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Report on the individual review of the annual submission of the Russian Federation submitted in 2018*

Note by the expert review team

Summary

Each Party included in Annex I to the Convention must submit an annual greenhouse gas inventory covering emissions and removals of greenhouse gas emissions 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 inventory review of the 2018 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 8 to 13 October 2018 in Moscow.

* In the symbol for this document, 2018 refers to the year in which the inventory was submitted, not to the year of publication.

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Abbreviations and acronyms

2006 IPCC Guidelines	*2006 IPCC Guidelines for National Greenhouse Gas Inventories*
AAU	assigned amount unit
AD	activity data
AR	afforestation and reforestation
ARR	annual review report
Article 8 review guidelines	"Guidelines for review under Article 8 of the Kyoto Protocol"
$BCEF_S$	Biomass conversion and expansion factor for expansion of merchantable growing stock volume to above-ground biomass
CaO	calcium oxide
CCF	carbon content factor
CER	certified emission reduction
CF	carbon fraction of dry matter
CH_4	methane
CM	cropland management
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
COF	carbon oxidation factor
COPERT	computer programme to calculate emissions from road transport
CPR	commitment period reserve
CRF	common reporting format
EF	emission factor
DE%	feed digestibility
DOC	degradable organic carbon
DOC_f	fraction of degradable organic carbon that decomposes
DOC(x)	weighted average of biodegradable organic carbon
ERT	expert review team
ERU	emission reduction unit
FAOSTAT	Statistics Division of the Food and Agriculture Organization of the United Nations
F-gases	fluorinated gases
FM	forest management
FMRL	forest management reference level
GE	gross energy intake
GHG	greenhouse gas
GM	grazing land management
HFC	hydrofluorocarbon
HWP	harvested wood products
IE	included elsewhere
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
IPPU	industrial processes and product use
ICSCF	implied carbon stock change factor
ITL	international transaction log
KP-LULUCF activities	activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol
ktce	thousands of tonnes of coal equivalent
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
MCF	methane conversion factor
MSW	municipal solid waste
N	nitrogen
NA	not applicable
NE	not estimated
NEU	non-energy use
Nex	nitrogen excretion rate
NF_3	nitrogen trifluoride
NIR	national inventory report
NO	not occurring
PFC	perfluorocarbon
QA/QC	quality assurance/quality control
R	ratio of below-ground biomass to above-ground biomass
Revised 1996 IPCC Guidelines	*Revised 1996 Guidelines for National Greenhouse Gas Inventories*
RMU	removal unit
Rosstat	Russian Federal State Statistics Service
RUSAL	United Company RUSAL
RV	revegetation
SEF	standard electronic format
SF_6	sulfur hexafluoride
SIAR	standard independent assessment report
SOC	soil organic carbon
SWDS	solid waste disposal sites
UNFCCC	United Nations Framework Convention on Climate Change
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 Intergovernmental Panel on Climate Change Guidelines for National Greenhouse Gas Inventories: Wetlands*

I. Introduction[1]

1. This report covers the review of the 2018 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" (decision 13/CP.20). The review took place from 8 to 13 October 2018 in Moscow, and was coordinated by Mr. Javier Hanna Figueroa (secretariat). Table 1 provides information on the composition of the ERT that conducted the review of the Russian Federation.

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

Area of expertise	*Name*	*Party*
Generalist	Ms. Gherghita Nicodim	Romania
Energy	Ms. Songli Zhu	China
IPPU	Mr. Ioannis Sempos	Greece
Agriculture	Mr. Jonas Bergström	Sweden
LULUCF	Mr. Valentin Bellassen	France
Waste	Mr. Phindile Mangwana	South Africa
Lead reviewers	Mr. Sempos	
	Ms. Zhu	

2. The basis of the findings in this report is the assessment by the ERT of the Party's 2018 annual submission, in accordance with the Article 8 review guidelines.

3. The ERT has made recommendations that the Russian Federation resolve the findings related to issues,[2] including issues designated as problems.[3] Other findings, and, if applicable, the encouragements of the ERT to the Russian Federation to resolve them, 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 shows annual GHG emissions for the Russian Federation, including totals excluding and including the LULUCF sector, indirect CO_2 emissions and emissions by gas and by sector. Annex I also contains background data related to emissions and removals from KP-LULUCF activities, if elected, by gas, sector and activity for the Russian Federation.

[1] At the time of publication of this report, the Russian Federation had not yet submitted its instrument of ratification of the Doha Amendment, and the Amendment had not yet entered into force. The implementation of the provisions of the Doha Amendment is therefore considered in this report in the context of decision 1/CMP.8, paragraph 6, pending the entry into force of the Amendment.

[2] Issues are defined in decision 13/CP.20, annex, paragraph 81.

[3] Problems are defined in decision 22/CMP.1, annex, paragraphs 68 and 69, as revised by decision 4/CMP.11.

II. Summary and general assessment of the 2018 annual submission

6. Table 2 provides the assessment by the ERT of the 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 inventory of the Russian Federation

Assessment			*Issue or problem ID#(s) in table 3 and/or 5*[a]
Dates of submission	Original submission: 14 April 2018 (NIR), 14 April 2018, version 1 (CRF tables)		
Review format	In-country		
Application of the requirements of the UNFCCC Annex I inventory reporting guidelines and Wetlands Supplement (if applicable)	1. Have any issues been identified in the following areas:		
	(a) Identification of key categories	No	
	(b) Selection and use of methodologies and assumptions	Yes	E.14, E.25, I.15, I.16, A.15, L.8, L.15, L.16, L.19, L.21, L.22, W.12, W.14
	(c) Development and selection of EFs	Yes	E.12, E.20, E.21, I.1, I.17, I.18, A.17, A.18, L.18
	(d) Collection and selection of AD	Yes	I.9, A.16, L.27
	(e) Reporting of recalculations	Yes	E.13
	(f) Reporting of a consistent time series	Yes	L.9, L.18
	(g) Reporting of uncertainties, including methodologies	Yes	L.6, L.7
	(h) QA/QC	QA/QC procedures were assessed in the context of the national system (see para. 2 in this table)	
	(i) Missing categories/completeness[b]	Yes	I.10, I.14, I.19, I.21, I.22, I.23, I.24, L.20, L.24, KL.7
	(j) Application of corrections to the inventory	No	
Significance threshold	For categories reported as insignificant, has the Party provided sufficient information showing that the likely level of emissions meets the criteria in paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines?	Yes	
Description of trends	Did the ERT conclude that the description in the NIR of the trends for the different gases and sectors is reasonable?	No	E.15, E.16, W.11
Supplementary information under the Kyoto Protocol	2. Have any issues been identified related to the national system:		
	(a) The overall organization of the national system, including the effectiveness and reliability of the institutional, procedural and legal arrangements	No	

Assessment			*Issue or problem ID#(s) in table 3 and/or 5[a]*
	(b) Performance of the national system functions	Yes	G.2, G.3, G.5, G.6
	3. Have any issues been identified related to the national registry:		
	(a) Overall functioning of the national registry	Yes	G.4, G.8
	(b) Performance of the functions of the national registry and the technical standards for data exchange	NA	
	4. Have any issues been identified related to reporting of information on ERUs, CERs, AAUs and RMUs and on discrepancies reported 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 SIAR?	NA	
	5. 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 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.7
	6. Have any issues been identified related to the reporting of LULUCF activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, as follows:		
	(a) Reporting requirements in decision 2/CMP.8, annex II, paragraphs 1–5	Yes	KL.6, KL.7
	(b) Demonstration of methodological consistency between the reference level and reporting on FM in accordance with decision 2/CMP.7, annex, paragraph 14	No	
	(c) Reporting requirements of decision 6/CMP.9	No	
	(d) Country-specific information to support provisions for natural disturbances, in accordance with decision 2/CMP.7, annex, paragraphs 33 and 34	No	
CPR	Was the CPR reported in accordance with the annex to decision 18/CP.7, the annex to decision 11/CMP.1 and decision 1/CMP.8, paragraph 18?	NA	
Adjustments	Has the ERT applied an adjustment under Article 5, paragraph 2, of the Kyoto Protocol?	NA	
	Did the Party submit a revised estimate to replace a previously applied adjustment?	NA	The Russian Federation does not have a previously applied adjustment
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 the assessment of conformity with the UNFCCC Annex I inventory reporting guidelines and any further guidance adopted by the Conference of the Parties?	Yes	

Assessment			*Issue or problem ID#(s) in table 3 and/or 5*[a]
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] The ERT identified additional issues and/or problems in all sectors that are not listed in this table but are included in table 3 and/or 5.

[b] Missing categories for which methods are provided in the 2006 IPCC Guidelines may affect completeness and are listed in annex III.

III. Status of implementation of issues and/or problems raised in the previous review report

7. Table 3 compiles all the recommendations made in previous review reports that were included in the previous review report, published on 4 May 2018.[4] For each issue and/or problem, the ERT specified whether it believes the issue and/or problem has been resolved by the conclusion of the review of the 2018 annual submission and provided the rationale for its determination, which takes into consideration the publication date of the previous review report and national circumstances.

Table 3
Status of implementation of issues and/or problems raised in the previous review report of the Russian Federation

ID#	*Issue and/or problem classification*[a]	*Recommendation made in previous review report*	*ERT assessment and rationale*
General			
G.1	Annual submission – (G.1, 2017) (G.1, 2016) (G.1, 2015) (7, 2014) (6, 2013) (6, 2012) Adherence to the UNFCCC Annex I inventory reporting guidelines	Submit the inventory by 15 April of each year.	Resolved. The Party submitted the NIR and the CRF tables of the 2018 annual submission on 14 April 2018.
G.2	QA/QC and verification – (G.2, 2017) (G.5, 2016) Adherence to the UNFCCC Annex I inventory reporting guidelines	Adjust the QA/QC plan to ensure timely submission of the NIR.	Addressing. The ERT noted that the NIR and CRF tables were submitted on time. However, no information was included in the NIR about any adjustments of the QA/QC plan in order to ensure the timely submission of the NIR. During the review, the Party informed the ERT about its actions on updating the QA/QC plan. In particular, the Russian Federation presented to the ERT section 4.4 of its QA/QC plan containing deadlines and periodicity of the QA/QC procedures allowing the Party to submit the NIR and the CRF tables in due time.

[4] FCCC/ARR/2017/RUS.

ID#	*Issue and/or problem classification*[a]	*Recommendation made in previous review report*	*ERT assessment and rationale*
G.3	QA/QC and verification – (G.5, 2017) Adherence to the UNFCCC Annex I inventory reporting guidelines	Improve the QA/QC process undertaken on the NIR and report on the improvements made in the NIR.	Addressing. The Russian Federation did not report in the NIR about the improvements made to the QA/QC process. Although the Party corrected most of the compilation errors of the NIR, which were indicated in the previous review report, the ERT noted some repeated errors in the current submission (see ID#s A.10 and KL.4 below) and new errors (see ID#s W.9 and W.13 in table 5). The NIR and CRF tables still contain errors or inconsistencies related to the reported information. For example, the methodologies reported in the NIR as being used for the categories and subcategories of the GHG inventory across sectors are not consistent with the information in CRF table 3 (for example, according to the NIR, a tier 2 method was applied for CO_2 from silicon carbide production, while according to CRF table 3, tier 1 and tier 3 methods have been applied for CO_2 in chemical industry; and according to the NIR, fugitive emissions of HFCs from fluorochemical production were estimated by the application of a tier 1 method, while according to CRF table 3, a tier 2 method was used for HFCs in chemical industry; according to the NIR, CO_2 from incineration and open burning of waste was estimated using a tier 2 method and default EFs for CH_4 and N_2O, while CRF table 3 reported blank cells for methods and EFs). During the review, the Party presented to the ERT a consolidated list of the methodologies applied to the inventory key categories, consistent with CRF table 3, giving the ERT a better understanding of the current methodology and tier levels used for estimating key categories. Other examples of editorial errors include the inconsistent sequence of tables in part 2 of the NIR (table 3.3.8 is followed by the table 3.3.7; p.91), and use of the notation key "NO" for reporting sulfur dioxide emissions in category 1.A.1.c. Additional issues were identified during the 2018 review (see ID#s E.11, E.18, A.17, A.18, A.20, L.7, W.9 and W.13 in table 5). An adjusted QA/QC plan that includes information about updated procedures to improve the quality of the GHG inventory and the NIR was presented to the ERT during the review by the Russian Federation.
G.4	National registry – (G.3, 2017) (G.6, 2016) (G.6, 2015) Adherence to reporting guidelines under Article 7,	Include 2014 and 2015 SEF tables for the second commitment period of the Kyoto Protocol in the annual submission, as recommended in the SIAR.	Not resolved. The Party did not submit the 2014 and 2015 SEF tables for the second commitment period of the Kyoto Protocol. During the review, the Party presented to the ERT a draft version of the SEF tables for 2014 and 2015, which were generated manually. The ERT noted that these tables are yet to be

ID#	Issue and/or problem classification[a]	Recommendation made in previous review report	ERT assessment and rationale
	paragraph 1, of the Kyoto Protocol		officially submitted to the UNFCCC secretariat (see ID# G.8 in table 5).
G.5	National system – (G.6, 2017) Adherence to reporting guidelines under Article 7, paragraph 1, of the Kyoto Protocol	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.	Addressing. The Russian Federation reported the NIR and CRF tables of the 2018 annual submission, including information required under Article 7 of the Kyoto Protocol by the due date for annual submissions. However, as part of the reporting under Article 7 of the Kyoto Protocol, the Party did not report the information required in the SEF tables corresponding to the first and second commitment periods of the Kyoto Protocol, according to decision 3/CMP.11, paragraph 14 (see ID# G.4 above and ID# G.8 in table 5). The ERT noted that the Party reported in the NIR on the changes made in its national system to improve the process for approval of its annual submission under the Convention and the Kyoto Protocol. During the review the Russian Federation presented to the ERT an action plan (see ID# G.6 below), as part of the improvements, and the final draft of the "Procedure for preparing the inventory of anthropogenic emissions from sources and removals by sinks of greenhouse gases, its structure, as well as a list of information and data submitted by federal executive bodies", in accordance with Government Order No. 930-r. The latter is an implementing document, developed by the Ministry of Natural Resources and Environment and agreed by the relevant ministries, federal agencies and other bodies, which is currently under legal QC. The ERT also noted that the action plan to improve the national system does not provide a measure to improve reporting of the supplementary information on the national registry for the period when it has been connected to the ITL.
G.6	National system – (G.6, 2017) Adherence to reporting guidelines under Article 7, paragraph 1, of the Kyoto Protocol	Report on progress made regarding the detailed action plan.	Addressing. In the previous review report, it is stated that, in response to the potential problem on the national system, the Russian Federation provided a detailed action plan to reduce the time for approval of the annual submission and ensure the timely submission of its GHG inventory, in accordance with Government Order No. 930-r, adopted on 15 May 2017. However, no information was reported in the NIR on the progress made regarding the implementation of the detailed action plan and it was not included in the NIR. During the review, the Party presented to the ERT the detailed action plan to improve the functioning of its national system and the corresponding timeline for the implementation of the planned measures. The main pending measure of the action plan is the adoption and implementation of the final draft of the

ID#	Issue and/or problem classification[a]	Recommendation made in previous review report	ERT assessment and rationale
			"Procedure for preparing the inventory of anthropogenic emissions from sources and removals by sinks of greenhouse gases, its structure, as well as a list of information and data submitted by federal executive bodies" (see ID# G.5 above).
G.7	Article 3, paragraph 14, of the Kyoto Protocol – (G.7, 2017) Adherence to reporting guidelines under Article 7, paragraph 1, of the Kyoto Protocol	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 Russian Federation reported in the NIR (section 10.4, p.437) information on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol. The ERT noted that the Party reported in the NIR on some of the changes that have occurred to the information provided on the minimization of adverse impacts, but not for all. For example, the Party reported in the NIR the changes related to "international assistance in eliminating the consequences of natural disasters, including natural and climatic conditions". During the review, the Party explained to the ERT that there are other changes in the reported information compared with the previous annual submission, which were not reported in the NIR; for example, on the provision of updated information on nuclear power station construction projects in developing country Parties as an alternative to fossil fuel power supply (p.438) and on the international education programme organized by RUSAL for capacity-building of personnel for overseas branches of RUSAL operating in developing country Parties (p.439).
Energy			
E.1	1. General (energy sector) – (E.1, 2017) (E.1, 2016) (E.1, 2015) (19, 2014) (21, 2013) (33, 2012) Adherence to the UNFCCC Annex I inventory reporting guidelines	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 use of notation keys was reviewed and corrected in the CRF tables of the 2018 annual submission. The Party reported values for CO_2, CH_4 and N_2O emissions for liquid fuels for category 1.A.3.e.i instead of the notation key "NO" in 1990 and 1991 (see ID# E.4 below). However, the ERT considers that still for some subcategories in the energy sector the use of notation keys is still not correct; for example, for category 1.A.3.e.i pipeline transport the Party used the notation key "NA" for AD and emissions for solid fuels, other fossil fuels and biomass, but probably this activity does not occur in the country, therefore the correct notation key to be used is "NO".
E.2	1.A. Fuel combustion – sectoral approach – solid and gaseous fuels – CO_2 (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 NIR table 3.8 for the oxidation factor (or fraction of carbon not oxidized) for every fuel listed.	Not resolved. The NIR does not contain a summary of the main findings of the studies of the conditions in coal basins, conducted by RAO Energy Systems of Russia (1999) and the country-specific EF for natural gas published in the article by Uvarova et al. (2015), which were mentioned in the previous review report, and no new column or

ID#	*Issue and/or problem classification*[a]	*Recommendation made in previous review report*	*ERT assessment and rationale*
			documentation was added to the NIR to show the concrete value of oxidation factors used for every fuel listed in NIR table 3.8 (pp.33–35), except a brief description of the approach to identify carbon content in coal and references to the NIR of the 2014 annual submission in a footnote (see also ID# E.14 in table 5).
E.3	1.A.3.b Road transportation – liquid fuels – CO_2, CH_4 and N_2O (E.7, 2017) Transparency	Improve the description of the method used to calculate emissions from road transportation in the NIR by including information on the approach used to estimate CO_2 emissions for the other years of the time series not estimated using the COPERT IV model (1991–1999, 2001–2004, 2006–2009, 2011–2012 and 2014–2015).	Resolved. Clear information on the method used to calculate CO_2 emissions from road transportation is provided in the NIR (pp.52–53) for the years in which the COPERT IV model was not used (1991–1999, 2001–2004, 2006–2009 and 2011–2012). The COPERT IV model was used for the other years, including 2014 and 2015.
E.4	1.A.3.e Other transportation – liquid fuels – CO_2 (E.3, 2017) (E.9, 2016) (E.9, 2015) (32, 2014) (39, 2013) Comparability	Report separately CO_2 emissions from pipeline transport – liquid fuel reported under other transportation in 1990 and 1991 using extrapolation techniques, if necessary.	Resolved. CO_2 emissions from pipeline transport of liquid fuels were reported separately for 1990 and 1991 in the NIR (sections 3.2.4.3.3 and 3.2.4.7) and CRF tables of the 2018 annual submission.
E.5	1.A.3.e.i Pipeline transport – liquid and gaseous fuels – CO_2, CH_4 and N_2O (E.8, 2017) Comparability	Investigate the use of all types of liquid and gaseous fuels that are combusted for operation of pipeline transport and report the emissions in accordance with the 2006 IPCC Guidelines (vol. 2, chapter 3, table 3.1.1), and correct the category reference in the NIR to 1.A.3.e.i (instead of 1.A.1.e).	Resolved. The category reference has been corrected to 1.A.3.e.i instead of 1.A.1.e in the NIR. The Russian Federation confirmed in the NIR (p.46) and during the review that natural gas and crude oil are the only fuels burned in pipeline transport systems and their emissions were reported in this category; other fuels (such as diesel oil) are used as emergency fuel for electricity production for pipeline transport, but those emissions are reported under category 1.A.4.a commercial/ institutional.
E.6	1.B.2.b Natural gas – gaseous fuels – CO_2 and CH_4 (E.4, 2017) (E.13, 2016) Accuracy	Consider the results of the research into fugitive CO_2 and CH_4 emissions from natural gas and develop national EFs for the entire time series or, if that cannot be done in time for the next annual submission, include in the NIR information on the progress in development of the national EFs.	Resolved. Country-specific CO_2 and CH_4 EFs for natural gas production (including natural gas processing) and transmission were developed and used in the 2018 annual submission for the whole time series. For emissions from natural gas storage, which are reported together with natural gas transmission under 1.B.2.b.4, and natural gas distribution subcategories, default EFs from the 2006 IPCC Guidelines (vol. 2, table 4.2.4) were used.
E.7	1.B.2.b Natural gas – gaseous fuels – CH_4 (E.9, 2017) Transparency	Include in the NIR an explanation of how the country-specific EF for category 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).	Not resolved. The NIR does not provide a clear description on the methodology to show how the country-specific CH_4 EF for emissions from natural gas transmission was developed, which are reported together with natural gas storage under 1.B.2.b.4. Appropriate reference to Dedikov et al. (1998)

ID#	Issue and/or problem classification[a]	Recommendation made in previous review report	ERT assessment and rationale
			was not made in the NIR (see ID#s E.23, E.25 and E.26 in table 5).
IPPU			
I.1	2.A.1 Cement production – CO_2 (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 submission.	Addressing. The collection of plant-specific data on CaO content of clinker is in preparation. Data requests on the CaO content of clinker have been prepared and it was planned that these would be sent to 40 cement plants in the country by the end of October 2018. These 40 plants represent 87 per cent of total cement production capacity in the Russian Federation. During the review, the Party indicated to the ERT that the data collection and verification of the country-specific CaO content may not be completed in time for the next annual submission.
I.2	2.A.4 Other process uses of carbonates – CO_2 (I.12, 2017) Comparability	Allocate CO_2 emissions from the use of limestone and dolomite in iron and steel production under category 2.C.1 in accordance with the 2006 IPCC Guidelines (vol. 3, section 2.5.1, p.2.33).	Resolved. The Party has allocated CO_2 emissions from the use of limestone and dolomite in iron and steel production under category 2.C.1.
I.3	2.C.1 Iron and steel production – CO_2 (I.3, 2017) (I.4, 2016) (I.4, 2015) (35, 2014) Transparency	Include in the NIR information on significant changes in IEFs (e.g. the CO_2 IEF for pig iron) since 2011 due to the implementation of 10 joint implementation projects on iron production efficiency.	Resolved. The Russian Federation reported the specific consumption of reducing agents and limestone for the production of pig iron for the whole time series in table 4.39 of the NIR. The reported information in that table justifies the inter-annual changes of the CO_2 IEFs for the whole time series.
I.4	2.C.1 Iron and steel production – CO_2 (I.4, 2017) (I.10, 2016) (I.10, 2015) Transparency	In addition to explaining in the NIR the decrease in the CO_2 IEF for pig iron in recent years as recommended in issue ID# I.3 above, include the collection of improved AD for coke consumption in iron and steel production as an activity in the inventory improvement plan (recognizing that such data collection will take time and may not be possible to implement), and report on the planned improvement in the NIR.	Resolved. CO_2 emissions from category 2.C.1 iron and steel production have been recalculated using country-specific information and improved AD, including coke consumption obtained from the "Ferrous Metallurgy" annual bulletins for the period 1990–2016, published by the Central Research Institute of Information and Technical and Economic Studies of Ferrous Metallurgy. These bulletins cover all iron and steel industrial plants. The information in the NIR (pp.120–121) corresponds to the data and parameters used for the estimates of CO_2 emissions.
I.5	2.C.1 Iron and steel production – CO_2 (I.5, 2017) (I.11, 2016) (I.11, 2015) Accuracy	Use recent country-specific parameters that have been measured in joint implementation projects in iron and steel plants for a verification of the appropriateness of the current parameters used in the inventory. If the verification indicates that these parameters have changed considerably compared to those currently used in the inventory, elaborate a plan (as part of the inventory improvement plan) to update and improve these parameters	Resolved. To estimate CO_2 emissions from category 2.C.1 iron and steel production the Party used country-specific parameters published in the "Ferrous Metallurgy" annual bulletins (see ID# I.4 above) which, in contrast to the reports on joint implementation projects, cover all iron and steel industrial plants in the country. The information in the NIR (pp.120–121) corresponds to the data and parameters used for the estimates of CO_2 emissions.

ID#	Issue and/or problem classification[a]	Recommendation made in previous review report	ERT assessment and rationale
		reflecting improved efficiencies of the plants, and report on this activity in the NIR.	
I.6	2.C.1 Iron and steel production – CO_2 (I.13, 2017) Transparency	During the time that the recommendations made in ID#s I.3 and I.4 are not implemented, correct the text in the NIR to reflect the fact that, for the estimates of CO_2 emissions for the periods 1991–1999 and 2007–2010, the Party used an average value of the specific coke consumption for pig iron production (t/t) calculated using data on coke consumption available for the period 2000–2004 (and not 2000–2006).	Resolved. CO_2 emissions from category 2.C.1 iron and steel production have been recalculated using data and parameters from the "Ferrous Metallurgy" annual bulletins (see ID# I.4 above). The information in the NIR (pp.120–121) has been updated and corresponds to the data and parameters used for the estimates of CO_2 emissions for the whole time series.
I.7	2.C.1 Iron and steel production – CO_2 (I.14, 2017) Transparency	While the recommendations made in ID#s I.3, I.4 and I.5 are not implemented, improve the transparency of the NIR by including information on how coke consumption in pig iron production (category 2.C.1.b) is estimated for the period 2011–2015, including the methodology and assumptions used to estimate the amount of coke used in pig iron production. The explanation should clarify whether coke consumption in pig iron production decreases in the period 2012–2015 and, if so, explain the reasons why CO_2 emissions from pig iron production in the period 2012–2015 are overestimated.	Resolved. As explained in IDs# I.4–I.6, the Party has recalculated the whole time series (1990–2016) of CO_2 emissions from category 2.C.1 using country-specific information and improved AD. The method and assumptions for estimating CO_2 emissions were transparently described in the NIR (pp.120–121), including the information on how coke consumption in pig iron production is estimated. The ERT did not identify any overestimation of emissions in the 2018 submission.
I.8	2.C.3 Aluminium production – PFCs (I.6, 2017) (I.12, 2016) (I.12, 2015) Transparency	Add an explanation to table 4.44 in the NIR explaining why measured plant-specific parameters are not used in the inventory.	Resolved. The explanation on why measured plant-specific parameters are not used in the inventory has been included in the NIR (pp.125–126).
I.9	2.D Non-energy products from fuels and solvents use – CO_2 (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-Hs2); and explain the reporting of NEU for the category 2.D in the NIR.	Not resolved. The ERT noted that discrepancies were not solved in the reporting of CO_2 emissions from the NEU of fuels excluded from the energy sector between CRF table 1.A(d) and CRF table 2(I).A-H under category 2.D. For example, for 2016, table 1.A(d) indicates that 7,387.60 kt CO_2 from lubricants were reported under NEU from fuels in the inventory, but in CRF table 2(I).A-H under subcategory 2.D.1 only 1,380.76 kt CO_2 from lubricants were reported. The ERT also noted that the reporting of NEU for the category 2.D in the NIR is not comprehensive and clear. During the review, the Party presented to the ERT a revised CRF table 1.A(d), which provided more clarity about the reporting of CO_2 emissions from the NEU of

ID#	*Issue and/or problem classification*[a]	*Recommendation made in previous review report*	*ERT assessment and rationale*
			fuels excluded from the energy sector and those actually reported in the inventory in the IPPU sector. However, the ERT identified other issues related to the reporting of NEU of fuels (see ID#s I.14 and I.20 in table 5). The ERT believes that future ERTs should consider this issue further to ensure that there is not an underestimation of emissions.
I.10	2.B.1 Ammonia production – 2.D.3 Other (non-energy products from fuels and solvent use) – CO_2 (I.15, 2017) Completeness	Provide an estimate for urea use in selective catalytic reduction (under category 2.D.3) using diesel consumption in road transport and applying equation 3.2.2 from the 2006 IPCC Guidelines (vol. 2, chapter 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 CRF table 2(I).A-H under subcategory 2.D.3 and the NIR do not provide an estimate for urea use in selective catalytic reduction in road transportation. During the review, the Russian Federation indicated that CO_2 emissions for this subcategory are considered insignificant, and that justification in accordance with the requirements in paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines, will be provided in the NIR of the 2019 annual submission.
I.11	2.B.1 Ammonia production – 2.D.3 Other (non-energy products from fuels and solvent use) – CO_2 (I.15, 2017) Transparency	Provide in the NIR a better explanation of which source 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 requested information on CO_2 emissions from significant uses of urea and data on export/import of urea was not provided in the NIR. During the review, the Party provided to the ERT a urea trade balance. According to the balance, the estimated use of urea in the country is lower than the value of urea application in agriculture, which is reported in CRF table 3.G-I (around 71 per cent lower in 2016). The Party indicated that the reasons for this discrepancy will be investigated and results will be reported in the next annual submission.
I.12	2.E. Electronics industry – PFCs (I.8, 2017) (I.15, 2016) (I.15, 2015) Completeness	Collect the AD needed to implement the methodology provided in the 2006 IPCC Guidelines for this category, and report the emissions accordingly.	Resolved. In the 2018 annual submission, the Russian Federation collected relevant AD and the emissions of F-gases (HFCs, PFCs, SF_6 and NF_3) from category 2.E electronics industry have been estimated and reported for the first time by using the tier 2a method from the 2006 IPCC Guidelines.
I.13	2.E. Electronics industry – PFCs (I.9, 2017) (I.15, 2016) (I.15, 2015) Transparency	Report in the NIR on progress in the implementation of AD collection.	Resolved. The NIR (pp.133–134) included information about the progress made in AD collection for the estimates of HFC, PFC, SF_6 and NF_3 emissions from category 2.E electronics industry (see ID#I.12 above).
Agriculture			
A.1	3. General (agriculture) – CH_4 (A.8, 2017) Accuracy	Consistently use and report in the CRF tables and the NIR (tables 5.4 and 3.1.2) the correct DE% values for swine.	Resolved. The correct coefficients for DE% for swine were consistently used in the estimates and reported in the NIR, tables 5.4 and 3.1.2 and CRF table 3.A (additional information table).

ID#	*Issue and/or problem classification*[a]	*Recommendation made in previous review report*	*ERT assessment and rationale*
A.2	3. General (agriculture) – CH_4 (A.8, 2017) Accuracy	Calculate the DE% value of mixed fodder without considering concentrates and recalculate the GE of swine reflecting the correct value of DE% for mixed fodder.	Resolved. The Party corrected the DE% value of mixed fodder used in emission estimates. The ERT noted, however, that due to the method used by the Party GE is not dependent on the DE% value therefore recalculation of the GE owing to this correction was not performed.
A.3	3. General (agriculture) – CH_4 (A.8, 2017) Accuracy	Recalculate CH_4 emissions from enteric fermentation (category 3.A), N_2O emissions from manure management (category 3.B) (due to swine livestock husbandry) and direct and indirect N_2O emissions from agricultural soils (category 3.D).	Resolved. No recalculations were necessary because the CH_4 emissions from enteric fermentation and the Nex value (which affects the N_2O emissions from categories 3.B and 3.D) are not affected by the corrected DE% value of mixed fodder used.
A.4	3.A.1 Cattle – CH_4 (A.9, 2017) Transparency	Provide in the NIR the reference for the additional source of statistical data used in the inventory on the consumption of fodder in pasture.	Resolved. The reference to the additional source of statistical data was included in the NIR (p.156).
A.5	3.A.4 Other livestock – CH_4 (A.11, 2017) Transparency	Include the data on swine weight (56 kg/head) and the CH_4 EF for swine (1.5 kg CH_4/head/year) to support the assumptions used in the equation to estimate the CH_4 EF for fur-bearing animals in the NIR (p.159).	Resolved. The information on swine weight and the CH_4 EF for swine used in calculations were included in the NIR (p.168).
A.6	3.A.4 Other livestock – 3.B.4 Other livestock – 3.D Direct and indirect N_2O emissions from agricultural soils – CH_4 and N_2O (A.12, 2017) Completeness	Clarify whether the population of buffaloes exists in the country. If it does, estimate CH_4 and N_2O emissions under categories 3.A.4 (enteric fermentation), 3.B.4 (manure management) and 3.D (direct and indirect N_2O emissions from agricultural soils).	Resolved. CH_4 and N_2O emissions from buffaloes were calculated and reported for all relevant categories for the entire time series in the 2018 annual submission.
A.7	3.B Manure management – CH_4 and N_2O (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 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.	Addressing. The ERT noted that there is still no information in the NIR to support the use of the MCF for liquid manure systems without natural crust cover or the MCF for liquid manure systems with natural crust cover. However, in the absence of available information on the cover of liquid systems, the Party has, as recommended in the previous review report, taken a conservative approach and used the MCF for liquid manure systems without natural crust cover (17 per cent). A consequence of this approach is a simultaneous decrease in the estimated emissions of N_2O, because the default N_2O EF (0 kg N_2O-N/kg N excreted) associated with liquid systems without natural crust cover is lower than the default EF (0.005 kg N_2O-N/kg N excreted) for systems with natural crust cover. The ERT also noted that to increase the

ID#	*Issue and/or problem classification*[a]	*Recommendation made in previous review report*	*ERT assessment and rationale*
			accuracy of the CH_4 and N_2O emission estimates from this category and confirm the current assumption the Party could collect additional information regarding the occurrence of a crust cover in liquid manure systems. The ERT believes that future ERTs should consider this issue further to ensure that there is not an underestimation of emissions.
A.8	3.B Manure management – 3.D Direct and indirect N_2O emissions from agricultural soils – N_2O (A.13, 2017) Accuracy	Recalculate the crude protein (%) for dairy and non-dairy cattle diets and apply this value to recalculate N_2O emissions from dairy and non-dairy cattle under categories 3.B (manure management) and 3.D (direct and indirect N_2O emissions from agricultural soils).	Resolved. The crude protein (%) for dairy and non-dairy cattle diets, the estimates for total N excreted and the corresponding N_2O emissions were recalculated for categories 3.B and 3.D.
A.9	3.B Manure management – 3.D Direct and indirect N_2O emissions from agricultural soils – N_2O (A.13, 2017) Adherence to the UNFCCC Annex I inventory reporting guidelines	Correct the values of crude protein (%) in NIR table 5.8 consistently with table 3.1.1 (NIR, vol. 2, annex 3.1).	Resolved. The values of crude protein (%) were consistently reported in the NIR (table 5.8) and annex 3.1 to the NIR (vol. 2, table 3.1.1).
A.10	3.B.3 Swine – N_2O (A.10, 2017) Adherence to the UNFCCC Annex I inventory reporting guidelines	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.	Not resolved. The Russian Federation continued to report inconsistent values for crude protein (%) of fresh fodder in NIR tables 5.8 and 3.1.2 (annex 3.1). During the review, the Party acknowledged the inconsistency in the NIR of the value reported for crude protein (%) of fresh fodder consumed by swine, and that it had not been corrected in the 2018 annual submission.
A.11	3.C Rice cultivation – 3.D.a.4 Crop residues – CH_4 and N_2O (A.14, 2017) Transparency	Provide in the NIR the references for the average periods for rice cultivation by main types of rice and for the N content (0.45 per cent) in bedding (straw) applied in animal housing and, when an assumption and a reference are reported under different chapters in the NIR, cross-reference them or provide the correct reference where the assumption is reported.	Resolved. The requested references on average periods for rice cultivation by main types of rice and for the N content in bedding were provided in the NIR (pp.185 and 181), including relevant cross-references to different chapters of the NIR.
LULUCF			
L.1	Land representation (L.5, 2017) (L.13,	Include the impact of pre-1990 conversions for land converted to forest land and cropland converted to	Resolved. The impact of pre-1990 conversions for land converted to forest land has been estimated and accounted in the reported emissions and removals. Pre-1990 conversions

ID#	Issue and/or problem classification[a]	Recommendation made in previous review report	ERT assessment and rationale
	2016) (L.12, 2015) Accuracy	grassland in the reported emissions and removals.	for cropland converted to grassland are assumed to be not occurring because the area of cropland was regularly increasing in the pre-1990 period. The ERT agreed with this assumption.
L.2	Land representation (L.6, 2017) Transparency	Improve the transparency of the reporting by providing the final areas of land-use categories consistently between NIR tables 6.4 and 6.5 and CRF table 4.1.	Resolved. The NIR and CRF table 4.1 are consistent regarding the final areas of land-use categories.
L.3	Land representation (L.7, 2017) Adherence to the UNFCCC Annex I inventory reporting guidelines	Correct CRF tables 4.A–4.F to reflect the correct area conversions in accordance with CRF table 4.1 for all years in the time series.	Resolved. CRF tables 4.A–4.F and CRF table 4.1 are consistent, and the correct area conversions were reflected for all years in the time series.
L.4	Land representation (L.7, 2017) Adherence to the UNFCCC Annex I inventory reporting guidelines	Verify whether emission estimates are accurate considering the different areas reported between CRF table 4.1 and CRF tables 4.A–4.F and report on the results in the next NIR.	Resolved. The ERT noted that CRF tables 4.A–4.F and CRF table 4.1 are consistent, and the correct areas are reported, therefore emissions and removals are accurately reported. The NIR (section 6.3) provided information on the correctness of areas of land use and land-use changes used in the calculations.
L.5	4.C.2 Land converted to grassland – CO_2 (L.8, 2017) Adherence to the UNFCCC Annex I inventory reporting guidelines	Update the NIR, section 6.4.3.2 (on land converted to grassland), including sections 6.4.3.2.1.5 and 6.4.3.2.2 and table 6.65 related to areas of other lands converted to grassland (and corresponding carbon stocks and stock changes), in order to ensure the coherence of the information with CRF table 4.C.	Resolved. Section 6.4.3.2 of the NIR has been updated and is consistent with the information reported in CRF table 4.C.
Waste			
W.1	5. General (waste) – (W.3, 2017) Transparency	Report in CRF table 5.D (under additional information) the population data used in the estimates of emissions for category 5.D (i.e. Rosstat data) and clarify in the NIR which population data (FAO or Rosstat) are used to calculate "per capita protein consumption" and for which years, and report the per capita protein consumption accordingly in CRF table 5.D.	Resolved. In CRF table 5.D (additional information) the Party reported the population data and the protein consumption per capita used in the emission estimates. The NIR provides a footnote (table 7.14, p.398) that references the data source for population figures used (i.e. Rosstat data on protein consumption in households in Russia were used for the entire time series).
W.2	5. General (waste) – (W.3, 2017) Adherence to the UNFCCC Annex I inventory reporting guidelines	Correct the population data between NIR tables 7.6 and 7.14 to make them consistent.	Resolved. The population data in NIR tables 7.6 and 7.14 were reported consistently.
W.3	5.A Solid waste disposal on land – CH_4	Update CRF table 5.A with the correct data on the amount (kt) of "annual waste at the SWDS" for categories	Resolved. CFR table 5.A and the NIR were updated with the correct data on the amount of annual waste disposed at SWDS and the

ID#	Issue and/or problem classification[a]	Recommendation made in previous review report	ERT assessment and rationale
	(W.4, 2017) Accuracy	5.A.1 (for 2013) and 5.A.2 (for 2008, 2013 and 2015) and the correct value of DOC(x) (for 2008 and 2012) in the NIR and recalculate CH_4 emissions accordingly.	correct value of DOC(x) for all relevant years, and CH_4 emissions were recalculated accordingly.
W.4	5.A Solid waste disposal on land – CH_4 (W.5, 2017) Accuracy	Use the default value (0.50) for DOC_f and recalculate the CH_4 emissions from solid waste disposal on land for the entire time series.	Resolved. Party has updated the DOC_f value to 0.50 for the calculations in this category. As a result of the changes, CH_4 emissions from disposal of waste for the entire time series were recalculated. Emissions in 1990 increased by 9.9 per cent and in 2015 decreased by 0.3 per cent. The ERT noted that the Russian Federation incorrectly reported DOC_f value as 0.50 in CRF table 5.A instead of 50 per cent.
W.5	5.A.1 Managed waste disposal sites – CH_4 (W.6, 2017) Transparency	Increase the transparency of the information and clarify in the NIR when and in which regions CH_4 recovery occurs. For the years in which CH_4 recovery occurs, use the notation key "NE".	Resolved. In the previous submission, the Party reported CH_4 recovery from managed SWDS using the notation key "NO". In the 2018 annual submission, the Russian Federation reported in the NIR that it faces data collection challenges owing to the fragmented and incomplete nature of the information. However, it has provided information in the NIR on the regions where there is CH_4 recovery and, based on research conducted, the amount of CH_4 recovered and burned remains insignificant. Therefore the Party used the notation key "NE" in CRF table 5.A for reporting CH_4 recovery from managed SWDS for the entire time series. The Party has based its assessment of the insignificance of the recovery of emissions on the likely level of recovered CH_4 emissions from the two largest projects implemented recently in the Russian Federation where this activity occurs: ranging between 8,000 and 13,000 t CO_2 eq for the first project, and approximately 100,000 t CO_2 eq for the second project (NIR, p.398).
W.6	5.B.1 Composting – CH_4 and N_2O (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.	Addressing. The Party has made recalculations of the CH_4 and N_2O emissions in the 2018 annual submission using CH_4 and N_2O EFs (8 g CH_4/kg waste and 0.48 g N_2O/kg waste) that were consistent across the time series. The ERT noted that the Russian Federation indicated in the NIR (section 7.3.2, p.388) that default CH_4 and N_2O EFs from table 4.1 of the 2006 IPCC Guidelines (vol. 5, p.4.6) were used in the estimates with no further information provided. However, the values used by the Party are below the default values in table 4.1 for waste treated on dry weight basis (10 g CH_4/kg waste and 0.6 g N_2O/kg waste) and above the default values for waste treated on wet weight basis (4 g CH_4/kg waste and 0.3 g N_2O/kg waste). The ERT believes that future ERTs should consider this issue

ID#	Issue and/or problem classification[a]	Recommendation made in previous review report	ERT assessment and rationale
			further to ensure that there is not an underestimation of emissions.
W.7	5.C.2 Open burning of waste – CO_2, CH_4 and N_2O (W.2, 2017) (W.6, 2016) (W.6, 2015) Completeness	Investigate the occurrence of the open burning of waste and, if the emissions are considered relevant, quantify them, or, if the emissions are assumed to be negligible, use the notation key "NE" in CRF table 5.C and justify the use of the notation key in accordance with paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines.	Resolved. In section 7.4.1 of the NIR, the Party refers to open burning as an activity prohibited by law in the Russian Federation, and in section 7.4.2 it refers to the assessment of CO_2, CH_4 and N_2O emissions from this category and that these were estimated to be insignificant (i.e. 105 Gg/year) so the notation key "NE" was used in CRF table 5.C for the entire time series. The Party also reported difficulties in obtaining data on the quantity of waste open burned and thus the entire volume of waste generated from the population that does not use a centralized MSW collection system was considered to be buried in landfills.
W.8	5.D.1 Domestic wastewater – CH_4 (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 flaring as "NO" in CRF table 5.D for the entire time series, and explained in the NIR that biogas recovered is only used for energy recovery. However, the NIR did not include descriptions and details on parameters used to calculate the amount of CH_4 combusted for energy recovery (see ID# W.10 in table 5 below).
KP-LULUCF			
KL.1	General (KP-LULUCF) – (KL.2, 2017) (KL.2, 2016) (KL.2, 2015) Adherence to reporting guidelines under Article 7, paragraph 1, of the Kyoto Protocol	Ensure the consistency of the total area in CRF table NIR-2 with the area reported in CRF table 4.1.	Not resolved. The CRF table NIR-2 and CRF table 4.1 are still inconsistent in the 2018 annual submission: the total land area is equal for all years in both tables, except for 2012 and 2014.
KL.2	Deforestation – CO_2 (KL.4, 2017) (KL.3, 2016) Transparency	Include under information items for forest land only the area subject to past deforestation events that has been subsequently reforested.	Resolved. In CRF table 4(KP-1)A.2, under information items, for forest land only the area subject to past deforestation events that has been subsequently reforested is included. This area is zero (reported as "NO") .
KL.3	Deforestation – CO_2 (KL.5, 2017) (KL.4, 2016) (KL.4, 2015) Completeness	Provide additional information on the deforested areas with organic soils (including the share of the deforested area covered with buildings and roads) and measured data or references justifying the assumption that there are no CO_2 emissions from these organic soils, or alternatively report emissions from organic soils in accordance with the 2006 IPCC Guidelines and the Kyoto Protocol Supplement.	Resolved. The ERT noted that CO_2 emissions from deforestation occurring on organic soils have been estimated and reported. An explanation has been provided in the NIR (p.358) to support the assumptions made for estimating CO_2 emissions from deforestation occurring on organic soils.
KL.4	Deforestation – CO_2	Provide in CRF table 4(KP-I)A.2 under "Information items" the correct	Not resolved. The values provided in cells C21 and C11 do not match. For 2016, the

ID#	*Issue and/or problem classification*[a]	*Recommendation made in previous review report*	*ERT assessment and rationale*
	(KL.9, 2017) Yes. Transparency	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 (cell C23 to C27) the area related to destination land-use categories after deforestation.	value reported in cell C21 is 616.53 kha, which corresponds to deforestation in settlements, while the value reported in cell C11 is 629.91 kha (total for activity A.2 in the Russian Federation).
KL.5	FM – CO_2, CH_4 and N_2O (KL.7, 2017) (KL.6, 2016) (KL.6, 2015) Yes. Transparency	Report the correct value of the technical correction for the base year (1990) in CRF table 4(KP-I)B.1.1 and describe in the NIR how it was calculated.	Resolved. The correct value of the technical correction for the base year (1990) was reported in CRF table 4(KP-I)B.1.1 and its calculation was described in the NIR (p.465).

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

IV. Issues identified in three 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 included in table 4 have been identified in three successive reviews, including the review of the 2018 annual submission of the Russian Federation, and have not been addressed by the Party.

Table 4
Issues identified in three successive reviews and not addressed by the Russian Federation

ID#	*Previous recommendation for the issue identified*	*Number of successive reviews issue not addressed*[a]
General		
G.2	Adjust the QA/QC plan to ensure timely submission of the NIR	3 (2016–2018)
G.4	Include 2014 and 2015 SEF tables for the second commitment period of the Kyoto Protocol in the annual submission, as recommended in the SIAR	3 (2015/2016–2018)
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	6 (2012–2018)
IPPU		
I.9	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	3 (2015/2016–2018)

ID#	*Previous recommendation for the issue identified*	*Number of successive reviews issue not addressed*[a]
	fuels and solvent use in CRF table 2(I).A-Hs2); and explain the reporting of NEU for the category 2.D in the NIR	
Agriculture		
A.7	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 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	3 (2015/2016–2018)
LULUCF		
	No such issues were identified for the LULUCF sector	
Waste		
	No such issues were identified for the waste sector	
KP-LULUCF		
KL.1	Ensure the consistency of the total area in CRF table NIR-2 with the area reported in CRF table 4.1	3 (2015/2016–2018)

[a] The reviews of the 2015 and 2016 annual submissions were held in conjunction with each other, they are not considered "successive" years and 2015/2016 is considered as one year.

V. Additional findings made during the individual review of the 2018 annual submission

9. Table 5 contains findings made by the ERT during the individual review of the 2018 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 2018 annual submission of the Russian Federation

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and/or a problem?[a] If yes, classify by type*
General			
G.8	National registry	The Russian Federation did not include the SEF tables for the second commitment period of the Kyoto Protocol in its 2018 annual submission. The ERT noted that, although starting from 1 January 2016, the Russian Federation's national registry was disconnected from the ITL, the Party is required to submit SEF tables for the second commitment period of the Kyoto Protocol for the years 2013, 2014 and 2015, in accordance with decision 3/CMP.11, paragraph 14. During the review, the Russian Federation provided to the ERT draft SEF tables for 2014 and 2015 for the second commitment period of the Kyoto Protocol (see ID# G.4 in table 3). The ERT recommends that the Russian Federation 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.	Yes. Adherence to reporting guidelines under Article 7, paragraph 1, of the Kyoto Protocol
G.9	Further improvements (identified by the Party)	The Russian Federation reported in the NIR information on sectoral planned improvements. Nevertheless, the ERT noted that the Party has not reported on the expected timeline for the reported planned improvements or the status of implementation of previous planned improvements. The ERT encourages the Russian Federation to report information on the status of the previous planned improvements and the timeline for the expected implementation of the reported planned improvements, as part of the inventory management.	Not an issue/problem
G.10	Other	The use of notation keys in CRF table 6 and the absence of information in the NIR related to the indirect CO_2 and N_2O emissions reduces the transparency of the reporting on indirect emissions. The ERT noted that in some cases in CRF table 6 no values were reported, or notation keys were used, which in some cases may be not appropriate (e.g. "NA"), and that no explanations were provided in the NIR for the notation keys used in this table. For example, in 2016, CRF notation keys were used for all sectors except for the energy sector, in which the cells for indirect CO_2 and indirect N_2O emissions were left blank. The ERT further noted that the estimation and subsequent reporting of indirect CO_2 emissions could be performed by applying methods from the 2006 IPCC Guidelines (vol. 1, chapter 7). The ERT recommends that the Russian Federation 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, and encourages the Party to report emission estimates of indirect CO_2 and N_2O emissions.	Yes. Transparency
G.11	Key category analysis	The Russian Federation reported in the NIR the same key category analysis reported in CRF table 7, which was performed using the CRF Reporter software. The Party did not include in its key category analysis a more detailed level of disaggregation as described in the 2006 IPCC Guidelines (vol. 1, chapter 4, table 4.1, methodological choice and identification of key categories). The ERT noted that implementing a key category analysis at a more	Not an issue/problem

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		disaggregated level may indicate subcategories that need further attention regarding the selection of a higher methodological tier for emission estimation, in order to improve the accuracy of the GHG emission estimates. The ERT encourages the Russian Federation to perform and report in the NIR a more detailed key category analysis at the subcategory level, in accordance with the 2006 IPCC Guidelines, including the prioritization of inventory improvements following this detailed disaggregation. The ERT also encourages the Party to perform a key category analysis using approach 2, by taking into consideration the results of the uncertainty analysis.	
G.12	Uncertainty analysis	The Russian Federation used the approach 1 methodology from the 2006 IPCC Guidelines for the uncertainty analysis. At the same time, the Party reported the implementation of the approach 2 methodology for some categories (e.g. in the agriculture sector). During the review, the Russian Federation informed the ERT that it conducted a re-evaluation of uncertainty values used in the uncertainty analysis after the implementation of improvements, and this activity is performed annually, or even twice a year. The ERT recommends that the Russian Federation provide in the NIR details on how the re-evaluation of the uncertainty values is periodically accomplished, including after the implementation of improvements (see ID#s L.6 and L.7 below) and encourages the Party to expand the approach 2 uncertainty analysis to the entire inventory.	Yes. Transparency
Energy			
E.8	Fuel combustion – reference approach – all fuels – CO_2	CO_2 emissions from fuel combustion were calculated using the reference approach and the sectoral approach. For 2016, there is a difference of 2.7 per cent in the CO_2 emission estimates between the reference approach and the sectoral approach, with differences of 15.7, –6.9, 4.4, –100.3 and 16.2 per cent for liquid fuels, solid fuels, gaseous fuels, other fossil fuels and peat, respectively. The documentation box of CRF table 1.A(c) provides references to the NIR (section 3.2.1) for explanations of the differences between the two approaches. However, the NIR provides only general explanations for the differences between the two approaches. The ERT is of the view that, in addition to the reasons reported in the NIR, other reasons may include the allocation of other oils used for non-energy purposes among the energy and the IPPU sectors. The ERT encourages the Russian Federation to continue investigating and to report on the reasons for the gap between the reference approach and the sectoral approach, in particular analysing the differences per type of fuel (e.g. liquid fuels, solid fuels, gaseous fuels, other fossil fuels and peat) with special focus on liquid and solid fuels, with the aim of reducing the gap as much as possible and ensuring that the sectoral approach estimates are as accurate as possible.	Not an issue/problem
E.9	Fuel combustion – reference approach – all fuels – CO_2	In CRF table 1.A(b), for all years, the column on "unit" indicates that AD for all fuels are reported in TJ; however, the ERT noted that AD for all fuels for 1990–1991 and 2005–2016 are reported in "ktce", while in the other years of the time series AD are reported in kt for all fuels, except natural gas, for which AD are reported in million cubic metres. This clarification is provided in the NIR and in the documentation box of CRF table 1.A(b). The incorrect labelling does not affect the comparison because a fixed conversion factor is given in CRF table 1.A(b) (29.31 TJ/unit) for use when the AD are shown in energy units (ktce). However, for the years when data are reported	Yes. Adherence to the UNFCCC Annex I inventory reporting guidelines

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		in energy units (ktce), the ERT noted that it is difficult to determine whether the net calorific values used to convert from mass to energy units (in particular for solid fuels) are within comparable ranges. In addition, the mass value of the fuel consumption is not provided in the NIR. During the review the Party clarified that the energy balance tables are prepared in both mass value and energy units of the fuels consumption; however, owing to confidentiality, the mass value of fuels consumption is not public. The Party provided the ERT with access to the energy balance tables in both mass value and energy units during the review week. The ERT recommends that the Russian Federation 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, the mass value of fuels consumption available in the energy balance is not public.	
E.10	Fuel combustion – reference approach – other fossil fuels – CO_2	The ERT noted that significant amounts of "other oil" imported and exported and used as NEU were reported in CRF tables 1.A(b) and 1.A(d), respectively, but without indication in the NIR or CRF tables to clarify what is included under "other oil". During the review, the Party clarified that "other oil" includes bitumen, petroleum coke and other oil fuels not included under separate fuel types. The ERT recommends that the Russian Federation 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 of "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".	Yes. Transparency
E.11	Fuel combustion – reference approach – liquid fuels – CO_2	The ERT noted that few fuels are used for NEU and the amount of the carbon stored/excluded for these fuels in the reference approach is reported in both CRF tables 1.A(b) and 1.A(d). In principle, these reported values (i.e. carbon excluded) for each of the fuels should be equal between the two CRF tables. However, the ERT observed discrepancies in these two tables for lubricants for 1990–2015, and for bitumen for 2012–2015; in particular, in 2015 where carbon excluded from bitumen was reported as 5,437.39 kt C in CRF table 1.A(b) and as 4,548.31 kt C in CRF table 1.A(d). The ERT also noted that in CRF table 1.A(d), for 2016, the total of NEU of fuels is 3,525,408.41 TJ, but in the NIR (table 3.4, p.29) this total is reported as 3,841,097.02 TJ. Similar inconsistencies are also observed for 2007–2015. During the review, the Party explained that these inconsistencies are caused by editorial or copy/paste mistakes, and the data shown in CRF table 1.A(d) table are correct. The ERT recommends that the Russian Federation 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.	Yes. Adherence to the UNFCCC Annex I inventory reporting guidelines
E.12	1.A. Fuel combustion – sectoral approach	According to the Party's key category analysis, CO_2 emission from liquid fuel combustion in all categories under 1.A fuel combustion are key. The ERT noted that the Party used a country-specific net calorific value for all liquid fuels; however, the carbon contents used in calculations for these fuels are still the default values from the 2006 IPCC	Yes. Accuracy

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	– liquid fuels – CO_2	Guidelines. The Russian Federation explained that the development of a country-specific value for carbon content of liquid fuels was constrained by national circumstances. The ERT recommends that the Russian Federation 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.	
E.13	1.A. Fuel combustion – sectoral approach – liquid fuels – CO_2, CH_4 and N_2O	The ERT noted that recalculations were performed in the 2018 annual submission, and a major change was observed in liquid fuels consumption in the subcategory 1.A.5.a stationary (2014 and 2015). For example, the energy consumption of liquid fuels in this subcategory for 2015 was reported as 457,196.15 TJ in the 2018 annual submission, whereas it was reported as 326,139.65 TJ in the 2017 annual submission. As a result, GHG emissions from liquid fuels in this category in 2015 increased by 40.8 per cent. Reasons for recalculations were explained in the NIR (p.53) briefly, indicating that part of the diesel oil consumption in this subcategory was reallocated from road transportation, for example, when the diesel oil consumption simulation from the COPERT model for road transportation is smaller than the value in the energy balance table. During the review, the Party further explained that, in the 2018 annual submission, the COPERT model was used for the first time to simulate energy consumption in road transportation for 2013–2015 and, based on the output from that model, the diesel oil consumption reported in the energy balance was redistributed among different categories in the GHG inventory. In particular, the Party realized that diesel oil used for road transportation in 2015 was overestimated in the 2017 annual submission, hence it moved part of the diesel oil consumption from subcategory 1.A.3.b road transportation to the subcategory 1.A.5.a stationary in the 2018 annual submission. The Party confirmed that the overall diesel oil consumption in 2015 has not changed in the 2018 annual submission. The ERT also noted that this reallocation of fuel consumption introduced an apparent inconsistency in the time series as it was performed only for 2014 and 2015 and probably an issue of accuracy in the emission estimates, because of the use of CH_4 and N_2O EFs for stationary combustion instead of the appropriate technology-specific CH_4 and N_2O EFs (e.g. for road transportation). The ERT recommends that the Russian Federation 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. The ERT also recommends that the Russian Federation provide a clear justification on why it considers it 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 ensures 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 Party cannot demonstrate the appropriateness of the CH_4 and N_2O EFs applied, the ERT recommends that it reconsider the redistribution of the fuels.	Yes. Transparency

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E.14	1.A. Fuel combustion – sectoral approach – solid fuels – CO_2	The ERT noted that the oxidation factor for combustion of liquid and gaseous fuels used by the Russian Federation is 100 per cent, as per the 2006 IPCC Guidelines. During the review, the Party clarified that the oxidation factor of 0.98 was used for all coal combustion activities (see also ID# E.2 in table 3). As the oxidation factor is closely related to combustion conditions and the type of fuel used, the ERT recommends that the Russian Federation identify and apply the COF by combustion equipment and by coal type or grade for coal combustion activities, instead of applying a uniform oxidization rate for coal combustion in all categories.	Yes. Accuracy
E.15	1.A.1.a Public electricity and heat production – 1.A.1.b petroleum refining – liquid fuels – CO_2	The ERT noted that the inter-annual change of the CO_2 IEF of liquid fuels in subcategory 1.A.1.a public electricity and heat production between 2004 and 2005 is significant (an increase of 5.8 per cent, from 71.39 t CO_2/TJ to 75.53 t CO_2/TJ). The ERT also noted that the NIR briefly mentions that the structure of the statistics used by Rosstat was changed in 2005. The ERT further noted that the consumption of refinery gas, the carbon content of which is lower than other liquid fuels, changed significantly, decreasing from 177,677 TJ in 2004 to 42,950 TJ in 2005, which seems to be the major reason for the increase of the CO_2 IEF for liquid fuels combustion under category 1.A.1.a public electricity and heat production. In addition, the inter-annual change of the CO_2 IEF for liquid fuels in subcategory 1.A.1.b petroleum refining between 2004 and 2005 was identified as significant (a decrease of 11.0 per cent, from 71.39 t CO_2/TJ to 63.55 t CO_2/TJ). Similarly, the consumption of refinery gas increased from 137,532 TJ in 2004 to 297,911.754 TJ in 2005, which seems to be the major reason for the decreasing of the CO_2 IEF for liquid fuels in this subcategory. During the review, the Party explained that all AD are sourced from the energy balance prepared by Rosstat and further explained that, starting from 2005, the energy statistics system changed to a new system in which more disaggregated data are required; hence the consumption of refinery gas was redistributed among different consumption categories with the condition that the total amount of refinery gas consumption was not changed. The ERT recommends that the Russian Federation 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.	Yes. Transparency
E.16	1.A.1.c Manufacture of solid fuels and other energy industries – solid fuels – CO_2	The ERT noted that the CO_2 IEFs for solid fuels under subcategory 1.A.1c.i manufacture of solid fuels range between 94.35 and 96.07 t CO_2/TJ during 1990–2004, whereas they decreased to 44.40–62.79 t CO_2/TJ for 2005–2016. The inter-annual change of the CO_2 IEF between 2004 and 2005 is significant and has a value of –53.2 per cent (from 95.40 t CO_2/TJ to 44.67 t CO_2/TJ). In addition, the inter-annual change of the CO_2 IEF between 2015 and 2016 is –25.9 per cent (from 59.91 t CO_2/TJ to 44.40 t CO_2/TJ), which is also significant. The ERT also noted that the NIR briefly mentions that the structure of the statistics used by Rosstat was changed in 2005.The ERT further noted that the internal fuel share of solid fuels changed significantly between 2004 and 2005, as well as between 2015 and 2016 (i.e. coal decreased from 19,910 TJ in 2004 to 32 TJ in 2005, but coke oven gas increased from 507 TJ in 2004 to 6,603 TJ in 2005; whereas between 2015 and 2016, coal consumption decreased from 15,919 TJ to 0 TJ). This may be the major reason of the fluctuation of CO_2 IEF of solid fuels in this subcategory. During the review, the Party explained that all AD are sourced from the national statistical system under Rosstat and further explained that, starting from 2005, the energy statistics system changed to a new system in which more disaggregated data are	Yes. Transparency

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		required; hence the consumption of coal and coke oven gas was redistributed among different consumption categories. The ERT recommends that the Russian Federation 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.	
E.17	1.A.2.a Iron and steel – all fuels – CO_2, CH_4 and N_2O	The ERT noted from the NIR (p.42) and CRF table 1.A(a) that, from 2005, CO_2, CH_4 and N_2O emissions from subcategory 1.A.2.b non-ferrous metals are included under subcategory 1.A.2.a iron and steel, because the structure of the statistics of the energy balance was changed in 2005. During the review, the Party explained that these data could not be reported separately since 2005, because of confidentiality. The ERT encourages the Russian Federation to provide in the NIR, without compromising the provisions of the UNFCCC Annex I inventory reporting guidelines on confidentiality, information on relative indicators or other well-defined alternative means[b] on the CO_2, CH_4 and N_2O emissions from subcategory 1.A.2.b non-ferrous metals to improve the transparency of the emission estimates; for example, the ratios for CO_2, CH_4 and N_2O emissions between subcategories 1.A.2.a iron and steel and 1.A.2.b non-ferrous metals.	Not an issue/problem
E.18	1.A.2.f Non-metallic minerals – all fuels – CO_2, CH_4 and N_2O	The ERT noted that in the NIR (p.42), subcategory 1.A.2.f refers to other industries, whereas in CRF table 1.A(a), 1.A.2.f refers to non-metallic minerals. During the review, the Party indicated that this is caused by the difference between the structure of the previous CRF Reporter tables and the 2006 IPCC Guidelines (vol. 2, table 2.1). In the previous version of the CRF Reporter software subcategory 1.A.2.f referred to other industries, which included non-metallic minerals, and this reporting practice continued to be followed in the NIR of the 2018 annual submission. The ERT is of the view that this reporting practice is not in accordance with the UNFCCC Annex I inventory reporting guidelines and the 2006 IPCC Guidelines. The ERT recommends that the Russian Federation 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.	Yes. Adherence to the UNFCCC Annex I inventory reporting guidelines
E.19	1.A.2.f Non-metallic minerals – all fuels – CO_2, CH_4 and N_2O	The ERT noted from CRF table 1A(a) that emissions from subcategory 1.A.2.f non-metallic minerals are included under 1.A.2.g other, whereas during the review the Party informed the ERT that separated energy statistics for 1.A.2.f non-metallic minerals are available from Rosstat and these could be open to the public. The Party indicated that in the CRF tables provided in the previous UNFCCC reporting guidelines, emissions from non-metallic minerals were not separated from other industries and that this reporting practice continued to be followed in the 2018 annual submission. The ERT is of the view that this reporting practice is not in accordance with the UNFCCC Annex I inventory reporting guidelines and the 2006 IPCC Guidelines.	Yes. Comparability

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		The ERT recommends that the Russian Federation estimate and report emissions from 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.	
E.20	1.A.4.c Agriculture/forestry/fishing – liquid fuels – CH_4 and N_2O	The ERT noted that CH_4 and N_2O IEFs for gasoline and diesel oil reported under subcategory 1.A.4.c.ii off-road vehicles and other machinery are 10.00 kg/TJ and 0.60 kg/TJ, respectively, which are sourced from the 2006 IPCC Guidelines (vol. 2, table 2.5, p.2.22). However, the ERT also noted that these default EFs are for stationary combustion in residential and agriculture/forestry/fishing/fishing farms categories, and are therefore not applicable to off-road vehicles and machinery. The ERT believes that future ERTs should consider this issue further to ensure that there is not an underestimation of emissions.	Yes. Accuracy
		The ERT recommends that the Russian Federation 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.	
E.21	1.B.2.a Oil – liquid fuels – CH_4	According to the key category analysis, CH_4 fugitive emissions from oil systems is a key category; however, the ERT noted that the EFs used to estimate CH_4 emissions from all subcategories under this category are the default values for developing countries and economies in transition obtained from table 4.2.5 of volume 2 of the 2006 IPCC Guidelines (see ID# E.22 below). During the review, the Party informed the ERT that country-specific EFs for oil systems have been developed, and that they were currently under verification. The reference for these country-specific EFs (Uvarova et al., 2017) was provided to the ERT during the review. The Russian Federation further explained that it was also considering using the IPCC default EFs for developed countries from table 4.2.4 of volume 2 of the 2006 IPCC Guidelines, which the Party supposes to be more applicable to specific national circumstances of the Russian Federation.	Yes. Accuracy
		The ERT recommends that the Russian Federation use the developed and verified national EFs for category 1.B.2.a oil for the parts of the time series for which they are applicable, provided that the Party demonstrates 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, the ERT recommends that the Party 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 Party decides to use the default EFs from table 4.2.4, instead of data from table 4.2.5 of volume 2 of the 2006 IPCC Guidelines, the ERT recommends that the Russian Federation include a detailed explanation of why the Party considers these default EFs 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.	
E.22	1.B.2.a Oil – liquid fuels – CH_4	The NIR (p.88) indicates that the EFs used to calculate emissions for subcategory 1.B.2.a oil were those for developing countries and economies in transition from table 4.2.5 of volume 2 of the 2006 IPCC Guidelines. However, the ERT noted that the CH_4 EFs for subcategory 1.B.2.a.4 refining/storage were those for developed	Yes. Transparency

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		countries from table 4.2.4 of volume 2 of the 2006 IPCC Guidelines. During the review, the Party indicated that the EFs for oil refining/storage are not available in table 4.2.5, so the Party chose the corresponding values provided in table 4.2.4. The ERT recommends that the Russian Federation 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.	
E.23	1.B.2.b Natural gas – gaseous fuels – CO_2 and CH_4	The NIR (p.88) indicates that the EFs used to calculate emissions for all subcategories under 1.B.2.b natural gas were the default values from the 2006 IPCC Guidelines, except the CH_4 EF for gas transmission (0.009, dimensionless – 0.90 per cent of the total gas volume transported via transmission pipelines, 0.69 per cent of which is the leakage rate of compression stations and 0.21 per cent of which is for other leakage during the transmission). However, the ERT noted that the CH_4 and CO_2 IEFs for all subcategories in CRF table 1.B.2 show significant deviations from the IPCC default EFs, except for gas distribution. During the review, the Party explained that country-specific CH_4 and CO_2 EFs for gas production and processing together with CO_2 EF for gas transmission were used for the first time in the 2018 annual submission, while default EFs are used for gas storage and distribution, but the relevant text in the NIR had not been revised. The ERT recommends that the Russian Federation 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.	Yes. Transparency
E.24	1.B.2.b Natural gas – gaseous fuels – CO_2 and CH_4	The ERT noted that it was not clear from the NIR whether the national inventory of the Russian Federation includes the emissions associated with 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, in its comments to the provisional main findings, the Party clarified that fugitive emissions from natural gas transport are estimated for the total gas transported through the united gas transmission network of the Russian Federation, which also includes natural gas in transit from neighbouring countries, and that the total natural gas transmission data are collected annually by Rosstat and reported in the statistical yearbooks. The ERT recommends that the Russian Federation include in the NIR a clear description of the inclusion of fugitive emissions from transmission of natural gas in transit.	Yes. Transparency
E.25	1.B.2.b Natural gas – gaseous fuels – CO_2 and CH_4	The ERT noted that a country-specific CH_4 EF for gas transmission has been used in the inventory calculations for many years (0.009, dimensionless), and a country-specific CO_2 EF for gas transmission that was used for the first time in the 2018 annual submission (see ID# E.26 below). However, the data used for the calculations could not be seen in the NIR, which did not reflect the application of country-specific parameters (see ID #E.23 above), or in CRF table 1.B.2 because subcategory 1.B.2.b.4 includes emissions from gas storage. During the review the Russian Federation provided values of these EFs in Gg of GHG per 10^6 m^3 marketable gas (6.00×10^{-3} for CH_4 and 7.38×10^{-6} for CO_2). The Party further clarifed that these EFs include venting emissions from gas transmission. The	Yes. Accuracy

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		ERT also noted that for converting the dimensionless parameter (0.009) to the CH_4 EF used for the calculations (6.00×10^{-3} Gg CH_4 per 10^6 m^3 marketable gas), the density of commercial natural gas (0.679 kg/m^3) and CH_4 volume fraction in commercial natural gas (0.982) were applied (Uvarova et al., 2015). The ERT further noted that the values of these two EFs (for CH_4 and CO_2) are higher than the combined average value of the IPCC EF default values for fugitive and venting emissions from gas transmission provided in the 2006 IPCC Guidelines (4.55×10^{-4} Gg per 10^6 m^3 marketable gas for CH_4 and 3.98×10^{-6} Gg per 10^6 m^3 marketable gas for CO_2 from table 4.2.4 of volume 2, and 1.03×10^{-3} Gg per 10^6 m^3 marketable gas for CH_4 and 6.64×10^{-6} Gg per 10^6 m^3 marketable gas for CO_2 from table 4.2.5 of volume 2), in particular the CH_4 EF, which is one order of magnitude higher. No robust verification was provided in the NIR to show the applicability of these data. The ERT further noted that the major source for the development of country-specific EFs is the study by Dedikov et al. (1999). The explanations and supporting documents provided during the review did not show robust justification/verification of why the CH_4 EF for natural gas transmission is one order of magnitude higher than the default EFs of the 2006 IPCC Guidelines and whether this CH_4 EF is applicable for the whole period of the time series 1990–2016, given that it has been based on a study published in 1999 (with measurements undertaken in 1996–1997). Moreover, the ERT noted that information from more recent studies, peer-reviewed articles and working papers is available (see ID# E.27 below), which concluded that the CH_4 emissions from pipelines and compressor stations are lower than those in Dedikov et al (1999). The ERT also noted the conclusions from the paper "Justification for the use of optimal coefficients in assessing GHG emissions in the Gas Industry" provided by the Party during the review, indicate that "The Russian gas industry meets the standards of North America and Western Europe in terms of strictness of the standard requirements, quality of components used, access to natural gas markets and energy prices and energy savings". In this sense, it is considered by the paper that the country-specific CH_4 EF should fall within the range of the values from table 4.2.4 of volume 2 of the 2006 IPCC Guidelines. In its comments to the draft ARR, the Russian Federation clarified that the measurement procedures and methodology for developing country-specific EFs and their associated uncertainties were well described in the publications provided to the ERT during the review (Dedikov et al., 1999 and Uvarova et al., 2017). The Russian Federation also clarified that the development of country-specific EFs was made in response to recommendation ID# E.9 in the previous review report and in particular it took into account the observation made; namely, that the dimensionless EF would be of limited applicability for a mix of gases that contain less than 100 per cent of a specific gas. With this in mind, the country-specific EFs were developed based on average CO_2 and CH_4 content in the marketable natural gas subject to pipeline transport, as indicated by Uvarova et al. (2017). The high CO_2 and CH_4 content in the marketable natural gas is a reason for the increased values of the country-specific EFs concerned. Furthermore, the Russian Federation expressed the opinion that the country-specific EFs for natural gas transport fully meet the IPCC and UNFCCC eligibility criteria for application in the national GHG inventory. The ERT recommends that the Russian Federation 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	

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		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.	
E.26	1.B.2.b Natural gas – gaseous fuels – CO_2 and CH_4	The ERT noted that the NIR (p.88 and p.91) listed the references to the sources of the country-specific EFs used in gas production (including gas processing) (i.e. 213 for CH_4 and 3.92 for CO_2 with the unit of kg/10^6 m^3 natural gas produced, as shown in CRF table 1.B.2) and gas transmission (i.e. 6,000 for CH_4 and 7.38 for CO_2 with the unit of kg/10^6 m^3 marketable gas) (see ID # E.25 above). No further information on the development of these country-specific CH_4 and CO_2 EFs was provided in the NIR. During the review, two key references (Dedikov et al., 1999 and Uvarova et al., 2017) were provided by the Party to the ERT to further clarify the approach used to develop these country-specific EFs. Based on these two documents, the ERT understood that the country-specific CH_4 EFs for gas production (including gas processing) are based, primarily, on one case study performed in 1998 in western Siberia (Dedikov et al., 1999) when on-site measurements were carried out to test the CH_4 fugitive/venting/flaring rate in natural gas production and transmission systems, while a new study (Uvarova et al., 2017) performed in 2016 identified the chemical composition of natural gas in the Russian Federation, including its CO_2 content, by using fugitive/venting/flaring rates measured in 1998 (Dedikov et al., 1999), and CO_2 EFs were then developed. The Party confirmed the understanding by the ERT of the development of these country-specific CH_4 and CO_2 EFs. The ERT recommends that the Russian Federation include a summary of the two key references (Dedikov et al., 1999 and Uvarova et al., 2017) 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.	Yes. Transparency
E.27	1.B.2.b Natural gas – gaseous fuels – CO_2 and CH_4	The ERT noted that the country-specific CH_4 and CO_2 EFs for gas production (including processing) are 213 kg CH_4/10^6 m^3 natural gas produced and 3.92 kg CO_2/10^6 m^3 natural gas produced, respectively, as shown in CRF table 1.B.2. These EFs are significantly lower than the average values of the default EFs for gas production (not including gas processing) from volume 2 of the 2006 IPCC Guidelines, table 4.2.4 (1.34×10^{-3} Gg CH_4/10^6 m^3 natural gas produced and 4.80×10^{-5} Gg CO_2/10^6 m^3 natural gas produced) and from table 4.2.5 (12.19×10^{-3} Gg CH_4/10^6 m^3 natural gas produced and 9.70×10^{-5} Gg CO_2/10^6 m^3 natural gas produced). In addition, the ERT noted that the country-specific CO_2 and CH_4 EFs for flaring under gas production are 1.95×10^{-4} Gg CO_2/10^6 m^3 natural gas produced and 1.12×10^{-7} Gg CH_4/10^6 m^3 natural gas produced, respectively. These EFs are also lower than the values of the default EFs for flaring under gas production from volume 2 of the 2006 IPCC Guidelines, table 4.2.4 (1.20×10^{-3} Gg CO_2/10^6 m^3 natural gas produced and 7.60×10^{-7} Gg CH_4/10^6 m^3 natural gas produced) and the average values of the default EFs from table 4.2.5 (1.40×10^{-3} Gg CO_2/10^6 m^3 natural gas produced and 8.80×10^{-7} Gg CH_4/10^6 m^3 natural gas produced). During the review, the Party explained that the country-specific values were mainly obtained from the case study by Dedikov et al. (see ID# E.26 above) which, although 20 years old, still better reflect the national circumstances of the Russian Federation than the IPCC default values. The ERT noted that, owing to the limited time for the review, it would be difficult to fully assess the accuracy and applicability of these country-specific EFs for the Russian Federation, and in particular noted the high difference of the reported country-specific EFs compared with default EFs from the 2006 IPCC Guidelines. The ERT also noted that the most recent study provided by the Party (Uvarova et al., 2017) just used the data provided in Dedikov et al.,	Yes. Accuracy

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		and it did not provide any verification information on the results achieved and on their applicability, which is key for the development and use of country-specific parameters. Moreover, the ERT further noted that more recent peer-reviewed papers and a working paper (Lechtenböhmer and Dienst (2010), Lechtenböhmer and Dienst (2008), Lelieveld (2005) and Wuppertal Institute (2005)) concluded that average emissions from gas production and processing in Russia might be much larger than the results of the survey by Dedikov et al. (1999). In particular, during the discussion with the Party on the draft ARR, the ERT noted that the CH_4 emission rate of 0.032 per cent, which is the basis for the development of the country-specific CH_4 EF, was misquoted from Dedikov et al. (1999). In fact, this study clearly indicated that CH_4 emissions from gas production and processing in the case study (Yamburg field) amount to about 0.06 per cent of the annual gas quantity produced, or 0.1 per cent when rounded. The ERT also noted that the emission estimates in the 2018 annual submission are based on a CH_4 emission rate of 0.032 per cent instead of 0.06 per cent as indicated in Dedikov et al. (1999). The ERT also noted that the indicative values presented in table 4.2.8 of the 2006 IPCC Guidelines (vol.2, chapter 4, p.4.71) give a rather large range of EFs, with 0.05 per cent as a low, 0.2 per cent as a medium and 0.7 per cent as a high value for production and processing of natural gas. The ERT acknowledges that the values in table 4.2.8 of the 2006 IPCC Guidelines are to be used to qualify specific CH_4 losses and to assess their reasonableness; however, it notes that the source of the information for that table indicates that it was based on data from several countries, including the Russian Federation. In its comments to the draft ARR, the Russian Federation indicated that it disagreed with the observations of the ERT and clarified that the more recent publications (Lechtenböhmer and Dienst (2010), Lechtenböhmer and Dienst (2008), Lelieveld (2005)) and the research report by the Wuppertal Institute (2005) did not contain alternative measurements of fugitive emissions from natural gas production and flaring in the Russian Federation. The Russian Federation indicated that the authors of these publications made their own assumptions and interpretations based on the measurements of fugitive emissions taken from Dedikov et al. (1999), the same data that were used by the Russian Federation to derive CH_4 and CO_2 country-specific EFs for natural gas production and flaring (Uvarova et al., 2017). In its comments on the draft ARR, the Russian Federation further explained that the country-specific EFs for natural gas production and flaring meet IPCC and UNFCCC GHG inventory eligibility criteria, because they: (1) were derived based on the data from an international measurement programme; (2) were presented at international conferences; and (3) were published in peer-reviewed national and international scientific literature. Meanwhile, the data from Lechtenböhmer and Dienst (2010), Lechtenböhmer and Dienst (2008), Lelieveld (2005) and the research report by the Wuppertal Institute (2005) are insufficient for the development of country-specific EFs for natural gas production and flaring. Furthermore, in its comments to the draft ARR, the Russian Federation explained that according to Dedikov et al. (1999), 0.06 per cent of fugitive emissions from natural gas production are constituted of 0.02 per cent of leaks and 0.04 per cent of intentional CH_4 releases. However, 70 per cent of the intentional CH_4 releases (initially being 0.04 per cent of natural gas produced) are flared following national safety regulations (i.e. $0.04 \times 0.7 = 0.028$ per cent, rounded	

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		to 0.03 per cent). The remaining 30 per cent are directly emitted to the atmosphere (i.e. 0.04 × 0.3 = 0.012 per cent). With this, the direct fugitive emissions to the atmosphere become: 0.02 + (0.04 × 0.3) = 0.032, rounded to 0.03 per cent. Thus, the actual fugitive emissions to the atmosphere are equal to 0.03 per cent of net production, and this value was derived from the data by Dedikov et al. (1999). This value, which corresponds to the direct emissions to the atmosphere, was used for the development of country-specific EFs for fugitive emissions from natural gas production. The remaining portion of natural gas that was flared (0.03 per cent rounded as described above) was used for developing the country-specific EF for flaring. This approach for developing country-specific EFs for fugitive and flaring emissions from natural gas production was described in the paper by Uvarova et al. (2017). The Russian Federation, in its comments on the draft ARR, further clarified that, in response to recommendation ID# E.9 from the previous review report, the country-specific EFs for natural gas production and flaring were developed using the average actual content of CO_2 and CH_4 in raw natural gas that has low CO_2 and CH_4 specific content (Uvarova et al., 2017). The lower CO_2 and CH_4 specific content in the raw natural gas is a reason for the lower absolute values of the country-specific EFs concerned. The ERT recommends that the Russian Federation 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 reporting guidelines. In particular, the ERT recommends that the Russian Federation 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 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.	
E.28	1.B.2.b Natural gas – gaseous fuels –CO_2 and CH_4	The ERT noted that the notation key "IE" is used to report CO_2 and CH_4 emissions from subcategories 1.B.2.b.3 natural gas – processing and 1.B.2.c.ii venting – gas without clear indication in the NIR or CRF table 9 where these emissions were included. During the review, the Party clarified that fugitive emissions from gas processing are included under 1.B.2.b.2 natural gas – production, and gas venting emissions are included under the fugitive emissions of 1.B.2.b.4 natural gas – transmission and storage. The ERT recommends that the Russian Federation include explicit descriptions in the NIR and CRF table 9 that explain under which categories are reported the CO_2 and CH_4 emissions from 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.	Yes. Transparency
IPPU			
I.14	2. General (IPPU) – CO_2	The ERT noted that the Russian Federation did not include in the national totals any CO_2 emissions from the NEU of gas/diesel oil, liquefied petroleum gas and other oil, which are reported in CRF table 1.A(d). During the review, the Party explained that liquefied petroleum gas was used for ethylene production. The Party also explained that about 15 per cent of the reported quantity of other oil is petroleum coke, and its associated emissions were reported under the	Yes. Completeness

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		IPPU categories aluminium production, ferroalloys production and silicon carbide production. However, for gas/diesel oil and the remaining quantity of other oil (about 85 per cent), the Party did not provide a justification to indicate that the final use of these fuels is not associated with the release of CO_2. The ERT is of the view that in cases where the final NEU of fuels is not known, the lack of reporting on emissions for these fuels could result in a potential underestimation of emissions (see ID #E.8 and #E.10 above). The ERT recommends that the Russian Federation 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.	
I.15	2.A.3 Glass production – CO_2	The Russian Federation estimated CO_2 emissions from subcategory 2.A.4.b other uses of soda ash by applying the tier 1 methodology from the 2006 IPCC Guidelines. The ERT noted that CO_2 emissions from 2.A.3 glass production were estimated by applying the tier 2 methodology from the 2006 IPCC Guidelines. The ERT also noted that the use of these two methodologies results in double counting of CO_2 emissions associated with soda ash use in glass production under categories 2.A.4.b and 2.A.3. During the review, the Party indicated that for both sources of emissions the 2006 IPCC Guidelines methodology was used and a possible double counting is the result of following the IPCC methodological guidance. The ERT acknowledges the fact that a double counting of CO_2 emissions from glass production is the result of the selected methodologies from the 2006 IPCC Guidelines. However, the ERT notes that one of the main principles to follow in compiling national GHG inventories is accuracy of reported emissions. The ERT recommends that the Russian Federation 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.	Yes. Accuracy
I.16	2.B.1 Ammonia production – CO_2	The Russian Federation applied a tier 3 method for the estimation of CO_2 emissions from ammonia production. The COF used in emission estimates is 0.995. According to the 2006 IPCC Guidelines: "when using the tier 3 method, it is good practice to obtain information on the CCF and COF from producers or to use country-specific energy sector information". The ERT noted that the source of the COF is not reported in the NIR. During the review, the Party informed the ERT that the COF is the default value in the Revised 1996 IPCC Guidelines, and it will be corrected in the next annual submission in accordance with the 2006 IPCC Guidelines. The ERT believes that future ERTs should consider this issue further to ensure that there is not an underestimation of emissions. The ERT agrees with the Party and recommends that the Russian Federation 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.	Yes. Accuracy
I.17	2.B.4 Caprolactam,	The Russian Federation estimated N_2O emissions from glyoxal production by using the tier 1 method from the 2006 IPCC Guidelines. The default EF of 0.1 t N_2O/t glyoxal produced was used for the estimates. The ERT noted that this	Yes. Accuracy

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	glyoxal and glyoxylic acid production – N_2O	EF contains an N_2O destruction rate of 80 per cent. According to the 2006 IPCC Guidelines, to use default destruction rates, inventory compilers should verify that the abatement technology is installed at individual plants and operated throughout the year. During the review, the Party explained that information about abatement technology is not available, and it intends to use the default N_2O EF without destruction rate (0.52 t N_2O/t glyoxal produced) in 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. The ERT agrees with the Party and recommends that the Russian Federation 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.	
I.18	2.B.5 Carbide production – CO_2	The Russian Federation reported in the NIR (p.108) that CO_2 emission estimates from silicon carbide production were based on a CCF of petroleum coke equal to 0.877 t C/t, and a COF equal to 0.99. The ERT noted that the source of these parameters was not reported in the NIR. During the review, the Party explained that these two parameters are default values from the Revised 1996 IPCC Guidelines. The Party also explained that CO_2 emissions from silicon carbide production will be recalculated using default CCF and COF values from the 2006 IPCC Guidelines in 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. The ERT agrees with the Party and recommends that the Russian Federation estimate CO_2 emissions from silicon carbide production by applying CCF and COF parameters that are consistent with the 2006 IPCC Guidelines.	Yes. Accuracy
I.19	2.B.10 Other (chemical industry) – CO_2	The Russian Federation did not report any emissions associated with hydrogen production (e.g. under CRF category 2.B.10). During the review, the Party confirmed that there is hydrogen production within the country using natural gas as feedstock (steam reforming). The ERT noted that the chapter on petrochemical processes in the 2006 IPCC Guidelines (vol. 3, chapter 3.9) contains two general methods to estimate CO_2 emissions associated with petrochemical production that could be used for estimating emissions of CO_2 from hydrogen production. The ERT also noted that, during steam reforming of natural gas, all the carbon is converted to CO_2, as can be concluded from the chemical reactions presented in the 2006 IPCC Guidelines (vol. 3, chapter 3.2.2). Therefore, the Party could use either the tier 2 or the tier 3 methods, by following the guidance of figure 3.8 and figure 3.10 in volume 3 of the 2006 IPCC Guidelines. In its comments to the draft ARR, the Russian Federation, referring to the text of the 2006 IPCC Guidelines (vol. 3, chapter 3.9), expressed the opinion that the methodology for estimating emissions associated with hydrogen production is not provided by the 2006 IPCC Guidelines and therefore reporting emissions is not mandatory for this category. The ERT further noted that in the conclusions and recommendations of the sixteenth meeting of GHG inventory lead reviewers, the lead reviewers provided the following guidance: “The lead reviewers clarified that, consistent with the 2006 IPCC Guidelines, reporting of all CO_2 emissions related to the non-energy-uses of fuels is required, including fuels used for hydrogen production.” The ERT believes that future ERTs should consider this issue further to ensure that there is not an underestimation of emissions.	Yes. Completeness

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		Taking into consideration the guidance provided in the conclusions and recommendations of the sixteenth meeting of GHG inventory lead reviewers, the ERT recommends that the Russian Federation 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.	
I.20	2.D Non-energy products from fuels and solvents use – CO_2	The ERT noted that in CRF table 1.A(d) the amount of CO_2 reported under the column "CO_2 excluded" (i.e. excluded from the reference approach) is identical to the CO_2 reported under the column "CO_2 emissions from the NEU reported in the inventory". Furthermore, the reported CO_2 emissions in both columns were estimated under the assumption that the carbon of the NEU of fuels is 100 per cent oxidized to CO_2. The ERT also noted that, regarding the column "CO_2 excluded", this assumption is correct in cases where the associated emissions of a fuel are reported under a different category not in the energy sector (e.g. the IPPU sector). However, the column "CO_2 excluded" and the column "CO_2 emissions from the NEU reported in the inventory" could not be identical for all fuels, because the NEU of a fuel may be partly or may not be emissive. During the review, the Party presented to the ERT a revised CRF table 1.A(d) developed by following the above understanding. The Party also include in the table additional information about the category where the CO_2 emissions from the NEU of fuels were reported. The ERT recommends that the Russian Federation 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:…".	Yes. Adherence to the UNFCCC Annex I inventory reporting guidelines
I.21	2.E Electronics industry – HFCs, PFCs, SF_6 and NF_3	The emissions of F-gases (HFCs, PFCs, SF_6 and NF_3) have been estimated for the first time by the Russian Federation, using the tier 2a methodology from the 2006 IPCC Guidelines. However, as reported in the NIR (pp.133–134), the estimation of emissions from the electronics industry is preliminary and requires further elaboration. The ERT noted that the emissions from semiconductor and LCD manufacturing were estimated together by using EFs from table 6.3 of the 2006 IPCC Guidelines (vol. 3, chapter 6), which are applicable only for semiconductor manufacturing, while the EFs applicable for LCD manufacturing are contained in table 6.4 of the 2006 IPCC Guidelines (vol. 3, chapter 6). The use of values from table 6.3 instead of those in table 6.4 for LCD manufacturing may result in an underestimation of emissions in some cases (e.g. according to these tables, semiconductor manufacturing does not result in by-product HFC-23 emissions, while LCD manufacturing does result in such emissions), but also an overestimation of emissions in other cases (e.g. the $1–U_i$ factors, where U_i is the use rate of gas i (fraction destroyed or transformed in process), are higher in most cases for semiconductor manufacturing compared with LCD manufacturing). The ERT also noted that the Party did not report emissions associated with the use of F-gases, in particular PFCs, as heat transfer fluids to control temperature during certain processes in the electronics industry. During the review the Party explained that, in cooperation with the Ministry of Industry and Trade of the Russian Federation and companies operating in the electronics industry, the national inventory team plans to study for the next two years the possibilities of obtaining data for the reliable implementation of the methodologies of the 2006 IPCC Guidelines for estimating HFCs, PFCs, SF_6 and NF_3 emissions from category 2.E	Yes. Completeness

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and/or a problem?[a] If yes, classify by type*
		electronics industry. The ERT believes that future ERTs should consider this issue further to ensure that there is not an underestimation of emissions. The ERT recommends that the Russian Federation improve the accuracy of the emission estimates of F-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.	
I.22	2.F.1 Refrigeration and air conditioning – HFCs	According to the NIR (p.140), the use of HFC-134a, HFC-407c and HFC-410a in stationary air-conditioning equipment in small quantities began in 1997. The ERT noted that no emissions were included in the inventory from disposal of stationary air-conditioning equipment for any year of the time series (reported as "NO" in CRF table2(II)B-H). During the review, the Party clarified that the average lifetime for residential and commercial air-conditioning systems is 15 years and the average lifetime for chillers is 23 years. Therefore, the ERT considers that emissions associated with disposal of stationary air-conditioning equipment at least started to occur in 2012. The ERT believes that future ERTs should consider this issue further to ensure that there is not an underestimation of emissions. The ERT recommends that the Russian Federation estimate and report HFC emissions from disposal of stationary air-conditioning equipment.	Yes. Completeness
I.23	2.F.1 Refrigeration and air conditioning – HFCs	The Russian Federation did not report any emissions or notation keys under subcategory 2.F.1.d transport refrigeration for the entire time series. The ERT noted that, according to the information provided in the CRF tables of annual submissions of Parties included in Annex I to the Convention, HFC-32, HFC-125, HFC-134a and HFC-143a were used in transport refrigeration, which indicates the possibility that these gases and related emissions may also occur in the Russian Federation. During the review, the Party indicated that the sum of estimated emissions from the use of HFCs in other categories (i.e. without transport refrigeration) is consistent with the consumption of refrigerants derived from a national refrigerant balance. Therefore the emissions from transport refrigeration may have been included in other categories or may be negligible. The Party further indicated that HCFC-22 or other refrigerants not required to be reported by the UNFCCC Annex I inventory reporting guidelines may be used in this category. The ERT believes that future ERTs should consider this issue further to ensure that there is not an underestimation of emissions. The ERT recommends that the Russian Federation provide information and documentation in the NIR on the use of F-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.	Yes. Completeness
I.24	2.F.5 Solvents – HFCs and PFCs	The Russian Federation did not report any emissions or notation keys under subcategory 2.F.5 solvents. The ERT noted that according to the 2006 IPCC Guidelines HFC or PFC solvent use occur in four main areas: precision	Yes. Completeness

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue and/or a problem?[a] If yes, classify by type
		cleaning, electronics cleaning, metal cleaning and deposition applications. The most commonly used HFC solvent is HFC-43-10mee, with some use of HFC-365mfc and HFC-245fa. During the review, the Party explained that HFC-43-10mee, HFC-365mfc and HFC-245fa are not produced in the Russian Federation, and that HFC-43-10mee and HFC-365mfc are not imported in the country. Only insignificant amounts of HFC-245fa were imported (76 kg in 2014, 100 kg in 2015 and 1,000 kg in 2016). Hence, emissions from HFC or PFC solvent uses can be considered as negligible (for HFC-245fa, 0.08 kt CO_2 eq in 2014, 0.10 kt CO_2 eq in 2015 and 1.03 kt CO_2 eq in 2016) as the estimated values are below the threshold indicated in paragraph 37(b) of the annex to decision 24/CP.19. The ERT recommends that the Russian Federation either estimate and include in the inventory the HFC and/or PFC emissions from solvent cleaning activities under 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.	
Agriculture			
A.12	3. General (agriculture) – CH_4 and N_2O	In the Russian Federation's inventory the feed intake estimates are based on statistics on feed units. These statistics are produced by Rosstat. Consequently, the accuracy of the estimated emissions of CH_4 and N_2O from categories 3.A, 3.B and 3.D is heavily dependent on the accuracy of the feed unit statistics (see ID#s A.14, A.15 and A.18 below). However, the NIR does not include the definition of a "feed unit" in the Russian Federation or a description of how the statistics on feed units are produced. During the review, the Party provided the definition of a "feed unit" and informed the ERT that there are also differences between the methodologies used for estimating the feed units consumed by animals for enterprises, private farms and households. Moreover, the Party informed the ERT that statistics on feed units consumed by grazing animals are also produced, but the NIR does not describe the methodology used to collect these data. The ERT recommends that the Russian Federation include in the NIR the definition of a feed unit as used in the national statistics. The ERT also recommends that the Party 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.	Yes. Transparency
A.13	3. General (agriculture) – CH_4 and N_2O	The ERT noted that no information was included in the NIR on how the populations of different animal categories are distributed among enterprises, private farms and households. During the review, the Party showed these data to the ERT, which found them generally correct. The ERT also noted that this information is important, for example, when evaluating whether the reported IEFs and other parameters are of a reasonable magnitude in relation to the general structure of the agriculture sector in the country. For example, if the majority of the cattle in a country are found on enterprises, the average GE values are expected to be higher compared with those values for a country where most of the cattle are found in households.	Yes. Transparency

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and/or a problem?[a] If yes, classify by type*
		The ERT recommends that the Russian Federation 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.	
A.14	3.A Enteric fermentation – 3.B Manure management – 3.D Direct and indirect N_2O emissions from agricultural soils – CH_4 and N_2O	In the NIR the Russian Federation indicated that one of the QC checks performed has the objective of ensuring that the feed intake in kg of dry mass does not exceed 3 per cent of the body mass in ruminants for any year in the inventory. During the review, the Party informed the ERT that these checks are only performed for the aggregated country total averages. The ERT believes that this approach could be improved. The rationale as explained by the Party is that the 3 per cent is assumed to constitute the upper limit on how much feed it is possible for an individual animal to digest, but the ERT noted that the more aggregated are the data, the less reliable are the checks; in particular because there are several areas in the Russian Federation with low productivity and therefore the national average will seldom exceed 3 per cent despite the fact that the feed intakes in specific regions are sometimes significantly higher than the average (see ID# A.18 below) as well as the average GE for dairy cattle (see ID# A.15 below). Hence, not performing these QC checks on a disaggregated level may overlook errors in the inventory. In addition, the ERT noted that daily feed intake for high-productivity dairy cattle may well exceed 4 per cent of their body weight. The ERT recommends that the Russian Federation perform the QC checks at the disaggregated level (i.e. regions) to ensure that the feed intake in kg of dry mass does not exceed 3 per cent of the body mass in ruminants. Additionally, to avoid false conclusions, the ERT recommends that the Party 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).	Yes. Adherence to the UNFCCC Annex I inventory reporting guidelines
A.15	3.A.1 Cattle – 3.B.1 Cattle – 3.D.a Direct N_2O emissions from managed soils CH_4 and N_2O	The ERT noted that GE values are unexpectedly high in some regions of the Russian Federation (e.g. in the Moscow and the Leningrad regions, in which the average GE for dairy cattle in 2016 were 474.22 and 447.78 MJ/head/day, respectively). These values are higher than the GE values reported by any of the reporting Parties included in Annex I to the Convention (the highest being 396.3 MJ/head/day). In addition, the value reported by the Party for average gross feed intake needed for dairy cattle to produce 1 kg of milk in 2016 (23.97 MJ/kg milk) suggests that dairy cattle in the country are less effective compared with those of other reporting Parties, for which the average value reported is 17.48 MJ/kg milk. Only three other Parties reported a higher gross feed intake per kg of milk produced: Kazakhstan (37.57 MJ/kg milk), Romania (27.05 MJ/kg milk) and Belarus (26.60 MJ/kg milk). Moreover, the average DE% reported for dairy cattle by the Russian Federation is higher than that reported by each of these three Parties. These facts together could be an indication that the average GE is overestimated in the Russian Federation (see also ID# A.18 below). The ERT recommends that the Russian Federation further investigate and clearly justify in the NIR the GE values estimated from the feed unit statistics. As a first step the ERT encourages the Party to estimate the feed intake in kg dry mass compared to body weight for the Moscow and the Leningrad regions and discuss the results with an expert in animal nutrition to identify whether the feed intake levels in kg dry mass are reasonable and report on the results in the NIR. If it turns out that feed intake levels are considered unreasonable, the ERT recommends that the Russian	Yes. Accuracy

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue and/or a problem?[a] If yes, classify by type
		Federation 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.	
A.16	3.A.1 Cattle – 3.B.1 Cattle – 3.D Direct and indirect N_2O emissions from agricultural soils – CH_4 and N_2O	The ERT noted that between 2015 and 2016 there were significant decreases for several parameters for non-dairy cattle (e.g. GE, VS daily excretion and Nex). This is unexpected not only because the decreases are significant, but also because, according to CRF tables 3.A, there has been a continuously increasing trend for the previous 15 years before 2015 for GE for non-dairy cattle. Moreover, the ERT also noted that the values for GE for dairy cattle reported in CRF table 3.A continued to increase between 2015 and 2016 (by 1.6 per cent). However, the ERT further noted that, for non-dairy cattle, GE decreased from 149.23 to 136.64 MJ/head/day (8.4 per cent) between 2015 and 2016, while VS daily excretion decreased from 2.64 to 2.33 kg dm/head/day (11.9 per cent) and Nex decreased from 76.19 to 69.99 kg N/head/year (8.1 per cent) between 2015 and 2016. During the review, the Party did not provide an explanation for such large decreases. Hence, the ERT cannot exclude the possibility that there is an error in the AD used for the calculations. The ERT believes that future ERTs should consider this issue further to ensure that there is not an underestimation of emissions. The ERT recommends that the Russian Federation 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, the ERT recommends that the Party include in the NIR clear explanations for the observed decreases in the values for GE, VS daily excretion and Nex between 2015 and 2016.	Yes. Accuracy
A.17	3.A.1 Cattle – CH_4	The ERT found an error in the estimate of the emissions from enteric fermentation for non-dairy cattle in 2016. When comparing the GE values and the CH_4 IEFs, the two data curves follow each other perfectly between 1990 and 2015. This is expected because the Party used equation 10.21 from the 2006 IPCC Guidelines (vol. 4, chapter 10, p.10.31) to estimate the CH_4 emissions. However, in 2016 there is a significant decrease in GE (8.4 per cent), but the IEFs are exactly the same in 2015 and 2016 (63.62 kg CH_4/head/year). This pattern is not possible if the emissions were estimated correctly. During the review, the Party acknowledged the error related to the calculation of GE. The ERT believes that future ERTs should consider this issue further to ensure that there is not an underestimation of emissions. The ERT recommends that the Russian Federation 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.	Yes. Accuracy
A.18	3.A.1 Cattle – CH_4	The ERT noted that in the NIR (annex, table 3.1.9) the reported CH_4 IEF for enteric fermentation for non-dairy cattle in the Bryansk region more than doubled between 2014 and 2015 (from 66.09 to 173.41 kg CH_4/head/year) and then stayed at a high level in 2016 (158.5 kg CH_4/head/year). During the review, the Party agreed that such high CH_4 IEFs (and the corresponding feed intake levels) are unfeasible, and constitute an error in the inventory calculations. Because there are other regions (e.g. Republic of Sakha, Republic of Adygea and Tambov Region) that also show high CH_4 IEFs and GE, although not to the degree that appears in the Bryansk region, the ERT considers that it is possible that CH_4 EFs and GE for these regions are also overestimated (see also ID# A.15 above).	Yes. Accuracy

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and/or a problem?[a] If yes, classify by type*
		The ERT recommends that the Russian Federation 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. The ERT also recommends that the Russian Federation thoroughly investigate the cause of the error to see if there could be other regions of the Russian Federation affected by this mistake.	
A.19	3.A.4 Other livestock – 3.B.4 Other livestock – CH_4	The Russian Federation estimated CH_4 emissions from reindeer using appropriate method and EFs, and these emissions were reported in the CRF tables under subcategories 3.A.4 other livestock – deer and 3.B.4 other livestock – deer. The ERT noted that, although reindeer do belong to the family Cervidae together with other species of deer, other Parties included in Annex I to the Convention that reported CH_4 emissions from reindeer generally include these emissions under subcategories 3.A.4 other livestock – other – reindeer and 3.B.4 other livestock – other – reindeer. The ERT recommends that the Russian Federation 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. This will increase the comparability with other reporting Parties.	Yes. Comparability
A.20	3.B Manure management – CH_4	In the NIR (p.171) the Party indicated that "For other livestock cattle – in addition to pasture and dry storage – systems with liquid manure are used, which, as a rule, do not mix and allow the formation of a natural crust on the surface of the storage. For pigs, storage systems with liquid manure (with natural crust) are also used…". The ERT noted that this is not consistent with the text on page 173 of the NIR, which indicates that "in accordance with the recommendations of the ERT for liquid manure storage systems, the conversion was performed: the MCF default coefficients for 'liquid systems with a natural crust' were changed to the default coefficient for 'liquid systems without a natural crust cover' for all years of the period 1990–2015." During the review the Party informed the ERT that the EFs for liquid manure without natural crust cover are consistently used in the inventory, for the emission estimates of CH_4 as well as N_2O (see ID# A.7 in table 3). The ERT recommends that the Russian Federation 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.	Yes. Transparency
LULUCF			
L.6	4. General (LULUCF) – CO_2	The ERT noted that, in the NIR, the uncertainties associated with the estimates of the LULUCF sector were provided, but with a variable degree of precision. In several instances no reference was provided for a given uncertainty value. For example, for the EF of biomass stock changes in forest land converted to settlements, it is unclear whether both the uncertainty of the average biomass stocks in the region and the sampling error due to the small area deforested are included in the reported 13 per cent uncertainty estimate. Moreover, it is unclear how this uncertainty can be lower than the uncertainty of biomass stocks in forest land remaining forest land (22.4 per cent). Also, for the EF of biomass	Yes. Adherence to the UNFCCC Annex I inventory reporting guidelines

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue and/or a problem?[a] If yes, classify by type
		stock changes in forest land remaining forest land, it is unclear how the uncertainty of 22.4 per cent is derived from the reported uncertainty value of 20 per cent for standing volume. The ERT recommends that the Russian Federation 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.	
L.7	4.C.2.2 Cropland converted to grassland – CO_2	The ERT noted that equation 6.39 of the NIR for the uncertainty estimates of the EF of soil carbon stock change in cropland converted to grassland is taken from the 2006 IPCC Guidelines (vol. 1, equation 3.2). However, the ERT identified an error in equation 6.39 of the NIR: U and X terms should be multiplied rather than added. The ERT recommends that the Russian Federation 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.	Yes. Adherence to the UNFCCC Annex I inventory reporting guidelines
L.8	Land representation – CO_2	The ERT noted that the approach used for land representation in the Russian Federation was not explicitly specified in the NIR. During the review, the Party clarified that it used approach 2 of the 2006 IPCC Guidelines to represent land areas. The ERT noted that, for land converted to settlements, the Party is able to identify conversions and the share of those conversions occurring on forest land and wetlands (see ID# KL.6 below). However, for land converted to settlements which do not occur on forest land and wetlands, the Party is not able to identify the original land use (i.e.. cropland, grassland or other land) and, in some years, attributes most of these conversions to other land. The ERT considers that this approach is not in line with the 2006 IPCC Guidelines because, in the Russian Federation, it is unlikely that the original land use before conversion to settlements was other land (which consists of bare rock, ice and tundra). Moreover, assimilating cropland or grassland conversions to settlements as transitions from other land to settlements leads to inaccurate estimates of soil carbon stock changes because the carbon stock for other land is assumed to be zero. The ERT recommends that the Russian Federation 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 onwards depending on the transition period chosen by the Party for each transition. The ERT also recommends that the Russian Federation describe in the NIR how the original land use for the transition is determined when it is not directly identifiable in existing datasets (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. The ERT further recommends that the Russian Federation, if it is unable 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.	Yes. Accuracy
L.9	4. General (LULUCF) –	The Russian Federation reported in the NIR that the collection of data on soil drainage in forest land and on peat extraction areas stopped in 2008. Since 2008, the AD for soil drainage in forest land and peat extraction are extrapolated from pre-2008 data, in accordance with the 2006 IPCC Guidelines. The ERT noted large soil carbon	Yes. Consistency

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and/or a problem?[a] If yes, classify by type*
	CO_2, CH_4 and N_2O	losses associated with these practices in the Russian Federation (e.g. around 32 Mt C in 2008 across all land-use categories). The ERT is therefore of the view that for such a large source of emissions, extrapolating data more than 10 years away from the last measurement is increasing the overall uncertainty of the inventory and introducing inconsistencies in the time series. The ERT recommends that the Russian Federation 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 Party needs to continue with the current approach, 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 its improvement plan and report on progress made in the NIR.	
L.10	4.A.1 Forest land remaining forest land – CO_2	In its NIR (table 6.15), the Russian Federation provided the list of conversion coefficients used to estimate carbon gains and losses related to forest land. During the review, the Party clarified that these values correspond to the product "$BCEF_S$ x (1 + R) x CF" in equation 2.8 of the 2006 IPCC Guidelines (vol. 4, chapter 2, p.2.12). The ERT recommends that the Russian Federation clarify in its NIR the meaning of the values included in table 6.15, including the references to the parameter names and abbreviations used as defined in the 2006 IPCC Guidelines.	Yes. Transparency
L.11	4.A.1 Forest land remaining forest land – CO_2	In its NIR (equation 6.2, p.242), the Russian Federation refers to age groups and the standing merchantable volume for these age groups without indicating how the underlying data were collected. During the review, the Party clarified that data on area per age group for each species and region and their standing volumes were collected during forest inventories occurring every 10–15 years. The Party further clarified that age was obtained either from the registered date of plantation or by coring one or two of the largest trees in the FM unit, and that standing volume was obtained either by applying allometric equations to the measured diameters and heights or by using ground-truthed satellite measurements. The ERT recommends that the Russian Federation describe in the NIR how data on age are collected, specifying in which cases it uses a recorded clear-cut date and in which cases it uses tree coring. The ERT also recommends that the Party 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, the ERT recommends that the Party include data in the NIR on the evolution of the distribution of areas per age group.	Yes. Transparency
L.12	4.A.1 Forest land remaining forest land – CO_2	In its NIR (equation 6.7), the Russian Federation refers to clear-cut forest areas without indicating how the underlying data were collected. During the review, the Party clarified that data on clear-cut areas were collected by the Federal Forest Agency from logging companies for fiscal purposes, and verified by using a combination of satellite imagery and ground checks. The Party further clarified that the corresponding harvested carbon losses were obtained by using the average standing volume of the mature or over-mature age group of the corresponding species in the corresponding region.	Yes. Transparency

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and/or a problem?[a] If yes, classify by type*
		The ERT recommends that the Russian Federation include in the NIR a description of how data on clear-cut areas are collected. For verification purposes, the ERT encourages the Russian Federation to compare the harvested volumes and age groups structure resulting from these assumptions with the actual statistics on harvested volumes and age groups structure.	
L.13	4.A.1 Forest land remaining forest land – CO_2	In its NIR (equation 6.8), the Russian Federation refers to burned forest areas without indicating how the underlying data were collected. During the review, the Party clarified that data on burned areas were collected by the Federal Forest Agency using satellite imagery. The Party further clarified that the corresponding carbon losses and emissions were obtained by using the average standing volume of forests in the corresponding region. The Party also clarified that data on areas affected by other disturbances were collected by regional forest agencies through ground observation. The number and location of ground observations are determined by each agency depending on the specific disturbance risks in each area. The ERT recommends that the Russian Federation include in the NIR a description of how data on areas subject to fire and other disturbances are collected.	Yes. Transparency
L.14	4.A.1 Forest land remaining forest land – CO_2	In its NIR (tables 6.23–6.26), the Russian Federation explained that deadwood carbon stocks in forests increase with forest age. However, the ERT noted from scientific literature that the evolution of deadwood stocks with age tends to be U-shaped (Pregitzer and Euskirchen, 2004), while the IPCC default assumption is that deadwood stocks are constant with forest age. During the review, the Party clarified that it excluded the deadwood resulting from slash from its accounting of deadwood stocks in order to avoid double counting with the emissions from clear-cut while still using a tier 2 approach. The ERT is of the view that this approach is accurate, although excluding the emissions from slash from the biomass pool and including them in the deadwood pool would be accurate as well. The ERT recommends that the Russian Federation clarify and document in its NIR that the reason why deadwood stock change with forest age in its calculations is neither flat nor U-shaped is because the deadwood resulting from slash from clear-cuts is excluded from deadwood stocks.	Yes. Transparency
L.15	4.A.1 Forest land remaining forest land – CO_2	In its NIR (tables 6.23–6.26), the Russian Federation explained that soil carbon stocks in forests increase with forest age. However, the ERT noted from scientific literature that the evolution of soil carbon stocks with age tends to be either U-shaped or constant (Achat et al., 2015; Pregitzer and Euskirchen, 2004), while the IPCC default assumption is that soil carbon stocks are constant with forest age. During the review, the Party provided to the ERT national publications supporting the absence of soil carbon stock change after disturbance and national publications supporting a decrease in soil carbon stock changes over the long term in forest stands, which are frequently disturbed (Chestnykh et al., 2004; Zamolodchikov et al., 2007; and Zamolodchikov et al., 2013). However, the ERT is of the view, in line with the scientific literature and the IPCC default assumption, that this does not support an increase of soil carbon stocks with forest age. As a result, the ERT is also of the view that the tier 2 method used by the Party for soil carbon stock changes in forest land remaining forest land is inaccurate, because the Russian Federation could not provide	Yes. Accuracy

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and/or a problem?[a] If yes, classify by type*
		evidence that its national circumstances deviate from the IPCC default assumption that soil carbon stocks are constant with age. The ERT recommends that the Russian Federation either provide in the NIR documentation supporting its 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-tied 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.	
L.16	4.A.1 Forest land remaining forest land – CO_2	The Russian Federation assumed that carbon stocks and carbon stock changes in protected forests of a given region are equal to the average carbon stocks and carbon stock changes in managed forests of the same region. During the review, the Party clarified that protection status has often been provided recently, which supports this assumption. The Party further clarified that the only data collected for these protected forests are their area and standing volume. The ERT is of the view that protected forests are necessarily older on average than non-protected forests. The ERT understands that this discrepancy in average age and hence carbon stock and carbon stock changes may currently be small. However, this discrepancy will increase over time and the assumption currently used for the characteristics of protected forests will not hold over the long term. The ERT recommends that the Russian Federation 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 no discrepancy in average age and hence carbon stock and carbon stock changes assumed occur for the estimates for protected forests. The ERT encourages the Russian Federation to include data collection in these forests in its improvement plan in the next annual submission.	Yes. Accuracy
L.17	4.A.2.1 Cropland converted to forest land – CO_2	The ERT noted that tables 6.34 and 6.35 of the NIR report carbon stock changes in cropland converted to forest land for 30 years, whereas the Party stated in its NIR that it chose a 50-year transition period (section 6.4.1.2). Moreover, the titles of those tables mention carbon stocks whereas the data provided correspond to carbon stock changes. The ERT recommends that the Russian Federation extend tables 6.34 and 6.35 of the NIR from 30 years to the full 50 years of the transition period for cropland converted to forest land. The ERT also recommends that the Party correct the titles of these tables and mention carbon stock changes in cropland converted to forest land.	Yes. Transparency
L.18	4.A.2.1 Cropland converted to forest land – CO_2	The ERT noted that in CRF table 4.A, the ICSCF for deadwood, litter and soil carbon under cropland converted to forest land should reflect the weighted average of the ICSCFs of each subcategory weighted by the respective area of each subcategory under cropland converted to forest land. However, this is not the case in the 2018 annual submission: for example, in 1993, in CRF table 4.A the ICSCF for soil carbon under cropland converted to forest land is 2.45 t C/ha, whereas the ICSCF of the two subcategories (anti-erosion plantation and field-protective plantation) are both equal to 0.64 t C/ha. Moreover, these ICSCFs of 0.64 t C/ha are inconsistent with the EF of 0.96 t C/ha reported in table 6.35 of the NIR for the first 20 years of the cropland to forest land conversion. During the review,	Yes. Accuracy

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue and/or a problem?[a] If yes, classify by type
		the Party clarified that this lower value for ICSCF is the result of an assumption that 33 per cent of SOC increase is lost by fire. However, the ERT is of the view that the impact of fire is already included in the data used to estimate the carbon pools of the different land uses and that there is therefore no basis to discount the EF of 0.96 t C/ha reported in the NIR. The ERT recommends that the Russian Federation use the EFs reported in the NIR (table 6.35) 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. The ERT also recommends that the Russian Federation 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.	
L.19	4.B.1 Cropland remaining cropland – CO_2	The Russian Federation used a tier 3 method (model) to estimate soil carbon stock changes in mineral soils in cropland remaining cropland and grassland remaining grassland. The resulting ICSCF for cropland remaining cropland is a net carbon loss averaging 0.335 t C/ha/year over the period 1990–2016 (ranging from 0.11 to 0.54 t C/ha/year). This is two times higher than the average net carbon loss measured over European cropland (0.16 t C/ha/year, 1990–1999), which includes grassland to cropland conversions (Ciais et al., 2010). It is also the highest ICSCF in absolute value reported by Parties included in Annex I to the Convention for this category (the 1990–2016 averages for other reporting Parties range from –0.10 to 0.31 t C/ha/year). In the underlying data used by the Russian Federation, the ERT identified several issues (e.g. inconsistency between the manure time series and the herd time series, grassland productivity, share of grass grazed or cut) that may contribute to the inaccuracy of the ICSCF. Most importantly, the ERT is of the view that the verification data for its tier 3 model, which were provided by the Party to the ERT during the review, are not suitable. Specifically, the verification data comprise soil carbon measurements made between 1995 and 1999 in several regions of the Russian Federation but unfortunately the location of these measurements could not be identified as being the same over time, and in several instances the location of some measurements clearly differed from one year to another. Moreover, even if the measurements had been made in the same location over time, four years of data are usually not enough to identify significant soil carbon stock changes, especially when land use is constant. In addition, in several regions the number of sample plots is too small to be representative. During the review the Party explained that no other verification data were available for the Russian Federation at the time of the review. The ERT therefore concluded that the tier 3 method used to estimate soil carbon changes in mineral soils in cropland remaining cropland and grassland remaining grassland is currently not sufficiently robust for being used in these calculations by the Russian Federation. The ERT recommends that the Russian Federation 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).	Yes. Accuracy
L.20	4.B.2 Land converted to	In tables 6.45 and 6.51 of its NIR the Russian Federation reported increases in cropland area and in managed grassland area for some years (e.g. 2013 and 2016). However, the associated areas and emissions/removals in CRF	Yes. Completeness

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and/or a problem?[a] If yes, classify by type*
	cropland – 4.C.2 Land converted to grassland – CO_2	tables 4.B and 4.C are reported as "NO". The Party explained that the original land uses of these additional areas were recently abandoned cropland and grassland, respectively, and that it believes that the associated emissions and removals are small. The ERT acknowledges that the associated emissions and removals in these recently abandoned cropland and grassland areas would likely be small, but notes that the 2006 IPCC Guidelines do not allow changes in areas in any given land-use category to remain unreported, no matter the amount of land and emissions/removals concerned. The ERT recommends that the Russian Federation 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. Similarly, the ERT recommends that the Russian Federation 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.	
L.21	4.C.2 Land converted to grassland – CO_2	As explained in the NIR, the Russian Federation applied the IPCC tier 1 method for estimating biomass stock changes in land converted to grassland and land converted to settlements, with two exceptions. First, the Party assumes that the stocks are linearly changing over the transition period rather than being attributed to the first year of the transition period (2006 IPCC Guidelines, vol. 4, equation 2.16). Second, the biomass stock in cropland is assumed to be zero instead of using the IPCC default value of either 2.1 t C/ha (annual crops) or 63 t C/ha (perennial crops). In its NIR, the Party explained that the reason for the latter assumption is that the soil is ploughed before conversion. However, the ERT noted that the 2006 IPCC Guidelines recommend that the biomass carbon stock to be accounted for in these conversions is not the stock immediately preceding the transition but rather the average stock of the previous land use. The ERT recommends that the Russian Federation, in its 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. The ERT also recommends that the Russian Federation use the average biomass stock of the previous land use rather than zero in its estimates of biomass stock changes in land converted to grassland and land converted to settlements.	Yes. Accuracy
L.22	4.C.2.2 Cropland converted to grassland – CO_2	The ERT noted that the Russian Federation uses the IPCC default value of zero for carbon stocks in dead organic matter in cropland and a country-specific value of 5.92 t C/ha for carbon stocks in dead organic matter in grassland. This difference in the tier approach is a source of inaccuracy when estimating carbon stock changes for cropland converted to grassland. Indeed, the IPCC default assumption underestimates the stock, while the country-specific value does not, which results in an inaccuracy of the estimates because of the difference between the two initial stocks. The ERT recommends that the Russian Federation 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.	Yes. Accuracy

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and/or a problem?[a] If yes, classify by type*
L.23	4.C.2.2 Cropland converted to grassland – CO_2	The Russian Federation used a tier 3 method (model) to estimate the changes in soil carbon stocks in cropland converted to grassland. In table 6.64 of its NIR, the Party provided information on independent measurements for transitions lasting from 11 to 35 years, which verify the tier 3 estimates. However, the NIR did not provide information on the verification of the cumulated carbon stock changes over the 50 years of the transition period used by the Party in its calculations, and did not describe the necessary data inputs for the model (initial carbon stock, organic matter inputs and pedo-climatic data). The ERT recommends that the Russian Federation increase the transparency of the description in the NIR on 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.	Yes. Transparency
L.24	4.C.2.3 Wetlands converted to grassland – CO_2	In its NIR the Party provided information on a country-specific method for estimating carbon stock changes resulting from wetlands converted to grassland. The ERT noted that in the CRF tables the area of organic soils for this subcategory was reported but the carbon stock changes were reported as "NO". The ERT recommends that the Russian Federation estimate and report emissions and removals from carbon stock changes for the reported area of organic soils under wetlands converted to grassland.	Yes. Completeness
L.25	4.E.1 Settlements remaining settlements – CO_2	The Russian Federation reported urban forests as a subcategory under category 4.E settlements. During the review, the Party clarified that these forests meet the national definition of forest but are located within the administrative boundaries of cities. The ERT is of the view that with such proximity to densely populated areas, these forests are likely subject to "practices for stewardship and use of forest land" and therefore likely meet the definition of managed forests. The ERT recommends that the Russian Federation report urban forests as a subcategory under 4.A.1 forest land remaining forest land for reporting under the Convention.	Yes. Comparability
L.26	4.G HWP – CO_2	The ERT noted that AD on production, imports and exports of sawnwood, wood panels and paper and paperboard were reported only from 1990 onwards in CRF table 4.G (sheet 2). Moreover, sawnwood was not reported in CRF table 4.G (sheet 1) as a subcategory of solid wood. The ERT recommends that the Russian Federation 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).	Yes. Adherence to the UNFCCC Annex I inventory reporting guidelines
L.27	4.G HWP – CO_2	The ERT noted that the total harvest reported in figure 6.8 of the NIR (e.g. 284 million m^3 in 1990) is much higher than the production statistics reported in CRF table 4.G (e.g. around 114 million m^3 in 1990, assuming 3 m^3 per t of paper/paperboard, which is only about 40 per cent of total harvest) for a number of years in the time series. Total harvest should necessarily be higher than production statistics for HWP because the reported HWP do not include	Yes. Accuracy

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and/or a problem?[a] If yes, classify by type*
		energy wood and processing waste. However, such a large discrepancy was not explained in the NIR. During the review, the Party provided the ERT with a flow chart describing wood flows from the production of roundwood to the final uses of wood, but this flow chart did not contain information on the sizes of each flow. The ERT recommends that the Russian Federation 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. The ERT encourages the Russian Federation to improve transparency of its reporting by providing a flow chart in the NIR describing wood flows from the production of roundwood to the final uses of wood, including estimates of each flow, possibly including coarse estimates for the flows that are not constrained by available HWP statistics.	
L.28	4.G HWP – CO_2	The ERT noted that the trends of roundwood, sawnwood, wood panels and paper and paperboard production reported in figure 6.8 of the NIR (p.230) are broadly consistent with FAOSTAT[c] data, but some significant discrepancies were noted. For example, the roundwood value in FAOSTAT for 1992 is 227.9 million m^3 while in figure 6.8 it is around 250 million m^3. In 1996, a large decrease from the level of 1997, to 96.8 million m^3, is reported in FAOSTAT, while in figure 6.8 of the NIR the 1996 level is comparable to the 1997 level and is around 140 million m^3. In 2016, the Russian Federation reported production of 23.8 million m^3, 11.7 million m^3 and 8.2 million m^3 of sawnwood, wood panels and paper and paperboard, respectively, in CRF table 4.G, while the FAOSTAT values are 36.8 million m^3, 15 million m^3 and 8.5 million m^3, respectively. The ERT acknowledges that national AD may be more accurate than international data and that they need not be exactly the same. Nevertheless, the ERT notes that the 2006 IPCC Guidelines (vol. 1, p. 6.15) indicates that "Where possible, a comparison check of the national activity data with independently compiled activity data sources should be undertaken." The ERT is therefore of the view that investigating the reasons for these inconsistencies between national and international data should be part of the QA procedure of the GHG inventory. The ERT encourages the Russian Federation to investigate the discrepancies in roundwood, sawnwood, wood panels and paper and paperboard production data between the GHG inventory and FAOSTAT and report on the results in the NIR.	Not an issue/problem
Waste			
W.9	5. General (waste) – CH_4	The ERT noted a decline in the amount of solid waste that is deposited in unmanaged SWDS from 1990 to 2012 and a slight increase thereafter (16,926.60 kt in 1990; 9,656.28 kt in 2012 and 9,891.77 kt in 2016). The ERT could not find in the NIR any information or justification on the drivers for the declining trend in waste generation for waste disposed in unmanaged SWDS, although the waste generation rate remains constant and the population not serviced by centralized waste collection increased throughout the time series (NIR table 7.6, p.383). In addition, in table 7.5 of the NIR the ERT noted inconsistencies in the values of MSW disposed at unmanaged SWDS for the years 2000, 2012, 2013, 2014 and 2015, where the amount of waste disposed is higher than the amount of waste collected, taking into account composting and incineration. During the review, the Party acknowledged that the population data and the	Yes. Adherence to the UNFCCC Annex I inventory reporting guidelines

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue and/or a problem?[a] If yes, classify by type
		different amounts of MSW disposed for the years 2012–2015 in the NIR were incorrect and that the population presented in table 7.6 of the NIR, which should represent population that has access to centralized waste collection systems but instead shows the population that does not have access to centralized waste collection systems. The Party indicated that this was an error in the data entry in the NIR. During the review, the ERT was given access to the calculation files and noted that there was no error in the calculations and the associated AD (population) used as input into the national first-order decay model used for estimates and the CRF tables. The ERT recommends that the Russian Federation correct all the inaccurate information provided in the NIR regarding the main parameters used in calculations, such as amount of solid waste disposed 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 CFR tables.	
W.10	5. General (waste) – CO_2, CH_4 and N_2O	In the NIR the Party reported that in the Russian Federation all specialized waste incineration plants generate thermal power, while in some cases electricity is also generated. In addition, the Party reported that the sewage treatment plants use various designs of CH_4 tanks, including those equipped with biogas collection and utilization systems. The most common method of utilization of biogas is combustion in boiler plants of sewage treatment facilities. The ERT noted that there is insufficient documentation provided in the NIR on where, in the energy sector, the final combustion of such biogas is reported. During the review, both the energy and waste sector national experts explained to the ERT that emissions from all activities with energy recovery in the waste sector were included in the reporting for the energy sector, under category 1.A.5 other. Based on the information presented, the ERT did not identify an issue in the reporting of emissions from energy recovery from categories 5.C.1 waste incineration and 5.D.1 domestic wastewater. The ERT recommends that the Russian Federation document and provide in the NIR documentation and references to the specific category in the energy sector where emissions from energy recovery from categories 5.C.1 waste incineration and 5.D.1 domestic wastewater are included and reported.	Yes. Transparency
W.11	5.A Solid waste disposal – CH_4	The ERT noted that, in line with equations 3.2 and 3.7 of the 2006 IPCC Guidelines (vol.5, chapter 3), the Russian Federation uses DOC(x) values, taking into account the different waste types to determine the amount of decomposable DOC from managed anaerobic waste disposal sites. During the review, the Party provided the ERT with access to the parameters used in the spreadsheet for the calculations developed by the Party for its estimates. The ERT also noted a decline in the DOC(x) values used in the calculations from 1982–1999 (about 18.0 per cent). However, the decline in the trend of this parameter and the assumptions and data sources used to inform the changes in this parameter were not justified or described in the NIR. The ERT further noted that, in the NIR, the Party reported that the content of DOC(x) in MSW was estimated from long-term results of studies of the composition of MSW of the Soviet Union and the Russian Federation, with references provided in the NIR. The Party further reported in the NIR that the DOC(x) in MSW for the period 1990–2014 was calculated taking into account the available data on the evolution of MSW composition and national data on the content of DOC in these years, while for 1980 and earlier years it used a constant value of DOC(x) equal to 0.25, calculated as the average over several sources. These DOC(x) values were adopted to calculate CH_4 emissions from MSW disposal in both managed and	Yes. Transparency

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and/or a problem?[a] If yes, classify by type*
		unmanaged landfills (dumps). During the review, the ERT noted that the data from the references provided in the NIR were not used as provided, but that data were further adapted based on expert judgment and assumptions for suitability for their use in the spreadsheet for calculations developed by the Party. The ERT also noted that data were available only for certain points in the time series from 1960–2016 with no explanation of how the data splicing methods recommended by the 2006 IPCC Guidelines were applied. The ERT recommends that the Russian Federation 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. The ERT also recommends that the Russian Federation 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.	
W.12	5.A.2 Unmanaged waste disposal sites – CH_4	In the NIR the Russian Federation reported that waste which is not collected through centralized waste collection systems is considered to be disposed in unmanaged SWDS. During the review, based on the additional information provided by the Party, the ERT noted that waste which is not centrally collected is generally deposited in open shallow dumps that are not managed. The ERT considers that accurate selection of solid waste management types and types of SWDS is important for the purposes of calculating the appropriate methane correction factor; therefore the Party could be over- or underestimating its CH_4 emissions because of a lack of data on proper classification of its SWDS types, namely, unmanaged waste disposal sites and open shallow dumps. The ERT recommends that the Russian Federation transparently explain in the NIR the assumptions used to inform the classification of its 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. The ERT also recommends that the Russian Federation revise its 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.	Yes. Accuracy
W.13	5.C.1 Waste incineration – CO_2	In table 7.5 of the NIR, the ERT noted that the amount of MSW incinerated in the year 2000 was significantly higher than the values for other years in the time series (1975–2016) with a value of 2.03 Mt. During the review, the Party acknowledged that these were data input errors in the NIR but stated that the incorrect value for 2000 was not applied in the calculations of emissions. The ERT recommends that the Russian Federation correct the value used for amount of MSW incinerated for the year 2000 in the NIR.	Yes. Transparency
W.14	5.D.1 Domestic wastewater – CH_4	In the NIR the Party reported that in the calculations of emissions for category 5.D.1 domestic wastewater it was assumed that the recovered sludge (in Saint Petersburg) is not subject to biological treatment and is not included in the CH_4 separation process from wastewater treatment facilities (section 7.5.1 of the NIR). In table 7.10 of the NIR the Party presented data on sludge incinerated from 1998 to 2016 in Saint Petersburg. The ERT noted that it was unclear how this portion of sludge removed, as presented in table 7.10, was taken into account in the calculation of wastewater emission estimates. During the review, the Party clarified that there is incineration of sludge in the city of	Yes. Accuracy

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue and/or a problem?[a] If yes, classify by type
		Saint Petersburg only, and thus this has been taken into account in the calculations by subtracting the population of Saint Petersburg from the total population of the Russian Federation that is serviced by wastewater facilities. The ERT considers that this approach is not in accordance with the method described in the general equation 6.1 of the 2006 IPCC Guidelines (vol. 5, chapter 6, p.6.11). The Party further clarified that the amount of CH_4 emitted from the wastewater treatment plants in Saint Petersburg is insignificant; because these plants are aerobic and well managed. The ERT noted that according to the 2006 IPCC Guidelines (vol. 5, chapter 6, table 6.3), the default MCF value for well-managed centralized aerobic systems could be 0 (with a range of 0–0.1). This means that the CH_4 emissions based on the tier 1 method from the 2006 IPCC Guidelines could be nearly zero. Nevertheless, the ERT noted that according to the 2006 IPCC Guidelines (vol. 5, chapter 6, section 6.2.1), the default assumption for sludge removal is zero, when sludge removal data are not available, and that when sludge separation is practised in the country it is important that CH_4 emissions from sludge are not included in the estimates of the category 5.D.1 domestic wastewater, ensuring that sludge removal data is consistent across sectors and categories. The ERT recommends that the Russian Federation 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, chapter 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, the ERT recommends that the Russian Federation assume no sludge removal from the Saint Petersburg facility.	
W.15	5.D.1 Domestic wastewater – CH_4 and N_2O	In table 7.12 of the NIR the Party provided data on the populations using different wastewater systems in the Russian Federation, on the basis of the number of rural and urban inhabitants using different systems for domestic wastewater discharge. However, the ERT noted a declining trend in the population using the fourth type of treatment system (local wastewater collection facilities without treatment) presented in table 7.12 of the NIR, but this declining trend is not justified by any changes in practices and/or policies introduced in the country to move away from the use of such systems. The ERT recommends that the Russian Federation 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 6.1 of the 2006 IPCC Guidelines (vol. 5, chapter 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.	Yes. Transparency
KP-LULUCF			
KL.6	Deforestation – CO_2, CH_4 and N_2O	The Russian Federation used reporting method 1 of 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 are assumed to be not occurring because cheaper land (e.g. unmanaged grassland) is available when new cropland or managed grassland is needed. Data on total conversions to settlements, including infrastructure and buildings, are available from Rosstat; forest conversion to infrastructure is assumed to be occurring in proportion to the share of forest land over the total land area	Yes. Adherence to reporting guidelines under Article 7, paragraph 1, of the Kyoto Protocol

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and/or a problem?[a] If yes, classify by type*
		in the region from total conversions to infrastructure; and data on total conversions to wetland are available from the Federal Agency on Water Resources. Forest conversions to buildings are assumed to be not occurring. The ERT is of the view that these generic assumptions are not sufficient to identify deforestation activities. The ERT noted that if deforestation increases because of conversions other than conversion to infrastructure, the national system would not detect this increase. During the review, the Party provided detailed data from the Federal Forest Agency on forest conversion to all types of land for 2008–2016 for each region, demonstrating the ability of the national system to identify deforestation within all geographical areas. The ERT is of the view that these data enable the Party to identify deforestation activities on managed forests, which comprised 89 per cent of reported forest land in 2016. The Party further clarified that the 11 per cent of remaining unmanaged forests are remote and therefore unlikely to undergo deforestation. The ERT agrees with this rationale. The ERT further considers that possible deforestation occurring in forests naturally regrowing in unmanaged grassland but undetected in cadastral data is also negligible. The ERT is therefore of the view that the method described in the NIR does not show that the Russian Federation meets the requirements of decision 2/CMP.7, annex, paragraph 25, and decision 2/CMP.8, annex II, paragraph 2(b)(i), because deforestation activities are not identifiable and cannot be reliably tracked over time. However, the ERT considers that the national system meets these requirements, thanks to the Federal Forest Agency data provided during the review. The ERT recommends that the Russian Federation use the detailed data from the Federal Forest 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). The ERT encourages the Russian Federation to assess whether similar data can be obtained from the cadastral records in order to verify data on managed forests and completeness of the reporting on unmanaged forests. The ERT also encourages the Russian Federation to assess whether forest-cover data derived from satellite images and freely downloadable on the Internet could be used to verify managed forests and completeness of reporting on unmanaged forests and naturally regrowing unmanaged grassland.	
KL.7	FM – CO_2, CH_4 and N_2O	In 2013, the FM area as reported in CRF table NIR-2 decreased by 2,100 kha, while the deforestation area only increased by 9 kha in the same year, meaning that the total area of activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol decreased by at least 2,091 kha. During the review, the Russian Federation explained that these areas had been transferred to the "unmanaged forests" category as a result of a decision of some regional forest agencies to stop managing them. However, the ERT noted that reporting a decrease in the total area of activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol is not in line with the guidance in the Kyoto Protocol Supplement (page 1.13), which indicates that "in principle the total land area included in the reporting of Article 3.3 and 3.4 activities can never decrease" and it is not in accordance with the requirements of decision 2/CMP.8, annex II, paragraph 2(d). The ERT recommends that the Russian Federation continue reporting under FM activities those areas of managed forest that leave the database of the Federal Forest Agency because the decision to stop managing them, and estimate emissions and removals associated with these areas. The ERT also recommends that the Russian Federation report in	Yes. Completeness

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and/or a problem?[a] If yes, classify by type*
		the NIR all such transitions at the regional level to demonstrate compliance with the principle of accounting (i.e. that areas once reported and accounted under an activity under Article 3, paragraphs 3 and 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.	
KL.8	FM – CO_2	The Russian Federation reported urban forests as a subcategory under category 4.E settlements under the Convention (see ID# L.25 above), therefore not considering urban forests as managed forests and consequently not including them in the FM reporting. During the review, the Party clarified that these forests meet the national definition of forest but are located within the administrative boundaries of cities. The ERT is of the view that with such proximity to densely populated areas, these forests are likely subject to "practices for stewardship and use of forest land" and therefore likely meet the definition of managed forests. The ERT recommends that the Russian Federation report urban forests as a subcategory under FM for reporting under the Kyoto Protocol.	Yes. Comparability

[a] Recommendations made by the ERT during the review are related to issues as defined in paragraph 81 of the UNFCCC review guidelines, or problems as defined in paragraph 69 of the Article 8 review guidelines. Encouragements are made to the Party to address all findings not related to such issues or problems.

[b] Conclusions and recommendations of the sixteenth meeting of GHG inventory lead reviewers, paragraph 27(b) (available at https://unfccc.int/sites/default/files/resource/04_GHG-LRs-2019-conclusions_0.pdf).

[c] http://www.fao.org/faostat/en/.

VI. Application of adjustments

10. The Russian Federation does not have a quantified emission limitation or reduction commitment in 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 in the second commitment period of the Kyoto Protocol and does not account for KP-LULUCF activities.

VIII. Questions of implementation

12. No questions of implementation were identified by the ERT during the individual review of the 2018 annual submission.

Annex I

Overview of greenhouse gas emissions and removals for the Russian Federation for submission year 2018 and data and information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, as submitted by the Russian Federation in its 2018 annual submission

1. Tables 6–9 provide an overview of total GHG emissions and removals as submitted by the Russian Federation.

Table 6
Total greenhouse gas emissions for the Russian Federation, 1990–2016
(kt CO_2 eq)

	Total GHG emissions excluding indirect CO_2 emissions		*Total GHG emissions including indirect CO_2 emissions*[a]		*Land-use change (Article 3.7 bis as contained in the Doha Amendment)*[b]	*KP-LULUCF activities (Article 3.3 of the Kyoto Protocol)*[c]	*KP-LULUCF activities (Article 3.4 of the Kyoto Protocol)*	
	Total including LULUCF	*Total excluding LULUCF*	*Total including LULUCF*	*Total excluding LULUCF*			*CM, GM, RV, WDR*[d]	*FM*
FMRL								–116 300.00
1990	3 893 152.78	3 734 344.76	NA	NA	NA		NA	
1995	2 302 990.80	2 422 404.75	NA	NA				
2000	1 847 582.27	2 249 071.86	NA	NA				
2010	1 943 665.74	2 573 184.52	NA	NA				
2011	1 986 435.33	2 634 906.05	NA	NA				
2012	2 059 368.53	2 674 245.81	NA	NA				
2013	2 004 014.21	2 614 875.12	NA	NA		850.24	NA	–548 626.86
2014	1 968 025.57	2 619 990.83	NA	NA		1 580.60	NA	–538 733.06
2015	2 026 828.96	2 629 877.47	NA	NA		403.83	NA	–532 934.61
2016	2 009 362.46	2 643 816.89	NA	NA		26.11	NA	–517 508.09

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

[a] The Party has not reported indirect CO_2 emissions in CRF table 6.

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

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

[d] In accordance with decision 3/CMP.11, paragraph 8, the Russian Federation previously reported that it will not report on any activities under Article 3, paragraph 4, of the Kyoto Protocol.

Table 7
Greenhouse gas emissions by gas for the Russian Federation, excluding land use, land-use change and forestry, 1990–2016
(kt CO_2 eq)

	CO_2[a]	*CH_4*	*N_2O*	*HFCs*	*PFCs*	*Unspecified mix of HFCs and PFCs*	*SF_6*	*NF_3*
1990	2 571 210.65	922 029.61	188 671.01	35 937.16	15 105.81	NO	1 390.53	NO, IE
1995	1 640 263.22	634 297.97	118 299.57	15 447.31	13 453.88	NO	642.80	NO, IE
2000	1 499 616.21	611 795.12	100 303.72	26 569.40	9 867.31	NO	920.09	NO, IE
2010	1 657 560.68	800 251.40	97 294.02	13 471.65	3 619.67	NO	987.11	NO, IE
2011	1 712 424.77	814 248.90	92 772.54	11 348.31	3 295.27	NO	816.26	NO, IE
2012	1 726 099.50	824 673.86	96 721.45	17 870.48	3 315.42	NO	5 564.73	0.36
2013	1 665 988.57	827 510.35	90 895.01	21 831.47	3 411.57	NO	5 237.42	0.72
2014	1 667 110.71	832 010.63	91 805.03	24 841.80	3 049.39	NO	1 172.19	1.08
2015	1 671 895.08	838 808.82	92 170.37	22 355.06	3 507.27	NO	1 139.57	1.30
2016	1 668 069.93	856 363.71	91 042.80	23 622.72	3 657.44	NO	1 052.12	8.17
Per cent change 1990–2016	**–35.1**	**–7.1**	**–51.7**	**–34.3**	**–75.8**	**NA**	**–24.3**	**NA**

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

Table 8
Greenhouse gas emissions by sector for the Russian Federation, 1990–2016
(kt CO_2 eq)

	Energy	*IPPU*	*Agriculture*	*LULUCF*	*Waste*	*Other*[a]
1990	3 045 239.50	283 472.50	324 475.93	158 808.02	81 156.84	
1995	1 947 066.23	182 735.88	211 031.07	–119 413.95	81 571.57	
2000	1 813 850.93	196 349.36	155 564.05	–401 489.59	83 307.53	
2010	2 137 893.21	196 865.31	140 195.80	–629 518.79	98 230.21	
2011	2 199 172.77	200 206.36	134 517.63	–648 470.72	101 009.28	
2012	2 213 884.93	216 356.94	140 319.09	–614 877.27	103 684.84	
2013	2 153 011.90	220 610.46	134 763.88	–610 860.91	106 488.88	
2014	2 152 566.86	220 779.99	136 102.04	–651 965.27	110 541.94	
2015	2 162 055.91	218 768.95	135 797.12	–603 048.50	113 255.49	

	Energy	*IPPU*	*Agriculture*	*LULUCF*	*Waste*	*Other*[a]
2016	2 175 355.49	218 495.48	134 175.62	–634 454.44	115 790.31	
Per cent change 1990–2016	**–28.6**	**–22.9**	**–58.6**	**–499.5**	**42.7**	

Notes: (1) Emissions/removals reported in the sector other (sector 6) are not included in the total GHG emissions. (2) The Russian Federation did not report indirect CO_2 emissions in CRF table 6.

[a] These cells were blank in the 2018 annual submission.

Table 9

Greenhouse gas emissions/removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol by activity, 1990[a]–2016, for the Russian Federation

(kt CO_2 eq)

	Article 3.7 bis as contained in the Doha Amendment[b]	*Article 3.3 of the Kyoto Protocol*		*FM and elected Article 3.4 activities 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		–4 771.31	5 621.55	–548 626.86	NA	NA	NA	NA
2014		–4 639.41	6 220.01	–538 733.06	NA	NA	NA	NA
2015		–4 505.67	4 909.50	–532 934.61	NA	NA	NA	NA
2016		–4 410.19	4 436.30	–517 508.09	NA	NA	NA	NA
Per cent change 1990–2016					**NA**	**NA**	**NA**	**NA**

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

[b] The Russian Federation has selected not to report on any activities under Article 3, paragraph 4, of the Kyoto Protocol. For activities under Article 3, paragraph 3, of the Kyoto Protocol, and FM under Article 3, paragraph 4, only the inventory years of the commitment period must be reported.

[c] The value reported in this column refers to 1990.

2. Table 10 provides an overview of relevant key data for the Russian Federation's reporting under Article 3, paragraphs 3 and 4, of the Kyoto Protocol.

Table 10
Key relevant data for the Russian Federation under Article 3, paragraphs 3 and 4, of the Kyoto Protocol in the 2018 annual submission

Key parameters	*Values*
Periodicity of accounting	NA
Election of activities under Article 3, paragraph 4	None
Election of application of provisions for natural disturbances	No
3.5% of total base-year GHG emissions, excluding LULUCF	NA
Cancellation of AAUs, ERUs, CERs and/or issuance of RMUs in the national registry for:	
1. AR in 2016	NA
2. Deforestation in 2016	NA
3. FM in 2016	NA
4. CM in 2016	NA
5. GM in 2016	NA
6. RV in 2016	NA
7. WDR in 2016	NA

Annex II

Additional information to support findings in table 2

Missing categories that may affect completeness

The categories for which 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 reporting in the Party's inventory are the following:

(a) 2.B.10 other (chemical industry) – hydrogen production (CO_2) (see ID# I.19 in table 5);

(b) 2.D.3 other – urea use in selective catalytic reduction (CO_2) (see ID# I.10 in table 3);

(c) 2.D non-energy products from fuels and solvent use (CO_2) (see ID# I.14 in table 5);

(d) 2.E electronics industry (HFCs, PFCs, SF_6 and NF_3) (see ID# I.21 in table 5);

(e) 2.F.1 refrigeration and air conditioning – stationary air-conditioning (HFCs) (see ID# I.22 in table 5);

(f) 2.F.1 refrigeration and air conditioning – transport refrigeration (HFCs) (see ID# I.23 in table 5);

(g) 2.F.5 solvents (HFCs and PFCs) (see ID# I.24 in table 5);

(h) 4.B.2 land converted to cropland and 4.C.2 land converted to grassland (managed) (CO_2) (see ID# L.20 in table 5);

(i) 4.C.2.3 wetlands converted to grassland (CO_2) (see ID# L.24 in table 5);

(j) 4(KP-I)B.1 FM (managed forest becoming unmanaged) (CO_2, CH_4, N_2O) (see ID# KL.7 in table 5).

Annex III

Documents and information used during the review

A. Reference documents

IPCC reports

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

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 http://www.ipcc-nggip.iges.or.jp/public/wetlands/.

Annual review reports

Reports on the individual review of the 2013, 2014, 2015, 2016 and 2017 annual submissions of the Russian Federation, respectively, contained in documents FCCC/ARR/2013/RUS, FCCC/ARR/2014/RUS, FCCC/ARR/2015/RUS, FCCC/ARR/2016/RUS and FCCC/ARR/2017/RUS.

Other

Achat DL, Fortin M, Landmann G, et al. 2015. Forest soil carbon is threatened by intensive biomass harvesting. *Scientific Reports.* 5:15991. Available at https://doi.org/10.1038/srep15991.

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%20report_2018.pdf.

Ciais P, Wattenbach M, Vuichard N, et al. 2010. The European carbon balance. Part 2: croplands. *Global Change Biology*. 16:1409–1428. Available at https://doi.org/10.1111/j.1365-2486.2009.02055.x.

Lechtenböhmer S and Dienst C. 2008. Treibhausgas-Emissionen zukünftiger Erdgas-Bereitstellung für Deutschland. *Umweltwissenschafter und Schadstoff-Forschung*. 20(2):133–144. Available at https://link.springer.com/article/10.1065/uwsf2008.03.241.

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Lelieveld J, Lechtenböhmer S, Assonov Sergey S, Brenninkmeijer CA, Dienst C. 2005. Low methane leakage from gas pipelines: a switch from coal or oil to natural gas could mitigate climate effects in the short term. *Nature*. 434(7036):841–842. Available at https://www.academia.edu/13315645/Greenhouse_gases_Low_methane_leakage_from_gas_pipelines.

Pregitzer KS and Euskirchen ES. 2004. Carbon cycling and storage in world forests: biome patterns related to forest age. *Global Change Biology*. 10:2052–2077. Available at https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1365-2486.2004.00866.x.

RAO Energy Systems of Russia. 1999. Inventory of Greenhouse Gas Emissions from Thermal Power Plants and Boilers in the Electric Power Industry of the Russian Federation (1990–1997). (unpublished report).

Status report on the annual inventory of the Russian Federation. Available at https://unfccc.int/sites/default/files/resource/asr2018_RUS.pdf.

Uvarova NE, Ishkov AG, Akopova GS, Ginzburg VA, et al. 2015. The update of methane emission parameters for natural gas operations in Russia. *Carbon Management*. 5(5-6): 573–577. Available at https://www.tandfonline.com/doi/abs/10.1080/17583004.2015.1049105.

Wuppertal Institute. 2005. *Greenhouse Gas Emissions from the Russian Natural Gas Export Pipeline System. Results and Extrapolation of Measurements and Surveys in Russia*. Wuppertal and Mainz: Wuppertal Institute and Max Planck-Institut für Chemie. Available at https://epub.wupperinst.org/frontdoor/deliver/index/docId/2136/file/2136_GEPS_en.pdf.

B. Additional information provided by the Party

Responses to questions during the review were received from Mr. Alexander Nakhutin (Institute of Global Climate and Ecology), including additional material on the methodology and assumptions used. The following documents[1] were also provided by the Russian Federation:

Chestnykh O.V., Zamolodchikov D.G., Utkin A.I. 2004. *Obshchiye Zapasy Biologicheskogo Ugleroda i Azota v Pochvakh Lesnogo Fonda Rossii* (Total stock of biological carbon and nitrogen in the soils of the Russian Forest Fund). Lesovedeniye. № 4. S. 30-42.

Dedikov J.V., Akopova G.S., Gladkaja N.G., Piotrovskij A.S., Markellov V.A., Salichov S.S., Kaesler H., Ramm A., Muller von Blumencron A., Lelieveld J. 1999. Estimating Methane Realeases from Natural Gas Production and Transmission in Russia. Atmospheric Environment, 1999 (33), 3291-3299.

Uvarova N.E., Nakhutin A.I., Berdin V.Kh., Dygan M.M., Gytarsky M.L. 2017. The country-specific Emission Factors and Parameters for Greenhouse Gas Inventory in the Russian Oil and Gas Sector. 17th International Multidisciplinary Scientific GeoConference SGEM 2017 Proceedings. Sofia, Bulgaria: STEF92 Technology LTD, 2017. p. 605-612.

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Zamolodchikov D.G., Korovin G.N., Gitarskiy M.L. 2007. *Byudzhet Ugleroda Upravlyayemykh Lesov Rossiyskoy Federatsii* (The carbon budget of managed forests of the Russian Federation). Lesovedeniye. № 6. S. 23-34.

[1] Reproduced as received from the Party.