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Report of the individual review of the annual submission of the Russian Federation submitted in 2009*

* In the symbol for this document, 2009 refers to the year in which the inventory was submitted, and not to the year of publication.

CONTENTS

I. Executive summary

1. This report covers the in-country review of the 2009 annual submission of the Russian Federation, coordinated by the UNFCCC secretariat, in accordance with decision 22/CMP.1. The review took place from 7 to 12 August 2009 in Moscow, the Russian Federation, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalist – Ms. Riitta Pipatti (Finland); energy – Mr. Ralph O. Harthan (Germany); industrial processes – Mr. Marius Țăranu (Republic of Moldova); agriculture – Ms. Batimaa Punsalmaa (Mongolia); land use, land-use change and forestry (LULUCF) – Mr. Giacomo Grassi (European Community); and waste – Ms. Violeta Hristova (Bulgaria). Ms. Pipatti and Mr. Țăranu were the lead reviewers. The review was coordinated by Mr. Javier Hanna (UNFCCC secretariat).

2. In accordance with the "Guidelines for review under Article 8 of the Kyoto Protocol" (decision 22/CMP.1), 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.

3. In 2007, the main greenhouse gas (GHG) in the Russian Federation was carbon dioxide (CO_2), accounting for 72.0 per cent of total GHG emissions[1] expressed in CO_2 eq, followed by methane (CH_4) (21.7 per cent) and nitrous oxide (N_2O) (4.7 per cent). Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) collectively accounted for 1.6 per cent of the overall GHG emissions in the country. The energy sector accounted for 81.4 per cent of the total GHG emissions, followed by industrial processes (9.5 per cent), agriculture (6.1 per cent), waste (2.9 per cent) and solvent and other product use (0.02 per cent). Total GHG emissions amounted to 2,192,818.11 Gg CO_2 eq and decreased by 33.8 per cent between the base year[2] and 2007. The trend is reasonable taking into account the structural and economic changes that have taken place since the break-up of the Soviet Union in the early 1990s.

4. Tables 1 and 2 show GHG emissions by gas and by sector, respectively. Table 1 includes emissions from Annex A sources only and excludes emissions and removals from the LULUCF sector.

5. The inventory for the years 1990–2007 is prepared generally in line with the Intergovernmental Panel on Climate Change (IPCC) *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines), the *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance) and the *Good Practice Guidance for Land Use, Land-Use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF). The 2009 inventory submission is generally of a high quality and shows improvements in several areas, including the implementation of quality control/quality assurance (QA/QC) procedures and in uncertainty analyses, results of which have been submitted in 2009 for the first time for all sectors and covering the whole inventory. The expert review team (ERT) commends the Russian Federation for these improvements.

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[1] In this report, the term "total GHG emissions" refers to the aggregated national GHG emissions expressed in terms of CO_2 eq excluding LULUCF, unless otherwise specified.

[2] "Base year" refers to the base year under the Kyoto Protocol, which is 1990 for CO_2, CH_4 and N_2O, and 1995 for HFCs, PFCs and SF_6. The base year emissions include emissions from Annex A sources only.

Table 1. Total greenhouse gas emissions by gas, 1990–2007[a]

Greenhouse gas	Gg CO_2 eq								Change base year–2007 (%)
	Base year[b]	1990	1995	2000	2004	2005	2006	2007	
CO_2	2 499 097.56	2 499 097.56	1 570 739.39	1 471 148.87	1 523 941.38	1 525 742.97	1 582 638.19	1 579 822.88	–36.8
CH_4	568 111.34	568 111.34	442 257.75	420 229.45	455 703.89	459 623.21	470 523.80	474 876.69	–16.4
N_2O	221 763.01	221 763.01	140 340.69	107 482.85	104 508.18	101 851.22	101 070.75	103 902.99	–53.1
HFCs	6 948.74	14 802.46	6 948.74	12 776.74	12 625.77	13 820.79	14 289.05	16 089.94	131.6
PFCs	15 771.36	15 334.84	15 771.36	18 623.71	15 819.21	15 975.27	16 202.91	16 948.79	7.5
SF_6	96.15	217.65	96.15	168.90	493.02	807.18	1 158.60	1 176.81	1 124.0

[a] Total greenhouse gas emissions includes emissions from Annex A sources only and excludes emissions and removals from the land use, land-use change and forestry sector.
[b] "Base year" refers to the base year under the Kyoto Protocol, which is 1990 for CO_2, CH_4 and N_2O, and 1995 for HFCs, PFCs and SF_6. The base year emissions include emissions from Annex A sources only.

Table 2. Greenhouse gas emissions by sector, 1990–2007

Sector	Gg CO_2 eq								Change base year–2007 (%)
	Base year[a]	1990	1995	2000	2004	2005	2006	2007	
Energy	2 707 174.75	2 707 174.75	1 769 257.82	1 661 198.73	1 727 957.57	1 733 310.03	1 790 469.63	1 785 678.77	–34.0
Industrial processes	239 211.48	246 750.18	154 118.66	170 188.24	186 209.12	189 278.59	201 200.37	208 070.67	–13.0
Solvent and other product use	561.61	561.61	511.68	522.89	534.76	531.90	531.96	541.40	–3.6
Agriculture	309 972.41	309 972.41	205 019.83	146 232.42	139 946.68	134 301.67	131 486.14	134 708.97	–56.5
LULUCF	NA	40 240.38	–326 001.58	337 578.69	–623 609.61	–119 937.01	22 205.53	–187 042.24	NA
Waste	54 867.91	54 867.91	47 246.08	52 288.24	58 443.32	60 398.45	62 195.22	63 818.30	16.3
Other	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total (with LULUCF)	NA	3 359 567.25	1 850 152.50	2 368 009.20	1 489 481.85	1 997 883.63	2 208 088.83	2 005 775.87	NA
Total (without LULUCF)	3 311 788.16	3 319 326.86	2 176 154.08	2 030 430.52	2 113 091.46	2 117 820.65	2 185 883.30	2 192 818.11	–33.8

Abbreviations: LULUCF = land use, land-use change and forestry, NA = not applicable.
[a] "Base year" refers to the base year under the Kyoto Protocol, which is 1990 for CO_2, CH_4 and N_2O, and 1995 for HFCs, PFCs and SF_6. The base year emissions include emissions from Annex A sources only.

6. The Russian Federation has submitted, in part, on a voluntary basis supplementary information required under Article 7, paragraph 1, of the Kyoto Protocol in accordance with section I of the annex to decision 15/CMP.1. The Party did not submit on a voluntary basis information on minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol.

7. The Russian Federation has reported information on its accounting of Kyoto Protocol units in accordance with section I.E of the annex to decision 15/CMP.1, and used the standard electronic format (SEF) tables as required by decision 14/CMP.1.

8. Changes in the institutional arrangements of the national system have been reported in the national inventory report (NIR). The responsibilities and tasks of ministries that form part of the national system have been redistributed owing to a general reorganization of the governmental structure in the Russian Federation. The Russian experts involved in the inventory estimated the impacts of these changes on the performance of the national system to be small.

9. The national system continues to perform its required functions as set out in the annex to decision 19/CMP.1. The ERT identified the following improvements since the previous review: the technical staff have been increased, a QA/QC plan has been developed and implemented, and uncertainties have been estimated for all categories for the first time. The ERT found the Russian inventory team to be competent, motivated and capable of preparing a high-quality inventory. The Russian Federal Service for Hydrometeorology and Environmental Monitoring (Roshydromet), as the single national entity, has signed agreements on institutional collaboration with the Open Joint Stock Company Gazprom and with the United Company Russian Aluminium (Rusal) to exchange data and information for preparation of the inventory. These companies also provide support for the QA of the inventory by reviewing the relevant inventory sections annually. The ERT welcomes these agreements, which should allow the Russian Federation to make use of more accurate data and methods in the relevant parts of the inventory in future submissions. The ERT noted that many country-specific methodologies are used in the inventory preparation, but information on how these are validated and verified is not provided. The ERT therefore encourages the Russian Federation to further increase the collaboration with other institutions, such as universities, research and other expert organizations, for peer review, validation and verification of country-specific methods by national and other experts, as this would increase the confidence that they produce accurate results.

10. The national registry continues to meet the requirements set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant decisions of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP).

11. During the in-country review, the Russian Federation reported on a voluntary basis information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol. The ERT commends the Russian Federation for this voluntary reporting, although it is not fully in accordance with section I.D of the annex to decision 15/CMP.1. The identification of land areas, in particular, need further work. In the course of the in-country review, the ERT formulated recommendations relating to land area identification and reporting, as well as other aspects of the Article 3, paragraphs 3 and 4, information, including how the definitions for afforestation and reforestation (AR) should be applied, the completeness and transparency of the reporting and documentation, and QA and verification procedures (see paras. 134–140 below).

12. In the course of the review, the ERT also formulated a number of recommendations to address issues concerning the completeness and accuracy of the inventory. For example, estimates of CO_2 emissions from organic soils in the forest land category were reported as not estimated (“NE”) in the

LULUCF sector, as well as actual emissions of HFCs, PFCs and SF_6 from a number of sub-categories under consumption of halocarbons and SF_6 in the industrial processes sector (e.g. see paras. 18 and 80 below). Also estimates of potential emissions of HFCs, PFCs and SF_6 were not provided. The CO_2 emissions from organic soils may be significant and relevant for the Kyoto Protocol reporting. The ERT recommends that the Russian Federation prioritise this category when improving the completeness of the inventory in its next annual inventory submission. The inventory is largely prepared using aggregated data at national level. For some categories the use of more disaggregated data is expected to improve the accuracy of the inventory, e.g., data on technologies used in the energy sector would allow more accurate estimation of the non-CO_2 GHG emissions, whereas more detailed information on manure management systems by climate regions in the agriculture sector could improve the estimates of CH_4 and N_2O emissions from manure management.

13. The ERT encourages the Russian Federation to explore the possibility of structuring its reporting, in its next annual submission, following the annotated outline of the NIR, and the guidance contained therein, that can be found on the UNFCCC website.[3]

II. Overview

A. Annual submission and other sources of information

14. The 2009 annual inventory submission contains almost a complete set of common reporting format (CRF) tables for the period 1990–2007 and an NIR. The CRF tables were submitted on 15 April 2009 and the NIR was submitted on 14 May 2009. The Russian Federation also submitted information required under Article 7, paragraph 1, of the Kyoto Protocol, including information on accounting of Kyoto Protocol units, and information on changes in the national system and in the national registry. The SEF tables were submitted on 15 April 2009. The annual submission was submitted in accordance with decision 15/CMP.1. The Party indicated that the 2009 submission is also its voluntary submission under the Kyoto Protocol. A voluntary submission of CRF tables on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol was made on 8 September 2009 during the in-country review. In addition, the Russian Federation submitted a revised chapter 7 of the NIR (on the LULUCF sector) and information on activities under Article 3, paragraphs 3 and 4, on 10 September 2009.

15. The Russian Federation officially resubmitted CRF tables, including revised LULUCF emission and removal estimates on 11 September 2009 during the in-country review. The ERT took these revised estimates and information into account for the review, as well as the information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol. Where necessary, the ERT also used the previous years' submissions during the review.

16. In addition, the ERT used the standard independent assessment report (SIAR), Parts I and II, to review information on the accounting of Kyoto Protocol units (including the SEF tables and their comparison report) and on the national registry.[4]

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[3] <http://unfccc.int/files/national_reports/annex_i_ghg_inventories/reporting_requirements/application/pdf/annotated_nir_outline.pdf>.

[4] The SIAR, Parts I and II, is prepared by an independent assessor in line with decision 16/CP.10 (paras. 5 (a), 6 (c) and 6 (k)), under the auspices of the international transaction log administrator using procedures agreed in the Registry System Administrators Forum. Part I is a completeness check of the submitted information relating to the accounting of Kyoto Protocol units (including the SEF tables and their comparison report) and to national registries. Part II contains a substantive assessment of the submitted information and identifies any potential problem regarding information on the accounting of Kyoto Protocol units and the national registry. The SIAR is not publicly available.

17. During the in-country review, the Russian Federation provided the ERT with additional information and access to the calculation sheets used in the preparation of the inventory. The documents concerned are not part of the annual submission but are in many cases referenced in the NIR. The full list of materials used during the review is provided in annex I to this report.

Completeness of inventory

18. The inventory covers most source and sink categories for the period 1990–2007 and is complete in terms of years and geographical coverage. Emissions from organic soils under the forest land category in the LULUCF sector and actual emissions of HFCs, PFCs and SF_6 for a number of subcategories under consumption of halocarbons and SF_6 in the industrial processes sector were identified as a potentially significant missing sources. In addition, the Russian Federation has not estimated potential emissions of HFCs, PFCs and SF_6 for consumption of halocarbons and SF_6. The other missing categories identified by the ERT are addressed in the sectoral sections of this report and are estimated to contribute very little to the overall emissions. Nevertheless, the ERT recommends that the Russian Federation report estimates for the missing categories, particularly those categories for which the Revised 1996 IPCC Guidelines and/or the IPCC good practice guidance or the IPCC good practice guidance for LULUCF provide methodologies.

19. The notation keys "NE" and "IE" (included elsewhere) are used for some categories, but the reasoning behind this is provided only partially in the CRF table 9(a) on completeness. The ERT recommends that the Russian Federation complete table 9(a) in accordance with the "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories" (hereinafter referred to as the UNFCCC reporting guidelines) in its next annual inventory submission.

20. In the CRF table 8(b), explanations for the rationale for the recalculations have not been provided. The ERT also identified minor inconsistencies and missing background data in some sectoral CRF tables (e.g. see paras. 71 and 126 below). The ERT recommends that the Russian Federation complete the CRF tables in accordance with the UNFCCC reporting guidelines in its next annual inventory submission.

B. A description of the institutional arrangements for inventory preparation, including the legal and procedural arrangements for inventory planning, preparation and management

1. Overview

21. The ERT concluded that the national system continued to perform its required functions as set out in the annex to decision 19/CMP.1. Furthermore, the ERT noted that the NIR provides an adequate description of the national system and the changes made since the previous submission (see chapter VIII.C).

22. During the in-country review, the Russian Federation explained its institutional arrangements for the preparation of the inventory. The Roshydromet has the overall responsibility for the national inventory. The Institute of Global Climate and Ecology (IGCE) of Roshydromet and the Russian Academy of Science has responsibility for the preparation and management of the national inventory. It collects the necessary data, performs the calculations and compiles the NIR and the CRF tables. The national system also encompasses the Russian Federal Service for State Statistics (Rosstat), other agencies that provide data, and the relevant government ministries, which provide support by, for example, reviewing the NIR every year.

23. The Russian Federation also presented the changes that have been made to the national system since the previous annual submission. The responsibilities and tasks of ministries taking part in the

national system have been redistributed owing to a general reorganization of the governmental structure in the Russian Federation. Large industrial companies (Gazprom and Rusal) have signed agreements with Roshydromet to provide data and support by reviewing the quality of the inventory. The ERT welcomes these collaboration agreements and encourages the Russian Federation to conclude more such agreements with large industrial companies and industry associations in the future in order to further improve the quality of the inventory. The ERT also identified other improvements in the performance of the national system since the previous review (see paras. 33, 35 and 37 below).

24. In its review of the voluntary submission on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, the ERT identified certain issues with the collection of data on land areas that represent a challenge for the national system. A key issue in this respect is that the national system needs to ensure that the inventory team is given access to detailed land-use and related data for preparing the estimates for these activities. These issues are discussed in more detail in paragraphs 134–140 below. The ERT encourages the Russian Federation to increase the effort and resources for the reporting of information under Article 3, paragraphs 3 and 4, in time for its next annual submission.

2. Inventory planning

25. As part of the QA/QC plan, IGCE has prepared an annual timetable for the preparation of the inventory. The plan is rather general, but specifies dates for data collection, inventory calculations, and preparation and compilation of the NIR and the CRF tables, as well as dates for the review of the inventory (QA) by Rosstat, the relevant ministries and the companies involved in the national system. During the in-country review the ERT was informed that the deadlines in the plan are not always met. However, in recent years the situation has been improved, and the Russian Federation has been able to submit the inventory on time. The ERT noted that the NIR was submitted after the due date of 15 April 2009, but within six weeks from that date, however it recommends that the Russian Federation intensify its efforts to provide timely submissions.

26. The team that prepares the inventory consists of about 10 experts, who also have other responsibilities such as providing support to the climate change negotiations or participating in related research activities. The sectoral experts within the team are independently responsible for the calculations and development of methodologies for their sectors. These experts discuss each year possible improvements and their implementation with the inventory manager and the team when the new inventory cycle starts. The Russian Federation has not prepared an overall inventory improvement plan,[5] as it considers the current procedure for planning to be sufficient. The ERT believes that an overall inventory improvement plan would be useful for prioritizing improvements across sectors. Also, documentation of the planned improvements and setting timetables for their implementation would help to monitor progress of the improvements. The ERT therefore reiterates the recommendation from the previous review report that the Russian Federation prepare an inventory improvement plan and include it in its next annual inventory submission.

27. Rosstat and other agencies prepare comprehensive statistics in several areas for all sectors and these are used in the inventory preparation. The statistical data are usually published at a national level; regional data are also available in many cases. The inventory team does not in most cases use or have access to disaggregated data such as land-area data at the local level or agricultural management data for each climatic region. As the area of the country is so large, covering a number of climatic regions and conditions, the ERT encourages the Russian Federation to explore ways to use more disaggregated data in the inventory in areas where this could have an impact on the accuracy of the emission or removal

[5] The NIR mentions an Action Plan on National Greenhouse Gas Inventory Improvement. However, this plan is general and does not provide details on prioritization and schedules for implementation of inventory improvements.

estimates, for example, data on land-use changes for reporting under Article 3, paragraphs 3 and 4, of the Kyoto Protocol.

3. Inventory preparation

Key categories

28. The Russian Federation has reported a key category tier 1 analysis, both level and trend assessments, as part of its 2009 submission. The key category analysis performed by the Party and that performed by the secretariat[6] produced similar results with slight differences being explained by the fact that the Party used a different level of disaggregation from that used by the secretariat. The Russian Federation has included the LULUCF sector in its key category analysis, which was performed in accordance with the IPCC good practice guidance and the IPCC good practice guidance for LULUCF.

29. In its key category analysis the Russian Federation identified 23 key categories for the year 2007 when the LULUCF sector was excluded, and 19 key categories when the LULUCF sector was included. A list combining these results was not presented, and qualitative criteria for the identification of key categories were not used. In the analysis performed by the secretariat 23 key categories were identified for the year 2007. CO_2 from forest land remaining forest land, CO_2 from stationary combustion (gaseous fuels and solid fuels) and CH_4 from oil and natural gas were identified as the most significant categories in 2007 in the analyses by the Russian Federation and the secretariat. The ERT recommends that the Russian Federation provide one list of key categories in its next annual inventory submission and to consider using qualitative criteria. It is also encouraged to explore the possibility of applying a tier 2 key category analysis in future submissions.

30. The Russian Federation has not identified key categories for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol. The ERT encourages the Russian Federation to include this information in its next annual inventory submission under the Kyoto Protocol, following the guidance on establishing the relationship between the activities under the Kyoto Protocol and the associated key categories in the UNFCCC inventory as provided in chapter 5.4.4 of the IPCC good practice guidance for LULUCF.

Uncertainties

31. The Russian Federation has provided uncertainty estimates for all sectors for the first time in its 2009 submission. The estimates were provided at an aggregate level. During the in-country review the Russian Federation provided the results of a more detailed uncertainty analysis, with the uncertainties for the energy sector presented by gas and fuel type and grouped by category level, and the estimates for the other sectors presented by gas at the category level. The uncertainty for the total GHG emissions in 2007 was estimated as 40.32 per cent and the uncertainty in trend was estimated as 14.94 per cent. The uncertainty analyses were generally performed using the IPCC tier 1 method. For some country-specific data, the uncertainty estimates were based on the IPCC default uncertainties. In the agriculture sector a tier 2 method using Monte Carlo analysis was used. The ERT commends the Russian Federation for the improvements in its uncertainty analysis, and encourages it to continue improving this analysis, with an emphasis on providing country-specific uncertainty estimates for those categories where country-specific

[6] The secretariat identified, for each Party, the categories that are key categories in terms of their absolute level of emissions, applying the tier 1 level assessment as described in the Intergovernmental Panel on Climate Change *Good Practice Guidance for Land Use, Land-Use Change and Forestry*. Key categories according to the tier 1 trend assessment were also identified for Parties that provided a full set of CRF tables for the base year or period. Where the Party performed a key category analysis, the key categories presented in this report follow the Party's analysis. However, they are presented at the level of aggregation corresponding to a tier 1 key category assessment conducted by the secretariat.

methods, activity data (AD) and/or emission factors (EFs) are used. The ERT recommends that the Russian Federation include the results of the improved uncertainty analysis and a description of how the uncertainties are obtained in its next annual inventory submission. Improvements in the uncertainty analysis would represent a step in moving towards a tier 2 key category analysis (see para. 29 above).

Recalculations and time-series consistency

32. Recalculations have been performed in the 2009 submission in accordance with the IPCC good practice guidance and they have in most cases led to real improvements in the inventory. The ERT noted that recalculations reported by the Party of the time series 1990 to 2006 have been undertaken to take into account changes in data and methods in all sectors. The effect of the recalculations on the estimates of total emissions excluding the LULUCF sector is a 0.2 per cent decrease in the estimates for both 1990 and 2006. The effect of the recalculations on the estimates of total emissions including the LULUCF sector was a 4.2 per cent decrease in 1990 and a 10.9 per cent decrease in 2006. The major changes are attributable to methodological changes in the LULUCF sector in the categories forest land and cropland (see paras. 104 and 105 below). The changes in the agriculture sector (e.g. the estimate of CH_4 emissions from rice cultivation have decreased by approximately 40 per cent for the whole time series) and in the waste sector (e.g. the estimate of CH_4 emissions from solid waste disposal on land has decreased approximately by 7 per cent and the estimate of CH_4 emissions from wastewater handling by approximately 26 per cent for the whole time series) are significant for the individual categories concerned but minor in terms of their impact on the total GHG emissions. The rationale for these recalculations is provided in the NIR but not in CRF table 8(b). The level of detail given in explaining the rationale for the recalculations and also justifying the new estimates varies in different sections of the NIR. No summary of the recalculations is given in NIR chapter 9, "Recalculations and improvements". The ERT recommends that the Russian Federation complete and improve the information on recalculations in the NIR and the CRF tables in its next annual inventory submission.

Verification and quality assurance/quality control approaches

33. The Russian Federation developed a QA/QC plan for the initial review under the Kyoto Protocol. The plan has been revised once since then. It includes the timetable for annual preparation of the inventory and provides general guidance on QC, with references to the IPCC tier 1 and 2 measures. Templates have been developed and are filled and signed by the inventory experts to document their annual quality checks. According to the QA/QC plan, tier 2 measures for key categories should be performed every two to three years, but these have not yet been implemented and a plan for how and when they would be implemented has not been elaborated. QA measures are also described in the plan. Examples of these include the review by the ministries and the companies participating in the inventory preparation. Also Rosstat annually reviews the AD used, and evidence of these activities was provided to the ERT during the in-country review. The ERT was also informed that only the NIR is reviewed by the ministries and other institutions. The ERT commends the Russian Federation for the implementation of the QA/QC procedures. However, the ERT recommends that the Russian Federation include data sources, calculations (including assumptions used) and CRF tables, as relevant, in the material to be reviewed by external institutions and experts. The ERT also recommends that the Russian Federation include the QA/QC plan in its next annual inventory submission and provide more detailed descriptions of the results of the QA/QC measures in the QC templates used and in the NIR to build further confidence in the implementation of its QC procedures.

34. The Russian Federation uses a number of country-specific methods for estimating emissions, especially in the agriculture sector. These methods, including underlying AD and model parameters, have been verified to some extent by results from national research. The ERT encourages the inventory team to enhance its collaboration with national experts, including through peer review and validation and

verification of the national methodologies, to confirm their accuracy and to report on these activities in its next annual inventory submission.

Transparency

35. The transparency of the NIR is generally good and has been improved since the previous submission. The ERT encourages the Russian Federation to continue the improvements, particularly by adding more details on country-specific methodologies, EFs and parameters and on verification. The ERT noted that the NIR does not include descriptions on emission trends and how time-series consistency is ensured. The ERT recommends that the Russian Federation add sections describing emissions trends and how time-series consistency is ensured in the sectoral chapters of the NIR of its next annual inventory submission, in accordance with the UNFCCC reporting guidelines.

4. Inventory management

36. The Russian Federation has a centralized archiving system, which includes the archiving of disaggregated EFs and AD, and documentation on the sources of the data. The archived information also includes the annual inventory submissions, internal documentation on QA/QC procedures, external and internal reviews, and documentation on key category identification. During the in-country review, the ERT was provided with the requested additional archived information.

C. Follow-up to previous reviews

37. The ERT noted several improvements to the inventory since the previous review: the transparency has been improved, the inventory is more complete, evidence on the implementation of the QA/QC plan was provided during the in-country review and uncertainty estimates covering the whole inventory have been provided for the first time. There have also been several methodological improvements, which are addressed in more detail in the relevant sector chapters below.

D. Areas for further improvement

1. Identified by the Party

38. The 2009 NIR identifies areas for improvement in the sectoral chapters. The Russian Federation indicated that the main areas for improvement are the methodological development, moving from tier 1 to higher tier methods when more detailed AD become available, and further development of country-specific methods.

2. Identified by the expert review team

39. The ERT identifies the following cross-cutting issues for improvement:

(a) To further improve the uncertainty estimates by moving from the use of default uncertainty values for country-specific methods, AD and EFs to uncertainty estimates that correspond to the actual methods, AD and EFs used;

(b) To increase the use of more disaggregated AD and EFs and other parameters (e.g. by climatic region) to increase the accuracy of the estimates and to capture the impact of changes in technology and practices on the emissions;

(c) To continue the improvement of completeness, consistency and transparency of the inventory, especially related to country-specific methods, for example by including information on how these have been verified and providing emission estimates for missing categories;

(d) To develop an improvement plan for the inventory, with priorities and time schedules for planned improvements;

(e) To include the QA/QC plan and descriptions of the results of implemented QC procedures in the NIR;

(f) To enhance collaboration with experts that do not participate in preparing the inventory to validate and verify country-specific methods and data;

(g) To explore the possibility of structuring the reporting, following the annotated outline of the NIR, and the guidance contained therein, that can be found on the UNFCCC website.

40. Recommended improvements relating to specific categories are presented in the relevant sector chapters of this report.

III. Energy

A. Sector overview

41. The energy sector is the main sector in the GHG inventory of the Russian Federation. In 2007, emissions from the energy sector amounted to 1,785,678.77 Gg CO_2 eq, or 81.4 per cent of total GHG emissions. Since 1990, emissions have decreased by 34.0 per cent. The key drivers for the fall in emissions are the decline in economic activity in the country between 1990 and 1998, resulting in lower overall fuel demand and thus a decrease in related oil and natural gas operations and fuel combustion, and a significant change in the overall fuel mix (an increase in the share of natural gas and a decrease in the shares of oil and coal) resulting in a less emission-intensive (in specific terms) fuel combustion. In 2007, within the sector, 49.8 per cent of the emissions were from energy industries, followed by 20.0 per cent from oil and natural gas, 11.6 per cent from transport and 7.8 per cent from other sectors. Manufacturing industries and construction accounted for 6.4 per cent and fugitive emissions from solid fuels accounted for 2.7 per cent. The remaining 1.9 per cent were from the category other. The contribution of this category to overall sectoral emissions has decreased significantly – it was 10.5 per cent in 1990 – mostly owing to statistical changes in the allocation of fuels in the energy balance. Other fuel combustion categories generally follow the decrease in economic activity, especially between 1990 and 1998. The contribution of the category oil and natural gas has increased substantially, from 13.2 per cent in 1990 to 20.0 per cent in 2007. This is supported by the fact that oil production in 2007 almost reached 1990 levels and natural gas production in 2007 was already greater than in 1990. Coal production has decreased since 1990, especially from emissions-intensive underground mines. Fugitive emissions have decreased accordingly.

1. Completeness

42. The CRF tables include emission estimates of all categories, gases and fuel use from the energy sector, as recommended by the Revised 1996 IPCC Guidelines. Emissions from the energy sector have been reported for all years of the inventory time series, and for all geographical locations.

2. Transparency

43. The description of the energy sector in the NIR is generally transparent. In this respect recommendations for improving transparency given in previous review reports have been adequately addressed. However, QA/QC measures are only explained in a generic manner and time-series consistency is not explained. The ERT therefore recommends that the Russian Federation improve the description of these aspects in the NIR of its next annual inventory submission.

3. Recalculations and time-series consistency

44. The ERT noted that recalculations reported by the Russian Federation for the time series 1990–2006 have been undertaken to take into account a new methodological approach for estimating emissions from domestic and international aviation (affecting the whole time series), updated AD for methane recovery in coal mining (affecting 2006) and changes in the net calorific values used to estimate emissions related to gas condensate production as well as oil processing and storage in order to make them consistent across the whole energy sector. The change in the approach to estimate domestic and international emissions from aviation (see para. 64 below) has had the greatest impact; overall, the recalculations have led to a 0.01 per cent decrease in the estimate of CO_2 emissions from fuel combustion in 1990 and a 0.20 per cent increase in the estimate for 2006. Furthermore, as a consequence of this methodological change, a significant share of emissions was reallocated from transport to other (1.A.5) in 1990 and from other (1.A.5) to transport in 2006. In this respect, the recalculations have led to real improvements in the inventory by increasing the accuracy and certainty of the estimates. The rationale for the recalculations is provided in the NIR but not in CRF table 8(b). The ERT recommends that the Russian Federation complete the information on recalculations in the CRF tables in its next annual inventory submission.

45. CO_2 emissions from subcategories of the energy industries category were recalculated for 2005 and 2006 and estimated for 2007 following a more detailed disaggregation of the energy balance. This is in line with the recommendations of previous review reports. Corresponding CH_4 and N_2O estimates were only reported for 2007; the CH_4 and N_2O estimates for 2005 and 2006 were aggregated under public electricity and heat production. During the in-country review, the Russian Federation explained that overall CH_4 and N_2O estimates for energy industries were not affected since IPCC default CH_4 and N_2O EFs were used. The ERT recommends that the Russian Federation explore ways of estimating the breakdown of emissions under energy industries for the whole time series and estimate CH_4 and N_2O emissions at the same level of disaggregation as CO_2 emissions ensuring consistency in the time series, in its next annual inventory submission.

46. CO_2 emissions from subcategories of the manufacturing industries and construction category were recalculated for the years 1990–2006. The allocation of emissions to these subcategories has changed to reflect a change of the structure of the energy balance for 2005. Estimates for non-ferrous metals are only available until 2004. In contrast to this issue, a more detailed breakdown of industrial sectors is generally available starting from 2005, which allows a more accurate allocation of emissions to IPCC subcategories. CH_4 and N_2O estimates for the subcategories were only reported for 2007, and the estimates for 1990 to 2006 were recalculated and aggregated under iron and steel. As with energy industries, the Russian Federation explained during the in-country review that overall CH_4 and N_2O estimates for manufacturing industries and construction were not affected since IPCC default CH_4 and N_2O EFs were used. Nevertheless, the ERT considers that the calculation of CH_4 and N_2O emission estimates is not consistent throughout the time series. The ERT therefore reiterates the recommendation of previous review reports that the Russian Federation provide a consistent set of CH_4 and N_2O emission estimates for the whole time series in its next annual inventory submission.

4. Uncertainties

47. Uncertainties in the energy sector are estimated based on a tier 1 approach. Many uncertainty values used are IPCC default values, some are provided by expert judgement. The validity of the use of default uncertainty values or the derivation of own estimates from expert judgment is not substantiated in the NIR. During the in-country review the Russian Federation provided the results of a more detailed uncertainty analysis, with the uncertainties for the energy sector presented by gas and fuel type and grouped by category level, however total quantitative uncertainties for the sector were not reported. Given the fact that the energy sector accounts for the bulk of total GHG emissions and that fugitive

emissions, which involve high uncertainties, are an important source of GHGs in the Russian Federation (see para. 41 below), the Party is strongly encouraged to investigate ways to move to a tier 2 method for estimating uncertainties.

5. Verification and quality assurance/quality control approaches

48. QA/QC measures are only described in a generic manner in the NIR. During the in-country review, the calculation sheets underlying the estimation of emissions in the energy sector were shown to the ERT. QC measures applied to the calculations are in place which ensures that the totality of fuel included in the energy balance is consistently reflected in the estimation of emissions. It can therefore be concluded that the QC weaknesses raised in the previous review reports have been adequately resolved. Nevertheless, the Russian Federation is encouraged to further enhance these procedures and to document them, and their results, in the NIR of its next annual inventory submission.

49. QA generally involves submitting the NIR to relevant external entities (e.g. Rosstat and Gazprom) for review. Comments received are considered by the inventory team and implemented, if appropriate. Underlying calculation sheets and data sets are not provided to external entities. However, the ERT believes that verification of effective calculation procedures, data sets and assumptions used, going beyond the descriptions in the NIR, is an important and necessary part of QA. It therefore recommends that the Russian Federation further improve its QA procedures in the energy sector to allow a more detailed verification of calculation procedures, data sources and assumptions by external experts, and report on the results in its next annual inventory submission.

B. Reference and sectoral approaches

1. Comparison of the reference approach with the sectoral approach and international statistics

50. Differences between the estimates of CO_2 emissions derived using the reference approach and the sectoral approach have decreased from 10.08 per cent in 1990 to 3.82 per cent in 2007, which still constitutes a significant difference. According to the NIR, the differences are due to the fact that the estimates of carbon stored that were used in the reference approach were based on IPCC default carbon storage factors only, as included in the Revised 1996 IPCC Guidelines. The ERT considers that IPCC default values could not be fully adequate for the national circumstances of the Russian Federation. For fuels for which no IPCC default values are available, no carbon stored was estimated by the Russian Federation. Other reasons for the differences between the two approaches mentioned in the NIR are potential losses during conversion of primary fuels into secondary fuels not being accounted for in the reference approach, and differences between the fuel properties (such as carbon content) used in the reference approach and the sectoral approach. For some fuels in the reference approach, emission estimates are not complete; for instance, for bitumen and lubricants the amount of carbon stored is estimated, whereas no value for apparent consumption is available. The ERT recommends that the Russian Federation investigate further the reasons for the differences between the approaches, especially by gaining a better understanding of (and estimating) the amounts of stored carbon attributable to non-energy use of fuels (see para. 54 below), and ensure, as far as possible, that fuel losses reported in the energy balance are not taken into account in the calculation (see para. 49 below). The ERT also recommends that the Russian Federation complete estimates from the reference approach that are currently reported as "NE".

51. For solid fuels, the value for energy consumption in 2007 used in the reference approach is 18.46 per cent higher than the sectoral approach value as calculated by the ERT, whereas CO_2 emissions are 7.37 per cent lower than under the sectoral approach. For 1990, the values for energy consumption and CO_2 emissions were both higher under the reference approach than under the sectoral approach (by 18.62 per cent and 3.93 per cent, respectively). The implied emission factor (IEF) for solid fuels (71.05 t

CO_2/TJ) in the reference approach, as calculated by the ERT, was significantly lower than that under the sectoral approach (90.86 t CO_2/TJ) in 2007. In 1990, the differences were significantly smaller (80.79 t CO_2/TJ in the reference approach and 92.21 t CO_2/TJ in the sectoral approach). During the in-country review, this issue was discussed between the Russian experts and the ERT. The reason for these discrepancies could be the different accounting of coke consumption in the reference and sectoral approaches. However, the issue could not befully be clarified during the review. The ERT recommends that the Russian Federation investigate the reasons for these differences and provide an explanation in its next annual inventory submission.

52. During the in-country review, the structure of the energy balance and the use of fuel consumption values in the calculation sheets were explained to the ERT by the Russian inventory team. It was demonstrated that all fuels reported under consumption in the energy balance are correctly accounted for in the emissions estimates for the energy sector. In further discussions with the inventory team and in a presentation given by Rosstat, it was explained that besides production, import, export and stock changes items as well as consumption in different sectors and non-energy use of fuels and feedstocks, there are two positions in the energy balance which relate to losses – at the production stage and at the consumption stage. It was explained that these losses include losses at the production stage due to enrichment (e.g. removal of mineral matter from run-of-mine coal) and losses at the distribution and consumption stage (e.g. pipeline losses). However, the clear definition of "losses" in the energy balance could not be fully clarified during the in-country review, and therefore the ERT recommended that the Russian Federation investigate this further and use the findings, for instance, for a better explanation of differences between the reference and the sectoral approaches and for a verification of estimates for fugitive emissions. Furthermore, the ERT recommended during the in-country review that the Russian Federation investigate whether there could be a missing source (related to either combustion or fugitive emissions) that has not been accounted for in the inventory so far, whose omission could lead to an underestimation of emissions. After the in-country review, the Russian Federation provided the ERT with a more precise explanation of the meaning of "losses" in the energy balance. The ERT recommends that the Russian Federation provide this information in the NIR of its next annual inventory submission and use this information to verify its estimate of fugitive emissions and to explain the differences between the results of the reference and the sectoral approaches. Apparent consumption in Russian Federation's reference approach for year 2007 corresponds closely to the International Energy Agency (IEA) data. For 2007, there is a difference of 4.5 per cent in apparent consumption between the reference approach and the IEA data.

2. International bunker fuels

53. Estimates of emissions from international bunker fuels used for aviation are derived from data on flight movements of all Russian and international air carriers between Russian territory and other countries. The emissions from international bunker fuels used for navigation are estimated using the overall fuel consumption from the energy balance and by splitting fuel between domestic and international consumption on the basis of data on loading and unloading of cargo at Russian ports. Emissions from both types of bunker fuels are calculated using the same methodological approaches as for domestic fuel use. The ERT recommends that the Russian Federation refine the approaches, especially by taking into account changes in the aircraft fleet structure, fuel efficiency and passenger capacity for aviation and by estimating domestic passenger transport and river transport for navigation (see paras. 64 and 66 below).

3. Feedstocks and non-energy use of fuels

54. The amount of stored carbon that is attributable to the non-energy use of fuels or to the use of fuels as feedstocks is determined for fuels for which default storage factors from the Revised 1996 IPCC Guidelines are available. Furthermore, the use of coke as a reducing agent in the iron and steel industry

is subtracted as non-energy fuel use. In some cases (e.g. for bitumen and lubricants), the amount of carbon stored is estimated, whereas there is no estimate of apparent consumption reported (see para. 50 above). The ERT recommends that the Russian Federation improve the understanding of non-energy use of fuels and use of fuels as feedstocks that has not been covered in the estimates so far and report values for the corresponding carbon stored or emissions, as recommended in previous review reports. Holding discussions with inventory experts from other sectors (e.g. regarding AD for feedstocks in the industrial processes sector or waste types and amounts in the waste sector) or consulting information (e.g. by the Center for Energy Efficiency) on existing experiences in estimating the non-energy use of fuels in the country could be a good starting point for a further elaboration of this issue.

C. Key categories

1. Stationary combustion: all fuels – CO_2, CH_4 and N_2O[7]

55. CO_2 emissions from stationary combustion of fuels are calculated following a tier 1 approach using IPCC default EFs for most of the categories. Relevant data on fuel consumption are taken from the energy balance. For the energy industries category, the estimate of CO_2 emissions is based on aggregated country-specific EFs. These were derived from plant-specific data on fuel consumption and fuel properties of power plants accounting for 90 per cent of electricity and heat production in the Russian Federation. Information used included the origin of coal (basins) and corresponding fuel properties. Plant-specific oxidation factors were incorporated in the estimates of CO_2 EFs. During the in-country review, the ERT noted that these aggregated CO_2 EFs are not updated over time to reflect changes in the proportions of coal originating from different coal basins. Furthermore, country-specific CO_2 EFs were only used for the energy industries category. The ERT therefore recommends that the Russian Federation further elaborate its approach for estimating country-specific CO_2 EFs in its next annual inventory submission, especially by exploring whether basin-specific data on fuel consumption could be used to derive country-specific CO_2 EFs for all stationary combustion categories. The Russian Federation should also investigate whether CO_2 EFs could be updated over time by considering the amount of coal originating from each basin in each year. Improvements in data regarding coal production by basin should also be considered for the calculations of fugitive emissions from coal mining (see para. 61 below). The ERT encourages the Russian Federation to explore ways to separate oxidation factors from the country-specific CO_2 EFs, and to use this information to derive country-specific oxidation factors which could be used instead of IPCC default factors. The Russian Federation informed the ERT during the in-country review that the iron and steel industry is developing its own corporate GHG inventory and that corresponding EFs might be used for the national inventory in the future.

56. CO_2 emissions from the use of coke as a reducing agent are allocated under the industrial processes sector. The corresponding amount of coke is subtracted from the estimate of emissions in the energy sector. CO_2, CH_4 and N_2O emissions related to the combustion of blast furnace gas, for instance in power plants, are also excluded from the energy sector in order to avoid double counting of emissions. During the in-country review, the ERT noted that in contrast to CO_2 emissions, CH_4 and N_2O emissions depend on the type of technology used for the combustion of blast furnace gas and that these emissions are therefore not covered in the industrial processes sector. The omission of CH_4 and N_2O could therefore lead to an underestimation of emissions from the combustion of blast furnace gas. The ERT recommends that the Russian Federation investigate how GHG emissions from blast furnace gas are estimated and allocated, and provide revised estimates in its next annual inventory submission, if appropriate.

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[7] Not all emissions related to all fuels and gases under this category are key categories, particularly CH_4 and N_2O emissions. However, since the calculation procedures and issues for stationary combustion are discussed as a whole, individual categories under stationary combustion are not assessed in separate sections.

57. The estimates of CH_4 and N_2O emissions from stationary combustion for all fuels are based on IPCC default EFs. As mentioned above, CH_4 and N_2O emissions depend on the type of technology used for fuel combustion, therefore the ERT encourages the Russian Federation to investigate the availability of information on technology used for stationary combustion, including AD and EFs, which could be used to produce more accurate estimates of CH_4 and N_2O emissions based on higher tiers. It should be investigated whether plant-specific data gathered for the purpose of estimating country-specific CO_2 EFs contain information on technology which might be used as a starting point for exploring this issue.

58. During the in-country review, the Russian Federation informed the ERT that fuel consumption in the energy balance related to electricity production from industry is reported under public electricity and heat production. The ERT encourages the Russian Federation to explore ways of allocating fuel consumption in industrial power plants to the relevant subcategories of manufacturing industries and construction in accordance with the Revised 1996 IPCC Guidelines.

2. Road transportation: liquid fuels – CO_2, CH_4 and N_2O[8]

59. AD for transport in the Russian energy balance are split between different economic sectors (e.g. gasoline use of private cars is reported in the category households), and stationary and mobile uses are aggregated under some categories for some fuels (e.g. for motor fuels). To estimate emissions from road transportation, fuel consumption related to transport therefore has to be isolated from other (stationary) fuel uses reported in the energy balance. For fuels used for mobile and stationary purposes such as diesel oil, the allocation of fuel consumption is less accurate than for fuels mostly used for mobile sources such as gasoline.

60. CO_2, CH_4 and N_2O emissions are currently estimated following a tier 1 approach using IPCC default EFs. In the NIR and during the in-country review, the Russian Federation explained that it is investigating ways to estimate emissions from road transportation following a tier 2 or tier 3 method. The ERT notes that an estimate of the amount of fuel consumed in road transportation based on the specific fuel consumption per kilometre travelled for different vehicle classes, calculated using the tier 2 method, could be used to verify and improve the allocation of fuels between stationary and mobile sources, especially for diesel oil. The use of a tier 3 method with specific CH_4 and N_2O emissions per kilometre travelled for different vehicle classes could provide more accurate estimates of CH_4 and N_2O emissions from road transportation. The ERT commends the Russian Federation for these steps and recommends that it continue its efforts to implement higher tier methods for estimating emissions from road transportation in its next annual inventory submission.

3. Coal mining and handling: solid fuels – CH_4

61. The Russian Federation estimates CH_4 emissions from coal mining and handling using EFs which were derived using mine- and basin-specific CH_4 measurements and historical basin-specific production data from the literature. Current basin-specific production data are not available. During the in-country review, the Russian Federation explained to the ERT that it is investigating whether it could derive current basin-specific production data from production data available from different economic regions. This would allow it to reflect changes in the production structure for different basins in the estimates of CH_4 from coal production. The ERT appreciates these efforts and recommends that the Russian Federation continue improving the estimation approach and investigate whether basin-specific data could also be provided by other entities (e.g. Rosstat). Information on coal production could also be used for updating CO_2 EFs for stationary combustion (see para. 55 above). Emissions from closed

[8] CH_4 and N_2O emissions from the combustion of liquid fuels for road transportation are not key categories. However, since the calculation procedures and issues for road transportation are discussed as a whole, individual gases under road transportation are not assessed in separate sections.

underground mines are not reported and the ERT reiterates the encouragement of previous review reports to estimate these emissions in the next annual inventory submission.

4. Oil and natural gas: gaseous and liquid fuels – CO_2, CH_4 and N_2O[9]

62. The estimates of emissions from oil and natural gas are based to a large extent on IPCC default EFs. Some country-specific EFs are also used (e.g. for pipeline leakage). Subcategories for which methodologies (e.g. for the distribution of oil products) or default EFs (e.g. for N_2O emissions from several activities) are not available in the Revised 1996 IPCC Guidelines or the IPCC good practice guidance, or for which no data are available (e.g. for drilling and testing of oil wells), are reported as "NE".

63. Since fugitive emissions from oil and natural gas account for one sixth of total GHG emissions in the Russian Federation and the EFs have a large uncertainty value, the ERT recommends that the Russian Federation strengthen its efforts to improve the completeness and accuracy of its emission estimates for the oil and natural gas industry. The ERT especially recommends verifying the appropriateness of using default parameters in the Russian context. This could be done, for instance, by cross-checking AD and EFs against available studies, by discussing detailed assumptions and calculation procedures with external experts or by comparing estimated fugitive emissions against losses accounted for in the energy balance (see para. 52 above). This information could be used to further prioritize planned improvements in this category. The cooperation with Gazprom could facilitate access to further information (e.g. from the corporate GHG inventory that is currently being developed) to help improve emission estimates in this category. The ERT appreciates the effort already made in this respect and recommends that the Russian Federation continue and strengthen its collaboration with external experts in the oil and gas industry. The ERT further recommends that the Russian Federation consider changes in EFs over time (e.g. to reflect refurbishment or deterioration of the transmission or distribution networks) and investigate additional emission sources (e.g. from exploration of natural gas, oil drilling and testing, distribution of oil production or losses in the energy balance potentially not yet accounted for) and provide estimates for these in its next annual inventory submission, if applicable.

D. Non-key categories

1. Civil aviation: liquid fuels – CO_2, CH_4 and N_2O

64. In the 2009 submission, the Russian Federation has refined its method for estimating domestic and international emissions from civil aviation, which is based on flight hours of Russian (for domestic flights) and international (for domestic and international flights) air carriers. The overall fuel consumption is estimated by multiplying flight hours for different aircraft types with specific fuel consumption data from the State Scientific and Research Institute of Civil Aviation. Since data on flight hours are only available starting from 2000, the fuel consumption was extrapolated backwards based on domestic and international passenger turnover. The difference between the sum of fuel used for domestic and international aviation and the amount of fuel reported in the energy balance is accounted for in the category other (stationary (1.A.5.a)). The ERT commends the Russian Federation for improving the method, which has increased the accuracy of the estimate. The ERT recommends that it refine the method further and justify the allocation of the emissions to the category other (stationary) (e.g. by explaining what other fuel uses are relevant in this respect) in its next annual inventory submission. Furthermore, the ERT recommends that the Russian Federation consider refining the approach of extrapolating the fuel consumption by taking into account changes in the fleet structure and the evolution

[9] Not all emissions related to all subcategories and gases under this category are key categories. However, since the calculation procedures and issues for oil and natural gas are discussed as a whole, individual subcategories under oil and natural gas are not assessed in separate sections.

of fuel efficiency and passenger capacity of aircrafts over time, and ensure consistency in the emission trend for this category.

65. The issue raised in previous review reports of discrepancies between overall fuel consumption reported by IEA and the value used in the inventory was clarified during the in-country review. IEA figures include the export of jet kerosene, which is reported as a separate item in the Russian energy balance. Furthermore, in the energy balance jet kerosene is included under "other motor fuels". IEA apparently allocated all of this fuel consumption to aviation, whereas in the Russian energy balance, stationary uses are also included in this figure. Consequently, the value for overall fuel consumption available for aviation in the inventory is significantly smaller than that reported by IEA. The Russian Federation is recommended to provide an explanation of these differences in the NIR of its next annual inventory submission.

2. Navigation: liquid fuels – CO_2, CH_4 and N_2O

66. The Russian Federation has developed an approach for estimating domestic and international emissions from navigation based on data on loading and unloading of dry and bulk cargo in Russian ports and on distances for different destinations. The ERT commends the Russian Federation for these efforts. Based on an assumption of fuel consumption per tonne of good transported, the fuel consumption for domestic and international journeys was estimated. For international trips, it was assumed that 50 per cent of the fuel consumed was taken on board in the Russian Federation, which corresponds to the bunker fuel consumption. Subsequently, the share of national and domestic fuel consumption is derived from these estimates and multiplied with the corresponding fuel consumption for navigation in the energy balance, yielding a figure for the fuel consumption for domestic and international navigation which is then used for estimating emissions. The Russian Federation explained to the ERT that passenger transport and river transport had not been taken into account in the derivation of shares of national and domestic fuel consumption. These types of transport are considered to be mostly domestic. Omitting them could therefore lead to an underestimation of emissions from domestic navigation. The Russian Federation further explained to the ERT that data on ship movements to and from Russian ports could be made available and might be used for estimating emissions from passenger and river transport in future. The ERT recommends that the Russian Federation explore this possibility and other approaches for incorporating domestic passenger and river transport in its estimates of emissions from navigation in its next annual inventory submission.

E. Areas for further improvement

1. Identified by the Party

67. The NIR identifies the following areas for further improvement of the completeness and accuracy of its energy sector estimates, to be implemented in the next or future annual inventory submissions:

(a) To strengthen co-operation agreements on data and information exchange with external entities such as Gazprom to improve the inventory;

(b) To consider using in the national inventory EFs from the corporate GHG inventory that is being developed for the iron and steel sector;

(c) To use tier 2 and 3 approaches for estimating emissions from road transportation;

(d) To investigate options for obtaining basin-specific coal production data for use in the inventory.

2. Identified by the expert review team

68. The ERT identified the following areas for improvement:

(a) To estimate the breakdown of emissions for the whole time series of subcategories under energy industries and manufacturing industries and construction;

(b) To further investigate the reasons for the differences between the results from the reference approach and the sectoral approach and complete the estimates obtained using the reference approach;

(c) To use information on losses in the energy balance for verifying fugitive emissions and for explaining differences between the reference and sectoral approaches;

(d) To improve the understanding and reporting of non-energy fuel use and use of fuels as feedstocks;

(e) To further elaborate the approach for estimating country-specific CO_2 EFs for stationary combustion;

(f) To estimate CH_4 and N_2O emissions from blast furnace gas;

(g) To move to higher tier approaches for estimating CH_4 and N_2O emissions from stationary combustion;

(h) To further refine the approaches for estimating domestic and international aviation and navigation emissions.

IV. Industrial processes and solvent and other product use

A. Sector overview

69. In 2007, emissions from the industrial processes sector amounted to 208,070.67 Gg CO_2 eq, or 9.5 per cent of total GHG emissions, and emissions from the solvent and other product use sector amounted to 541.40 Gg CO_2 eq, or 0.02 per cent of total GHG emissions. Since the base year, emissions have decreased by 13.0 per cent in the industrial processes sector and by 3.6 per cent in the solvent and other product use sector. The key driver for the fall in emissions in the industrial processes sector is the decrease in industrial activities reflected in the decrease of emissions from mineral products, namely from limestone and dolomite use (51.4 per cent), lime production (28.6 per cent) and cement production (20.1 per cent); and from metal production, namely from iron and steel production (15.8 per cent). In 2007, within the industrial processes sector, 41.0 per cent of the emissions were from iron and steel production, followed by 13.1 per cent from cement production, 11.4 per cent from aluminium production, 9.5 per cent from ammonia production, 8.4 per cent from limestone and dolomite use and 6.0 per cent from production of HCFC-22, which were the most important categories. CO_2 emissions accounted for 81.5 per cent of the emissions, followed by PFCs (8.1 per cent), HFCs (7.7 per cent), N_2O (1.6 per cent), SF_6 (0.6 per cent) and CH_4 (0.4 per cent).

1. Completeness

70. The CRF tables includes estimates of most categories of emissions from the industrial processes and solvent and other product use sectors. Emissions have been reported for all years of the inventory time series, and for all geographical locations. Potential emissions of HFCs, PFCs and SF_6 are reported as "NE". Actual emissions of HFCs, PFCs and SF_6 are reported as "NE" for a number of subcategories, including HFCs from industrial refrigeration under refrigeration and air conditioning equipment, foam

blowing, aerosols/metered dose inhalers and solvents; and HFCs, PFCs and SF_6 from other applications using ODS substitutes and from semiconductor manufacture. CO_2 emissions from paint application, degreasing and dry cleaning and chemical products, manufacture and processing; and N_2O emissions from degreasing and dry cleaning, fire extinguishers, aerosol cans and other use of N_2O are also reported as "NE". The ERT further noted that only part of the non-methane volatile organic compounds (NMVOCs) emissions from the category other (polyethylene) have been reported by the Russian Federation. In the NIR, AD on total polyethylene production, including low-density and high-density polyethylene, are presented; however, for a certain amount of polyethylene which remains unclassified NMVOC emissions were not reported. The ERT recommends the Russian Federation to prepare and report estimates for categories currently reported as "NE" for which methodologies are provided in the Revised 1996 IPCC Guidelines and/or the IPCC good practice guidance in its next annual inventory submission, and if emissions for a given category cannot be estimated then the Party is to provide sufficient explanation in the NIR as to why it cannot be estimated.

2. Transparency

71. The Russian Federation provides justifications in the NIR for the assumptions made and the choice of data and methods used. Most categories are reported with the required detail in the CRF tables, with a few exceptions where AD (e.g. CO_2 and PFC emissions from aluminium production) have been reported as confidential ("C") to protect commercially sensitive information. The CRF tables and the NIR provide sufficient information to enable assessment of the data used and methodologies applied, except for the categories glass production, carbide production and iron and steel production. In the case of glass production, the assumptions used for converting the unit of container glass production AD from millions of bottles into thousands of tonnes is not clearly explained. During the in-country review the Russian Federation explained to the ERT that it uses an average weight value of glass containers for this conversion. In the category carbide production (silicone carbide), both CH_4 and CO_2 emissions have been estimated based on "petroleum coke used" as AD. In the CRF table 2(I).A-G, however, the AD were reported as "silicone carbide production". For the category iron and steel production, the assumption used to estimate CO_2 emissions from steel is not clearly explained. The sources for the country-specific values on carbon content in conversion of pig iron and steel are not referenced adequately in the NIR. Also, AD on the amount of iron scrap used in the technological process of steel production are not given. The ERT recommends the Russian Federation to provide explanations in its next annual inventory submission for the assumptions and methodologies used, as well as adequate references for the country-specific EFs.

72. The ERT noted that for the years 1990–1995, the corrections for international trade operations (exports and imports) of soda ash and calcium carbide were not taken into account because data were not available at the Federal Customs Service. For this reason, for categories soda ash production and use and calcium carbide, the time series are not consistent. The ERT recommends that the Russian Federation consider taking into consideration the correction for international soda ash and calcium carbide trade for 1990–1995, and document and demonstrate in the NIR of its next annual inventory submission that the time series for these categories is internally consistent in all its elements with inventories of other years. The ERT also recommends that the Russian Federation use one of the techniques provided by the IPCC good practice guidance (e.g. overlap, surrogate method, interpolation or trend extrapolation) to calculate the missing values if necessary.

3. Recalculations and time-series consistency

73. The ERT noted that recalculations of the time series 1990–2006 have been undertaken to take into account updated AD in the refrigeration and air conditioning equipment, foam blowing and electrical equipment subcategories, use of country-specific parameters for carbon content in conversion of pig iron and steel in the iron and steel production category, and use of a tier 3 methodology for direct reduced

iron production at the Oskolsky Electrometallurgical Works (direct reduced iron). The recalculations performed by the Russian Federation have resulted in real improvements in the inventory and in time-series consistency.

74. The impact of the recalculations on the total GHG emissions is small: an increase in the estimates of CO_2 and SF_6 emissions in 1990 (of 0.07 per cent and 0.0002 per cent, respectively), and an increase in the estimates of CO_2, HFC and SF_6 emissions in 2006 (of 0.10 per cent, 0.03 per cent and 0.0004 per cent, respectively). The rationale for the recalculations is not provided in the NIR or in CRF table 8(b). The ERT recommends that the Russian Federation provide explanatory information including justification for recalculations in the NIR and relevant CRF tables of its next annual inventory submission.

4. Uncertainties

75. Uncertainties in the data used for all categories within the industrial processes sector have been quantitatively discussed in a transparent manner in the NIR, except for the category consumption of halocarbons and SF_6. The ERT recommends that the Russian Federation complete the discussion on uncertainties in the NIR by including all categories in its next annual inventory submission. The uncertainty analysis was based to a large extent (for all categories except limestone and dolomite use) on the default EF uncertainties included in the IPCC good practice guidance and in the *2006 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the 2006 IPCC Guidelines), while for AD uncertainties were based on information obtained from Rosstat, other country-specific information obtained from ministries, industrial associations, directly from plants, as well as from expert judgment. The ERT encourages the Russian Federation to further use country-specific information in future and to request the institutions providing AD to estimate the relevant uncertainty values as well. During the in-country review the Russian Federation provided the results of a more detailed uncertainty analysis, with estimates presented by gas at the category level, however total quantitative uncertainties for the sector were not reported.

5. Verification and quality assurance/quality control approaches

76. Very limited information is provided in the sectoral chapter on QA/QC procedures applied for individual categories of the industrial processes sector. The ERT encourages the Russian Federation to report more detailed information on this in the NIR of its next annual inventory submission, in particular for the key categories, as well as information on the external reviews conducted for the industrial processes sector and key findings on the quality checks of the AD and methods used.

B. Key categories

1. Cement production – CO_2

77. In previous review reports the Russian Federation was encouraged to apply country-specific data on the lime content of clinker and on the cement kiln dust (CKD) correction factor. This recommendation has not been followed as yet. The ERT reiterates the recommendation that the Russian Federation apply country-specific data on the calcium oxide and magnesium oxide content of clinker and on the CKD correction factor (i.e. using the existing State standards (GOSTs) on CKD), in order to improve the accuracy of its next annual inventory submission.

2. Ammonia production – CO_2

78. In previous review reports Russian Federation was recommended to make efforts to estimate CO_2 emissions from ammonia production using a tier 1a methodology, based on natural gas input and country-specific EFs based on the carbon content of natural gas. However, the Russian Federation has not yet

followed this recommendation, and the ERT reiterates that the Russian Federation implement this methodological improvement in its next annual inventory submission.

3. Aluminium production – PFCs

79. The Russian Federation was recommended in previous review reports to make efforts to apply a tier 2 methodology to estimate PFC emissions from the key category of aluminium production, as recommended by the IPCC good practice guidance. However, this recommendation has not been fully followed. Estimates using a tier 2 methodology have been reported, using detailed information received from Rusal, only for 2006 and 2007. The ERT reiterates the recommendation that the Russian Federation explore possibilities for obtaining the relevant information for the years 1990–2005, and move to a higher tier methodology for estimating PFC emissions from this category ensuring consistency across the whole time series in its next annual inventory submission.

C. Non-key categories

Consumption of halocarbons and SF_6 – HFCs, PFCs and SF_6

80. The Russian Federation has reported potential emissions of HFCs, PFCs and SF_6 from the consumption of halocarbons and SF_6 as "NE" for the complete time series. Also, the actual emissions of HFCs, PFCs and SF_6 from a number of subcategories were reported as "NE" for the complete time series (see para. 70 above). The ERT recommends that the Russian Federation report actual emissions from HFCs, PFCs and SF_6 for all the missing subcategories for the whole time series, as well as all potential emissions, and provide in the NIR of its next annual inventory submission a discussion of these categories and of other potential categories not addressed in the 2009 inventory submission. After the in-country review, the Russian Federation informed the ERT that taking into account that relevant AD are not collected by federal statistics, the implementation of this recommendation may take more time and resources than available in the process of preparation of the next annual inventory submission.

D. Areas for further improvement

1. Identified by the Party

81. The NIR identifies the following areas for further improvement of the completeness and accuracy of the industrial processes sector, to be implemented in the next or future annual inventory submissions:

(a) Estimation of CO_2 emissions from use of magnesite for the manufacture of bricks used in ferrous and non-ferrous metallurgy;

(b) Collection of AD on dichloroethylene production for estimating CH_4 emissions from the category other (dichloroethylene);

(c) Assessment of the amount of non-concentrated nitric acid used as a raw material in the production of nitroammophosphates and other mineral fertilizers (except ammonium nitrate), to be taken into account in the calculation of the N_2O emissions from nitric acid production;

(d) Collection of AD on silicon metal production for estimating CO_2 emissions from ferroalloys production;

(e) Recalculation of HFC, PFC and SF_6 emissions from consumption of halocarbons and SF_6 to reflect revised AD (e.g. refrigeration and air conditioning equipment, as well as other consumption of halocarbons).

2. Identified by the expert review team

82. The ERT identified the following areas for improvement:

(a) Increase the transparency of the NIR by including more information on data used and methodologies applied for glass production, silicon carbide and iron and steel production;

(b) Increase the completeness of the inventory by including estimates for all current missing categories for which methodologies are provided in the Revised 1996 IPCC Guidelines and the IPCC good practice guidance and to complete estimates for the category other (polyethylene);

(c) Include missing actual and potential emissions of all HFCs, PFCs and SF_6 from consumption of halocarbons and SF_6.

V. Agriculture

A. Sector overview

83. In 2007, emissions from the agriculture sector amounted to 134,708.97 Gg CO_2 eq, or 6.1 per cent of total GHG emissions. Since 1990, emissions have decreased by 56.5 per cent. The key driver for the fall in emissions is the significant decline in the agricultural output of the Russian Federation, particularly in terms of animal population numbers. Within the sector, 54.3 per cent of the emissions were from agricultural soils, followed by 28.1 per cent from enteric fermentation, 16.9 per cent from manure management and 0.6 per cent from rice cultivation. AD collection activities in the country appear to be of high quality. Comprehensive agricultural data have been collected for many years and these are regularly published by Rosstat. Data from government agricultural organizations are collected by census each year, and sampling techniques are used for completing the information from small and medium-sized farms. In 2006 the Russian Federation conducted the first full national agricultural census since 1920, which covered all farms and private holdings.

1. Completeness

84. The inventory includes estimates of emissions from enteric fermentation, manure management, agricultural soils and rice cultivation, as recommended by the Revised 1996 IPCC Guidelines. Burning of savannas and burning of agricultural residues are reported as "NO" (not occurring), considering that field burning of agricultural residues is prohibited by law in the Russian Federation. The Russian Federation has provided data in the CRF tables for all years. The NIR provides information on QA/QC and verification procedures as recommended in the previous review report.[10] The ERT welcomes the efforts made by the Russian Federation in improving the completeness of the inventory information.

2. Transparency

85. The transparency of the reporting of the sector has improved since the previous submission. In general, the NIR includes descriptions of methodologies, EFs and data sources. These are complemented with descriptions of trends, the uncertainty analysis and implementation of QA/QC measures. During the in-country review the ERT was provided with all required information including work sheets, data sheets and templates used for QC.

[10] FCCC/ARR/2008/RUS.

3. Recalculations and time-series consistency

86. Recalculations have been performed in accordance with the IPCC good practice guidance. The ERT noted that recalculations reported by the Russian Federation for 1990–2006 have been undertaken to take into account updated AD for organic amendment applied in rice cultivation and changes in the EFs for rabbits, deer and fur animals. The changes in the EFs for these animals resulted in changes in the estimates of emissions from enteric fermentation and manure management, as well as in the estimate of emissions from agricultural soils owing to changes in values for the amount of nitrogen in the manure applied to soils. The rationale for the recalculations is provided in the NIR but not in CRF table 8(b). The ERT recommends that the Russian Federation provide explanatory information in the relevant CRF tables of its next annual inventory submission. The recalculations have increased the estimates of total GHG emissions from the sector in 1990 by 0.18 per cent and in 2006 by 0.01 per cent compared with those reported in the previous submission.

4. Uncertainties

87. Uncertainty analyses were conducted for the agriculture sector using a combination of tier 1 and tier 2 methods for the latest inventory year, as recommended in the previous review report, and the results were provided in the NIR. A Monte Carlo model was applied for 2004 inventory data. The ERT noted that as a result of the recalculation, the uncertainty value for rice cultivation in 2007 decreased from 40 to 26 per cent, while for other categories the changes were not significant. The overall uncertainty of the agriculture inventory was 29 per cent for 2007. The ERT welcomes these developments and encourages the Russian Federation to extend its efforts to all sectors of the inventory.

5. Verification and quality assurance/quality control approaches

88. QA/QC for the agriculture sector is carried out using a tier 1 method. The ERT found that the QC procedures is largely restricted to AD. All results of estimates for key categories in the agriculture sector have been published in peer reviewed journals, but this could not be considered equal to independent external peer review or verification. The QA procedures still do not fully meet the requirements of the IPCC good practice guidance. The ERT noted that the QA and verification approaches for country-specific methods could be strengthened and encourages the Russian Federation to increase its efforts in implementing QA procedures for the inventory of the agriculture sector in its next annual inventory submission.

B. Key categories

1. Enteric fermentation – CH_4

89. To estimate CH_4 emissions from enteric fermentation from cattle, the Russian Federation used country-specific methods equivalent to and consistent with the tier 2 method in the IPCC good practice guidance, using data published by Rosstat on direct feed intake by livestock. Basic information on this methodology is reported in the NIR, but the ERT recommends that the Russian Federation expand on this description in the NIR of its next annual inventory submission, including by providing the formulae used in the estimates. The CH_4 emission estimates from this category are calculated using livestock and fodder data aggregated at the national level, although statistical data disaggregated for regions within Russia are available. The value FU_i (average feed unit content in 1 kg of dry matter for certain types of fodder) used in the country-specific methodology to estimate gross-energy input (GE) varies from 0.55±0.14 (coarse fodder) to 1.13±0.27 (concentrated fodder). According to the statistical data for 2007 provided to the ERT during the in-country review, the proportions of the different kinds of fodder used in agriculture vary over time and across the different Russian regions. The ERT encourages the Russian Federation to use disaggregated data by region to improve the accuracy of the emission estimates, as appropriate, in its next annual inventory submission.

90. Tier 1 methods have been used for the estimates of categories other than cattle, in line with the IPCC good practice guidance. In the 2009 submission, the EFs for fur farming and rabbits have been estimated in accordance with the methodologies provided in the 2006 IPCC Guidelines, and the methane conversion rate (Y_m) for deer was taken from the emission factor database (EFDB) of the IPCC. The Russian Federation uses these methods and parameters to improve completeness of its inventory and owing their applicability to its national circumstances. In accordance with these changes, recalculations were performed for the entire time series and resulted in a 0.54 per cent increase in the estimate of CH_4 emissions in 1990 and a 0.79 per cent increase in the estimate for 2006 compared with those reported in the previous submission. The ERT welcomes these efforts to improve the completeness of the inventory.

91. The Russian Federation has provided a description of how it ensured time-series consistency in its estimates of enteric fermentation emissions, as recommended by the previous review report. The ERT welcomes this improvement.

2. Manure management – N_2O

92. The Russian Federation used the IPCC method for N_2O emission estimates for cattle and swine, with a combination of the country-specific nitrogen (N) intake rate and the IPCC default fraction of annual N intake. The Russian Federation has identified the types of animal waste management systems (AWMS) used in the country and uses country-specific data on the allocation of manure to different types of AWMS. Emissions have been estimated using aggregated AD at national level.

93. In its 2009 submission, the Russian Federation estimated the N excretion rate for rabbits and fur animals using methodologies provided in the 2006 IPCC Guidelines, whereas the N excretion rate for deer was estimated using the methane correction factor (MCF) taken from the EFDB of the IPCC and performed recalculations for the entire time series accordingly. The Russian Federation uses these methods and parameters to improve completeness of its inventory and owing their applicability to its national circumstances. These recalculations resulted in a 0.87 per cent increase in the estimate of N_2O emissions in 1990 and a 0.72 per cent increase in the 2006 estimate compared with those reported in the previous submission. The ERT welcomes these efforts in improving the completeness of the inventory.

3. Direct soil emissions – N_2O

94. As in all other categories in the agriculture sector, there was a significant decline in emissions of N_2O from this category between 1990 and 2007. This is explained by a 31 per cent reduction in the area of cropland in the country and a 75 per cent decrease in the use of synthetic fertilizers in that period. The Russian Federation used tier 1a and 1b methods for different subcategories, with the exception of crop residues for which a country-specific method was applied. In addition, country-specific EFs for some soils, such as "chernozem" and "sod-podzol", were adopted for the estimates of direct soil emissions, and country-specific data on the N content in crop residues have been applied to estimate N_2O emissions from crop residues. As part of the 2009 submission the Russian Federation has revised the N excretion rates for rabbits, deer and fur animals, which affected the estimates of N_2O emissions from manure applied to soils. The recalculation was performed for the entire time series and resulted in a 0.26 per cent increase in the estimate of N_2O emissions from agricultural soils in 1990 and a 0.18 per cent increase in the 2006 estimate. The ERT welcomes these efforts in improving the accuracy of the inventory.

C. Non-key categories

Rice cultivation – CH_4

95. In 2007, emissions from rice cultivation accounted for 0.6 per cent of total emissions from the agriculture sector. Recalculations have been performed in this category to take into account country-

specific data on organic amendment applied to the country's rice fields. Statistical data on organic amendment were available from the Krasnodarskiy region only for the years 1990 and 2007. Based on these data the Russian Federation determined the methane scaling factor for these years and used them in the inventory calculations. Linear interpolation was used to obtain methane scaling factors for the years between 1990 and 2007. The recalculation carried out using these country-specific values resulted in a 32.5 per cent decrease in the estimate of CH_4 emissions in 1990 and a 40.0 per cent decrease in the 2006 estimate. The decrease in the emissions from rice cultivation is significant, but has a very minor impact on total emissions for the sector or on the total GHG emissions (for total GHG emissions the impact is –0.02 per cent in 1990 and –0.03 per in 2006). The ERT welcomes these efforts in improving the accuracy of the inventory.

D. Areas for further improvement

1. Identified by the Party

96. The NIR states that the Russian Federation is planning to further improve the methodologies and EFs used for the agriculture sector on the basis of the most recent scientific findings.

2. Identified by the expert review team

97. The ERT identified the following areas for improvement:

(a) To consider using spatially disaggregated AD, especially for estimating emissions from enteric fermentation, to improve the accuracy of the estimates and also to capture the impact of changes in agricultural practices;

(b) To increase the efforts to implement QA procedures for inventory of the agriculture sector.

VI. Land use, land-use change and forestry

A. Sector overview

98. In 2007, net removals from the LULUCF sector amounted to 187,042.24 Gg CO_2 eq, offsetting 8.5 per cent of total GHG emissions. Since 1990 – when the sector was a net source of emissions amounting to 40,240.38 Gg CO_2 eq – the LULUCF sector has shown a marked interannual variability, ranging from net emissions of 337,578.69 Gg CO_2 eq in 2000 to net removals of 830,232.96 Gg CO_2 eq in 2003. On average, the LULUCF sector of the Russian Federation has been a net sink of 207,910 Gg CO_2 eq per year over the 1990–2007 period. This variability has mainly been caused by the variability in the net emissions and removals of managed forests (about 70 per cent of total forest lands) under the forest land remaining forest land category. A clearer pattern of decreasing emissions can be seen in the reported estimates for cropland between 1990 and 2007. The Russian Federation indicated in the NIR that changes in forest harvest rates and the occurrence of forest fires (including post-fire emissions) are among the key drivers for the interannual variability. However, during the in-country review, it emerged that other causes, may be the reason for this variability (see para. 110 below). In 2007, net removals from forest land remaining forest land amounted to 289,713.58 Gg CO_2 eq, while cropland remaining cropland was responsible for net emissions of 104,465.74 Gg CO_2 and grassland remaining grassland for net emissions of 1,794.40 Gg CO_2. Emissions and removals from other categories are not reported.

1. Completeness

99. The inventory of the LULUCF sector of the Russian Federation is not complete. Emissions and removals are reported only for the categories forest land remaining forest land, cropland remaining cropland and grassland remaining grassland. For other categories, including all the mandatory land-use

change categories, notation keys are used: land converted to forest land is reported as "IE", "NE" and "NO"; land converted to cropland is reported as not applicable ("NA") and "NO"; land converted to grassland is reported as "NA", "NE" and "NO". Wetlands, settlements and other land are reported as "NE". Peat extraction, to be reported under land converted to wetlands, is not reported and therefore represents a potential missing source. Direct N_2O emissions from N fertilization of forest land are included under the agriculture sector, which is in accordance with the UNFCCC reporting guidelines as the Party was not able to separate the fertilizer used in forests from that applied on agricultural lands.

100. The incompleteness of the inventory is mainly related to difficulties in land identification due to the fact that the information on categories that is currently available from official statistics does not correspond in full to the IPCC categories. To be complete and consistent, the sum of AD (i.e. areas of all land uses) should match the official statistics of total national area (within the confidence limits) and be constant over time; this is an essential requirement to demonstrate that no omission or double counting of lands occurred. In the Russian Federation, the sum of AD is neither complete nor consistent over time, as it accounts for less than 50 per cent of total land area of the country and decreases by 5 per cent from 1990 to 2007.

101. In response to recommendations of previous review reports, the Russian Federation has produced a land-use change matrix using categories from official statistics. The ERT recognizes this effort as an important step towards the application of the approach 2 for land representation as described by the IPCC good practice guidance for LULUCF. The ERT recommends that the Russian Federation make additional efforts to convert existing statistics into IPCC land-use categories, and consider, among other issues, that: (1) even if a land use results in no emissions, it is good practice to report its AD (and use "NE" or "NO" for the implied emission factors); (2) where relevant, forest land, grassland, wetlands and other land should be divided into "managed" and "unmanaged" – although emissions of unmanaged lands do not need to be reported, reporting the area would allow the consistency of AD to be checked; (3) the definitions of land categories in the IPCC good practice guidance for LULUCF are rather flexible, and this should facilitate the use of available statistics, with the help of proxy data, expert judgement and motivated assumptions; (4) for the purposes of reporting the Party may report aggregate estimates for all land conversions to a particular land use, when data are not available to report them separately; and (5) the category other land remaining other land is intended to allow the total reported land area to match the total national area. During the in-country review, the Russian Federation assured the ERT that all possible efforts will be made to report land-use categories in a complete and consistent manner in the next annual inventory submission.

102. In terms of carbon pools, the ERT noted that the completeness of the reporting has improved, as emissions and removals from dead organic matter and mineral soils of forest land have been estimated in the 2009 submission. Of the carbon pools not yet estimated, the ERT recommends that the Russian Federation prioritize efforts to include estimates for organic soils of forests in its following annual inventory submissions.

2. Transparency

103. The description in the NIR of the methods, AD and parameters used in the estimates for the LULUCF sector is generally transparent. However, the ERT recommends that the Russian Federation make additional efforts in providing details in its description of forest inventory procedures and the processing of forest data for calculating emissions and removals in its next annual inventory submission.

3. Recalculations and time-series consistency

104. The ERT noted that recalculations reported by the Russian Federation of the time series 1990–2006 have been undertaken to take into account inclusion of new carbon pools under the forest land

category, changes in the structure of the model applied for calculations and the use of updated data for the cropland category.

105. In addition, during the in-country review the Russian Federation provided revised estimates of net emissions and removals of forest land for the years 2001, 2005 and 2007. The major change was in the 2007 estimate, which decreased from a net removal of 1,416,080.53 Gg CO_2 eq to a net removal of 289,713.58 Gg CO_2 eq (a decrease by 79.5 per cent). The Russian Federation explained to the ERT that this change corrected an overestimation of carbon stock changes connected with changes in the area and growing stock of managed forests, as a result of forests from former agricultural lands being added to the category forest land. During the in-country review, the ERT noticed that an error remains in the revised calculation of net emissions and removals in dead organic matter and mineral soil for the year 2007. The Russian Federation agreed to correct this error in its next annual inventory submission. The ERT recommends that the Russian Federation provide explanatory information on this and other possible changes in the NIR and relevant CRF tables of its next annual inventory submission.

4. Uncertainties

106. In response to a recommendation from the previous review report, the Russian Federation has provided a tier 1 estimate of uncertainty for the LULUCF sector for the year 2007. Uncertainty values used were obtained from national publications and by expert judgement, and some values were taken from the IPCC good parctice guidance for LULUCF. Following the recalculations in the forest land category mentioned in paragraph 104 above, the overall uncertainty for the LULUCF sector was estimated to be around 17 per cent for the year 2007.

5. Verification and quality assurance/quality control approaches

107. Although a QA/QC system is in place for the LULUCF sector, the ERT considers that a number of mistakes identified during the in-country review could have been identified with more comprehensive QA/QC procedures related to AD. While recognizing the improvements made since the previous review, the ERT recommends that the Russian Federation further strengthen its QA/QC procedures in the LULUCF sector.

108. Some verification has been carried out for the LULUCF sector, but given the high uncertainty that typically characterizes this sector, the ERT notes that additional verification activities would help to increase the overall confidence in the reported estimates. For the category forest land these could include, inter alia, verification of estimates using different methods (e.g. a gain–loss method, even if only for specific regions), a critical assessment of existing information from other official sources (e.g. the Food and Agriculture Organization of the United Nations (FAO)) or a discussion of common trends in forest land and possible causes of divergence between Russian estimates and results of comparable work by the international scientific community.

B. Key categories

1. Forest land remaining forest land – CO_2

109. The Russian Federation uses the stock change method to assess biomass carbon stock changes in forest land. The interval used to assess differences is five years for the period 1990–1997, while annual updates of total carbon stocks were used from 1998 onwards. Carbon stock changes in dead organic matter and mineral soils of forest land were estimated in the 2009 submission for the first time, using country-specific EFs.

110. The Russian Federation reports a significant interannual variability in net emissions and removals from managed forest land under the forest land remaining forest land category, especially from

1998 onwards. During the in-country review, the ERT noted that this variability correlates to a year-to-year variability in forest area in official statistics (albeit very small in relation to the total forest area). This suggests a probable error in the calculations of carbon stock changes. For example, if an existing forest area is included in the forest land category simply because the category of this forest area has changed (e.g. change in ownership) and has been allocated to a new category in the statistics, the new area (and corresponding net emissions and removals) should also be included under forest land retrospectively for the previous years. Given the method applied by the Russian Federation to assess net emissions and removals, an apparently insignificant increase in area and carbon stock from one year to the next may generate significant errors in the estimate of the annual net emissions and removals, if not properly accounted for in the relevant time series. This possible error appears similar to that which caused revisions for the year 2007 during the in-country review. To avoid any risk of introducing artificial variability into the annual net emissions or removals estimate, the ERT recommends that the Russian Federation, for its next annual inventory submission:

(a) Clarify the reasons for any increase or decrease in forest area. To this aim, the ERT recommends closer interaction between inventory compilers and the Russian Federal Forestry Agency. If year-to-year variations cannot be explained, an alternative solution could be to apply the stock change method over longer time intervals (e.g. five years);

(b) Report consistently all changes in the forest area, so that the change in total forest area from one year to another matches the sum of the areas under conversions to or from forest.

111. Following a recommendation from the previous review report, the Russian Federation also provided estimates of net emissions and removals for managed forests that are disaggregated by forest region (annex 3.4 to the NIR). As these estimates fall within the 95 per cent confidence interval of assessments made by using the aggregate nationwide data, the Party concluded that the level of disaggregation during calculations does not significantly affect the overall results.

2. Cropland remaining cropland – CO_2

112. The Russian Federation applies a simple country-specific model to calculate net emissions and removals from cropland remaining cropland, based on official statistics and scientific literature on the annual balance of the inputs and outputs of carbon compounds in soils. Since the previous submission, the ERT noted that the structure of the model has been refined, more up-to-date input data have been used and work has been undertaken to verify the results against independent data. While recognizing that the model has been already published in a Russian peer-reviewed scientific journal, the ERT encourages the Party to publish updated information on the model, including the latest refinement and verification efforts.

113. The Russian Federation uses a tier 1 default EF to estimate emissions from organic soils in cropland remaining cropland. The ERT noted that if a tier 2 EF similar to those used by Parties with similar circumstances (e.g. Finland, Latvia or Sweden) were used, organic soils would become a significant pool within this key category. The ERT encourages the Russian Federation to develop country-specific EFs for organic soils in cropland in its following annual inventory submissions

C. Non-key categories

1. Grassland remaining grassland – CO_2

114. The Russian Federation applies the same conceptual country-specific model used for cropland remaining cropland for grassland remaining grassland, although no refinements in model structure have been made for this category since the previous submission. As the area of land converted to grassland in

the country is likely to be significant, the ERT encourages the Party to provide estimates of net emissions and removals for the land converted to grassland category in its next annual inventory submission, and – to the extent possible – develop model refinements similar to those applied for cropland.

2. Biomass burning – CH_4 and N_2O

115. The amount of burned forest area reported by the Russian Federation, and the corresponding non-CO_2 emissions, seem considerably lower than estimates from several international scientific studies (e.g. Achard et al., 2008)[11]. Fires occurring on unmanaged lands may explain some or all of this difference. The ERT encourages the Russian Federation to collect and provide in the NIR any additional available information that could help in understanding of the reasons for discrepancies with other sources. During the in-country review, the Russian Federation provided the ERT with additional information about post-fire emissions and committed to make efforts to verify reported data in future. The ERT encourages the Russian Federation to do so in its next inventory submissions.

D. Areas for further improvement

1. Identified by the Party

116. The NIR does not explicitly mention areas of further improvements for the LULUCF sector. However, during the in-country review, the Russian Federation informed the ERT that issues to be addressed for future inventories include:

(a) Conversion of existing land-use statistics into IPCC land-use categories;

(b) Enhancement of data collection, for example, for those areas of managed forests for which only old forest inventory data are available and reduction of delays in updating statistical information after disturbances;

(c) Verification of estimates using different models;

(d) Ensuring times-series consistency by securing the continuity between data avaialble from the old state forest fund and the new state forest register .

2. Identified by the expert review team

117. The ERT identified the following areas for improvement:

(a) To provide estimates of land areas for all categories, including for land-use changes, in a complete and consistent way;

(b) To improve the completeness of the inventory by providing estimates of emissions and removals for categories for which methodologies are given in the Revised 1996 IPCC Guidelines and the IPCC good practice guidance for LULUCF, prioritizing provision of estimates of CO_2 emissions from organic soils in the forest land category and from land-use changes;

(c) To strengthen the QA/QC procedures, paying special attention to the application of correct computational steps when a new area of forest enters the statistics;

(d) To provide additional information on verification of the methodologies used, especially for forest fires and any country-specific methods used.

[11] Achard F, Eva HD, Mollicone D and Beuchle R. 2008. **The effect of climate anomalies and human ignition factor on wildfires in Russian boreal forests.** *Phil. Trans. R. Soc. B.* 363 (1501): pp.2331–2339.

VII. Waste

A. Sector overview

118. In 2007, emissions from the waste sector amounted to 63,818.30 Gg CO_2 eq, or 2.9 per cent of total GHG emissions. Since 1990, emissions have increased by 16.3 per cent. The key driver for the rise in emissions is increased solid waste disposal on land (SWDL). Within the sector, 58.9 per cent of the emissions were from SWDL, followed by 41.1 per cent from wastewater handling.

119. Emissions from waste incineration are reported as "IE" because all incineration plants in the country are facilities with energy recovery, and related emissions are included in the energy sector, in line with the IPCC good practice guidance.

1. Completeness

120. The CRF tables include estimates of most gases and categories of emissions from the waste sector, as recommended by the Revised 1996 IPCC Guidelines. Emissions from the waste sector have been reported for all years of the inventory time series, and for all geographical locations. However, the ERT noted that the SWDL category does not include industrial waste. The ERT recommends that the Russian Federation include disposed industrial waste and revise the CH_4 emission estimates accordingly in its next annual inventory submission.

2. Transparency

121. In general, the information provided by the Russian Federation in the NIR is transparent. However, the ERT considers that insufficient data were provided in the NIR on the reasoning for the recalculations and on time-series consistency (see para. 122 below).

3. Recalculations and time-series consistency

122. Recalculations have been performed in accordance with the IPCC good practice guidance. The Russian Federation reported that recalculations have been undertaken for the whole time series from 1990 to 2006 to exclude waste generation in rural areas from the AD used for estimates in the SWDL category, as recommended in the previous review report, and to reflect revised AD and EFs in the wastewater handling category. These resulted in a decrease of 0.29 per cent in the estimate of total GHG emissions in 1990, and a 0.50 per cent decrease in the estimate for 2006. Recalculations carried out for wastewater handling are more significant than those for SWDL (see para. 129 below), and these resulted in a decrease of 0.26 per cent in the estimate of total GHG emissions in 1990 and a 0.36 per cent decrease for 2006. The rationale provided in the NIR for these recalculations is insufficient, and the ERT recommends that the Russian Federation provide a more detailed explanation in the NIR of its next annual inventory submission, as well as relevant explanations in CRF table 8(b).

4. Uncertainties

123. In the NIR, the uncertainty value for the waste sector emissions is reported as ±30.41 per cent. The details of the uncertainty analysis for the waste sector are not provided in the NIR. During the in-country review the Russian Federation presented the ERT with the results of a more disaggregated uncertainty analysis which arrived at a higher uncertainty value for the sector (±36.81 per cent). The ERT recommends that the Russian Federation provide an explanation for how the uncertainties are estimated in the NIR of its next annual inventory submission.

5. Verification and quality assurance/quality control approaches

124. Although some verification has been carried out for the waste sector, the ERT notes that very little information is provided in the NIR on QA/QC procedures applied . The ERT recommends the Russian Federation to report more detailed information in the NIR of its next annual inventory submission on QA/QC activities implemented for the waste sector, in particular for the key categories.

B. Key categories

Solid waste disposal on land – CH_4

125. The IPCC tier 2 first order decay method and IPCC default EFs and parameters were used to estimate CH_4 emissions from SWDL. The AD on disposal of solid waste in landfill were taken from reports of the Academy of Municipal Economy for 1960–1990, and from official Rosstat publications for 1999–2007. The data for 1991–1998 were interpolated, based on a linear function. The ERT recommends that the Russian Federation provide detailed information in the NIR of its next annual inventory submission about the consistency of data from these two sources and about the assumptions used for the method, and demonstrate that the linear function used is the 'best fit' approach.

126. The ERT noted that the SWDL category includes household waste and sludge disposal (an improvement on the previous year submission) but does not take into account industrial waste. This could lead to an underestimation of CH_4 emissions from this category. Sludge generation was estimated based on national data (taking into account wastewater treatment technology). The ERT recommends that the Russian Federation include disposed industrial waste and revise the CH_4 emission estimates accordingly in its next annual inventory submission.

127. The ERT noted that the value of 0.19 for degradable organic carbon (DOC) in municipal solid waste is maintained constant for the entire period from 1990 to 2007 and for the whole country. In most reporting Parties, the waste composition has changed substantially since the beginning of the 1990s. Especially for a country with an economy in transition, as is the case with the Russian Federation, this parameter can be expected to have varied during the 1990–2007 period. In addition, the same CH_4 generation rate (k) is used for the whole country. As the Russian Federation is a country with diverse climatic conditions, the ERT considers that the use of k values taking climatic conditions into account could improve the accuracy of the estimates. The ERT recommends that the Russian Federation revise the DOC value, taking into consideration changes in waste composition over time, in order to improve the accuracy of the estimates across the time series in its next annual inventory submission. It also encourages the Russian Federation to consider taking the climatic conditions, and waste composition as relevant, into account in the k value. This could also improve the accuracy of the estimates.

128. The ERT noted that the AD and CH_4 emissions from unmanaged waste disposal sites are reported as "NO". The explanation given for this in the NIR is that data are available but that emissions are not reported in the CRF tables, because they are estimated to be insignificant in accordance with the rationale for last recalculation (see para. 122 above). The ERT recommends that the Russian Federation provide more justification for not including these emissions in the NIR of its next annual inventory submission.

C. Non-key categories

Wastewater handling – CH_4

129. The ERT noted that CH_4 emissions from wastewater handling have been recalculated in the 2009 submission, in response to recommendations from previous review reports. The recalculation takes into consideration three different systems for domestic wastewater treatment (aerobic wastewater treatment

with anaerobic sludge treatment in methane tanks, aerobic wastewater treatment without methane tanks, and other wastewater treatment), which resulted in a decrease of 26.5 per cent in the estimate of emissions from this category in 2006. Emissions from the first type of treatment were estimated based on the IPCC good practice guidance methodology and country-specific EFs. Emissions from the other two types of treatment were estimated based on the IPCC good practice guidance methodology and the 2006 IPCC Guidelines for default methane conversion factor (MCF) values. The EFs applied are in the range of those reported by other Parties. The Russian Federation did not explain these recalculations in the NIR; however, during the in-country review it provided the ERT with detailed explanations for the recalculations including working tables and files. The ERT recommends that the Russian Federation provide this detailed information in the NIR of its next annual inventory submission.

130. The ERT noted that CH_4 emissions from sludge under the industrial wastewater subcategory were included under wastewater. However, the AD and recovery for sludge (as well as N_2O emissions) were reported as "NE". The ERT noted that the "IE" notation key is more appropriate and recommends that the Russian Federation use this notation key in the CRF tables and include the relevant background information in the NIR of its next annual inventory submission.

D. Areas for further improvement

1. Identified by the Party

131. The Russian Federation has identified some areas for improvement in the waste sector in its NIR, such as the intention to collect AD for industrial waste to complement estimates of emissions under the SWDL category.

132. In the NIR, the Russian Federation also stated its intention to collect data to take into account the variations in the DOC value for the period of reporting, and explore possibilities to improve the CH_4 generation rate k. Furthermore, it plans to explore the possibility of using a country-specific value for protein consumption for the entire time series instead of FAO data.

2. Identified by the expert review team

133. The ERT identified the following areas for improvement:

(a) To increase the transparency of the inventory by including more detailed information on recalculations and methods used (e.g. interpolation) for filling gaps in AD;

(b) To complement the estimates for the SWDL category by including industrial waste in the next annual inventory submission.

VIII. Supplementary information required under Article 7, paragraph 1, of the Kyoto Protocol

A. Information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol

134. During the in-country review, the Russian Federation submitted on a voluntary basis information and estimates for the activities afforestation, reforestation and deforestation under Article 3, paragraph 3, of the Kyoto Protocol and for the elected activity forest management under Article 3, paragraph 4, of the Kyoto Protocol. Under Article 3, paragraph 3, the Russian Federation provided data on carbon stock changes for the year 2006 on lands that have been afforested, reforested or deforested since 1990. The carbon stock changes and CH_4 and N_2O emissions from biomass burning under forest management were also reported for the year 2006 (in the NIR the carbon budget for the time series from 1990 to 2006 was

given). The issues identified in paragraphs 135–140 below are those that could be identified by the ERT in the limited time available for the review due to the late submission.

135. According to the information provided by the Russian Federation, the area of forest land (Convention reporting) differs from the area under forest management (Kyoto Protocol reporting). The latter does not include lands covered with shrubs, because such lands do not conform to the definition of forest. However, the ERT noted that the minimum tree height for forests definition is the same (5 m) for both Convention and Kyoto Protocol reporting, and therefore recommends that the Russian Federation clarify the reasons for excluding shrubs from forest management in its Kyoto Protocol reporting while including them under forest land in the Convention reporting. Furthermore, the ERT identified that burned area and clear-cuts are not included under the forest management area. It recommends that the Russian Federation include under forest management those forest areas that are temporarily unstocked as a result of natural causes or human intervention such as harvesting but are expected to revert to forest.

136. The ERT noted that the definitions of afforestation and reforestation used by the Russian Federation are not consistent with the definitions provided in decision 16/CMP.1. The ERT recommends that the Russian Federation change its national definitions accordingly to avoid any inconsistencies with definitions in decision 16/CMP.1.

137. The Russian Federation did not report with sufficient detail all information required in the annex to decision 15/CMP.1. The most important information that is missing or not transparently reported is the following:

(a) How managed forests under Article 3, paragraph 4, of the Kyoto Protocol are differentiated (area, carbon stocks and corresponding changes) from the rest of the forest in the land statistics;

(b) How activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol (area, carbon stocks and corresponding changes) will be identified at the appropriate spatial assessment level and the areas under activities under Article 3, paragraph 3 will be tracked after a land-use change;

(c) The methodology to develop a land-use change matrix for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol;

(d) Appropriate information on the identified geographical boundaries;

(e) Information that demonstrates that activities under Article 3, paragraph 3, of the Kyoto Protocol began on or after 1 January 1990 and are directly human-induced;

(f) Information on how harvesting or forest disturbance that is followed by the re-establishment of a forest is distinguished from deforestation;

(g) Information on the size and geographical location of forest areas that have lost forest cover but are not yet classified as deforested.

138. Most of the problems with land identification described for forest land for the Convention reporting (see para. 110 above) also apply to activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol. The ERT recommends that the Russian Federation cross-check the consistency of reported data over time for its next annual submission.

139. Non-CO_2 emissions from fires occurring in activities under Article 3, paragraph 3, of the Kyoto Protocol and emissions from organic soils are both reported as "NE". The ERT recommends that the Russian Federation estimate these emissions in its next annual submission.

140. While acknowledging the effort put into this voluntary submission by the Russian Federation, the ERT notes that a significant amount of work still needs to be done for the next annual submission. In order for the Party to fulfil all the reporting requirements under the Kyoto Protocol, in terms of both detailed information at the level of geographical boundaries and accuracy and consistency of reporting, the ERT considers it essential that the inventory compilers have access to forest data at an adequate disaggregation level and that the reasons for any increase or decrease in forest area are clearly understood. For the next submission, the ERT encourages the Russian Federation to provide appropriate and transparent information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, following the annotated outline of the NIR, and the guidance contained therein, which can be found on the UNFCCC website.[12]

B. Information on Kyoto Protocol units

1. Standard electronic format and reports from the national registry

141. The Russian Federation has reported information on its accounting of Kyoto Protocol units in the required SEF tables, as required by decisions 15/CMP.1 and 14/CMP.1. The ERT took note of the findings included in the SIAR on the SEF tables and the SEF tables comparison report.[13] The SIAR was forwarded to the ERT prior to the review, pursuant to decision 16/CP.10.

142. Information on the accounting of Kyoto Protocol units has been prepared and reported in accordance with section I.E of the annex to decision 15/CMP.1, and reported in accordance with decision 14/CMP.1 using the SEF tables. This information is consistent with that contained in the national registry and with the records of the international transaction log (ITL) and the clean development mechanism registry, and meets the requirements set out in paragraph 88 (a) to (j) of the annex to decision 22/CMP.1. The transactions of Kyoto Protocol units initiated by the national registry are in accordance with the requirements of the annex to decision 5/CMP.1 and the annex to decision 13/CMP.1. No discrepancy has been identified by the ITL and no non-replacement has occurred. The national registry has adequate procedures in place to minimize discrepancies.

2. National registry

143. The ERT took note of the SIAR and its finding that the reported information on the national registry is complete and has been submitted in accordance with the annex to decision 15/CMP.1. The ERT further noted from the SIAR that the national registry continues to meet the requirements set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with decisions 16/CP.10 and 12/CMP.1. The national registry also has adequate security, data safeguard and disaster recovery measures in place and its operational performance is adequate.

3. Calculation of commitment period reserve

144. The Russian Federation has reported its commitment period reserve in its 2009 annual submission. The Russian Federation reported its commitment period reserve to be 10,964,090,543 t CO_2 eq, based on the total GHG emissions in its most recently reviewed inventory (2,192,818.109 Gg CO_2 eq). The ERT agrees with this figure.

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[12] <http://unfccc.int/files/national_reports/annex_i_ghg_inventories/reporting_requirements/application/pdf/annotated_nir_outline.pdf>.

[13] The SEF tables comparison report is prepared by the administrator of the international transaction log (ITL) and provides information on the outcome of the comparison of data contained in the Party's SEF tables with corresponding records contained in the ITL.

C. Changes to the national system

145. The Russian Federation reported changes in the institutional arrangements of its national system. First, the responsibilities and tasks of ministries taking part in the national system have been redistributed to reflect a general reorganization of the governmental structure in the Russian Federation. The impacts of these changes on the performance of the national system are small. Second, the single national entity, Roshydromet, has also signed cooperation agreements with large companies such as Gazprom and Rusal to provide data and exchange information to help prepare the inventory. The companies also assist in the QA of the inventory by reviewing the relevant inventory sections annually. The ERT welcomes these agreements and believes they will enhance the use of more accurate data and methods in the relevant parts of the inventory in future submissions.

146. The ERT has identified other improvements in the functions of the national system since the previous review. The QA/QC plan has been fully developed and implemented, and uncertainties have been estimated for all categories for the first time. The ERT concluded that the Party's national system continues to be in accordance with the requirements of national systems outlined in decision 19/CMP.1.

D. Changes to the national registry

147. The Russian Federation has reported no change in its national registry since the previous annual submission. The ERT concluded that the Party's national registry continues to meet the requirements set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with decisions 16/CP.10 and 12/CMP.1.

IX. Conclusions and recommendations

148. The Russian Federation made its annual submission on 15 April 2009, containing the CRF tables and the SEF tables. The NIR was submitted on 14 May 2009. The Russian Federation also submitted on 14 May 2009 on a voluntary basis information required under Article 7, paragraph 1, of the Kyoto Protocol, including: information on accounting of Kyoto Protocol units, information on changes in the national system and in the national registry. The Party indicated that the 2009 annual submission is a voluntary submission under the Kyoto Protocol. A voluntary submission of CRF tables on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, was made on 8 September 2009 during the in-country visit. In addition, the Russian Federation submitted a revised chapter 7 of the NIR (on LULUCF) and information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol on 10 September 2009. This is in line with decision 15/CMP.1. The Russian Federation officially submitted revised CRF tables in order to include revised estimates for the LULUCF sector on 11 September 2009.

149. The ERT concludes that the inventory submission of the Russian Federation has been generally prepared and reported in accordance with the UNFCCC reporting guidelines. The Russian Federation has submitted a complete set of CRF tables for the years 1990–2007 and an NIR; these are complete in terms of geographical coverage, years, gases and sectors, as well as generally complete in terms of categories. Some of the categories, particularly in the LULUCF sector and those including actual emissions of fluorinated gases in the industrial processes sector, were reported as "NE".

150. The submission on a voluntary basis of information required under Article 7, paragraph 1, of the Kyoto Protocol has been prepared and reported in accordance with decision 15/CMP.1. The Russian Federation did not report on a voluntary basis information on adverse impact in accordance with Article 3, paragraph 14, of the Kyoto Protocol.

151. The Russian Federation has reported information on its accounting of Kyoto Protocol units in accordance with section I.E of the annex to decision 15/CMP.1, and used the required reporting format tables as required by decision 14/CMP.1.

152. The GHG inventory of the Russian Federation is generally in line with the UNFCCC reporting guidelines, the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF. The ERT noted that use of more detailed country-specific AD, and corresponding EFs and other parameters, could improve the accuracy of the estimates for some categories, especially categories for which technology, management and/or climatic conditions are factors that influence the emissions significantly.

153. Information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol was submitted during the in-country review. This reporting is not fully in accordance with section I.D of the annex to decision 15/CMP.1. The ERT notes that additional effort is needed, especially in identifying and reporting land area and in enhancing the accuracy and consistency of the reporting in general. The ERT has made several recommendations to this end in paragraphs 135–140 above.

154. The Russian Federation has reported some changes in the institutional arrangements of the national system. The ERT concluded that these changes, as well as those identified by the ERT in the functionality of the system, have had a positive effect on and improved the inventory. The national system continues to perform its required functions as set out in the annex to decision 19/CMP.1.

155. The national registry continues to meet the requirements set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant CMP decisions.

156. In the course of the review, the ERT formulated a number of recommendations relating to the completeness and transparency of the information presented in the annual submission, QA/QC and verification procedures, as well as methodological issues. The key recommendations are that the Russian Federation:

(a) Complete the inventory by providing estimates for all missing categories for which methodologies are provided in the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF, in particular:

(i) Actual HFC emissions from industrial refrigeration under the refrigeration and air conditioning equipment subcategory, and from foam blowing and solvents;

(ii) Actual HFC, PFC and SF_6 emissions from semiconductor manufacture;

(iii) Net carbon stock changes in organic soils of forest land, as these may be significant;

(iv) CH_4 and N_2O emissions from forest fires under activities under Article 3, paragraph 3 of the Kyoto Protocol;

(b) Increase the transparency of the inventory information by providing in the NIR:

(i) More details on country-specific methods and related QA/QC and verification activities;

(ii) The QA/QC plan and information on the results of its implementation;

(iii) Sections on time-series consistency in the sector chapters;

(iv) Detailed descriptions of the uncertainty analysis;

(c) Increase the accuracy of the estimates by using more disaggregated AD and EFs and other parameters (e.g. by climatic region) and capture the impact of changes in technology and practices on the emissions;

(d) Continue and increase its collaboration with national and international experts from universities, research organizations and industry (in particular with the oil and gas industry, as well as the cement industry) to enhance the flow of data and information needed in the inventory preparation, as well as to validate and verify results of the inventory calculations, especially for key categories and when country-specific methodologies are used.

X. Questions of implementation

157. No questions of implementation were identified by the ERT during the review.

Annex I

Documents and information used during the review

A. Reference documents

Intergovernmental Panel on Climate Change. *2006 IPCC Guidelines for National Greenhouse Gas Inventories*. Available at <http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html>.

Intergovernmental Panel on Climate Change. *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*. Available at <http://www.ipcc-nggip.iges.or.jp/public/gl/invs1.htm>.

Intergovernmental Panel on Climate Change. *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*. Available at <http://www.ipcc-nggip.iges.or.jp/public/gp/english/>.

Intergovernmental Panel on Climate Change. *Good Practice Guidance for Land Use, Land-Use Change and Forestry*. Available at <http://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf.htm>.

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"Guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol". Decision 15/CMP.1. Available at <http://unfccc.int/resource/docs/2005/cmp1/eng/08a02.pdf#page=54>.

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Synthesis and assessment report on the greenhouse gas inventories submitted in 2009. Available at <http://unfccc.int/resource/webdocs/sai/2009.pdf>.

FCCC/ARR/2008/RUS. Report of the individual review of the greenhouse gas inventories of the Russian Federation submitted in 2007 and 2008. Available at <http://unfccc.int/resource/docs/2009/arr/rus.pdf>.

UNFCCC. Standard independent assessment report, Parts I and II. Unpublished document.

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) and Ms. Elena Vikulova (Russian Federal Service for Hydrometeorology and Environmental Monitoring), including additional material on the methodology and assumptions used. The following documents were also provided by the Russian Federation:

General:

Russian Federal Service for State Statistics (Rosstat). 2009. *Main Indicators of Environmental Protection – Statistical Bulletin* (in Russian). Moscow: Rosstat.
Russian Federal Service for State Statistics (Rosstat). 2008. *Russian Statistical Yearbook. Official Edition 2008 - Statistical Collection* (in Russian). Moscow: Rosstat.

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Demakov Yu.P., Kalinin K.K. Lesovodstvo. Vedenie hozyaistva v lesah, povrejdennyh pojarami. Uchebnoe posobie. Ischshkar-Ola: MarGU, 2003. 136 s. (in Russian)
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Annex II

Acronyms and abbreviations

AD	activity data
AWMS	animal waste management systems
CH_4	methane
CKD	cement kiln dust
CMP	Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
CRF	common reporting format
DOC	degradable organic carbon
EF	emission factor
ERT	expert review team
FAO	Food and Agriculture Organization of the United Nations
GHG	greenhouse gas; unless indicated otherwise, GHG emissions are the sum of CO_2, CH_4, N_2O, HFCs, PFCs and SF_6 without GHG emissions and removals from LULUCF
HFCs	hydrofluorocarbons
IE	included elsewhere
IEA	International Energy Agency
IPCC	Intergovernmental Panel on Climate Change
ITL	international transaction log
LULUCF	land use, land-use change and forestry
Mg	megagram (1 Mg = 1 tonne)
NA	not applicable
NE	not estimated
NMVOC	non-methane volatile organic compound
NO	not occuring
N_2O	nitrous oxide
NIR	national inventory report
PFCs	perfluorocarbons
QA/QC	quality assurance/quality control
SEF	standard electronic format
SF_6	sulphur hexafluoride
SIAR	standard independent assessment report
SWDL	solid waste disposal on land
TJ	terajoule (1 TJ = 10^{12} joule
UNFCCC	United Nations Framework Convention on Climate Change

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