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Report of the individual review of the annual submission of Romania submitted in 2013*

* In the symbol for this document, 2013 refers to the year in which the inventory was submitted, and not to the year of publication.

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I. Introduction and summary

1. This report covers the review of the 2013 annual submission of Romania, coordinated by the UNFCCC secretariat, in accordance with decision 22/CMP.1. The review took place from 2 to 7 September 2013 in Bonn, Germany, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalist – Mr. Riccardo de Lauretis (Italy); energy – Mr. Daniel Tutu Benefoh (Ghana), Ms. Renee Kidson (Australia), Mr. Ricardo Fernandez (European Union (EU)) and Mr. Sangay Dorji (Bhutan); industrial processes and solvent and other product use – Mr. Stanford Mwakasonda (United Republic of Tanzania) and Ms. Valentina Idrissova (Kazakhstan); agriculture – Mr. Jean Stephan (Lebanon) and Mr. Kohei Sakai (Japan); land use, land-use change and forestry (LULUCF) – Mr. Eiichiro Nakama (Japan), Ms. Marina Vitullo (Italy) and Mr. Richard Volz (Switzerland); and waste – Ms. Estela Santalla (Argentina) and Mr. Kai Skoglund (Finland). Mr. de Lauretis and Mr. Tutu Benefoh were the lead reviewers. The review was coordinated by Mr. Vitor Góis Ferreira (UNFCCC secretariat).

2. In accordance with the “Guidelines for review under Article 8 of the Kyoto Protocol” (decision 22/CMP.1) (hereinafter referred to as the Article 8 review guidelines), a draft version of this report was communicated to the Government of Romania, which provided comments that were considered and incorporated, as appropriate, into this final version of the report. All encouragements and recommendations in this report are for the next annual submission, unless otherwise specified.

3. In 2011, the main greenhouse gas (GHG) in Romania was carbon dioxide (CO₂), accounting for 71.3 per cent of total GHG emissions¹ expressed in CO₂ equivalent (CO₂ eq), followed by methane (CH₄) (18.0 per cent) and nitrous oxide (N₂O) (10.3 per cent). Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF₆) collectively accounted for 0.4 per cent of the overall GHG emissions in the country. The energy sector accounted for 70.0 per cent of total GHG emissions, followed by the agriculture sector (15.4 per cent), the industrial processes sector (10.2 per cent), the waste sector (4.4 per cent) and the solvent and other product use sector (0.1 per cent). Total GHG emissions amounted to 123,359.15 Gg CO₂ eq and decreased by 54.9 per cent between the base year² and 2011. The expert review team (ERT) concludes that the description in the national inventory report (NIR) of the trends for the different gases and sectors is reasonable.

4. Tables 1 and 2 show GHG emissions from sources included in Annex A to the Kyoto Protocol (hereinafter referred to as Annex A sources), emissions and removals from the LULUCF sector under the Convention and emissions and removals from activities under Article 3, paragraph 3, and, if any, elected activities under Article 3, paragraph 4, of the Kyoto Protocol (KP-LULUCF), by gas and by sector and activity, respectively. In table 1, CO₂, CH₄ and N₂O emissions included in the rows under Annex A sources do not include emissions and removals from the LULUCF sector.

5. Additional background data on recalculations by Romania in the 2013 annual submission, as well as information to be included in the compilation and accounting database, can be found in annex I to this report.

¹ In this report, the term “total GHG emissions” refers to the aggregated national GHG emissions expressed in terms of CO₂ eq excluding LULUCF, unless otherwise specified.

² “Base year” refers to the base year under the Kyoto Protocol, which is 1989 for all gases. The base year emissions include emissions from sources included in Annex A to the Kyoto Protocol only.

Table 1
Greenhouse gas emissions from Annex A sources and emissions/removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, by gas, base year^a to 2011

	Greenhouse gas	Gg CO ₂ eq								Change (%)	
		Base year [†]	1990	1995	2000	2008	2009	2010	2011	Base year–2011	
Annex A sources	CO ₂	195 541.82	175 642.08	124 023.08	92 422.16	100 093.99	83 372.26	80 939.05	87 962.88	-55.0	
	CH ₄	46 540.15	42 806.27	30 568.21	26 397.54	25 088.20	24 057.26	22 584.36	22 258.13	-52.2	
	N ₂ O	27 893.98	23 923.07	16 395.94	13 282.36	14 373.27	12 163.21	12 408.07	12 679.45	-54.5	
	HFCs	NA, NE, NO	NA, NE, NO	95.04	163.43	890.27	703.10	695.05	440.55	NA	
	PFCs	3 349.56	2 115.83	1 773.69	1 292.37	15.34	7.00	7.93	10.92	-99.7	
	SF ₆	NA, NE, NO	NA, NE, NO	0.06	0.004	16.33	7.38	5.09	7.21	NA	
KP-LULUCF	Article 3.3 ^b	CO ₂				1 756.14	125.52	102.25	105.91		
		CH ₄				NO	NO	NO	NO		
		N ₂ O				IE, NO	IE, NO	IE, NO	IE, NO		
	Article 3.4 ^c	CO ₂	-1 274.97				-22 502.32	-22 993.44	-22 568.05	-20 851.41	NA
		CH ₄	NO				0.02	0.02	0.005	0.07	NA
		N ₂ O	NO				0.002	0.002	0.0005	0.007	NA

Abbreviations: Annex A sources = sources included in Annex A to the Kyoto Protocol, IE = included elsewhere, KP-LULUCF = land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, NA = not applicable, NE = not estimated, NO = not occurring.

^a “Base year” for Annex A sources refers to the base year under the Kyoto Protocol, which is 1989 for all gases. The “base year” for cropland management, grazing land management and revegetation under Article 3, paragraph 4, of the Kyoto Protocol is 1989. For activities under Article 3, paragraph 3, of the Kyoto Protocol and forest management under Article 3, paragraph 4, only the inventory years of the commitment period must be reported.

^b Activities under Article 3, paragraph 3, of the Kyoto Protocol, namely afforestation and reforestation, and deforestation.

^c Elected activities under Article 3, paragraph 4, of the Kyoto Protocol, including forest management, cropland management, grazing land management and revegetation.

Table 2

Greenhouse gas emissions by sector and activity, base year^a to 2011

		Gg CO ₂ eq								Change (%)
Sector		Base year ^a	1990	1995	2000	2008	2009	2010	2011	Base year–2011
Annex A	Energy	191 809.14	177 768.20	122 320.62	92 894.36	95 965.23	82 877.82	79 624.01	86 320.46	–55.0
	Industrial processes	35 466.12	24 890.14	21 405.55	16 826.43	17 945.58	11 253.06	12 414.25	12 605.14	–64.5
	Solvent and other product use	645.80	540.50	229.40	224.30	135.14	122.33	124.74	125.61	–80.5
	Agriculture	40 734.14	36 708.34	24 135.56	18 455.10	20 753.53	20 353.84	18 760.94	18 941.46	–53.5
	Waste	4 670.31	4 580.08	4 764.89	5 157.70	5 677.92	5 703.17	5 715.62	5 366.48	14.9
	LULUCF	NA	–27 355.39	–27 192.55	–29 219.59	–24 312.00	–28 254.61	–25 830.81	–25 304.94	NA
Total (with LULUCF)		NA	217 131.87	145 663.46	104 338.29	116 165.41	92 055.61	90 808.74	98 054.21	NA
Total (without LULUCF)		273 325.51	244 487.26	172 856.02	133 557.88	140 477.41	120 310.22	116 639.55	123 359.15	–54.9
Other ^b		NA	NA	NA	NA	NA	NA	NA	NA	NA
KP-LULUCF	Article 3.3 ^c	Afforestation and reforestation				–333.56	–354.23	–373.92	–392.21	
		Deforestation				2 089.70	479.76	476.17	498.12	
		Total (3.3)				1 756.14	125.52	102.25	105.91	
	Article 3.4 ^d	Forest management				–22 263.35	–22 739.84	–22 299.76	–20 564.39	
		Cropland management	NA			NA	NA	NA	NA	NA
		Grazing land management	NA			NA	NA	NA	NA	NA
		Revegetation	–1 274.97			–238.94	–253.57	–268.28	–286.95	–77.5
Total (3.4)	–1 274.97			–22 502.29	–22 993.41	–22 568.05	–20 851.34	NA		

Abbreviations: KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, NA = not applicable.

^a “Base year” for sources included in Annex A to the Kyoto Protocol refers to the base year under the Kyoto Protocol, which is 1989 for all gases. The “base year” for cropland management, grazing land management and revegetation under Article 3, paragraph 4, of the Kyoto Protocol is 1989. For activities under Article 3, paragraph 3, of the Kyoto Protocol and forest management under Article 3, paragraph 4, only the inventory years of the commitment period must be reported.

^b Emissions/removals reported in the sector other (sector 7) are not included in Annex A to the Kyoto Protocol and are therefore not included in national totals.

^c Activities under Article 3, paragraph 3, of the Kyoto Protocol, namely afforestation and reforestation, and deforestation.

^d Elected activities under Article 3, paragraph 4, of the Kyoto Protocol, including forest management, cropland management, grazing land management and revegetation.

II. Technical assessment of the annual submission

A. Overview

1. Annual submission and other sources of information

6. The 2013 annual inventory submission was submitted on 12 April 2013 and resubmitted on 14 May 2013; it contains a complete set of common reporting format (CRF) tables for the period 1989–2011 and an NIR. Romania also submitted the information required under Article 7, paragraph 1, of the Kyoto Protocol, including information on: activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, accounting of Kyoto Protocol units, changes in the national system and in the national registry, and the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol. The standard electronic format (SEF) tables were submitted on 12 April 2013 and resubmitted on 14 May 2013. The annual submission was submitted in accordance with decision 15/CMP.1.

7. Romania officially submitted revised emission estimates on 20 September 2013 and 17 October 2013 in response to the list of potential problems and further questions raised by the ERT (see para. 46 below). The values used in this report are those submitted by Romania on 17 October 2013.

8. The full list of materials used during the review is provided in annex II to this report.

2. Overall assessment of the inventory

9. Table 3 contains the ERT’s overall assessment of the annual submission of Romania. For recommendations for improvements related to cross-cutting issues for specific categories, please see the paragraphs cross-referenced in the table.

Table 3

The expert review team’s overall assessment of the annual submission

<i>General findings and recommendations</i>		
The expert review team’s (ERT’s) findings on completeness of the 2013 annual submission		
Annex A sources ^a	Complete	Mandatory: none
		Non-mandatory: “NE” is reported for: CO ₂ , CH ₄ and N ₂ O emissions from multilateral operations; CO ₂ fugitive emissions from natural gas (other leakage at industrial plants and power stations and in residential and commercial sectors); CO ₂ emissions from asphalt roofing and road paving with asphalt; CH ₄ and N ₂ O emissions from glass production; CH ₄ and N ₂ O emissions from ammonia production; GHG emissions from other non-specified (chemical industry) and sulphuric acid production; CH ₄ emissions from iron and steel production, ferroalloys production and

General findings and recommendations

		<p>aluminium production; CO₂ emissions from food and drink; N₂O emissions from the solvent and other product use sector (see para. 42 below); CH₄ emissions from agricultural soils; N₂O emissions from industrial wastewater; CH₄ and N₂O emissions from waste incineration (biogenic, clinical waste and hazardous waste)</p> <p>The ERT encourages Romania to estimate these emissions</p>
Land use, land-use change ^a and forestry	Not complete	<p>Mandatory: the inventory is not complete for CSCs in dead organic matter, mineral soil pools (see para. 61 below) and organic soils (see para. 62 below) in forest land remaining forest land. In addition, “NE” is reported for CSCs in dead organic matter from forest land remaining forest land (subcategory forest vegetation outside of the National Forest Fund (VFAFF)) (see para. 61 below)</p> <p>Non-mandatory: CO₂ emissions from cropland remaining cropland (see para. 64 below) and grassland remaining grassland (see para. 65 below)</p>
KP-LULUCF	Not complete	<p>Romania did not report estimates of CSCs for the dead wood pool for afforestation/reforestation, and for litter, dead wood and soil pools for forest management, and did not provide transparent and verifiable information that these pools are not net sources (see paras. 81 and 85 below). In addition, CO₂, CH₄ and N₂O emissions from biomass burning in areas subject to afforestation and reforestation activities have not been estimated (see para. 83 below) as well as CSCs in organic soils and N₂O emissions from drainage of soils (see paras. 86 and 87 below) under forest management</p>
The ERT’s findings on recalculations and time-series consistency in the 2013 annual submission	Generally consistent	<p>Potential time-series inconsistencies have been identified, especially in the energy and waste sectors (see paras. 36, 63, 73 and 79 below)</p>
The ERT’s findings on verification and quality assurance/quality control procedures in the 2013 annual submission	Sufficient	<p>Some inconsistencies between the CRF tables and the NIR have been found in different sectors and incorrect EFs were reported in the CRF tables for some years, leading to overestimation of emissions (see paras. 25, 29, 30, 37, 39, 49 and 82 below)</p>
The ERT’s findings on the transparency of the 2013 annual	Generally transparent	<p>The ERT considers that the transparency of the NIR could be improved, for example by</p>

submission	reorganizing and giving prominence to the most relevant information and by documenting detailed information on the AD and parameters used in annexes to the NIR (see paras. 20, 24, 27, 28, 34, 35, 37, 43, 51, 54, 55, 58, 63, 68, 72, 74, 76, 79, 81, 82, 84, 85 and 89 below)
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Abbreviations: AD = activity data, Annex A sources = sources included in Annex A to the Kyoto Protocol, CRF = common reporting format, CSCs = carbon stock changes, EF = emission factor, GHG = greenhouse gas, IPCC = Intergovernmental Panel on Climate Change, KP-LULUCF = land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, NE = not estimated, NIR = national inventory report, QA/QC = quality assurance/quality control.

^a The assessment of completeness by the ERT considers only the completeness of reporting of mandatory categories (i.e. categories for which methods and default emission factors are provided in the IPCC Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories, the IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories, or the IPCC Good Practice Guidance for Land Use, Land-Use Change and Forestry).

3. Description of the institutional arrangements for inventory preparation, including the legal and procedural arrangements for inventory planning, preparation and management

Inventory planning

10. The NIR described the national system for the preparation of the inventory. On 1 April 2013 the Ministry of Environment and Climate Change (MECC) became the single national entity with the overall responsibility for the national inventory, which was previously managed by the National Environmental Protection Agency (NEPA). On the basis of Governmental Decree no. 48/2013, all NEPA climate change related structure, personnel, attributions and responsibilities were assumed by MECC. Other agencies are also involved in the preparation of the inventory, primarily through the collection and provision of basic data (e.g. statistics on the national energy balance, transport, agriculture and waste activities). These include the National Institute of Statistics (NIS), which compiles the national statistical yearbook and the national energy balance, regional environmental protection agencies, the Ministry of Economy, the Romanian Civil Aviation Authority, relevant industrial operators, the Ministry of Agriculture, Forest and Rural Development and the National Administration Romanian Waters.

11. The inventory for the LULUCF sector and the estimates for the KP-LULUCF activities are prepared by the Forest Research and Management Institute (ICAS) in accordance with a specific contract with Ministry of Environment and Forest that has been extended to the year 2014. The responsibilities of ICAS comprise the preparation of the emission/removal estimates, the compilation of the CRF tables and the NIR, and the implementation of all relevant quality control (QC) activities.

Inventory preparation

12. Table 4 contains the ERT's assessment of Romania's inventory preparation process.

Table 4

Assessment of inventory preparation by Romania

General findings and recommendations

Was the key category analysis performed in accordance with the Intergovernmental Panel on Climate Change (IPCC) <i>Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories</i> (hereinafter referred to as the IPCC good practice guidance) and the IPCC <i>Good Practice Guidance for Land Use, Land-Use Change and Forestry</i> (hereinafter referred to as the IPCC good practice guidance for LULUCF)?	Yes	
Approach followed?	Tier 1 and tier 2	
Were additional key categories identified using a qualitative approach?	No	
Has the Party identified key categories for activities under Article 3, paragraphs 3 and 4, of 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?	Yes	
Does the Party use the key category analysis to prioritize inventory improvements?	Yes	
Are there any changes to the key category analysis in the latest submission?	Yes	Two additional categories were identified as key in the 2013 submission: CO ₂ from navigation and CO ₂ from railways
<i>Assessment of uncertainty analysis</i>		
Approach followed?	Tier 1 and tier 2	Total uncertainty values from tier 2 are not reported in the NIR; only the uncertainty values for individual categories are available
Was the uncertainty analysis carried out in accordance with the IPCC good practice guidance and the IPCC good practice guidance for LULUCF?	Yes	
Quantitative uncertainty (including LULUCF)	Level = 30.3% Trend = 13.0%	Tier 1 in 2011
Quantitative uncertainty (excluding LULUCF)	Level = 19.3% Trend = 2.4%	Tier 1 in 2011

Abbreviations: LULUCF = land use, land-use change and forestry, NIR = national inventory report.

Inventory management

13. Romania has a centralized archiving system, which includes the archiving of disaggregated emission factors (EFs) and activity data (AD), and documentation on how these factors and data have been generated and aggregated for the preparation of the inventory. The archived information also includes internal documentation on quality assurance/quality control (QA/QC) procedures, external and internal reviews, and documentation on key categories and key category identification and planned inventory improvements. All documents are archived electronically wherever possible; documents not available in electronic format are archived in paper format. Electronic data are backed up daily on the MECC server during the time of the preparation of the annual submission and weekly at other times. The archiving system is located at the MECC headquarters in Bucharest. During the review, the ERT was provided with the requested additional archived information.

4. Follow-up to previous reviews

14. In the follow-up to the previous review process, Romania has implemented a significant number of recommendations. The improvements have strengthened the general and specific functions of the national system, as well as the overall accuracy of the national inventory. Specifically, the main progress achieved by Romania, compared with the previous annual submission, includes: improvements in the transparency of the reporting of methodologies in the NIR and in the documentation of recalculations; improvements in the QA/QC, resulting in the reduction of inconsistencies, especially in the LULUCF sector (see para. 57 below); and the improvements made to some of the methodologies to estimate emissions, in particular in the energy, industrial processes and waste sectors (see paras. 32, 36, 45 and 74 below).

15. The ERT observed that the recommendations made in the previous review report have generally been implemented, despite the 2012 annual review report being published on 12 April 2014, three days before the due date for the 2013 annual submission. The ERT also notes that Romania has provided focused and transparent explanations on all issues raised during the review week. The ERT commends Romania for its efforts.

16. However, other recommendations made in previous review reports have not yet been fully implemented by Romania, in particular: the collection of plant-specific emissions data from the nitric acid production plants and the collection of background data and parameters to estimate emissions from consumption of halocarbons and SF₆ in the industrial processes sector (see paras. 44 and 47 below); improvement of the accuracy of estimates of forest land remaining forest land (see para. 60 below); the inclusion of estimates for CH₄ from solid waste disposal on land (see para. 72 below); and the inclusion of estimates for the dead wood pool for afforestation/reforestation and the litter, dead wood and mineral and organic soil pools for forest management. The ERT commends the Party for its efforts to address recommendations in previous review reports and encourages it to develop and implement improvement plans and to continue to report on the progress made in subsequent annual submissions.

5. Areas for further improvement identified by the expert review team

17. During the review, the ERT identified a number of areas for improvement, including some related to specific categories. These are listed in the relevant chapters of this report and in table 8.

B. Energy

1. Sector overview

18. The energy sector is the main sector in the GHG inventory of Romania. In 2011, emissions from the energy sector amounted to 86,320.46 CO₂ eq, or 70.0 per cent of total GHG emissions. Since 1989, emissions have decreased by 55.0 per cent. The key driver for the fall in emissions was the process of transition to a market economy and the restructuring of the heavy industry, as some energy-intensive industries reduced their activities or closed during the 1990s. Within the sector, 42.4 per cent of the emissions were from energy industries, followed by 18.3 per cent from manufacturing industries and construction, 16.9 per cent from transport and 11.8 per cent from other sectors. Fugitive emissions from oil and natural gas accounted for 8.9 per cent and fugitive emissions from solid fuels accounted for 1.0 per cent. The remaining 0.7 per cent were from other (fuel combustion), including military fuel use.

19. Romania has reported substantial recalculations of emissions from fuel combustion for 2008, 2009 and 2010. The recalculations resulted in reductions of 12,866.89 Gg CO₂, or 6.3 per cent, in 1989 and 6,417.01 Gg CO₂ eq, or 7.5 per cent, 2010. The main recalculations affected in particular CO₂ emissions from manufacturing industries and construction, followed by CO₂ and N₂O emissions from the transport sector and CO₂ emissions from energy industries. Chapter 10 of the NIR explains in great detail where these recalculations have taken place at the source category level, but only in qualitative terms. In response to questions raised by the ERT during the review, Romania provided transparent and detailed explanations for these recalculations. The single most important reason for the recalculations was the subtraction of non-energy use from several fuels, in line with recommendations made in the previous review report. The ERT commends Romania for the improvements made, which have increased the comparability with other Parties included in Annex I to the Convention (Annex I Parties).

20. The ERT identified other instances where the transparency of the information reported could be improved, noting that more information does not necessarily mean more transparency. For example, the ERT considers that anything that is available in the CRF tables should not be replicated in the NIR. Therefore, the ERT strongly recommends that Romania reduce the amount of redundant information in the NIR (e.g. Intergovernmental Panel on Climate Change (IPCC) definitions or copies of CRF tables) and explain more clearly the methods, EFs and AD used in its GHG inventory in those aspects that are country-specific or diverge from methods in the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines) and the *IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance).

21. The ERT noted that Romania updated its uncertainty analysis for the energy sector to take into account the uncertainty of the national statistics used to derive the AD, as recommended in the previous review report. The uncertainty values used by the Party have been selected based on the statistical difference in the energy balances for the last year and the base year, which equal 3.0 per cent and 6.0 per cent, respectively. The ERT commends Romania for the improvements made and encourages the Party to continue to investigate the possibility of applying the statistical differences by broad group of fuel from the energy balance in order to select more representative uncertainty values.

22. Romania used data from the EU Emissions Trading System (EU ETS) to determine country-specific EFs for a number of fuels for the categories energy industries and manufacturing industries and construction. However, the category-specific QA/QC procedures performed on the data are not adequately described in the NIR. Therefore, the

ERT recommends that the Party improve the description in the NIR of the category-specific QA/QC activities performed on its AD, with the objective of better understanding the connections between the EU ETS data, the energy balances and the data reported in the CRF tables.

23. During the review, the ERT found that the GHG inventory compiler had access to plant-specific EU ETS AD. However, this is not the case for the energy balance compiler for reasons of confidentiality. The ERT also noted that the GHG inventory compilers do not have access to the background data used in the national energy balance also due to confidentiality. The ERT considers that the quality of the inventory would be strengthened if the energy balance compilers had access to all plant-specific AD from the EU ETS and the GHG inventory compilers had access to the background energy data from the energy balance. This could improve the consistency between the EU ETS, the energy balance and the CRF tables. The ERT recommends that Romania endeavour to facilitate effective access to, and the sharing of, all relevant data underpinning the GHG inventory between all relevant actors involved in AD collection, while respecting the confidentiality of the data.

24. The ERT notes that Romania uses EFs from the *2006 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the 2006 IPCC Guidelines) for a number of categories, including fugitive emissions from oil and natural gas and non-CO₂ emissions from civil and international aviation. Methodological descriptions provided in the NIR were not sufficiently transparent. In response to questions raised by the ERT during the review, the Party provided additional information, including clearer justification for using the EFs from the 2006 IPCC Guidelines which are directly related to Romania's national circumstances. The ERT found that the use of the above-mentioned EFs has improved the accuracy and completeness of the Party's inventory and that their use is in line with the IPCC good practice guidance and 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". However, the ERT strongly recommends that the Party justify in a transparent manner in the NIR the use of the 2006 IPCC Guidelines on a case-by-case basis for appropriate categories and explain how this applies to its own national circumstances.

25. The ERT noted instances where the QA/QC of the data reported in the CRF tables could be improved. Some of these errors are identified below for individual categories (see paras. 29, 30, 33, 37 and 39 below). Nevertheless, the ERT did not find errors that would lead to the underestimation of GHG emissions in 2011, but rather the opposite. There were some minor transcription errors in the reference approach and feedstocks tables, and others regarding the EFs reported for some categories (particularly in fugitive emissions and marine bunkers). The ERT recommends that the Party strengthen its QA/QC procedures for the data reported.

2. Reference and sectoral approaches

26. Table 5 provides a review of the information reported under the reference approach and the sectoral approach, as well as comparisons with other sources of international data. Issues identified in table 5 are more fully elaborated in paragraphs 27–33 below.

Table 5
Review of reference and sectoral approaches

		<i>Paragraph cross-references</i>
Difference between the reference approach and the sectoral approach	Energy consumption: -0.79% CO ₂ emissions: +3.32%	
Are differences between the reference approach and the sectoral approach adequately explained in the NIR and the CRF tables?	Yes	27
Are differences with international statistics adequately explained?	Yes	28, 31, 33
Is reporting of bunker fuels in accordance with the UNFCCC reporting guidelines?	Yes	29, 30, 31
Is reporting of feedstocks and non-energy use of fuels in accordance with the UNFCCC reporting guidelines?	Yes	32, 33

Abbreviations: CRF = common reporting format, NIR = national inventory report, UNFCCC reporting guidelines = “Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories”.

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

27. There are some differences between the reference approach and the sectoral approach at the individual fuel level. In 2011, the consumption of liquid fuels excluding non-energy use was 6.2 per cent lower in the reference approach than in the sectoral approach. For solid fuels, this difference was 1.3 per cent. For gaseous fuels, the consumption was 3.9 per cent higher in the reference approach than in the sectoral approach. Some of these differences are explained either in the NIR or in the additional explanations provided by the Party during the review week in response to questions raised by the ERT. For example, for coke oven coke, energy use is reported in the energy balance while non-energy use is considered in the inventory. The ERT believes that other discrepancies could be due to the use of different calorific values or AD. However, in order to increase the transparency of reporting, the ERT encourages the Party to include a summary of the main reasons for the differences that are above 2.0 per cent of the AD for each group of fuel reported in CRF table 1.A(c).

28. The comparison for 2011 of the energy data reported to Eurostat and data reported by Romania in its GHG inventory showed some significant differences in absolute terms for the apparent consumption of crude oil in 2011 (15,929 TJ higher in the Eurostat data). There were smaller differences for refinery feedstocks (3,032 TJ) and coke oven gas (1,943 TJ), where consumption published by Eurostat was higher. In response to questions raised by the ERT during the review, the Party explained these differences, which were due to the different calorific values used. The ERT encourages Romania to include a table showing the comparison between the calorific values used in the reference approach and those published by Eurostat for individual fuels.

International bunker fuels

29. The ERT noted that the consumption of jet kerosene for aviation bunkers as reported in CRF table 1.C (5,358.75 TJ) did not match the relevant consumption in CRF table 1.A(b) of the reference approach (e.g. 3,910.44 TJ, for the year 2011). The ERT also noted that the consumption of jet kerosene used in civil aviation corresponded to the AD for aviation bunkers reported in the reference approach (CRF table 1.A(b)). During the review, the Party confirmed to the ERT that there was an error in the AD for jet kerosene in the reference approach. The Party also confirmed that the reported AD for civil aviation and aviation bunkers of the sectoral approach (CRF tables 1.A(a) and 1.C) are correct. The ERT recommends that the Party improve the QA/QC procedures applied to the final values reported in the CRF tables to ensure that these values are consistent across different CRF tables.

30. Romania reported emissions of CH₄ and N₂O from marine bunkers which were unusually high in comparison with CO₂ emissions, in particular considering that Romania reported using default IPCC EFs to estimate these emissions. For example, for 2011, Romania reported 27.71 Gg CO₂, 1.91 Gg CH₄ (or 40.10 Gg CO₂ eq) and 0.23 Gg N₂O (or 71.04 Gg CO₂ eq) in CRF table 1. The relevant default IPCC EFs are 5 kg/TJ for CH₄ and 0.6 kg/TJ for N₂O (table I-47 in the Revised 1996 IPCC Guidelines). The Party applied these EFs directly in the relevant CRF tables. However, the EFs in the CRF tables are reported in tonnes per terajoule as opposed to kg per terajoule. As a result, the CH₄ and N₂O emissions reported by the Party are 1000 times higher than they should be. During the review, Romania confirmed that there was a transcription error. The ERT recommends that the Party correct these estimates of CH₄ and N₂O emissions, and improve its QA/QC procedures, particularly when using units different from those expected in the CRF tables.

31. The consumption of fuel in marine and aviation bunkers as well as the fuel consumption in navigation and civil aviation were consistent with the energy statistics reported internationally. For aviation, however, the ERT recommends that the Party make use of additional sources of information, such as Eurocontrol,³ as a supplementary QA activity regarding the fuel allocation for domestic and international uses based on higher-tier methods.

Feedstocks and non-energy use of fuels

32. One of the most noteworthy improvements in Romania's 2013 submission was the implementation of a recommendation made in previous review reports regarding the subtraction of non-energy use of fuels and feedstocks in the energy sector. This led to very substantial recalculations in the energy sector. During the review, the Party provided transparent documentation of the recalculations in the energy sector which are due to the subtraction of non-energy use of fuels. The reporting of non-energy use of fuels in CRF table 1.A(d) is transparent and the consistency with tables 1.A(b) and 1.A(c) is exemplary. The ERT commends Romania for this improvement, which has increased the accuracy, comparability and transparency of its emission estimates in the energy sector.

33. The comparison of CRF table 1.A(d) with data reported to Eurostat points to a small discrepancy in the consumption of naphtha. The consumption of naphtha reported in CRF table 1.A(d) in 2011 matched the amount of non-energy use of fuels by industry in the energy balance. The ERT commends Romania for the very good consistency overall between the energy statistics reported internationally and the AD reported in the CRF tables.

³ European Organization for the Safety of Air Navigation.

3. Key categories

Stationary combustion: liquid and solid fuels – CO₂

34. Romania uses a CO₂ implied emission factor (IEF) for solid fuels in public electricity and heat production of 87.18 t/TJ for 2011, which is below the defaults in the Revised 1996 IPCC Guidelines for listed solid fuel: these range from 93.50 t/TJ for bituminous coal to 105.97 t/TJ for peat; the default EF for lignite is 101.20 t/TJ). The dominant solid fuel in the country is lignite and most of it is produced in the country and mostly used in conventional thermal power stations. The average CO₂ EF and oxidation factor for lignite reported by the Party in 2011 were 86.96 t/TJ and 0.92, respectively. In response to questions raised by the ERT during the review, Romania provided transparent information on this country-specific EF for lignite for all available years which, the Party explained, was calculated from EU ETS data. The range of the reported oxidation factors for the EU ETS installations was between 0.765 and 1, with a weighted mean of 0.92. In order to increase transparency, the ERT recommends that the Party include summary tables for EFs and oxidations factors for each fuel used in the NIR based on EU ETS data, while respecting confidentiality issues. the ERT encourages that this additional information be presented at an aggregated level in tabular form and should include the weighted average for each fuel-specific EF from EU ETS installations used in the estimation of emissions, as well as the net calorific values and oxidation factors.

35. The CO₂ IEF for liquid fuels used in electricity and heat production decreased from 77.42 t/TJ in 2009 to 69.41 t/TJ in 2011 (a 10.4 per cent decrease). In response to questions raised by the ERT during the review, the Party provided transparent information on the calculation of the country-specific EFs for all liquid fuels when EU ETS data were used. In particular, the drop in the CO₂ EF was largely due to a higher proportion of refinery gas (with an average EF of 57.40 t/TJ, compared with residual fuel oil with an average EF of 78.02 t/TJ). The ERT recommends that the Party include summary tables in the NIR containing information for each fuel based on EU ETS data, while respecting confidentiality issues. This additional information should be presented at an aggregated level in tabular form and should include the weighted average for each fuel-specific EF from EU ETS installations used in the estimation of emissions, as well as the calorific values and oxidation factors.

Road transportation: liquid fuels – CO₂, CH₄ and N₂O⁴

36. Romania has implemented the COPERT IV model to estimate GHG emissions from road transportation. The ERT commends Romania for this improvement, which is in line with recommendations made in the previous review report. The implementation of this higher-tier method covered the period 2005 to 2011. During the review, the ERT found that there are no detailed fleet data disaggregated by technology for the period 1989–2004, and therefore the COPERT IV model could not have been used for the whole time series. The CO₂ EFs for the period 1989–2004 were based on the weighted average of EFs for stationary combustion from EU ETS installations in the period 2007–2010 for the relevant fuels. As a result, the CO₂ EFs for the first period are different (lower) than those used in the second period. As an example, for gasoline, a constant value was reported between 1990 and 2004 (70.90 t/TJ); the IEFs rose to a maximum value in 2005 (73.56 t/TJ); and decreased thereafter by 3.1 per cent towards 2011 (71.30 t/TJ). The CH₄ and N₂O EFs for the period 1989–2004 are IPCC default values. As with CO₂, the EFs used in the first

⁴ Not all emissions related to all gases under this category are key categories, particularly CH₄ and N₂O emissions. However, since the calculation procedures for issues related to this category are discussed as whole, the individual gases are not assessed in separate sections.

period are lower than those used in the second period. The ERT notes the following: the AD reported in the CRF tables are consistent with energy statistics reported to Eurostat for all years; the EFs used by Romania are similar to those used by other Annex I Parties; and, emissions from CO₂, CH₄ and N₂O are not underestimated for any year of the commitment period. The ERT concludes that, although the time series is not timely consistent for any of the three gases, this situation does not lead to any potential underestimates for the recent years where the COPERT IV model has been implemented. However, the ERT encourages the Party to make efforts to implement the COPERT IV model for the whole time series, or, if this is not possible due to lack of AD, consider applying splicing techniques as described in chapter 3.2 (on methodological choice) of the IPCC good practice guidance to ensure the consistency of the time series.

Fugitive emissions from oil and natural gas systems – CO₂, CH₄ and N₂O⁵

37. Romania used a default EF from the 2006 IPCC Guidelines to estimate fugitive emissions from oil and natural gas. During the review, in response to questions raised by the ERT, the Party provided a justification for the use of the EFs, stating that this is applicable to Romania's national circumstances. The ERT noted that the AD used in the estimation of fugitive emissions are given in petajoules (PJ). During the review week, Romania provided a table showing how the default EFs in IPCC units published in table 4.2.5 of volume 2, chapter 4, of the 2006 IPCC Guidelines have been converted to the EFs reported in CRF table 1.B.2 for the year 2011. However, the ERT noted discrepancies between the EFs reported in the CRF table, the values provided by the Party during the review week and the default values from table 4.2.5 from the 2006 IPCC Guidelines. The ERT noted that the reported EFs for a number of sources in the CRF table are higher than those from table 4.2.5, and that this may be related to errors in the conversion of specific EFs. Considering that there are no potential causes of underestimation, the ERT encourages the Party to review and, where necessary, revise all the EFs reported in CRF table 1.B.2 and to provide transparent documentation in the NIR on the link between each EF in the CRF table and the IPCC factors from table 4.2.5 from the 2006 IPCC Guidelines and/or from table 2.16 of the IPCC good practice guidance.

4. Non-key categories

Other (fuel combustion) – all gases

38. Romania reports the notation key "NA" (not applicable) under the subcategory mobile (emission values are reported for stationary). In response to a question raised by the ERT during the review regarding whether any emissions from mobile military fuel occurred in the country, Romania provided evidence that mobile emissions from fuel use are accounted for under other stationary combustion. The Party also stated that this allocation is consistent with the reporting of energy statistics to Eurostat, where "other sectors" covers activities not included elsewhere in the energy balance. The ERT recommends that the Party change the notation key from "NA" to "IE" (included elsewhere), and include the relevant explanation provided to the ERT.

⁵ Not all emissions related to all gases under this category are key categories, particularly CH₄ and N₂O emissions. However, since the calculation procedures for issues related to this category are discussed as whole, the individual gases are not assessed in separate sections.

Coal mining and handling – CH₄

39. The ERT noted that the CH₄ IEF for this category for underground mines in 2011 (14.83 kg/t) is higher than the IEFs reported for the period 1990–2010 (13.74 kg/t). During the review, Romania clarified that there was a transcription error in the CRF tables for 2011. The ERT recommends that the Party include the correct value and improve its QA/QC activities for the data reported in its GHG inventory.

C. Industrial processes and solvent and other product use**1. Sector overview**

40. In 2011, emissions from the industrial processes sector amounted to 12,605.14 Gg CO₂ eq, or 10.2 per cent of total GHG emissions, and emissions from the solvent and other product use sector amounted to 125.61 Gg CO₂ eq, or 0.1 per cent of total GHG emissions. Since 1989, emissions have decreased by 64.5 per cent in the industrial processes sector, and by 80.5 per cent in the solvent and other product use sector. The key drivers for the fall in emissions in the industrial processes sector are decreases in the production of metals (mainly iron and steel), cement, lime, ammonia (NH₃) and nitric acid. Within the industrial processes sector, 38.7 per cent of emissions were from mineral products, followed by 33.8 per cent from chemical industry and 24.0 per cent from metal production. The remaining 3.6 per cent were from consumption of halocarbons and SF₆. Emissions from production of halocarbons and SF₆ were reported as “NO” (not occurring) and CO₂ emissions from other production as “NE” (not estimated).

41. The inventory for the industrial processes sector is complete in terms of gases, geographical coverage and categories for which there are methodologies available in the Revised 1996 IPCC Guidelines and the IPCC good practice guidance.

42. Only CO₂ emissions were reported under the solvent and other product use sector; 70.6 per cent of the emissions came from other solvents use followed by 21.4 per cent from degreasing and dry cleaning and 8.1 per cent from paint application. The ERT encourages Romania to collect data and estimate N₂O emissions from the solvent and other product use sector which are currently reported as “NE” (not estimated).

43. The ERT noted that Romania followed many of the recommendations made in the previous review report and improved the transparency of its NIR. However, the ERT noted that excessive information is reported in the NIR, in particular when the methodologies used are those from the Revised 1996 IPCC Guidelines or the IPCC good practice guidance, whereas information on the local production technologies and producers, which could be more valuable to enhance transparency, is lacking in the NIR. The ERT recommends that Romania improve the readability and transparency of its NIR by including additional descriptions of country-specific methodologies and reduce the methodological descriptions when these are simply copied from the IPCC guidelines.

2. Key categoriesNitric acid production – N₂O

44. Romania estimated N₂O emissions from nitric acid production based on total annual nitric acid production and using the average values of the default EF ranges from the IPCC good practice guidance, differentiated according to the process. The ERT noted that nitric acid production is a key category (both level and trend) and therefore it is good practice to use plant-specific emissions data to estimate the corresponding emissions. In response to questions raised by the ERT during the review, the Party explained that the plant-specific

emissions data reported by operators are not sufficiently documented and could not be used for emission estimates. The ERT strongly reiterates the recommendation made in the previous review report that Romania make efforts to obtain data or perform accurate QA/QC procedures on the data reported by the operators, with a view to using those data as the basis for the emission estimates.

Limestone and dolomite use – CO₂

45. Following the recommendation made in the previous review report, Romania used plant-specific limestone and dolomite consumption data obtained from iron and steel producers, pulp and paper producers, sugar mills and ceramics producers. In the NIR Romania explained that the amount of material (limestone and dolomite) used to produce lime in the iron and steel industry was not included under limestone and dolomite use to avoid double counting. The ERT recommends that Romania perform a cross-check of the limestone and dolomite use data against production, export and import information to ensure the completeness of the emission estimates in the category.

3. Non-key categories

Calcium carbide production and use – CO₂

46. Romania reported CO₂ emission estimates from calcium carbide (CaC₂) production for the period 1990–2006. Production of CaC₂ did not occur after 2007, and the notation key “NO” was reported for the period 2007–2011. However, the ERT noted that no information on the use or imports of CaC₂ for the whole time series was provided by the Party, either in the NIR or during the review week in response to questions raised by the ERT. The ERT notes that the Revised 1996 IPCC Guidelines provide methodologies to estimate emissions in relation to CaC₂ use (p. 2.19 of the Revised 1996 IPCC Guidelines workbook and table 2-8 for default EFs). Therefore the ERT included this issue in the list of potential problems and further questions by the ERT. In response to this list, Romania provided: data and calculations; the AD for CaC₂ production, export and import; the EF; and the resubmitted CRF tables for the whole time series. The amount of CaC₂ used was obtained as a balance of production, import and export data provided by the National Institute for Statistics (the amount used equals the production amount plus the imported amount minus the exported amount, starting with the year 2007; the production was interrupted for the years 1989, 1990, 1991 and 1993). Additionally, to estimate emissions the Party used the default EF of 1.10 t CO₂/tonne carbide corresponding to the use of product from table 2.9 in the Revised 1996 IPCC Guidelines (Reference Manual). The ERT considered the issue resolved as Romania included CaC₂ import data in its estimates. The recalculations provided by the Party resulted in an increase of CO₂ emissions of 13.61 Gg, or 0.1 per cent of the total emissions from the industrial processes sector in 2011.

Consumption of halocarbons and SF₆ – HFCs

47. Romania estimated and reported actual emissions from refrigeration and air-conditioning equipment, foam blowing, fire extinguishers and aerosols/metered dose inhalers using the average emission rates based on clusters of countries with economies in transition (excluding those with no emissions or those whose estimates were adjusted by the respective ERT), and using the gross domestic product (GDP) as the proxy (cluster approach). The ERT considered that this approach was sufficient to address the problems of emissions underestimation identified two years ago (annual submission 2011).⁶ However,

⁶ FCCC/ARR/2011/ROU, paragraph 106.

the ERT supports the conclusion in the previous review report that such an approach cannot be a permanent solution to the problem, since it is not in line with the IPCC good practice guidance and decision 20/CMP.1. In addition, the estimates of HFC emissions do not differentiate between the different chemical species. The ERT strongly reiterates the recommendation made in the previous review report that the Party: collect the required national data for the estimation of these subcategories and species; report the emissions per chemical species and at a higher level of disaggregation in CRF table 2(II).F, in order to improve transparency; and extend the data collection process to the main users of fluorinated gases (F-gases), such as the producers/importers of vehicles, refrigerators and air-conditioning equipment, in order to move to the use of a tier 2a (bottom-up) approach.

D. Agriculture

1. Sector overview

48. In 2011, emissions from the agriculture sector amounted to 18,941.46 Gg CO₂ eq, or 15.4 per cent of total GHG emissions. Since 1989, emissions have decreased by 53.5 per cent. The key drivers for the fall in emissions are the decrease in animal population of all species and the decrease in the amount of synthetic fertilizers applied to agricultural soils. Within the sector, 47.9 per cent of the emissions were from agricultural soils, followed by 41.6 per cent from enteric fermentation, 9.5 per cent from manure management and 0.9 per cent from field burning of agricultural residues. The remaining 0.1 per cent were from rice cultivation.

49. The ERT found some inconsistencies between the NIR and the CRF tables, as well as several reporting errors. For example, for cultivation of histosols the explanation in the NIR (page 975) that the country does not cultivate histosols is not clear and appears to contain a typographical error. Also, in CRF table 9(a), it is stated that no methodology is available for the estimation of direct and indirect agricultural soils emissions. However, in the NIR and in CRF table 4.D, emission estimates for the three subcategories (direct, indirect and pasture, range and paddock manure) are reported. The ERT recommends that the Party enhance its QA/QC procedures to avoid these inconsistencies and errors.

50. The time series are generally consistent: most of the AD are provided by NIS, FAOSTAT, the database of the Food and Agriculture Organization of the United Nations (FAO), or a study on the elaboration of national emission factors and other parameters relevant to the energy, industrial process, agriculture and waste sectors and the use of higher-tier calculation methods and were obtained using the same method for the complete time series.

51. Concerning transparency, and in line with the previous review report, the ERT found that the NIR is difficult to follow because it provides very detailed narration about AD (e.g. several tables, including tables 6.6, 6.10, 6.15, 6.16 and 6.20 could be placed in annexes), and some tables related to the time series are presented using graphs rather than tables, which prevents the reading of values with precision. In addition, the ERT considers that concise information explaining the methodology of collecting AD or showing the country-specific parameters would improve the transparency, and recommends that the Party follow that reporting approach.

52. The ERT commends the Party for its achievements in developing country-specific values for: the methane conversion rate (Y_m) for significant animal categories, ash content in manure, methane conversion factors (MCFs), methane producing potential (B_o), the fraction of synthetic fertilizer nitrogen (N) applied to soils that volatilizes as NH₃ and nitrogen oxides (NO_x) ($Frac_{GAZF}$), the fraction of livestock N excretion that volatilizes as

NH_3 and NO_x ($\text{Frac}_{\text{GAZM}}$) and the fraction of N input to soils that is lost through leaching and run-off ($\text{Frac}_{\text{LEACH}}$).

2. Key categories

Enteric fermentation – CH_4

53. The ERT acknowledged the efforts of the Party in disaggregating its AD for livestock population according to the IPCC good practice guidance. However, inconsistency with FAOSTAT estimates for 2011 persist (1.7 per cent difference for dairy cattle). In response to questions raised by the ERT during the review, Romania explained that the differences in livestock population are due to the fact that in the CRF tables the values for a given year X are allocated to the previous year (X – 1), which is explained by methodological differences between FAOSTAT and NIS. The ERT recommends that the Party include such explanations in the NIR in order to enhance the transparency of its reporting.

54. The ERT noted that in CRF table 4.A the reported country-specific gross energy intake (GE) value for dairy cattle (227.37 MJ/head/day) was significantly lower than the values of neighbouring countries in Eastern Europe (ranging between 259 and 310 MJ/head/day in the group of countries that includes Hungary, Slovakia, the Russian Federation and the Czech Republic). This value also affects the estimates for the category manure management. In response to questions raised by the ERT during the review, the Party provided additional documentation for the country-specific parameters and the methodology used to calculate GE for dairy cattle, which relies on an expert assumption for the daily milk productivity estimate for cattle. The ERT strongly recommends that the Party improve the description of its methodology for estimating milk production per head for dairy cattle, and avoid the use of a constant value for milk productivity in its methodology for estimating GE for dairy cattle.

Manure management – N_2O

55. The Party has reported in CRF table 4.B(b) N excretion rates (Nex) for dairy and non-dairy cattle and sheep that are much lower than the default values for Eastern Europe in the Revised 1996 IPCC Guidelines (i.e. the Party has used 53.63, 38.16 and 4 kg N/head/year for dairy cattle, non-dairy cattle and sheep, respectively, in 2011, compared with the IPCC default values for Eastern Europe, which are 70, 50 and 16 kg N/head/year, respectively). In response to a question raised by the ERT during the review concerning how the Nex values were obtained, the Party provided comprehensive documentation explaining how the Nex values were derived: data on the amount of solid and liquid manure and percentage of N in solid and liquid manure were collected based on specialized literature from the study referred to in paragraph 50 above. The ERT recommends that the Party improve the description of the methodology, for instance by including the documentation provided during the review.

E. Land use, land-use change and forestry

1. Sector overview

56. In 2011, net removals from the LULUCF sector amounted to 25,304.94 Gg CO_2 eq. Since 1989, net removals have increased by 17.6 per cent. The key drivers for the rise in net removals were the increase in the removals in forest land remaining forest land and the very significant increase in the removals from land converted to forest land. Within the sector, net removals of 23,353.01 Gg CO_2 eq were from forest land, followed by 3,199.47 Gg CO_2 eq from cropland and 130.10 Gg CO_2 eq from wetlands. Other land accounted for net

emissions of 835.26 Gg CO₂ eq and settlements accounted for net emissions of 409.76 Gg CO₂ eq. The remaining 132.62 Gg CO₂ eq of net emissions were from grassland.

57. The ERT noted a general improvement in the QA/QC procedures in the LULUCF sector, which has resulted in a considerable decrease in the number of discrepancies between the CRF tables and the NIR data in comparison with those reported in the previous review report.⁷

58. The ERT concludes that the transparency is generally sufficient. However, to further enhance the transparency of the reporting, the ERT recommends that Romania use tables and flow charts to report data sources and values of country-specific parameters.

59. The inventory for the LULUCF sector has been prepared in accordance with the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF). The Party has developed a methodology to collect data on areas of land use and land-use change in order to identify the land-use categories. The NIR also included a land-use change matrix, referring to disaggregated land categorization. However, the ERT encourages the Party to include in the next NIR land-use change matrices taking into account the six IPCC land categories.

2. Key categories

Forest land remaining forest land – CO₂

60. The methodologies used by Romania to estimate the emissions and removals from forest land remaining forest land are a combination of tier 1 and tier 2 methods with country-specific data, and are generally consistent with the IPCC good practice guidance for LULUCF and comparable with the methods used by other reporting Parties. Romania used national statistics data for two types of land covered by forest vegetation: the National Forest Fund (NFF), which is considered managed forest land; and forest vegetation outside NFF (VFAFF). The latter, which historically is not subject to the forestry regime, and for which the development of management plans is not mandatory, is considered to be “unmanaged forest lands” in accordance with the IPCC good practice guidance for LULUCF. National statistics data have been used as the main data to determine areas, while the country-specific parameters that were used in the estimation process (i.e. volume increment, area, harvest rates and root-to-shoot ratios) were deduced from the national forest inventory (NFI) and from the forest management plans for NFF. However, as already noted in previous review reports, much of these data have not been updated since 1984. Since Romania was due to complete its first NFI since 1984 at the end of 2012, the ERT reiterates the recommendation made in the previous review report that the Party make use of the newly available data to improve the accuracy of the estimates for the LULUCF sector.

61. As identified in previous review reports, Romania reports the carbon stock changes (CSCs) in the dead organic matter and mineral soil pools under forest land remaining forest land (subcategory NFF) as “NO”, using the tier 1 assumptions from the IPCC good practice guidance for LULUCF for the key categories (for the VFAFF type of forest, “NE” is reported for CSC in dead organic matter). In response to questions raised by the ERT during the review, the Party explained that efforts to estimate the emissions/removals from these pools are ongoing, namely by simulating the CSCs using the Canadian carbon budget model (CBM). The Party provided the ERT with the preliminary results of the model simulation during the review, related to estimates of carbon stocks in the dead organic

⁷ FCCC/ARR/2012/ROU, paragraph 112.

matter and mineral soil pools for the period 2008–2030. The ERT strongly recommends that the Party provide estimates for these pools.

62. Romania reported the area of organic soils in the subcategory forest land remaining forest land, but reported the related CO₂ emissions as “NO”. In response to a question raised by the ERT during the review, Romania provided preliminary estimates of CO₂ emissions from organic soils. The ERT strongly recommends that the Party include these estimates in its next annual submission.

Land converted to forest land – CO₂

63. The ERT identified some inconsistencies, mainly regarding the increasing trends of the IEFs for dead organic matter and soils, which might indicate an overestimation of removals from land converted to forest land (and from afforestation/reforestation activities under KP-LULUCF in each year in the period 2008–2011). For example, for the net CSC in dead organic matter the overall trend of the CSC IEF (net removals) is increasing and the 2011 value (0.84 Mg C/ha) is 458.5 per cent higher than the 1989 value (0.15 Mg C/ha); and the trend of the CSC IEF is not stable and three different periods can be identified (between 1990 and 2004 net removals increased by 67.9 per cent; between 2004 and 2009 net removals increased by 230.1 per cent; and between 2009 and 2011 net removals increased by 0.7 per cent). In response to a question raised by the ERT during the review, Romania provided additional information and informed the ERT about its intention to use the outcomes of the joint implementation (JI) project verification activities in the estimation process. ERT strongly recommends that the Party clearly explain the rationale of the trends.

Cropland remaining cropland – CO₂

64. Romania reported the area of organic soils in the subcategory cropland remaining cropland, but reported the related CO₂ emissions as “NO”. The ERT encourages that the Party estimate the CO₂ emissions from organic soils in the subcategory cropland remaining cropland.

3. Non-key categories

Grassland remaining grassland – CO₂

65. Romania reported the area of organic soils in cropland remaining cropland, but reported the related CO₂ emissions as “NO”. The ERT encourages the Party to estimate the CO₂ emissions from organic soils in the subcategory grassland remaining grassland.

F. Waste

1. Sector overview

66. In 2011, emissions from the waste sector amounted to 5,366.48 Gg CO₂ eq, or 4.4 per cent of total GHG emissions. Since 1989 emissions have increased by 14.9 per cent. The main drivers of this increase are an increase in population consumption and improvements in living standards and consumption. Within the sector, 53.7 per cent of emissions were from wastewater handling, followed by 46.1 per cent from solid waste disposal on land. The remaining 0.2 per cent of emissions were from waste incineration.

67. The inventory for the waste sector is complete in terms of gases and categories for which there are methodologies in the Revised 1996 IPCC Guidelines and the IPCC good

practice guidance, and includes all of the required information on uncertainties, QA/QC procedures and planned inventory improvements.

68. The information in the NIR is mostly presented in a transparent manner, although the ERT considers that additional information is required on assumptions used in the estimation of emissions (e.g. fractions of municipal solid waste (MSW) and sludge disposed in managed or unmanaged disposal sites (deep or shallow), the fraction of wastewater type and the amount of sludge anaerobically treated). Therefore, the ERT recommends that Romania include such additional documentation as an annex to the NIR.

69. The ERT noted that Romania used default IPCC EFs and parameters to prepare estimates for the key categories and also for waste incineration. Therefore, the ERT recommends that Romania make efforts to develop and use country-specific EFs and parameters, particularly for the key categories, such as the methane generation rate constant (k) for the estimation of CH₄ emissions from solid waste disposal on land, for the degradable organic component (COD) for wastewater handling.

70. Romania has implemented sector-specific QA/QC procedures and documented them in the NIR. The ERT commends the Party for this improvement.

71. The ERT noted that the uncertainty values for the waste sector of Romania are comparatively high, but these could be explained by the aggregation of AD and EF-related uncertainties. The ERT commends Romania for its effort to improve the assessment of uncertainty and the additional information provided as annex 8.1 to the NIR, but recommends that the Party made efforts to improve the uncertainty values for AD and identify country-specific EFs for key categories.

2. Key categories

Solid waste disposal on land – CH₄

72. Romania has used the tier 2 first-order decay (FOD) method to estimate emissions from both managed and unmanaged solid waste in its 2013 annual submissions, which is in line with the IPCC good practice guidance. The ERT commends Romania for having followed the recommendation made in the previous review report and for having used a tier 2 methodology to assess the emissions from MSW disposed in unmanaged waste disposal sites. However, the ERT noted that Romania has used default values for all parameters used in the calculation of CH₄ emissions, which is not in line with the IPCC good practice guidance. Therefore, the ERT recommends that the Party make efforts to develop country-specific parameters and EFs to improve the accuracy of the inventory. It recommends that the Party include in the NIR all necessary information concerning the country-specific parameters, including information supporting expert judgements, in order to enhance the transparency of the annual submission.

73. The ERT observed significant inter-annual changes in AD and emissions which are not sufficiently explained in the NIR, namely the changes in AD and CH₄ emissions from solid waste disposal on land. The quantities of biogas recovered increased from 0.43 Gg in 1996 (the first year that values were reported) to 16.37 Gg in 2010 and increased to 42.69 Gg in 2011 (a 160.7 per cent increase in a single year). In response to questions raised by the ERT during the review, Romania explained that in 2011 the quantity of CH₄ recovered from landfill registered a significant increase, due to an increase in compliance by waste operators with EU and national legislation, and due to the installation of capture and measurement systems for landfill gas. The ERT reiterates the recommendation made in previous review reports that the Party improve the consistency of the time series and provide supporting explanations in the NIR, since the problems identified in the previous annual submission have not yet been solved.

74. In response to a recommendation made in the previous review report, Romania included estimates of CH₄ emissions from the sludge disposed in landfills. The ERT commends Romania for this improvement to the inventory but, in order to enhance the transparency of the calculations, it recommends that the Party provide sufficient information regarding the fractions and composition of sludge in the NIR.

Wastewater handling – CH₄ and N₂O

75. Romania used the default method suggested in the IPCC good practice guidance to estimate emissions from wastewater handling. Emissions from industrial wastewater were reported together with sludge while those from domestic/commercial wastewater were reported separately from sludge. Only the fraction of the domestic/commercial wastewater treated anaerobically was considered to estimate CH₄ emissions. Although CH₄ recovered from domestic/commercial wastewater was reported as “NO”, CH₄ emissions from sludge from industrial wastewater were reported as “IE” because they were included in industrial wastewater emissions.

76. Romania has used country-specific data for the estimation of CH₄ emissions: national data on the population connected/unconnected to sewerage (from NIS) was used to estimate CH₄ emissions in domestic/commercial wastewater; and data from the 2011 national statistical yearbook for the industrial production of beer, paper, pulp and petroleum refining was used for the calculation of CH₄ emissions from industrial wastewater. The EFs and parameters used were mostly IPCC default values. The ERT noted that the references for the fraction of wastewater type treated in wastewater handling systems (WS_{ix}), the degradable organic component (DOC), the biochemical oxygen demand (BOD), the fraction of BOD removed as sludge and the fraction of sludge anaerobically treated (SS_{iy}) were not sufficiently described in the NIR. Therefore, the ERT recommends that Romania improve the transparency of this information.

77. Romania estimated N₂O emissions from human sewage based on the method in the Revised 1996 IPCC Guidelines using default EFs and country-specific data on population (provided by NIS). For protein consumption, Romania used data from the national statistical yearbook together with data from the FAO country profile. For the missing years, values were interpolated based on expert judgement and arithmetic averages; nevertheless, a difference of a 9.0 per cent increase was detected between 2002 and 2003. The ERT recommends that the Party increase the consistency in the time series in order to avoid significant differences between years.

3. Non-key categories

Waste incineration – CO₂

78. Romania calculated CO₂ emissions from hazardous and clinical waste incinerated. N₂O emissions were reported as “NE” due to the lack of EFs in the IPCC good practice guidance. AD for hazardous waste generated by the industrial sector were provided by the Waste Directorate of NEPA for the period 2003–2010 and extrapolated by expert judgement for the period 1992–2002. For 1989–1991, incineration of hazardous waste was reported as “NO” while no data were available for clinical waste (reported as “NE”). Regarding the quantity of clinical waste generated and incinerated, the information was provided by the Public Health Institute of Bucharest (for the period 2000–2010), by the National Research and Development Institute for Environmental Protection (for the period 1996–1998) and extrapolated for previous years. Romania applied default EFs from the IPCC good practice guidance.

79. In response to questions raised by the ERT, the Party explained that the increase in the industrial waste incinerated between 2003 and 2006 (404.4 per cent) is based on the introduction of EU regulations with which operators must comply, but there is no explanation in the NIR about the decrease in the clinical waste incinerated since 2003 (72.4 per cent decrease between 2003 and 2011) or the fluctuations of hazardous waste incinerated from 2007 onwards (99.4 per cent decrease between 2006 and 2007; 41.7 per cent increase between 2007 and 2008; 16.3 per cent increase between 2008 and 2009; 68.1 per cent increase between 2009 and 2010; the 2010 value was carried on to 2011). The ERT recommends that the Party improve the consistency of the AD or enhance the transparency of its reporting for incineration of hazardous waste and clinical waste, and ensure completeness of reporting for the period 1989–1991.

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

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

Overview

80. Table 6 provides an overview of the information reported and parameters selected by the Party under Article 3, paragraphs 3 and 4, of the Kyoto Protocol.

Table 6

Supplementary information reported under Article 3, paragraphs 3 and 4, of the Kyoto Protocol

		<i>Findings and recommendations</i>
Has the Party reported information in accordance with the requirements in paragraphs 5–9 of the annex to decision 15/CMP.1?	Not sufficient	Romania reports emissions/removals for the litter, dead wood and soil pools for land subject to forest management and the dead wood pool for afforestation/reforestation as “NO”, and does not providing transparent and verifiable information that the unreported pools are not a source (annex to decision 15/CMP.1 para. 6(e)) (see paras. 81 and 85 below) Information on whether or not indirect and natural GHG emissions and removals have been factored out has been not included in the NIR (annex to decision 15/CMP.1, para. 7)
Identify any elected activities under Article 3, paragraph 4, of the Kyoto Protocol	Activities elected: forest management and revegetation	
Identify the period of accounting	Commitment period accounting	
Assessment of the Party’s ability to identify areas of land and areas of land-use change	Sufficient	(see para. 84)

Abbreviations: GHG = greenhouse gas, NIR = national inventory report and NO = not occurring.

Activities under Article 3, paragraph 3, of the Kyoto Protocol*Afforestation and reforestation – CO₂, CH₄ and N₂O*

81. Under afforestation and reforestation, Romania reported CSCs for the dead wood pool as “NO”. In response to questions raised by the ERT during the review, the Party explained that efforts to estimate the emissions/removals from this pool are ongoing, based on the results of the JI project hosted by Romania. The ERT strongly recommends that Romania report CSCs for the dead wood pool, or provide transparent and verifiable information that the pool is not a source, in accordance with decision 15/CMP.1, annex, paragraph 6(e).

82. The ERT noted some inconsistencies between the data reported in the NIR and the KP-LULUCF CRF tables, for the period 2008–2011. In particular, for 2011: the area reported as subject to afforestation/reforestation in table 5(KP-I)A.1.1 (27.36 kha) is approximately seven times smaller than the area reported as land converted to forest land in CRF table 5.A (210.50 kha); the total area of land converted from forest land to other types of land use (grassland, wetlands, settlements and other land) reported in CRF table 5 is 89.70 kha and is 63.3 per cent larger than the area reported as subject to deforestation in table 5(KP-I)A.2 (54.93 kha); and the total area of forest land remaining forest land reported in CRF table 5.A is 6,590.85 kha, which is 4.0 per cent larger than the area reported as subject to deforestation in table 5(KP-I)B.1 (6,335.14 kha). During the review, the Party provided information to the ERT explaining the inconsistencies, which relates to the inclusion of VFAFF forest in the reporting under the Convention but not in the reporting under the Kyoto Protocol. The ERT recommends that Romania ensure the consistency of its reporting by enhancing QA/QC procedures and providing the necessary explanations in the NIR.

83. The ERT notes that Romania did not report data related to biomass burning (AD and associated GHG emissions) in areas subject to activities under Article 3, paragraph 3, of the Kyoto Protocol. During the review, Romania informed the ERT about its intention to estimate GHG emissions from wildfires. The ERT strongly recommends that Romania report AD and CO₂, CH₄ and N₂O emissions from biomass burning in the areas subject to afforestation and reforestation activities.

Deforestation – CO₂

84. The ERT noted that Romania excluded forest lands not included under the NFF from its reporting of KP-LULUCF activities; as a consequence, CSCs associated with the conversion of forest land to other land uses outside the NFF areas (i.e. in VFAFF areas) are not reported under deforestation, resulting in a potential underestimation of emissions. During the review, in response to questions raised by the ERT, Romania provided additional information to confirm that: the Romanian national system is able to identify all deforested areas, including those in unmanaged areas (VFAFF); deforestation activities are recorded by the forest authority (the regional inspectorate of the Ministry of Environment and Forest (ITRSV)); and CSCs from deforestation in areas outside NFF are included in the KP-LULUCF tables. The ERT recommends that the Party include the provided information in the next annual submission.

Activities under Article 3, paragraph 4, of the Kyoto Protocol*Forest management – CO₂*

85. Under forest management, Romania reported CSCs for the litter, dead wood and soils pools as “NO”. During the review, in response to questions raised by the ERT, the Party explained that efforts to estimate the emissions/removals from these pools are

ongoing, namely by simulating the CSCs using the CBM model. It provided the ERT with the preliminary results of the model simulation, related to estimates of CSCs in the dead wood and mineral soil pools for the period 2008–2030. The ERT strongly recommends that Romania report, in its next annual submission, CSCs for the litter, dead wood and soils pools in areas under forest management, or provide transparent and verifiable information that these pool are not a source, in accordance with decision 15/CMP.1, annex, paragraph 6(e).

86. In addition, Romania reported as “NO” CSCs in organic soils under forest management. During the review, in response to questions raised by the ERT, the Party informed the ERT about its intention to include these estimates in the next annual submissions. The ERT strongly recommends that the Party estimate the CSCs in organic soils under forest management.

87. Romania has not reported estimates of N₂O emissions from drainage of soils under forest management. During the review, in response to questions raised by the ERT, the Party informed the ERT about its intention to include these estimates in the next annual submissions. The ERT strongly recommends that the Party estimate the N₂O emissions from drainage of soils under forest management.

2. Information on Kyoto Protocol units

Standard electronic format and reports from the national registry

88. Romania 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 and recommendations included in the standard independent assessment report (SIAR) on the SEF tables and the SEF comparison report.⁸ The SIAR was forwarded to the ERT prior to the review, pursuant to decision 16/CP.10. The ERT reiterated the main findings and recommendations contained in the SIAR.

89. Information on the accounting of Kyoto Protocol units has been prepared and reported in accordance with decision 15/CMP.1, annex, chapter I.E, 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 referred to in decision 22/CMP.1, annex, paragraph 88(a–j). No non-replacement has occurred. Information reported by the Party in the NIR on records of discrepancies was found to be inconsistent with information provided to the secretariat by the ITL. The SIAR identified discrepant transactions that will need corrective action from the Party in its national registry. The ERT recommends that Romania include the information required by decision 22/CMP.1, annex, paragraph 88(a–j), on any discrepancies identified by the ITL.

Calculation of the commitment period reserve

90. Romania has reported its commitment period reserve in its 2013 annual submission. It reported its commitment period reserve to be 616,727,686 t CO₂ eq based on the national emissions in its most recently reviewed inventory (123,345.54 Gg CO₂ eq). The ERT notes that, based on the submission of revised emission estimates by Romania during the course

⁸ The SEF comparison report is prepared by the international transaction log (ITL) administrator 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.

of the review of the 2013 annual submission, the commitment period reserve for Romania changed, and the new commitment period reserve is reported as 616,795,736 t CO₂ eq based on the revised national emissions (123,359.15 Gg CO₂ eq). The ERT agrees with this figure.

3. Changes to the national system

91. Romania reported that there are changes in its national system since the previous annual submission. The Party described the changes in the single national entity with the overall responsibility for the national inventory in its NIR: on 1 April 2013 MECC replaced NEPA as the single national entity. The NIR reports in detail on other changes that affected the national system following Governmental Decree no. 48/2013. For example, all NEPA climate change related structure, personnel, attributions and responsibilities were taken over by MECC; studies to strengthen the national system were implemented; training experts; and other improvements were made to the key category analysis, data collection, uncertainty analysis and QA/QC procedures. 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.

4. Changes to the national registry

92. Romania reported that there are changes in its national registry since the previous annual submission. In its NIR, the Party described the changes, which are specifically due to the centralization of the EU ETS operations into a single EU registry operated by the European Commission called the Consolidated System of European Union Registries (CSEUR). CSEUR is a consolidated platform which implements the national registries in a consolidated manner and was developed together with the new EU registry.

93. The ERT noted that there were recommendations in the SIAR that had not been addressed, in particular recommendations related to the public availability of information on the website, the reporting of a description of the changes in database structure and the reporting of test results. Specifically, with regard to the requirements regarding the public availability of information in accordance with section II.E of the annex to decision 13/CMP.1, the SIAR recommended that Romania include public information directly on the website of the national registry or via a link from the registry website to another website controlled by the Party. It also recommended that the publicly available information be up to date (i.e. updated as close to real time as possible, but at least updated on a monthly basis).

94. In response to questions raised by the ERT during the review, Romania provided further information on the changes to the national registry, including reporting a description of the changes in database structure and reporting of test results.

95. The ERT concluded that, taking into account the confirmed changes in the national registry, including additional information provided to the ERT during the review, Romania's national registry continues to perform the functions 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. With respect to the provision of information related to database structure specifically, the ERT encourages the Party to provide additional information in the NIR. The ERT recommends that Romania include all other additional information in response to the SIAR findings in its NIR in accordance with decision 15/CMP.1, annex, chapter I.G.

5. Minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol

96. Romania reported that there are no changes in its reporting of the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol since the previous annual submission. The ERT concluded that the information provided continues to be complete and transparent.

97. The Party reported that the reduction in the level of emissions since 1989 was mainly the result of the reduction in the level of economic activity, the upgrading of technologies, and the energy-efficiency activities promoted under the EU integration process. The Party considers that, under these circumstances, there were no adverse social, environmental and economic impacts on developing countries produced by its national climate change mitigation activities.

98. Romania also reported that national actions on the minimization of adverse impacts relate to the JI mechanisms, the upgrading and refurbishment of old technologies and energy efficiency have no transboundary effects. The Party also stated that it is planning to deliver technical and financial assistance to developing countries, and in that sense it is planning to contribute to the EU funding for developing countries, mainly the Republic of Moldova.

III. Conclusions and recommendations

A. Conclusions

99. Table 7 summarizes the ERT's conclusions on the 2013 annual submission of Romania, in accordance with the Article 8 review guidelines.

Table 7

Expert review team's conclusions on the 2013 annual submission of Romania

	<i>Cross-references</i>	
The ERT concludes that the inventory submission of Romania is complete (categories, gases, years and geographical boundaries and contains both an NIR and CRF tables for 1989–2011)		
Annex A sources ^a	Complete	Table 3
LULUCF ^a	Not complete	61, 62
KP-LULUCF	Not complete	81, 83–87
The ERT concludes that the inventory submission of Romania has been prepared and reported in accordance with the UNFCCC reporting guidelines	Yes	
The submission of information required under Article 7, paragraph 1, of the Kyoto Protocol has been prepared and reported in accordance with decision 15/CMP.1	Yes	
Romania's inventory is in accordance with the <i>Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories</i> , the <i>IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories</i> and the <i>IPCC Good</i>	Generally	47

Practice Guidance for Land Use, Land-Use Change and Forestry

Romania has reported information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol	Yes	
Romania has reported information on its accounting of Kyoto Protocol units in accordance with decision 15/CMP.1, annex, chapter I.E, and used the required reporting format tables as specified by decision 14/CMP.1	Yes	89
The national system continues to perform its required functions as set out in the annex to decision 19/CMP.1	Yes	
The national registry continues to perform the functions 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	Yes	
Did Romania provide information in the NIR on changes in its reporting of the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol?	Yes	

Abbreviations: Annex A sources = sources included in Annex A to the Kyoto Protocol, CMP = Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol, CRF = common reporting format, ERT = expert review team, IPCC = Intergovernmental Panel on Climate Change, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, NIR = national inventory report, UNFCCC reporting guidelines = “Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories”.

^a The assessment of completeness by the ERT considers only the completeness of reporting of mandatory categories (i.e. categories for which methods and default emission factors are provided in the IPCC *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*, or the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*).

B. Recommendations

100. The ERT identified the issues for improvement listed in table 8. All recommendations are for the next annual submission, unless otherwise specified.

Table 8
Recommendations identified by the expert review team

<i>Sector</i>	<i>Category</i>	<i>Recommendation</i>	<i>Paragraph cross-references</i>
Cross-cutting	QA/QC	Strengthen QA/QC procedures	25, 29, 30, 39, 49 and 82

<i>Sector</i>	<i>Category</i>	<i>Recommendation</i>	<i>Paragraph cross-references</i>
	Transparency	Increase transparency of reporting	20, 24, 27, 28, 34, 35, 37, 43, 51, 54, 55, 58, 63, 68, 72, 74, 76, 79, 81, 82, 84, 85 and 89
Energy	Sector overview – transparency	Reduce the amount of redundant information in the NIR (e.g. IPCC definitions or copies of CRF tables) and explain more clearly the country-specific methods, EFs and AD used in the inventory	20
		Improve the description in the NIR of the category-specific QA/QC activities performed on the AD, with the objective of better understanding the links between the EU ETS, the energy balances and the data reported in the CRF tables	22
		Endeavour to facilitate effective access to, and the sharing of, all relevant data underpinning the GHG inventory between all relevant actors, while respecting the confidentiality of the data	23
		Clearly justify in the NIR the use of the 2006 IPCC Guidelines for the relevant source categories on a case-by-case basis and explain how this applies to Romania's national circumstances	24
	Sector overview – QA/QC	Strengthen QA/QC procedures	25
	International bunkers	Improve the QA/QC procedures applied to the final values reported in the CRF tables to ensure that these values are consistent across different CRF tables	29
		Correct identified errors and improve the QA/QC of the EFs used in the CRF tables, particularly when the units for CH ₄ and N ₂ O in the IPCC Guidelines may be different from those in the CRF tables	30
		Make use of additional sources of information, such as Eurocontrol, as a supplementary QA activity regarding the fuel allocation for domestic and international uses based on higher-tier methods	31
	Stationary combustion: liquid and solid fuels – CO ₂	Include summary tables for each fuel used in the NIR based on EU ETS data, while respecting confidentiality issues	34 and 35
	Other (fuel combustion) – all gases	Change the notation key from “NA” to “IE” in the next inventory submission, and explain this choice of notation key	38

<i>Sector</i>	<i>Category</i>	<i>Recommendation</i>	<i>Paragraph cross-references</i>
	Coal mining and handling – CH ₄	Include the correct value for the CH ₄ EF and improve the QA/QC activities for the data reported in the GHG inventory	39
Industrial processes and solvent and other product use	Sector overview	Improve the readability and transparency of the NIR by including additional descriptions of country-specific industries and reduce the methodological descriptions when these are copied from the IPCC guidelines	43
	Nitric acid production – N ₂ O	Make efforts to obtain plant-specific emissions data of sufficient quality or perform accurate QA/QC procedures on the data reported by the operators, with a view to using those data as the basis for emission estimates	44
	Limestone and dolomite use – CO ₂	Perform a cross-check of the limestone and dolomite use data against production, export and import information to ensure the completeness of the emission estimates in the category	45
	Consumption of halocarbons and SF ₆ – HFCs	Collect the required national data and estimate emissions from these subcategories by species and use a higher-tier approach in the next annual submission	47
Agriculture	Sector overview	Enhance the QA/QC procedures to avoid inconsistencies and errors	49
		Enhance transparency by reporting concise information explaining the methodology of collecting AD or showing the country-specific parameters	51
	Enteric fermentation – CH ₄	Include explanations for the differences in livestock population between the inventory and FAOSTAT	53
		Improve the description of the methodology for estimating AD related to milk production per head for dairy cattle, and avoid the use of a constant value for milk productivity in its methodology for estimating gross energy intake for dairy cattle	54
	Manure management – N ₂ O	Improve the description of the methodology by providing the comprehensive documentation explaining how the nitrogen excretion rate values were derived, as provided to the ERT during the review	55
LULUCF	Sector overview	Use tables and flow charts to report data sources and country-specific values	58
	Forest land remaining forest land – CO ₂	Make use of the newly available data (from the updated national forest inventory, which was due by 2012) to improve the accuracy of the estimates for the LULUCF sector	60
		Provide estimates for the dead organic matter and mineral soil pools	61

<i>Sector</i>	<i>Category</i>	<i>Recommendation</i>	<i>Paragraph cross-references</i>
		Include the estimates for CO ₂ emissions from organic soils in the next annual submission	62
	Land converted to forest land – CO ₂	Clearly explain the rationale of the trend of the IEF for dead organic matter and soils	63
Waste	Sector overview	Improve transparency by including additional information on assumptions used in the estimation of emissions	68
		Make efforts to develop and use country-specific EFs and parameters, particularly for the key categories	69
		Make efforts to improve the uncertainty values for AD and identify country-specific EFs for key categories	71
	Solid waste disposal on land – CH ₄	Make efforts to use country-specific parameters and EFs to improve the accuracy of the inventory, and provide all necessary information, including information supporting expert judgements	72
		Improve the consistency of the time series and provide supporting explanations for the time trends	73
		Provide information regarding the fractions and composition of sludge	74
	Wastewater handling – CH ₄ and N ₂ O	Improve the transparency of the references for some of the parameters used to estimate emissions	76
		Increase the consistency in the time series in order to avoid significant differences between years	77
Waste incineration – CO ₂	Improve the consistency of the AD or enhance the transparency of the reporting for incineration of hazardous waste and clinical waste, and ensure completeness of reporting for the period 1989–1991	79	
KP-LULUCF	Afforestation and reforestation – CO ₂ , CH ₄ and N ₂ O	Report CSCs for the dead wood pool, or provide transparent and verifiable information that the pool is not a source, in accordance with decision 15/CMP.1 (annex, para. 6(e))	81
		Ensure the consistency of reporting by enhancing QA/QC procedures and providing the necessary explanations in the NIR	82
		Report AD and GHG emissions from biomass burning in the areas subject to afforestation and reforestation activities	83
	Deforestation – CO ₂	Include information confirming that the Romanian national system is able to identify all deforested area and CSCs, including those from unmanaged areas	84

<i>Sector</i>	<i>Category</i>	<i>Recommendation</i>	<i>Paragraph cross-references</i>
	Forest management – CO ₂	Report CSCs for the litter, dead wood and soil pools, or provide transparent and verifiable information that the pool is not a source, in accordance with decision 15/CMP.1 (annex, para. 6(e))	85
		Estimate the CO ₂ emissions from organic soils under forest management	86
		Estimate the N ₂ O emissions from drainage of soils under forest management	87
Standard electronic format		Include the information required by decision 22/CMP.1 on any discrepancies identified by the ITL	89
National registry		Include all other additional information in response to the SIAR findings in the NIR in accordance with decision 15/CMP.1, annex, chapter I.G	95

Abbreviations: AD = activity data, CRF = common reporting format, CSC = carbon stock change, EF = emission factor, EU ETS = European Union Emissions Trading System, FAOSTAT = database of the Food and Agriculture Organization of the United Nations, GHG = greenhouse gas, IE = included elsewhere, IEF = implied emission factor, IPCC = Intergovernmental Panel on Climate Change, ITL = international transaction log, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, NA = not applicable, NIR = national inventory report, QA/QC = quality assurance/quality control, Revised 1996 IPCC Guidelines = *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, SIAR = standard independent assessment report, 2006 IPCC Guidelines = *2006 IPCC Guidelines for National Greenhouse Gas Inventories*.

IV. Questions of implementation

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

Annex I

Background data on recalculations and information to be included in the compilation and accounting database

Table 9
Recalculations in the 2013 annual submission for the base year and the most recent year

<i>Greenhouse gas source and sink categories</i>	<i>1989</i>	<i>2010</i>	<i>1989</i>	<i>2010</i>	<i>Reason for the recalculation</i>
	<i>Value of recalculation (Gg CO₂ eq)</i>		<i>Per cent change</i>		
1. Energy	-12 866.89	-6 417.01	-6.3	-7.5	Update of EFs and AD
A. Fuel combustion (sectoral approach)	-12 703.53	-6 390.11	-7.0	-8.2	
1. Energy industries	16.74	-189.98	0.02	-0.6	
2. Manufacturing industries and construction	-14 578.51	-5 368.73	-17.2	-28.9	
3. Transport	1 858.24	-832.43	32.5	-5.5	
4. Other sectors		0.71		0.007	
5. Other		0.32		0.1	
B. Fugitive emissions from fuels	-163.35	-26.90	-0.7	-0.3	
1. Solid fuels	-28.60	-21.37	-0.5	-2.7	
2. Oil and natural gas	-134.76	-5.52	-0.8	-0.07	
2. Industrial processes	-4 025.37	-37.93	-10.2	-0.3	Update of AD to avoid double counting in the mineral products and iron and steel industry
A. Mineral products	-117.50	-24.23	-1.1	-0.5	
B. Chemical industry	154.20	18.35	1.4	0.5	
C. Metal production	-4 062.07	-32.05	-22.8	-0.9	
D. Other production					
E. Production of halocarbons and SF ₆					
F. Consumption of halocarbons and SF ₆					
G. Other					
3. Solvent and other product use					
4. Agriculture					
A. Enteric fermentation					
B. Manure management					
C. Rice cultivation					
D. Agricultural soils					
E. Prescribed burning of savannas					
F. Field burning of agricultural residues					
G. Other					

<i>Greenhouse gas source and sink categories</i>	1989	2010	1989	2010	<i>Reason for the recalculation</i>
	<i>Value of recalculation (Gg CO₂ eq)</i>		<i>Per cent change</i>		
5. Land use, land-use change and forestry	-71.55	-48.38	0.3	0.2	Update of AD for 2010 and fixing errors
A. Forest land	1.47	43.88	-0.008	-0.2	
B. Cropland	-117.56	-126.12	2.1	5.8	
C. Grassland	44.54	25.62	-6.8	19.7	
D. Wetlands		2.17		-1.7	
E. Settlements		-0.16		-0.04	
F. Other land		6.23		0.8	
G. Other					
6. Waste	67.74	93.23	1.5	1.7	Update of EF and AD
A. Solid waste disposal on land	23.61	56.61	1.9	2.0	
B. Wastewater handling	44.13	34.08	1.3	1.2	
C. Waste incineration		2.54		30.6	
D. Other					
7. Other	0.00	0.00	NA	NA	
Total CO₂ equivalent without LULUCF	-16 824.51	-6 361.71	-5.8	-5.2	
Total CO₂ equivalent with LULUCF	-16 896.06	-6 410.09	-6.3	-6.6	

Abbreviations: AD = activity data, EF = emission factor, LULUCF = land use, land-use change and forestry, NA = not applicable.

Table 10

Information to be included in the compilation and accounting database in t CO₂ eq for 2011, including the commitment period reserve

	<i>As reported</i>	<i>Revised estimates</i>	<i>Adjustment^a</i>	<i>Final^b</i>
Commitment period reserve	616 727 686	616 795 736		616 795 736
Annex A emissions for 2011				
CO ₂	87 949 273	87 962 883		87 962 883
CH ₄	22 258 129			22 258 129
N ₂ O	12 679 453			12 679 453
HFCs	440 552			440 552
PFCs	10 924			10 924
SF ₆	7 206			7 206
Total Annex A sources	123 345 537	123 359 147		123 359 147
Activities under Article 3, paragraph 3, for 2011				
3.3 Afforestation and reforestation on non-harvested land for 2011	-392 212			-392 212
3.3 Afforestation and reforestation on harvested land for 2011	IE, NO			IE, NO
3.3 Deforestation for 2011	498 124			498 124
Activities under Article 3, paragraph 4, for 2011^c				
3.4 Forest management for 2011	-20 564 392			-20 564 392
3.4 Cropland management for 2011				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2011				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2011	-286 946			-286 946
3.4 Revegetation in the base year	-1 274 969			-1 274 969

Abbreviations: Annex A sources = sources included in Annex A to the Kyoto Protocol, IE = included elsewhere, NO = not occurring.

^a "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).

^b "Final" includes revised estimates, if any, and/or adjustments, if any.

^c Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Table 11
Information to be included in the compilation and accounting database in t CO₂ eq for 2010

	<i>As reported</i>	<i>Revised estimates</i>	<i>Adjustment^a</i>	<i>Final^b</i>
Annex A emissions for 2010				
CO ₂	80 920 698	80 939 051		80 939 051
CH ₄	22 584 359			22 584 359
N ₂ O	12 408 070			12 408 070
HFCs	695 050			695 050
PFCs	7 925			7 925
SF ₆	5 094			5 094
Total Annex A sources	116 621 196	116 639 550		116 639 550
Activities under Article 3, paragraph 3, for 2010				
3.3 Afforestation and reforestation on non-harvested land for 2010	-373 924			-373 924
3.3 Afforestation and reforestation on harvested land for 2010	IE, NO			IE, NO
3.3 Deforestation for 2010	476 174			476 174
Activities under Article 3, paragraph 4, for 2010^c				
3.4 Forest management for 2010	-22 299 764			-22 299 764
3.4 Cropland management for 2010				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2010				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2010	-268 284			-268 284
3.4 Revegetation in the base year	-1 274 969			-1 274 969

Abbreviations: Annex A sources = sources included in Annex A to the Kyoto Protocol, IE = included elsewhere, NO = not occurring.

^a "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).

^b "Final" includes revised estimates, if any, and/or adjustments, if any.

^c Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Table 12
Information to be included in the compilation and accounting database in t CO₂ eq for 2009

	<i>As reported</i>	<i>Revised estimates</i>	<i>Adjustment^a</i>	<i>Final^b</i>
Annex A emissions for 2009				
CO ₂	83 356 443	83 372 263		83 372 263
CH ₄	24 057 261			24 057 261
N ₂ O	12 163 207			12 163 207
HFCs	703 104			703 104
PFCs	7 004			7 004
SF ₆	7 379			7 379
Total Annex A sources	120 294 397	120 310 217		120 310 217
Activities under Article 3, paragraph 3, for 2009				
3.3 Afforestation and reforestation on non-harvested land for 2009	-354 231			-354 231
3.3 Afforestation and reforestation on harvested land for 2009	IE, NO			IE, NO
3.3 Deforestation for 2009	479 756			479 756
Activities under Article 3, paragraph 4, for 2009^c				
3.4 Forest management for 2009	-22 739 839			-22 739 839
3.4 Cropland management for 2009				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2009				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2009	-253 575			-253 575
3.4 Revegetation in the base year	-1 274 969			-1 274 969

Abbreviations: Annex A sources = sources included in Annex A to the Kyoto Protocol, IE = included elsewhere, NO = not occurring.

^a "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).

^b "Final" includes revised estimates, if any, and/or adjustments, if any.

^c Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Table 13
Information to be included in the compilation and accounting database in t CO₂ eq for 2008

	<i>As reported</i>	<i>Revised estimates</i>	<i>Adjustment^a</i>	<i>Final^b</i>
Annex A emissions for 2008				
CO ₂	100 080 802	100 093 991		100 093 991
CH ₄	25 088 205			25 088 205
N ₂ O	14 373 274			14 373 274
HFCs	890 273			890 273
PFCs	15 343			15 343
SF ₆	16 326			16 326
Total Annex A sources	140 464 223	140 477 412		140 477 412
Activities under Article 3, paragraph 3, for 2008				
3.3 Afforestation and reforestation on non-harvested land for 2008	-333 558			-333 558
3.3 Afforestation and reforestation on harvested land for 2008	IE, NO			IE, NO
3.3 Deforestation for 2008	2 089 701			2 089 701
Activities under Article 3, paragraph 4, for 2008^c				
3.4 Forest management for 2008	-22 263 354			-22 263 354
3.4 Cropland management for 2008				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2008				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2008	-238 940			-238 940
3.4 Revegetation in the base year	-1 274 969			-1 274 969

Abbreviations: Annex A sources = sources included in Annex A to the Kyoto Protocol, IE = included elsewhere, NO = not occurring.

^a "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).

^b "Final" includes revised estimates, if any, and/or adjustments, if any.

^c Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Annex II

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>.

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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>.

“Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories”. FCCC/SBSTA/2006/9. Available at <http://unfccc.int/resource/docs/2006/sbsta/eng/09.pdf>.

“Guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention”. FCCC/CP/2002/8. Available at <http://unfccc.int/resource/docs/cop8/08.pdf>.

“Guidelines for national systems under Article 5, paragraph 1, of the Kyoto Protocol”. Decision 19/CMP.1. Available at <http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf#page=14>.

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FCCC/ARR/2012/ROM. Report of the individual review of the annual submission of Romania submitted in 2012. Available at <http://unfccc.int/resource/docs/2013/arr/rom.pdf>.

Standard independent assessment report, parts 1 and 2. Available at http://unfccc.int/kyoto_protocol/registry_systems/independent_assessment_reports/items/4061.php.

B. Additional information provided by the Party

Responses to questions during the review were received from Mr. Sorin Deaconu (Ministry of Environment and Climate Change), including additional material on the methodologies and assumptions used.

Annex III

Acronyms and abbreviations

AD	activity data
CH ₄	methane
CMP	Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol
CaC ₂	calcium carbide
CO ₂	carbon dioxide
CO ₂ eq	carbon dioxide equivalent
CRF	common reporting format
CSC	carbon stock change
EF	emission factor
ERT	expert review team
EU	European Union
EU ETS	European Union Emissions Trading System
F-gas	fluorinated gas
FAO	Food and Agriculture Organization of the United Nations
GE	gross energy intake
GHG	greenhouse gas; unless indicated otherwise, GHG emissions are the sum of CO ₂ , CH ₄ , N ₂ O, HFCs, PFCs and SF ₆ without GHG emissions and removals from LULUCF
HFCs	hydrofluorocarbons
IE	included elsewhere
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
ITL	international transaction log
Kha	kilohectare
kg	kilogram (1 kg = 1,000 grams)
KP-LULUCF	land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol
LULUCF	land use, land-use change and forestry
Mg	megagram (1 Mg = 1 tonne)
MSW	municipal solid waste
Mt	million tonnes
N	nitrogen
N ₂ O	nitrous oxide
NA	not applicable
NE	not estimated
Nex	N excretion rates
NFI	national forest inventory
NIR	national inventory report
NO	not occurring
PFCs	perfluorocarbons
PJ	petajoule (1 PJ = 10 ¹⁵ joule)
QA/QC	quality assurance/quality control
SEF	standard electronic format
SF ₆	sulphur hexafluoride
SIAR	standard independent assessment report
TJ	terajoule (1 TJ = 10 ¹² joule)
UNFCCC	United Nations Framework Convention on Climate Change