settlements, including infrastructure and buildings, were taken from Rosstat, and that forest conversions to infrastructure were assumed to occur in proportion to the share of forest land in the region's total land area and the available information on the forest land conversions to infrastructure in the region's total land area. Data on total conversions to wetlands were taken from the Federal Agency on Water Resources, and the Party used data from the Federal Forestry Agency on forest conversions to all types of land for 2008–2018 for each region. The ERT further noted that in the previous review report (FCCC/ARR/2018/RUS, ID# KL.6), the Russian Federation was encouraged to assess whether data similar to detailed deforestation data from the Federal Forestry Agency can be obtained from cadastral records in order to verify data on managed forests and the completeness of reporting on unmanaged forests, as well as to assess whether forest-cover data derived from satellite images and freely downloadable images on the Internet could be used to verify managed forests and the completeness of reporting on unmanaged forests and naturally regrowing unmanaged grassland. During the review, the Party indicated that the encouragement was addressed. However, the ERT could not find any relevant information on this in the NIR. The ERT reiterates the encouragement from the previous review report for the Russian Federation to assess whether data similar to detailed deforestation data from the Federal Forestry Agency can be obtained from cadastral records in order to verify data on managed forests and the completeness of reporting on unmanaged forests. The ERT also reiterates the encouragement from the previous review report for the Russian Federation to assess whether forest-cover data derived from satellite images and freely downloadable images on the Internet could be used to verify managed forests and the completeness of reporting on unmanaged forests and naturally regrowing unmanaged grassland.	Not a problem
KL.11	FM – CO_2, CH_4 and N_2O	The Russian Federation reported in section 6.4.1.1.2 of the NIR (p.254) the methodology applied for estimating burned and clear-cut areas under FM and the equations used (equations 6.5–6.6 of the NIR (p.254)), together with (1) summary estimates of temporarily unstocked forest land areas due to disturbances (felling, fires and other disturbances) obtained from the Federal Forestry Agency; and (2) the average overgrown and recovery time (in years) after the disturbances, broken down by district and disturbance type reported in table 6.17 of the NIR (p.255) (see ID# L.31 above). According to information provided by the Party during the review, the ERT noted that actual emissions were not reported in the year in which they occurred and that the Party's approach, namely accounting of emissions from disturbances in one year based on the "net" summary areas of disturbed land obtained only in the same year divided by the recovery time, may result in emissions from carbon stock losses due to disturbances in FM being underestimated (e.g. when the "net" area in the given year is bigger than in the previous year) or overestimated (e.g. when the "net" area in the given year is smaller than in the previous year). The ERT recommends that the Russian Federation collect and use actual data on disturbances (burned and clear-cut) for estimating carbon stock losses in FM, ensuring emissions are not overestimated or underestimated, and report the actual emissions in the year in which they occur. The ERT also recommends that the Party report in the NIR information indicating that the temporarily unstocked forest land areas obtained each year are "net" areas obtained from local Federal Forestry Agency bodies, broken down by harvested and burned areas, and that total	Yes. Accuracy

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
		living biomass was considered in estimating carbon stock losses, assuming a complete oxidation as a result of the disturbance.	
KL.12	FM – CO_2	The ERT noted that the Russian Federation reported conversions from unmanaged to managed forest land, which in some years of the time series were significant (see ID# L.32 above). In 2009, for example, 43.17 million ha unmanaged forests was converted to managed forests. Such conversions of unmanaged forest to managed forest land also occurred during the years of the second commitment period of the Kyoto Protocol (e.g. 1,080.03 kha and 263.51 kha in 2016 and 2017, respectively). The ERT identified an increase (11.3 per cent) in net CO_2 removals in forest land remaining forest land in 2009, found to be driven mainly by carbon stock gains in living biomass (11.3 per cent), and to a lesser degree by the other carbon pools. According the responses provided by the Party during the review, the ERT was unable to assess whether these increases in carbon stock changes represented actual increases or an artifact, namely appearing incorrectly as a carbon stock increase merely due to the entry of unmanaged forest land to the inventory and the change in the area (see ID# L.32 above). In its clarifications to the list of provisional main findings, the Russian Federation indicated that it applied the same methods for estimating carbon stock changes in all carbon pools for unmanaged forest land converted to managed forest land as those applied for managed forest land. The ERT recommends that the Party provide in the NIR a detailed explanation of how carbon stock changes in all carbon pools are estimated when unmanaged forest land converted to managed forest land enters into the accounting under FM under the Kyoto Protocol, in particular in the year of conversion, including information on the equation(s) used, the values of the parameters used in the equations before and after the conversion and their source(s), and how consistency in the treatment of land area used to estimate carbon stock changes is ensured in order to prevent erroneous inferences regarding increases in carbon stock changes merely due to increases in FM areas.	Yes. Transparency
KL.13	FM – N_2O	The ERT noted that the Party reported carbon stock changes from mineral soils under FM in CRF table 4(KP-I)B.1 at the level of stratification applied in general for FM (managed forests without shrubs, protected areas and land for defence) (see ID# L.35 above). According to the methodology presented in section 6.4.1.1.2 of the NIR (p.246), carbon stock changes were estimated separately for each of the main forest species in each administrative region at the zone and macroregion level, using the average age-dependent soil carbon stock values for each forest age group presented in tables 6.23–6.26 of the NIR (pp.267–270). The ERT also noted that the Party did not report direct and indirect N_2O emissions from N mineralization due to carbon losses associated with a management change in the mineral soils pool in CRF table 4(KP-II)3. During the review, the ERT requested more information on this issue, in particular on whether SOC losses occur at the disaggregated level at which the carbon stock change estimates for the mineral soil pool were made, for example when a mature forest is clear-cut and converted to temporarily unstocked forest land (“transfer” from mature forest to “zero” age group forest). In its response, the Party clarified that such losses of soil organic matter do occur, but are considered to be the result of a disturbance and not a change in management. However, the ERT further noted that these types of changes constitute a change between a disturbance or management regime, resulting in a carbon stock change from one equilibrium level to another, and that, in accordance with the 2006 IPCC Guidelines (vol. 4, chap. 2.3.3.1, p.2.29; and vol. 4, chap. 11, equations 11.1 and 11.10, pp.11.7 and 11.21, respectively), associated direct and indirect N_2O emissions have to be reported.	Yes. Completeness

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
		The ERT recommends that the Party estimate direct and indirect N_2O emissions associated with the loss of soil organic matter in mineral soils of the FM strata (managed forests without shrubs, protected areas and land for defence) due to a change in management, in accordance with the 2006 IPCC Guidelines (vol. 4, chap. 2.3.3.1, p.2.29; and vol. 4, chap. 11, equations 11.1 and 11.10, pp.11.7 and 11.21, respectively), and report these emissions in CRF table 4(KP-II)3.	
KL.14	FM – CO_2, CH_4 and N_2O	The ERT noted that the Russian Federation reported in section 10.3.5.6 of the NIR (p.443) information on the FMRL technical correction, which was reported as −16,607.72 kt CO_2 eq, the same value as reported in CRF table 4(KP-I)B.1.1. In the same section of the NIR, the Party explained that the technical correction value was calculated as the difference between the net emissions and removals from FM in 1990 (base year) and the FMRL value inscribed in the appendix to the annex to decision 2/CMP.7. The ERT also noted that the technical correction reported in section 10.3.5.6 of the NIR (p.443) and CRF table 4(KP-I)B.1.1 has the same value as that reported in the 2018 annual submission, despite at least one methodological element having changed in the 2020 annual submission since the 2018 annual submission, namely the FM area due to the inclusion of urban forests under FM, which in turn created the need for a technical correction. Further, the Party did not report information that demonstrates methodological consistency between the FMRL and reporting on FM during the second commitment period, including with regard to the area accounted for and the treatment of HWP in accordance with decision 2/CMP.8, annex II, paragraph 5(e). Lastly, the Party did not report the updated technical correction made pursuant to decision 2/CMP.7, annex, paragraph 14, to ensure consistency between the reference level and reporting on FM during the second commitment period, in accordance with decision 2/CMP.8, annex II, paragraph 5(f). During the review, the Party provided a technical correction value of –11,561.70 kt CO_2 eq, calculated using the same method referred to as the difference between the net emissions and removals from FM in 1990 (base year) and the FMRL value inscribed in the appendix to the annex to decision 2/CMP.7, without providing further information. The value estimated by the ERT of the difference between the 1990 (base year) net emissions and removals from FM and the FMRL value inscribed in the appendix to the annex to decision 2/CMP.7 was –11,521.70 kt CO_2 eq. In its comments to the draft review report, the Russian Federation indicated that it does “not agree that the decision 22/CMP.1 in conjunction with 4/CMP.11, as well as the guidance included in annex II to decision 2/CMP.8 and in decision 6/CMP.9, relate to the reporting of the Russian Federation. 2/CMP.8 para. 4 says that annex II is applied for the second commitment period only. The same is mentioned in para. 1 of 6/CMP.9. The Russian Federation had not ratified Doha Amendment therefore Russia is not a part of the second commitment period, being the part of the Kyoto Protocol. Therefore, the Russian Federation shall submit information under Article 7.1 of the Kyoto Protocol; however, shall not in accordance to the decision explicitly applicable for the second commitment period”. Further, the Russian Federation requested the ERT to change the recommendations for this issue into encouragements. The ERT considered the comment of the Party and concluded that it is not in a position to assess the legal implications of the Russian Federation not ratifying the Doha Amendment on the current review process as indicated in the Party’s comment. The ERT considers that an assessment of this comment and its implementation is beyond the technical competences and review tasks of the ERT as defined in the Article 8 review guidelines. The ERT recommends that the Party report in the NIR complete information that demonstrates methodological consistency between the FMRL and reporting on FM during the second commitment period of the Kyoto Protocol, including with regard to the area accounted for and the treatment of HWP in accordance with decision 2/CMP.8,	Yes. Transparency

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
		annex II, paragraph 5(e). The ERT also recommends that the Party report the rationale and method(s) used to for calculating the FMRL technical correction, following the guidance provided in chapters 2.7.5.2 and 2.7.6.2 of the Kyoto Protocol Supplement (pp.2.96–2.102), reporting in particular on the elements provided in table 2.7.1 of the Kyoto Protocol Supplement (p.2.101). The ERT further recommends that the Party report in the NIR the technical correction made pursuant to decision 2/CMP.7, annex, paragraph 14, to ensure consistency between the FMRL and reporting on FM during the second commitment period of the Kyoto Protocol, in accordance with decision 2/CMP.8, annex II, paragraph 5(f), following the guidance provided in chapter 2.7.6.2 of the Kyoto Protocol Supplement (p.2.102). In addition, the ERT recommends that the Party report the correct technical correction value in CRF table 4(KP-I)B.1.1.	
KL.15	HWP – CO_2	The ERT noted that the Party reported in section 10.3.5.3 of the NIR (p.440) the methodology and assumptions used for estimating the contribution of the HWP pool, which indicated that HWP originated from deforestation were accounted for by assuming instantaneous oxidation. However, the ERT also noted that the Russian Federation reported in CRF table 4(KP-I)C emissions and removals from HWP from land subject to deforestation. During the review, the Party explained that data on HWP from deforestation were reported in CRF table 4(KP-I)C for information purposes only, and that the correct data concerning the contribution of HWP to carbon stock changes were those that referred to the land subject to FM. The ERT recommends that the Party estimate the contribution of HWP from deforestation on the basis of instantaneous oxidation and report this information in CRF table 4(KP-I)C, using the notation key “NA” for carbon stock changes and net CO_2 emissions and removals, in accordance with decision 2/CMP.7, annex, paragraph 31.	Yes. Accuracy

[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. The Russian Federation 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. The Russian Federation 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 the Russian Federation in its 2020 annual submission

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

Table I.1

Total greenhouse gas emissions for the Russian Federation, 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)*	*KP-LULUCF (Article 3.3 of the Kyoto Protocol)*[b]	*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*[c]	*FM*
FMRL								–116 300.00
1990	3 109 544.28	3 187 507.08	NA	NA			NA	
1995	1 879 003.23	2 084 988.22	NA	NA				
2000	1 420 148.64	1 901 067.27	NA	NA				
2010	1 334 729.12	2 057 878.02	NA	NA				
2011	1 431 583.93	2 119 644.44	NA	NA				
2012	1 467 528.82	2 147 996.18	NA	NA				
2013	1 478 724.36	2 092 550.41	NA	NA		–1 756.05	NA	–548 819.44
2014	1 424 882.68	2 094 363.54	NA	NA		–1 712.07	NA	–538 843.77
2015	1 511 857.37	2 094 011.75	NA	NA		8 487.15	NA	–530 239.83
2016	1 496 958.01	2 098 138.55	NA	NA		–1 875.25	NA	–513 353.26
2017	1 564 095.33	2 155 270.61	NA	NA		–1 284.09	NA	–506 041.34
2018	1 629 549.85	2 220 122.95	NA	NA		–3 143.02	NA	–487 210.64

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

[a] The Party did not report indirect CO_2 emissions in CRF table 6.

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

[c] In accordance with decision 3/CMP.11, para. 8, the Party previously reported that it would not report on any activities under Article 3, para. 4, of the Kyoto Protocol.

Table I.2
Greenhouse gas emissions by gas for the Russian Federation, 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	2 525 293.78	463 735.66	146 044.14	35 937.16	15 105.81	NO	1 390.53	NO
1995	1 612 928.32	351 384.20	91 131.71	15 447.31	13 453.88	NO	642.80	NO
2000	1 471 052.23	317 014.95	75 643.73	26 568.96	9 867.31	NO	920.09	NO
2010	1 612 884.81	351 949.66	75 000.19	13 425.48	3 630.76	NO	987.11	NO
2011	1 664 953.15	360 136.78	79 118.91	11 315.18	3 304.17	NO	816.26	NO
2012	1 679 866.20	364 676.83	76 729.47	17 834.48	3 324.10	NO	5 564.73	0.36
2013	1 619 172.89	364 595.42	78 340.72	21 783.19	3 420.03	NO	5 237.42	0.72
2014	1 622 348.91	363 599.27	79 372.07	24 815.96	3 054.05	NO	1 172.19	1.08
2015	1 622 861.01	363 011.75	81 146.13	22 346.11	3 505.88	NO	1 139.57	1.30
2016	1 618 304.26	366 880.73	84 612.34	23 660.66	3 657.58	NO	1 014.81	8.17
2017	1 646 179.81	383 899.75	86 252.43	34 390.10	3 177.48	NO	1 370.87	0.17
2018	1 691 360.43	396 033.64	85 932.16	42 761.47	2 725.25	NO	1 309.82	0.20
Percentage change 1990–2018	**–33.0**	**–14.6**	**–41.2**	**19.0**	**–82.0**	**NA**	**–5.8**	**NA**

Note: Emissions and removals reported in the sector other (sector 6) are not included in this table.
[a] The Russian Federation did not report indirect CO_2 emissions in CRF table 6.

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

	Energy	*IPPU*	*Agriculture*	*LULUCF*	*Waste*	*Other*
1990	2 568 516.07	283 256.99	276 422.57	–77 962.79	593 11.45	NO
1995	1 664 005.10	182 636.76	180 033.95	–205 984.99	583 12.40	NO
2000	1 514 669.97	196 192.00	128 196.11	–480 918.63	620 09.19	NO
2010	1 668 368.37	196 429.30	114 980.16	–723 148.90	781 00.18	NO
2011	1 721 008.71	199 774.08	117 772.48	–688 060.51	810 89.17	NO
2012	1 730 919.50	215 943.61	117 669.21	–680 467.36	834 63.87	NO
2013	1 666 779.94	220 223.81	119 564.82	–613 826.05	859 81.83	NO
2014	1 664 616.04	220 416.26	120 061.94	–669 480.85	892 69.29	NO
2015	1 662 526.05	218 518.64	121 528.29	–582 154.38	914 38.77	NO

	Energy	*IPPU*	*Agriculture*	*LULUCF*	*Waste*	*Other*
2016	1 663 007.12	218 161.81	123 453.35	–601 180.55	935 16.27	NO
2017	1 700 735.43	232 397.35	126 579.13	–591 175.28	955 58.70	NO
2018	1 752 621.26	243 136.92	126 659.42	–590 573.10	977 05.35	NO
Percentage change 1990–2018	**–31.8**	**–14.2**	**–54.2**	**657.5**	**64.7**	**NA**

Notes: (1) The Russian Federation did not report emissions or removals in the sector other (sector 6); (2) the Russian Federation did not report indirect CO_2 emissions 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, base year[a]–2018, for the Russian Federation

(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				–116 300.00				
Technical correction				–16 607.72				
1990	NA				NA	NA	NA	NA
2013		–7 153.32	5 397.27	–548 819.44	NA	NA	NA	NA
2014		–6 956.70	5 244.64	–538 843.77	NA	NA	NA	NA
2015		–6 756.99	15 244.14	–530 239.83	NA	NA	NA	NA
2016		–6 614.06	4 738.81	–513 353.26	NA	NA	NA	NA
2017		–6 557.86	5 273.77	–506 041.34	NA	NA	NA	NA
2018		–6 553.21	3 410.19	–487 210.64	NA	NA	NA	NA
Percentage change base year–2018					**NA**	**NA**	**NA**	**NA**

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

[a] The Russian Federation has elected not to report on any activities under Article 3, para. 4, of the Kyoto Protocol. 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 the Russian Federation's reporting under Article 3, paragraphs 3–4, of the Kyoto Protocol.

Table I.5
Key relevant data for the Russian Federation 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	None
Election of application of provisions for natural disturbances	No
3.5% of total base-year GHG emissions, excluding LULUCF	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

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) 2.B.10 other (chemical industry) – hydrogen production (CO_2) (see ID# I.7 in table 3);

(b) 2.D.3 other (non-energy products from fuels and solvent use) – urea use in selective catalytic reduction (CO_2) (see ID# I.10 in table 3);

(c) 2.E electronics industry (HFCs, PFCs, SF_6 and NF_3) (see ID# I.12 in table 3);

(d) 2.F.1 refrigeration and air conditioning (HFCs) (see ID# I.14 in table 3);

(e) 2.G.2 SF_6 and PFCs from other product use: 2.G.2.c sound-proof windows, 2.G.2.d adiabatic properties: shoes and tyres and 2.G.2.e other (PFCs and SF_6) (see ID# I.25 in table 5);

(f) 4.A.1 forest land remaining forest land (CO_2, CH_4 and N_2O) (see ID# L.33 in table 5);

(g) 4.A.1 forest land remaining forest land – direct N_2O emissions from N mineralization/immobilization and indirect N_2O emissions from managed soils (N_2O) (see ID# L.35 in table 5);

(h) 4.B.1 cropland remaining cropland – mineral soils (CO_2) (see ID# L.38 in table 5);

(i) 4.B.2 land converted to cropland (CO_2) (see ID# L.17 in table 3);

(j) 4.C.1 grassland remaining grassland – mineral soils (CO_2) (see ID# L.38 in table 5);

(k) 4.C.2.3 wetlands converted to grassland – organic soils (CO_2) (see ID# L.23 in table 3);

(l) 4.E.2.2 cropland converted to settlements – mineral soils – direct N_2O emissions from N mineralization/immobilization and indirect N_2O emissions from managed soils (CO_2 and N_2O) (see ID# L.42 in table 5);

(m) 4.F.2.2 cropland converted to other land – mineral soils – direct N_2O emissions from N mineralization/immobilization and indirect N_2O emissions from managed soils (CO_2 and N_2O) (see ID# L.42 in table 5);

(n) 4(KP-I)B.1 FM (CO_2, CH_4 and N_2O) (see ID# KL.4 in table 3);

(o) 4(KP-II)3.B.1 FM – mineral soils – N_2O emissions from N mineralization/immobilization due to C loss associated with land-use conversions and management change in mineral soils (N_2O) (see ID# KL.13 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 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol*. T Hiraishi, T Krug, K Tanabe, et al. (eds.). Hayama, Japan: Institute for Global Environmental Strategies. Available at https://www.ipcc.ch/publication/2013-revised-supplementary-methods-and-good-practice-guidance-arising-from-the-kyoto-protocol/.

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 2012, 2013, 2014, 2015, 2016, 2017 and 2018 annual submissions of the Russian Federation, contained in documents FCCC/ARR/2012/RUS, FCCC/ARR/2013/RUS, FCCC/ARR/2014/RUS, FCCC/ARR/2015/RUS, FCCC/ARR/2016/RUS, FCCC/ARR/2017/RUS and FCCC/ARR/2018/RUS, 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 the Russian Federation for 2020. Available at http://unfccc.int/sites/default/files/resource/asr2020_RUS.pdf.

C. Other documents used during the review

Responses to questions during the review were received from Alexander Nakhutin (Institute of Global Climate and Ecology), including additional material on the methodology and assumptions used. The following references have been reproduced as received:

Кулик К.Н., Павловский Е.С. (2008). Стратегические направления защитного лесоразведения в Российской Федерации на период до 2020 года//Защитное лесоразведение, мелиорация земель и проблемы земледелия в Российской Федерации: материалы международной научно-практической конференции. Волгоград, 23-26 сентября 2008 г. – Волгоград: ВНИАЛМИ, 2008. – С. 9-19.

Jandl, Robert and Lindner, Marcus and Vesterdal, Lars and Bauwens, Bram and Baritz, Rainer and Hagedorn, Frank and Johnson, Dale and Minkkinen, Kari and Byrne, Kenneth. (2007). How strongly can forest management influence soil C sequestration?. Geoderma. 137. 253-268. 10.1016/j.geoderma.2006.09.003.

Э. Ф. Ведрова, Л. В. Мухортова, В. В. Иванов, Л. В. Кривобоков, М. В. Болонева. (2010). ВОССТАНОВЛЕНИЕ ЗАПАСОВ ОРГАНИЧЕСКОГО ВЕЩЕСТВА ПОСЛЕ

РУБОК В ЛЕСНЫХ ЭКОСИСТЕМАХ ВОСТОЧНОГО ПРИБАЙКАЛЬЯ. ИЗВЕСТИЯ РАН. СЕРИЯ БИОЛОГИЧЕСКАЯ, 2010, № 1, с. 83–94.

Norbert Hölzel, Carsten Haub, Markus P. Ingelfinger, Annette Otte, Vladimir N. Pilipenko, The return of the steppe large-scale restoration of degraded land in southern Russia during the post-Soviet era, Journal for Nature Conservation, Volume 10, Issue 2, 2002, Pages 75-85, ISSN 1617-1381.

Sorokin A., Bryzzhev A., Strokov A., Mirzabaev A., Johnson T., Kiselev S.V. (2016) The Economics of Land Degradation in Russia. In: Nkonya E., Mirzabaev A., von Braun J. (eds) Economics of Land Degradation and Improvement – A Global Assessment for Sustainable Development. Springer, Cham. Available at https://doi.org/10.1007/978-3-319-19168-3_18.

Latchininsky, A. (1995). Grasshopper Problems in Yacutia (Eastern Siberia, Russia) Grasslands. Journal of Orthoptera Research, (4), 29-34. doi:10.2307/3503455.

Tailakov O.V., Kormin V.O., Tailakov M.L., Gitarsky M.L. 2009. *Emisia Metana pri Dobichi Uglia v Rasii* (Methane Emissions from Coal Mining in Russia). Problemi Ekologicheskovo Monitoringa i Modelirovania Ekosistem. Tom XXII. S. 216-226.