



**Report of the individual review of the annual submission of Romania  
submitted in 2011**

**Note by the secretariat**

The report of the individual review of the annual submission of Romania submitted in 2011 was published on 27 February 2012. For purposes of rule 10, paragraph 2, of the rules of procedure of the Compliance Committee (annex to decision 4/CMP.2, as amended by decision 4/CMP.4), the report is considered received by the secretariat on the same date. This report, FCCC/ARR/2011/ROU, contained in the annex to this note, is being forwarded to the Compliance Committee in accordance with section VI, paragraph 3, of the annex to decision 27/CMP.1.





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Romania submitted in 2011\***

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\* In the symbol for this document, 2011 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 in-country review of the 2011 annual submission of Romania, coordinated by the UNFCCC secretariat, in accordance with decision 22/CMP.1. The review took place from 26 September to 1 October 2011 in Bucharest, Romania, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalist – Ms. Daniela Romano (Italy); energy – Mr. Leif Hockstad (United States of America); industrial processes – Mr. Mauro Meirelles de Oliveira Santos (Brazil); agriculture – Mr. Bernard Hyde (Ireland); land use, land-use change and forestry (LULUCF) – Mr. Robert Waterworth (Australia); and waste – Ms. Baasansuren Jamsranjav (Mongolia). Mr. Hockstad and Mr. Santos were the lead reviewers. The review was coordinated by Ms. Sevdalina Todorova and Mr. Tomoyuki Aizawa (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 made no comment on it.

3. In 2009, the main greenhouse gas (GHG) in Romania was carbon dioxide (CO<sub>2</sub>), accounting for 66.4 per cent of total GHG emissions<sup>1</sup> expressed in CO<sub>2</sub> eq, followed by methane (CH<sub>4</sub>) (18.5 per cent) and nitrous oxide (N<sub>2</sub>O) (14.6 per cent). Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF<sub>6</sub>) collectively accounted for less than 0.5 per cent of the overall GHG emissions in the country. The energy sector accounted for 67.5 per cent of total GHG emissions, followed by the agriculture sector (19.4 per cent), the industrial processes sector (9.3 per cent), the waste sector (3.8 per cent) and the solvent and other product use sector (0.1 per cent). Total GHG emissions amounted to 129,895.33 Gg CO<sub>2</sub> eq in 2009 and decreased by 54.4 per cent between the base year<sup>2</sup> and 2009. The key driver for the fall in emissions was the economic downturn during the period of transition to a market economy in Romania.

4. Tables 1 and 2 show GHG emissions from 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 Article 3, paragraph 4, of the Kyoto Protocol (KP-LULUCF), by gas and by sector and activity, respectively. In table 1, CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O emissions included in the rows under Annex A sources do not include emissions and removals from the LULUCF sector.

5. Table 3 provides information on the most important emissions and removals and accounting parameters that will be included in the compilation and accounting database.

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<sup>1</sup> In this report, the term “total GHG emissions” refers to the aggregated national GHG emissions expressed in terms of CO<sub>2</sub> eq excluding LULUCF, unless otherwise specified.

<sup>2</sup> “Base year” refers to the base year under the Kyoto Protocol, which is 1989 for all gases. The base year emissions include emissions from Annex A sources 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 to 2009<sup>a</sup>**

	Greenhouse gas	Gg CO <sub>2</sub> eq								Change	
		Base year <sup>a</sup>	1990	1995	2000	2005	2007	2008	2009	Base year–2009 (%)	
Annex A sources	CO <sub>2</sub>	193 338.99	176 566.13	130 860.64	96 780.76	106 245.03	110 252.07	103 561.88	86 238.80	–55.4	
	CH <sub>4</sub>	47 951.04	44 057.23	33 281.83	27 059.14	26 859.05	25 728.78	25 682.82	24 023.90	–49.9	
	N <sub>2</sub> O	40 366.98	33 771.45	24 632.88	19 318.43	22 068.14	19 358.05	21 070.71	18 915.14	–53.1	
	HFCs	NA, NE, NO	NA, NE, NO	95.04	163.43	487.21	840.45	890.27	703.10	100.0	
	PFCs	3 349.56	2 115.83	1 773.69	1 292.37	81.90	24.23	15.34	7.00	–99.8	
	SF <sub>6</sub>	NA, NE, NO	NA, NE, NO	0.06	0.00	49.56	58.39	16.33	7.38	100.0	
KP-LULUCF	Article 3.3 <sup>b</sup>	CO <sub>2</sub>						974.60	–883.07		
		CH <sub>4</sub>						NO	NO		
		N <sub>2</sub> O						IE, NO	IE, NO		
	Article 3.4 <sup>c</sup>	CO <sub>2</sub>	–1 999.35						–23 000.97	–22 985.82	1 049.7
		CH <sub>4</sub>	NA, NO						0.00	0.00	NA
		N <sub>2</sub> O	NA, NO						0.00	0.00	NA

*Abbreviations:* 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, IE = included elsewhere, NA = not applicable, NE = not estimated, NO = not occurring.

<sup>a</sup> “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 activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol is 1989.

<sup>b</sup> Activities under Article 3, paragraph 3, of the Kyoto Protocol, namely afforestation and reforestation, and deforestation. Only the inventory years of the commitment period must be reported.

<sup>c</sup> Elected activities under Article 3, paragraph 4, of the Kyoto Protocol, including forest management, cropland management, grazing land management and revegetation. For cropland management, grazing land management and revegetation, the base year and the inventory years of the commitment period must be reported. Romania has elected forest management and revegetation.

Table 2

Greenhouse gas emissions by sector and activity, base year<sup>a</sup> to 2009

		Gg CO <sub>2</sub> eq								Change
Sector		Base year <sup>a</sup>	1990	1995	2000	2005	2007	2008	2009	Base year– 2009 (%)
Annex A	Energy	188 510.87	178 936.97	132 271.21	98 138.32	104 044.96	104 919.29	101 585.07	87 631.37	–53.5
	Industrial processes	42 751.12	29 345.63	23 716.48	17 792.33	19 567.72	22 437.92	18 997.76	12 039.40	–71.8
	Solvent and other product use	645.80	540.50	229.40	224.30	269.65	137.82	135.14	122.33	–81.1
	Agriculture	49 751.30	44 337.26	30 536.99	23 261.40	26 569.85	24 108.90	25 643.34	25 205.70	–49.3
	Waste	3 347.47	3 350.30	3 890.07	5 197.79	5 338.71	4 658.05	4 876.05	4 896.54	46.3
	LULUCF	NA	–27 353.29	–27 150.95	–29 219.21	–28 025.71	–24 607.69	–25 345.07	–27 861.96	NA
<b>Total (with LULUCF)</b>		<b>NA</b>	<b>229 157.36</b>	<b>163 493.19</b>	<b>115 394.92</b>	<b>127 765.17</b>	<b>131 654.28</b>	<b>125 892.29</b>	<b>102 033.37</b>	<b>NA</b>
<b>Total (without LULUCF)</b>		<b>285 006.56</b>	<b>256 510.66</b>	<b>190 644.14</b>	<b>144 614.13</b>	<b>155 790.88</b>	<b>156 261.97</b>	<b>151 237.36</b>	<b>129 895.33</b>	<b>–54.4</b>
Other <sup>b</sup>		NA	NA	NA	NA	NA	NA	NA	NA	0.0
KP-LULUCF	Article 3.3 <sup>c</sup>	Afforestation and reforestation						–1 115.10	–1 362.83	
		Deforestation						2 089.70	479.76	
		<b>Total (3.3)</b>						<b>974.60</b>	<b>–883.07</b>	
	Article 3.4 <sup>d</sup>	Forest management						–21 920.48	–22 019.32	
		Cropland management	NA					NA	NA	NA
		Grazing land management	NA					NA	NA	NA
		Revegetation	–1 999.35					–1 080.47	–966.47	–51.7
	<b>Total (3.4)</b>		<b>–1 999.35</b>					<b>–23 000.95</b>	<b>–22 985.79</b>	<b>NA</b>

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

<sup>a</sup> “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 activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol is 1989.

<sup>b</sup> 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 the national totals.

<sup>c</sup> Activities under Article 3, paragraph 3, of the Kyoto Protocol, namely afforestation and reforestation, and deforestation. Only the inventory years of the commitment period must be reported.

<sup>d</sup> Elected activities under Article 3, paragraph 4, of the Kyoto Protocol, including forest management, cropland management, grazing land management and revegetation. For cropland management, grazing land management and revegetation, the base year and the inventory years of the commitment period must be reported.

Table 3  
Information to be included in the compilation and accounting database in in t CO<sub>2</sub> eq

	<i>As reported</i>	<i>Revised estimates</i>	<i>Adjustment<sup>a</sup></i>	<i>Final<sup>b</sup></i>	<i>Accounting quantity<sup>c</sup></i>
<b>Commitment period reserve</b>	643 729 573	649 476 664		649 476 664	
<b>Annex A emissions for current inventory year</b>					
CO <sub>2</sub>	86 179 992	86 238 802		86 238 802	
CH <sub>4</sub>	23 994 843	24 023 905		24 023 905	
N <sub>2</sub> O	18 531 573	18 915 139		18 915 139	
HFCs	25 124	703 104		703 104	
PFCs	7 004			7 004	
SF <sub>6</sub>	7 379			7 379	
<b>Total Annex A sources</b>	<b>128 745 915</b>	<b>129 895 333</b>		<b>129 895 333</b>	
<b>Activities under Article 3, paragraph 3, for current inventory year</b>					
3.3 Afforestation and reforestation on non-harvested land for current year of commitment period as reported	-173 134	-1 362 829		-1 362 829	
3.3 Afforestation and reforestation on harvested land for current year of commitment period as reported	IE, NO	IE, NO		IE, NO	
3.3 Deforestation for current year of commitment period as reported	23 320	479 756		479 756	
<b>Activities under Article 3, paragraph 4, for current inventory year<sup>d</sup></b>					
3.4 Forest management for current year of commitment period	-22 992 927	-22 019 318		-22 019 318	
3.4 Cropland management for current year of commitment period					
3.4 Cropland management for base year					
3.4 Grazing land management for current year of commitment period					
3.4 Grazing land management for base year					
3.4 Revegetation for current year of commitment period	-87 984	-966 473		-966 473	
3.4 Revegetation in base year	-3 900	-1 999 350		-1 999 350	

*Abbreviations:* IE = included elsewhere, NA = not applicable, NO = not occurring.

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

<sup>b</sup> "Final" includes revised estimates, if any, and/or adjustments, if any.

<sup>c</sup> "Accounting quantity" is included in this table only for Parties that chose annual accounting for activities under Article 3, paragraph 3, and elected activities under Article 3, paragraph 4, if any.

<sup>d</sup> Activities under Article 3, paragraph 4, are relevant only for Parties that elected one of these activities.

6. The GHG inventory is generally in line with the Intergovernmental Panel on Climate Change (IPCC) *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines), the *IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance) and the *IPCC Good Practice Guidance for Land Use, Land-Use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF). However, there is a need for further improvements, particularly in the LULUCF sector.

7. The 2011 inventory submission shows significant improvement in the major issues identified in previous review reports, particularly regarding the implementation of higher-tier methodologies for the key categories, in line with the IPCC good practice guidance, and the improved completeness of the inventory. The ERT notes that some methodological changes are still in progress and the full impact of these changes will be further assessed in future annual submissions. During the review, the expert review team (ERT) identified some methodological and completeness issues in relation to the 2011 annual submission (in particular regarding: CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O emissions from “other fuels” under fuel combustion; fugitive CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O emissions from flaring of oil and natural gas; CO<sub>2</sub> emissions from venting of natural gas; HFC emissions from refrigeration and air-conditioning equipment, foam blowing, fire extinguishers and aerosols/metered dose inhalers; and N<sub>2</sub>O emissions from human sewage and wastewater handling) and recommended that Romania submit revised emission estimates. In response to the list of potential problems and further questions raised by the ERT during the review week the Party submitted revised estimates on 14 November 2011. The submission of revised estimates increased the total national GHG emissions by 0.9 per cent for 2009. The revised estimates and the additional information provided by the Party during the review are addressed in more detail in the sectoral chapters of this report.

8. By submitting the revised inventory and supplying the additional information requested by the ERT, Romania has demonstrated sufficient capacity to comply with the “Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories” (hereinafter referred to as the UNFCCC reporting guidelines).

9. Romania has submitted supplementary information required under Article 7, paragraph 1, of the Kyoto Protocol in accordance with chapter I of the annex to decision 15/CMP.1.

10. Romania has chosen to account for activities under Article 3, paragraph 3, of the Kyoto Protocol at the end of the commitment period. The Party has elected forest management and revegetation as activities under Article 3, paragraph 4, of the Kyoto Protocol and has chosen accounting at the end of the commitment period. Romania has reported information on activities under Article 3, paragraph 3, of the Kyoto Protocol and elected activities under Article 3, paragraph 4, of the Kyoto Protocol in accordance with decisions 15/CMP.1, 16/CMP.1 and 6/CMP.3.

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

12. The national system performs its required functions as set out in the annex to decision 19/CMP.1. The ERT noted the improvements in the implementation of the general and specific functions of the national system (as specified in section II.A.2 of this report) with regard to completeness, methodological choices (the use of higher-tier methods for the key categories), the allocation of sufficient financial and human resources to inventory preparation and the timely implementation of inventory improvement plans. However, the ERT identified a need for further improvements with regard to: ensuring the continuity of methodological changes; strengthening the interaction between the National Environmental Protection Agency (NEPA) and data providers and research contractors at other agencies; improving the quality assurance/quality control (QA/QC) activities; and improving the documentation in the NIR for all sectors on the methodologies, activity data (AD) and emission factors (EFs) used, in order to increase the transparency of reporting. The ERT notes the improvements made by Romania, and recommends that the Party fully implement the inventory improvement plans.

13. The national registry continues to perform the functions set out in the annex to decision 5/CMP.1 and the annex to decision 13/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant decisions of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP). The ERT recommends that Romania address any issues raised in the standard independent assessment report (SIAR), as applicable.

14. Romania has reported information on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol, as requested in chapter I.H of the annex to decision 15/CMP.1, in its national inventory report (NIR).

15. In the course of the review, the ERT formulated a number of recommendations relating to the completeness of the annual submission and the transparency of reporting with regard to the methodologies and assumptions used, data collection, and the derivation of the EFs. The key recommendations for Romania are provided in paragraph 219 of this report.

## **II. Technical assessment of the annual submission**

### **A. Overview**

#### **1. Annual submission and other sources of information**

16. The 2011 annual inventory submission was submitted on 15 April 2011; it contains a complete set of common reporting format (CRF) tables for the period 1989–2009 and an NIR, which was submitted on 19 April 2011. The CRF tables and the NIR were resubmitted on 25 August and 15 September 2011 and the NIR was further updated on 22 September 2011. Romania also submitted 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, the accounting of Kyoto Protocol units, changes in the national system and in the national registry, and the minimization of adverse impacts under Article 3, paragraph 14, of the Kyoto Protocol. The SEF tables were submitted on 15 April 2011 and resubmitted on 15 September 2011. The annual submission was submitted in accordance with decision 15/CMP.1.

17. During the review, in response to a question raised by the ERT, Romania explained that the main reason for the three resubmissions was to provide the ERT with the latest available and most accurate data before and during the review week. The ERT noted the number of ongoing projects in the country and welcomes the efforts of the Party to improve its inventory. However, the ERT strongly encourages Romania to submit its next annual submission by 15 April 2012 as required by decision 15/CMP.1 and to make one official submission annually.

18. Romania officially submitted revised emission estimates (CRF tables) on 14 November 2011, including the CRF tables, in relation to activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol (KP-LULUCF CRF tables), in response to the list of potential problems and further questions raised by the ERT during the review week. The values in this report are based on the information submitted on 14 November 2011.

19. The ERT also used the previous 2011 and previous year's submissions during the review. In addition, the ERT used the SIAR, parts I and II, to review information on the

accounting of Kyoto Protocol units (including the SEF tables and their comparison report) and on the national registry.<sup>3</sup>

20. During the review, Romania provided the ERT with additional information. The documents concerned are not part of the annual submission but are in some cases referenced in the NIR. The full list of materials used during the review is provided in annex I to this report.

#### Completeness of inventory

21. The inventory covers most source and sink categories for the period 1989–2009 and is complete in terms of years and geographical coverage. Romania has implemented many improvements since the 2010 submission. The ERT noted that the number of categories reported as not estimated (“NE”) has decreased considerably in the latest submission and many estimates for categories previously reported as “NE” were included for the first time in the 2011 submission, such as the categories grassland, cropland, settlements and other land. In addition, in response to the list of potential problems and further questions raised by the ERT during the review week, Romania has also provided estimates of: emissions from the use of “other fuels” in energy industries, manufacturing industries and construction, and other sectors (commercial/institutional); emissions from other petroleum products under feedstocks and non-energy use of fuels; emissions from peat under other sectors (agriculture/forestry/fisheries); and fugitive emissions from oil and natural gas (venting and flaring), HFC emissions from refrigeration and air-conditioning equipment, foam blowing, fire extinguishers and aerosols/metered dose inhalers. Romania provided some additional estimates for the mandatory categories under the LULUCF sector and KP-LULUCF activities (see paras. 129, 130 and 173). However, changes in dead organic matter (DOM) and mineral soil carbon under forest land remaining forest land are still reported as “NE”. The ERT strongly recommends that Romania continue its studies on improving the estimates of soil carbon changes across the LULUCF sector and provide estimates for the change in soil carbon in its next annual submission. The ERT further encourages Romania to continue its efforts to improve the completeness of its inventory.

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

#### Overview

22. The ERT noted that previous ERTs had concluded that the national system was not performing all of the specific functions of inventory preparation in accordance with the annex to decision 19/CMP.1. The enumerated problems were mainly linked to completeness issues, the application of inappropriate IPCC tier methodologies in the inventory, the failure to implement important recommendations from previous review reports and inventory improvement plans according to schedule. In general, these issues were caused by a lack or insufficient allocation of financial resources.

23. For the 2011 submission, Romania has implemented numerous and important recommendations from the previous review report in order to resolve the problems relating

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<sup>3</sup> The SIAR, parts I and II, is prepared by an independent assessor in line with decision 16/CP.10 (paras. 5(a), 6(c) and 6(k)), under the auspices of the international transaction log administrator using procedures agreed in the Registry System Administrators Forum. Part I is a completeness check of the submitted information relating to the accounting of Kyoto Protocol units (including the SEF tables and their comparison report) and to national registries. Part II contains a substantive assessment of the submitted information and identifies any potential problem regarding information on the accounting of Kyoto Protocol units and the national registry.

to the compliance of the national system with all of the specific functions of inventory preparation. The national system has been strengthened through the allocation of additional financial resources by the Ministry of the Environment and Forest (MEF) to implement research studies at the national level in order to apply higher-tier methodologies to the estimation of emissions from the key categories; additional funding was also committed to NEPA for the employment of permanent staff at the agency.

24. As indicated above, the number of categories reported as “NE” has decreased, thereby improving the completeness of the national inventory (see para. 21 above).

25. The previous review report<sup>4</sup> concluded that the national system of Romania had failed to conduct some of the specific functions required by the “Guidelines for national systems under Article 5, paragraph 1, of the Kyoto Protocol” as included in the annex to decision 19/CMP.1, in particular:

(a) The preparation of estimates in accordance with the methods described in the Revised 1996 IPCC Guidelines, as elaborated by the IPCC good practice guidance, and ensuring that appropriate methods are used to estimate emissions from the key categories (para. 14(b) of the annex to decision 19/CMP.1);

(b) The collection of sufficient AD, process information and EFs as are necessary to support the methods selected for estimating anthropogenic GHG emissions by sources and removals by sinks (para. 14(c) of the annex to decision 19/CMP.1).

26. For the 2011 submission, Romania has increased the accuracy of the national inventory by estimating the emissions from some of the key categories using higher-tier methodologies. For example, in the energy sector, CO<sub>2</sub> emissions from public electricity and heat production, and manufacturing industries and construction were estimated using a tier 2 method, and emissions from road transportation were calculated using the COPERT III model; in the industrial processes sector, CO<sub>2</sub> and PFC emissions from aluminium production were estimated using a tier 3 and tier 2 method, respectively; and in the waste sector, CH<sub>4</sub> emissions from managed waste disposal on land were estimated using a tier 2 method. The ERT noted that the improvements are based on the preliminary results of the study “Elaboration/documentation of national emission factors/other parameters relevant to National Greenhouse Gas Inventory (NGHGI) Sectors Energy, Industrial Processes, Agriculture and Waste, values to allow for the higher tier calculation methods implementation” that will allow the application of higher-tier methodologies to all the key categories in the energy, industrial processes, agriculture and waste sectors. The ERT welcomes the methodological improvements to the inventory and recommends that the Party ensure full implementation and the continuity of the work undertaken.

27. In the previous review report, the ERT also concluded that the national system of Romania was unable to comply with the requirements for the preparation of the information required under Article 7, paragraph 1, of the Kyoto Protocol, in particular for the LULUCF activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, noting in particular that:

(a) The method used to estimate emissions and removals for forest management did not comply with the IPCC good practice guidance for LULUCF and did not properly reflect the national circumstances;

(b) The AD, processing of information and EFs were insufficient for the preparation of a complete inventory of emissions and removals for forest management activity and several other pools.<sup>5</sup>

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<sup>4</sup> FCCC/ARR/2010/ROU, paragraph 20.

<sup>5</sup> FCCC/ARR/2010/ROU, paragraph 21.

28. Progress has been noted in the estimation process for the LULUCF sector in the 2011 submission; in particular, increased completeness and improved accuracy of the estimates of emissions and removals using the results of the study “National GHG Inventory for LULUCF both under UNFCCC and KP obligations”, which was used for the implementation of a tier 2 methodology to estimate emissions and removals from living biomass under forest management. The estimates of emissions from forest management have been revised downwards based on this study. Although some pools under forest management are still reported as “NE”, the Party has provided some evidence that these pools are not a net source of emissions. Further, Romania has developed an improvement plan which describes how the Party plans to amend the estimates for the LULUCF sector, in particular the changes in the carbon stocks of DOM and mineral soil carbon, using data from the National Forest Inventory (NFI) and new soil carbon studies. The sectoral AD have been improved and land-use matrices have been developed, although they require further improvement. The reporting of the changes in carbon stocks under reforestation and deforestation now includes estimates for litter, dead wood and soil carbon. The ERT welcomes these improvements and recommends that the Party continue to implement the inventory improvement plan, taking into account the results of the 2011 review report.

29. The objectives set by the Party in the 2010–2011 inventory improvement plan have been achieved and the studies were funded and finalized in sufficient time to allow for some of the categories in the energy, waste, agriculture and LULUCF sectors to be estimated using higher-tier methodologies and for categories previously reported as “NE” to be included. During the review week, the ERT was also provided with the 2011–2012 improvement plan, and the first results scheduled for August and September 2011 led to an update of the inventory and the NIR. The study “Elaboration/documentation of national emission factors/other parameters relevant to National Greenhouse Gas Inventory (NGHGI) Sectors Energy, Industrial Processes, Agriculture and Waste, values to allow for the higher tier calculation methods implementation” was due to be finalized in October 2011. The ERT notes that the outputs of the study were communicated to the ERT during the review and the ERT was able to verify that this study has been completed and that the results have been presented as planned. The ERT commends the efforts of the national inventory team to implement the planned project activities as scheduled and recommends that Romania make full use of the results of the studies undertaken in its 2012 submission.

30. During the review week, Romania further clarified the institutional arrangements for the provision of documentation related to the establishment, maintenance and functioning of the national system. New permanent staff have been employed at NEPA, and each person in the inventory team has been assigned a specific role and responsibilities regarding the management of the sectors. The implementation of other relevant activities and the training of the personnel, both internally, with the cooperation of the European Environment Agency, and following the UNFCCC reviewer training courses is planned. The ERT welcomes these efforts to strengthen institutional capacity, but notes that, during the review, the new staff were still not completely involved in the inventory activities. The ERT recommends that Romania ensure the timely training of the new staff members and report on the activities undertaken in this regard in the next annual submission. The ERT strongly recommends that the Party involve all the internal staff in the next inventory compilation process as early as possible, in order to resolve the most important issues and problems identified in relation to accuracy and QA/QC procedures that were previously caused by a lack of dedicated resources.

31. All of the listed changes have been effective in terms of improving the accuracy of the emission estimates for some of the key categories and supporting the functioning of the overall national system for the 2011 submission. Specific changes are discussed in the relevant sector chapters of this report. The ERT notes that the arrangements for the national system are clearly defined and formulated in official documents, and concludes that the

organization of the national system at present is such to ensure the estimation of emissions and the timely reporting of the inventory.

32. Therefore, the ERT concludes that the national system of Romania is in accordance with the requirements of national systems outlined in decision 19/CMP.1, noting the progress in the 2011 submission compared to previous submissions, as well as the proven institutional changes already in place and the ongoing improvements. The ERT recommends that Romania continue to ensure the functionality of the national system by funding specific medium- and long-term studies on inventory-related information which will enable the use of higher-tier methodologies in the most relevant categories of the inventory and the continuous improvement of the accuracy and completeness of the national inventory.

#### Inventory planning

33. NEPA, under the auspices of MEF, is the single national entity with overall responsibility for the preparation and management of the GHG inventory as established by Governmental Decision no. 1570/2007. Subsequent to the entry into force of this decision, other regulations have been established to complete the institutional arrangements for the national system: the MEF Orders for approving the procedure on national inventory reporting, the modality for responding to the observations and questions raised by the review process and on the processing, archiving and storage of data; and the NEPA President Decisions for approving the procedure for the selection of the estimation methods and EFs used in the estimation process and the QA/QC procedures.

34. Other agencies and organizations are also involved in the preparation of the inventory, supplying the basic data necessary for the emission estimation process. Principally, the National Institute of Statistics (NIS), which compiles the *National Statistical Yearbook* and the energy balance of Romania, local and regional environmental protection agencies, the Ministry of Economy, the Romanian Civil Aviation Authority and relevant industrial operators supply data for the estimation of emissions in the energy and industrial processes sectors. The Ministry of Agriculture, Forests and Rural Development, the National Administration "Romanian Waters", and landfill operators through the local and regional environmental protection agencies assist in the compilation of data for the agriculture and waste sectors. The national GHG inventory for the LULUCF sector, both under the Convention and the Kyoto Protocol, is managed by the Forest Research and Management Institute (ICAS) in accordance with a specific contract established by MEF for 2011. The activities of ICAS comprise the preparation of the LULUCF emission and removal estimates, the completion of the CRF tables and the compilation of the NIR, the implementation of the relevant sector-specific QC activities and representing Romania during the review process. These institutions are obliged to provide the requested data, EFs and associated uncertainty figures to NEPA by a specific deadline as established by Governmental Decision no. 1570/2007. The ERT recommends that the Party ensure the continuous close collaboration between the contractors of the external projects, data providers and NEPA experts, in order to comply with the reporting requirements under the Convention and the Kyoto Protocol. The ERT also recommends that Romania describe the process for the official approval of the inventory in its next annual submission.

#### Inventory preparation

##### *Key categories*

35. Romania has reported a key category tier 1 analysis, both level and trend assessment, as part of its 2011 submission. The key category analysis performed by

Romania and that performed by the secretariat<sup>6</sup> produced similar results. Romania has included the LULUCF sector in its key category analysis, which was performed in accordance with the IPCC good practice guidance and the IPCC good practice guidance for LULUCF.

36. The ERT noted that Romania has reported the key category analysis for the base year as recommended by the previous review report. However, the analysis of key categories in the most recent version of the NIR for 1989 was based on base year emission estimates which were not consistent with the data reported in the most recent version of the CRF tables in the 2011 submission. The ERT recommends that Romania improve the relevant QC procedures before submitting the inventory and report the key category analysis consistent with the most recently submitted values in its next annual submission.

37. Romania also implemented the key category analysis for the activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol (KP-LULUCF activities) in accordance with the IPCC good practice guidance for LULUCF. Forest management, and afforestation and reforestation are identified as key categories.

38. The results of the key category analysis are used as a driving factor for the preparation of the inventory, particularly for the 2011 submission, and for the preparation of future inventory improvement plans. The ERT recommends that Romania continue to use the key category analysis for the prioritization of inventory improvements.

#### *Uncertainties*

39. Romania has prepared a tier 1 uncertainty analysis for the reported emissions for 2009 and for the trend during the period 1989–2009 in accordance with the IPCC good practice guidance and has reported the uncertainty estimates in the NIR in accordance with the UNFCCC reporting guidelines. The level of disaggregation by category is the same for the uncertainty analysis and the key category analysis, except for two categories included in the waste sector.

40. The total uncertainty of the inventory for 2009 excluding LULUCF is 16.8 per cent and 19.4 per cent including the LULUCF. The trend uncertainty was estimated to 4.5 and 3.8, respectively. The values including the LULUCF sector differ significantly with the 2008 values in the 2010 submission, namely of total uncertainty of 30.1 per cent and uncertainty in trend of 11.6 per cent. The ERT recommends that the Party include discussion on the uncertainty in its next NIR.

41. Similarly to the key category analysis, the ERT noted the inconsistency between the emission values used in the CRF tables for the final submission and those reported in the relevant tables of annex 7 to the NIR. The total estimated emission levels do not refer to any of the last three submissions, either for the base year or for 2009. Also, some of the uncertainty values described in the sectoral chapters of the NIR do not match the figures reported in annex 7 to the NIR (e.g. the CO<sub>2</sub> EF for road transportation for 2009). The ERT recommends that Romania improve the QC checks of the different versions of the annual submission and ensure consistency across the CRF tables, the data used in the uncertainty analysis and the NIR for each of its resubmissions.

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<sup>6</sup> The secretariat identified, for each Party, the categories that are key categories in terms of their absolute level of emissions, applying the tier 1 level assessment as described in the IPCC good practice guidance for LULUCF. Key categories according to the tier 1 trend assessment were also identified for Parties that provided a full set of CRF tables for the base year or period. Where the Party performed a key category analysis, the key categories presented in this report follow the Party's analysis. However, they are presented at the level of aggregation corresponding to a tier 1 key category assessment conducted by the secretariat.

42. The ERT further noted that the NIR provides little information on how the uncertainty values were established for most of the sectors. During the review, Romania provided the ERT with a list of references used in the uncertainty analysis. The uncertainty figures for the EFs are mainly based on default values from the Revised 1996 IPCC Guidelines, the IPCC good practice guidance, the IPCC good practice guidance for LULUCF and the *2006 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the 2006 IPCC Guidelines), or values based on expert judgement resulting from the analysis of inventories of neighbouring countries; the uncertainty values for the AD are mostly provided by NIS. The ERT reiterates the recommendation from the previous review report that Romania include references on how the uncertainty values are derived for each category in the NIR of its next annual submission. The ERT further recommends that the Party improve the uncertainty assessment characterizing the national EFs with nationally derived uncertainty figures, as far as feasible, for all sectors.

43. During the review, Romania informed the ERT of expected improvements to the uncertainty analysis due to the results of a national study on the implementation of higher-tier methods for the estimation of the key categories in different sectors. In addition, a specific study on uncertainty has been planned for 2013. The ERT appreciates the efforts of Romania to resolve this issue and its plans for future improvements. The ERT recommends that the Party incorporate any additional country-specific information it collects in the uncertainty analysis of the next annual submission.

#### *Recalculations and time-series consistency*

44. Recalculations have been performed and reported in accordance with the IPCC good practice guidance. The ERT noted that recalculations reported by Romania for the years 1989–2008 have been undertaken to take into account the availability of new and updated AD, EFs and relevant parameters, and the implementation of higher-tier methods, especially for the key categories. The recalculations had a major impact on the emission estimates of all sectors, and were undertaken in light of the number of recommendations from previous review reports. Detailed descriptions of these recalculations are provided in the sector-specific chapters of this report. The major changes, and the magnitude of the impact, include: an increase in estimated total GHG emissions in the base year (0.8 per cent excluding LULUCF and 5.2 per cent including LULUCF), and a decrease in 2008 (1.1 per cent) excluding LULUCF and an increase in 2008 (8.0 per cent) including LULUCF. The rationale for these recalculations is generally provided in the NIR and in CRF table 8(b), although the ERT recommends that Romania further justify the impact of the recalculations by including more transparent information in the NIR and the CRF tables on the rationale for the recalculations.

45. The ERT noted that Romania has implemented the recommendations of the previous review report; each resubmission in 2011 shows the recalculations compared to the 2010 submission and the recalculations are consistently applied over the entire time series. The ERT commends Romania for these improvements.

#### *Verification and quality assurance/quality control approaches*

46. Romania has elaborated a QA/QC plan in accordance with the IPCC good practice guidance. The plan includes all mandatory elements as set out in the IPCC good practice guidance and decision 19/CMP.1.

47. In response to questions raised by the ERT during the review, Romania provided the ERT with copies of the inventory improvement plans for 2010–2011 and 2011–2012, the GHG inventory preparation plan, and the QA/QC programme for the national GHG inventory. In addition, the Party provided the ERT with the sectoral QC checklists compiled by each of the sectoral experts. The ERT noted that there has been an

improvement in the documentation compared to previous years' submissions and that the objectives established in the 2011 improvement plan have been achieved. The ERT commends Romania for these improvements.

48. With regard to the implementation of the QC checks, the ERT noted that problems can still be detected both at the general and sectoral levels, such as inconsistencies between the CRF tables and the NIR for the key category and uncertainty analyses (see paras. 36 and 41 above); and inconsistencies between the data reported under the energy and industrial processes sectors, and the agriculture and LULUCF sectors. The ERT recommends that Romania further enhance its QC procedures before submitting its annual inventory and ensure that there is close interaction among the sectoral experts, especially for the interlinked sectors, so that a useful cross-check of the QA/QC procedures can be applied. The ERT recommends that Romania provide detailed information on the sector-specific QA/QC activities so that the QA/QC procedures and verification activities can be checked and/or implemented by experts other than the relevant sectoral ones, particularly the new staff members.

49. Romania has reported on its QA activities, mainly those involving the technical support of third-party countries. These include support efforts by Austria and the Netherlands regarding the implementation of different sector-specific projects, and the support of other relevant institutions responsible for developing sectoral studies for the improvement of the quality of the inventory.

50. With regard to verification, various activities are performed by the national inventory team in relation to the industrial processes sector (e.g. comparing the time series used for inventory compilation with those provided by the Ministry of Economy and NIS); the agriculture sector (e.g. comparing the national time series with data from the Food and Agriculture Organization of the United Nations (FAO) and Eurostat); and the waste sector (e.g. comparing the data sets with the data available from Eurostat).

51. Given the range of data providers participating in the inventory preparation process, the ERT recommends the close interaction between NEPA and the data providers and research contractors at other agencies in order to improve the quality of the inventory data, ensure the optimal implementation of research results, and ensure the implementation of continuous verification activities with a clear understanding of the reporting requirements under the Convention and the Kyoto Protocol. The ERT recommends that Romania clearly document all QA/QC and verification procedures in the next annual submission.

#### *Transparency*

52. The ERT notes that the NIR includes information on the key categories, methods, data sources, EFs, uncertainty estimates and QA/QC procedures. However, the ERT agrees with the recommendation in the previous review report that additional information should be provided to better explain the methodologies used, especially if they differ from those contained in the Revised 1996 IPCC Guidelines and the IPCC good practice guidance, the rationale for the choice of relevant AD, and the underlying assumptions for the choice of country-specific EFs and parameters.

53. The ERT further notes that initial improvements in this regard have been carried out in the 2011 inventory submission, notably the inclusion of information in the annexes to the NIR on the use of higher-tier methods, in particular in the energy sector, primarily for energy industries, manufacturing industries and construction and road transportation. Other improvements in the description of the methodologies used were observed in the industrial processes sector for cement, iron and steel and aluminium production. However, the ERT still considers that the NIR does not include all the information necessary to assess the inventory and strongly recommends that Romania continue to improve the transparency of

the information reported in the NIR, prioritizing its efforts for the most important key categories, as detailed in the relevant sectoral chapters of this report.

#### Inventory management

54. Romania has a centralized archiving system, which includes the archiving of disaggregated EFs and 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 QA/QC procedures, external and internal reviews, and documentation on annual key categories and key category identification and planned inventory improvements.

55. All documents are archived electronically whenever possible; documents not available in electronic format are archived in paper format. Electronic data are backed up daily on the NEPA server during the preparation of the annual submission and weekly at other times. Data archiving is implemented according to the provisions of MEF Order no. 1474/2008. The archiving system is located at the NEPA headquarters in Bucharest.

56. During the review week, the ERT was allowed access to the archiving system of Romania, and the ERT appreciates the fact that the Party was able to provide archived documentation upon request. However, the ERT considers that, given the recent increase in staff members in the inventory team, further efforts should be made regarding the classification of the archive and in order to expand the cross-referencing of documents and the sharing of information among the experts.

### **3. Follow-up to previous reviews**

57. In response to the previous review report, Romania has implemented a substantial number of recommendations, the most important being:

(a) The development and implementation of higher-tier methods to estimate emissions and sinks for some of the key categories, in accordance with the IPCC good practice guidance and the IPCC good practice guidance for LULUCF, thereby improving the accuracy of the inventory;

(b) The implementation of the annual inventory improvement plans according to schedule, and reporting in the NIR on the progress achieved;

(c) The allocation of sufficient resources to improve the inventory, and to increase the capacity of the national system in order to ensure the timely implementation of the inventory improvement plans;

(d) The strengthening of the institutional arrangements and funding of the national system, ensuring that it is able to conduct all the specific functions in accordance with the annex to decision 19/CMP.1;

(e) The strengthening of the institutional arrangements for the national system to enable compliance with the requirements for the preparation of the information required for the KP-LULUCF activities.

58. However, the ERT noted that some recommendations have not been fully implemented and recommends that Romania continue to improve the transparency of its reporting with regard to the description of the methodologies, assumptions and background data for the country-specific EFs, the assumptions behind the uncertainty values, and the reporting of implied emission factors (IEFs) and their trends when AD are confidential.

#### 4. Areas for further improvement

##### Identified by the Party

59. The 2011 NIR identifies several areas for improvement, such as the development of historical data for the period 1989–2010 and for the estimation of direct and indirect GHG emissions from road transportation using the COPERT IV model; and the improvement of the accuracy, completeness, consistency and transparency of the inventory for the LULUCF sector, both under the Convention and the Kyoto Protocol. Other planned improvements include the improvement of the completeness of the inventory and the implementation of higher-tier methods for most of the key categories. Planned improvements are provided in the category-specific sections of the NIR. The ERT recommends that the Party include a summary of the planned improvements in chapter 10 of the NIR in the next annual submission.

##### Identified by the expert review team

60. During the review, the ERT identified cross-cutting issues for improvement. These are listed in paragraph 219 below and are linked to the transparency of reporting, methodological choices, the implementation of the QA/QC procedures and the continuity of the changes undertaken in relation to the institutional arrangements of the national system.

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

### B. Energy

#### 1. Sector overview

62. The energy sector is the main sector in the GHG inventory of Romania. In 2009, emissions from the energy sector amounted to 87,631.37 Gg CO<sub>2</sub> eq, or 67.5 per cent of total GHG emissions. Since the base year, emissions have decreased by 53.5 per cent. The key driver for the fall in emissions is due to the economic downturn in the period of transition to a market economy in Romania. Within the energy sector, 44.9 per cent of the emissions were from energy industries, followed by 17.4 per cent from transport, 13.5 per cent from manufacturing industries and construction, 12.1 per cent from other sectors and 9.3 per cent from fugitive emissions from oil and natural gas. The remaining 2.8 per cent were from fugitive emissions from solid fuels.

63. Romania has made recalculations for the energy sector between the 2010 and 2011 submissions in response to the 2010 annual review report recommendations to implement methodological changes and following changes in the AD in the national energy balance consistent with routine statistical updates. The Party has transparently documented the quantitative effects of the recalculations in the NIR, and the ERT welcomes this effort. The ERT encourages Romania to include more qualitative information in the NIR on the recalculations, in order to allow for the easier review of the recalculations by future ERTs. The impact of these recalculations on the energy sector is a decrease in emissions of 0.4 per cent for 2008. The main recalculations took place in the following categories:

(a) Energy industries and manufacturing industries and construction: due to the implementation of tier 2 methodologies;

(b) Road transportation: due to the implementation of the COPERT III model across the time series;

(c) Oil and natural gas: due to inclusion of estimates of emissions from production, processing, transmission and venting, previously reported as “NE.

64. The energy sector, as reported by Romania in its 2011 submission, is generally complete. The emissions from some categories are reported as “NE”, but these include categories for which no methods or default EFs are provided in the IPCC good practice guidance and the Revised 1996 IPCC Guidelines. Estimates for CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O emissions from “other fuels” under fuel combustion, oil and natural gas, flaring of oil, and venting and flaring of natural gas were provided during the review (see paras. 83 and 86 below).

65. The previous ERT considered that the submission of Romania was not transparent, particularly with regard to the aggregated way of reporting emissions from energy industries and from manufacturing industries and construction even though the energy balance provided sufficient detail to support a more detailed disaggregation of the inventory by subcategory. The ERT reiterates the recommendation of the previous review reports that the Party improve the detail and transparency of its reporting and ensure consistency between the inventory and the energy balance. With regard to transparency, the ERT recommends that Romania improve its documentation on country-specific methodologies, specifically for the recently implemented higher-tier methods for the energy industries, manufacturing industries and construction, and transport categories (namely, road transportation), and provide more detailed documentation in the NIR on the derivation of the country-specific EFs and AD used in the calculations in the annexes to the NIR. The ERT also recommends that Romania further document the assumptions and expert judgement used in the calculation of emissions from categories in the energy sector, and include such information in the NIR of its next annual submission.

66. The ERT notes that Romania uses IPCC default values in its uncertainty analysis and encourages the Party to conduct further investigations to improve the uncertainty analysis for the energy sector in order to make it more applicable to the national circumstances. During the review week, the Party informed the ERT that a consultant in Romania is beginning an analysis of how to improve the uncertainty estimates for the energy sector, and the ERT welcomes this effort.

67. The ERT also notes that additional QA/QC procedures beyond those already detailed in Romania’s QA/QC plan may be necessary to ensure the accurate reporting of this important sector of Romania’s national inventory, especially regarding the use of data from the energy balance compiled by NIS. The ERT recommends that Romania develop a specific QA/QC plan for the energy sector, focused on the data inputs used from the energy balance in the energy sector calculations, and provide further documentation on the verification efforts already undertaken for some parameters (e.g. the EFs derived from European Union emissions trading scheme (EU ETS) data).

## **2. Reference and sectoral approaches**

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

68. In the 2011 submission, the CO<sub>2</sub> emissions for 2009 calculated using the reference approach were 10.0 per cent higher than the emissions estimated in accordance with the sectoral approach. Large differences are observed over the entire time series. The difference between the apparent energy consumption reported in the reference approach and the sectoral approach for 2009 is 8.6 per cent. The ERT notes that liquid fuels, as reported in CRF table 1.A(c), show the largest difference when comparing the reference approach and the sectoral approach (e.g. a 19.1 per cent difference in CO<sub>2</sub> emissions and a 16.3 per cent difference in energy consumption in 2009).

69. Romania provides very limited information in the NIR or in annex 4.1 to the NIR to explain the significant differences between the reference approach and the sectoral approach. The NIR states that corrections to the reference approach for the non-energy use of fuels are difficult given the limited information on non-energy use of fuels in the

national energy balance. The NIR also cites the “statistical differences” recorded in the energy balance. However, during the review week, the ERT noted that additional information on the non-energy use of liquid fuels is provided in the energy balance, and notes that these data were not used in the compilation of the reference approach. The ERT also notes that the reference approach does not consider international bunker fuels. The ERT recommends that the Party correct this omission in the next annual submission. The ERT also strongly reiterates the recommendations from the previous review report that Romania take additional steps to: improve the use of AD from the national energy balance; further examine the non-energy use of fuels in Romania; further explain the “statistical differences” recorded in the energy balance; and improve the AD and the way information is processed in the preparation of the reference approach, in order to increase the comparability between the two approaches and allow for a more useful analysis of the accuracy of the inventory.

70. The apparent consumption in Romania’s reference approach corresponds quite closely to the International Energy Agency (IEA) data. For most years of the time series, there is a difference of 2.0 per cent in apparent consumption between the reference approach and the IEA data, except for 2008 (–8.0 per cent) and 2009 (–5.3 per cent). The 1989–2009 growth rate of the total apparent consumption is closely comparable to the IEA data. In response to questions raised by the ERT during the review week, NIS stated that Romania is continuing its analyses of the differences. The ERT encourages the Party to continue to examine whether any underlying reasons for the differences can be identified, especially for the later year of the time series, and to provide its analysis in a future inventory submission.

#### *International bunker fuels*

71. The Party did not provide specific information on the methods used to calculate international bunker fuels in the NIR. An assessment by the ERT was made based on the information provided in the NIR on domestic civil aviation and domestic navigation transport and on the explanations of how fuel use is split between domestic and international uses. The ERT strongly recommends that Romania include a specific section in the NIR on the calculation of international bunker fuels.

72. The estimates of emissions from aviation bunker fuels are calculated using data provided by the Romanian Civil Aeronautical Authority through the Ministry of Transport. The split between domestic and international aviation is calculated assuming that all flights made by foreign operators are international, and for the national operators, a comparison is made between the distances travelled in Romania and the distances travelled abroad to determine the fuel consumption split. Given the size of the country and the internal destinations included in the itineraries of domestic operators (e.g. Carpatair), the allocation of 0.19 per cent of fuel consumption to domestic aviation in 2008 is not sufficiently justified. The rise in fuel consumption for domestic aviation from 0.19 per cent to 4.73 per cent between 2008 and 2009 is not documented in the NIR. Even with this significant increase, the comparison with the IEA data for 2009 shows much higher values reported for fuel consumption in international aviation in the CRF tables and much lower fuel consumption values reported for domestic consumption. The ERT strongly recommends that Romania investigate its current method for allocating fuel consumption to international flights, and coordinate with the Ministry of Transport on data availability to improve the currently employed method and its assumptions.

73. As regards the reporting of emissions from navigation, the ERT reiterates the recommendation of the previous review report that the Party justify the assumptions for the limited domestic maritime navigation, based on the fact that the country has only two ports in the Black Sea. With regard to inland navigation, the NIR states that domestic and

international navigation occur in the Danube River and some channels. The ERT noted that Romania divides domestic and international emissions using data from the NIS *National Statistical Yearbook* on transport of goods only and the NIR states that this assumes that the distance travelled by passengers is very small when compared with the distance travelled by goods. The ERT reiterates the recommendation from the previous review report that Romania improve, in its next annual submission, its description of the data used to differentiate domestic and international fuel use in aviation and maritime navigation, and confirm that the data used from the Romanian Civil Aeronautical Authority and the *National Statistical Yearbook* are in line with the definitions for international bunker fuels described in the IPCC good practice guidance.

#### *Feedstocks and non-energy use of fuels*

74. In the NIR, Romania states that it uses data from the energy balance on non-energy use of fuels to assess feedstocks and non-energy use of fuels. The ERT notes that the data in CRF table 1.A(d) are limited data on non-energy use of those fuels as reported in the energy balance, and that default IPCC carbon storage factors have been used. During the review week, the ERT further noted that additional information on the non-energy use of fuels, such as natural gas, refinery gas, and other petroleum products, is provided in the energy balance, but these data were not used to account for feedstocks and non-energy use of fuels in the inventory. Furthermore, the ERT notes, based on information received during the review week, that no direct link has been made between the feedstocks and non-energy use of fuels reported in the energy sector with the consuming categories estimated and reported in the industrial processes sector, notably iron and steel production and ammonia production. The ERT recommends that the Party implement additional QA/QC procedures to better align the information on feedstocks and non-energy use of fuels reported in the energy sector with the calculations in the industrial processes sector that use feedstocks and confirm that there is no double counting of emissions. The ERT also recommends that Romania further investigate and elaborate on the non-energy use of fuels reported in the energy balance which is not reported in the energy sector, and assess whether the country-specific carbon storage factors are appropriate. With regard to the transparency of reporting in CRF table 1.A(d), the ERT reiterates the recommendations of the previous review report that the Party report the values or provide explanations for the fuels currently reported as “NE”, and clearly indicate the fuels included under the category other non-specified. The ERT also recommends that the Party fill in the additional information box of the table in order to increase the transparency of reporting across sectors and ensure that no double counting occurs.

75. In response to the list of potential problems and further questions raised by the ERT, Romania provided revised estimates for feedstocks based on its examination of disaggregated data from the energy balance compiled by NIS for “other fuels”. Based on the disaggregated data, the Party provided revised estimates for fuel consumption and the stored carbon for ethane, bitumen and lubricants (mineral oils, paraffin waxes and paraffin). The ERT welcomes this effort by Romania to provide more complete estimates of feedstocks and non-energy use of fuels, and recommends that the Party continue to work with NIS to explore the collection of additional disaggregated data as noted in paragraph 85 below.

### **3. Key categories**

#### Stationary combustion: liquid, solid and gaseous fuels – CO<sub>2</sub>

76. Romania has implemented the recommendations of the previous review report by using a tier 2 method for the estimation of emissions from energy industries and from manufacturing industries and construction for 2008 and 2009. The ERT commends

Romania for the introduction of a higher-tier method for these key categories in line with the IPCC good practice guidance. The Party has provided some details on the country-specific EFs used in its calculations in the annexes to the NIR. These country-specific EFs are calculated using a weighted arithmetic average based on the values of individual EFs taken from the monitoring reports sent by the operators under the EU ETS and their fuel quantity use. The weighted average EF, considered to be country-specific, is then applied across the total consumption of each applicable fuel.

77. In response to questions raised by the ERT during the review week, Romania further described its analysis and provided the ERT with its analysis of the data reported by the operators under the EU ETS. Those operators performed a laboratory analysis of the fuels and in line with Governmental Decision no. 780/2007 regarding the establishment of the EU ETS in Romania, and the verification procedures for the EU ETS. The ERT welcomes the efforts by Romania to further explain the analyses conducted to develop a country-specific EF for stationary combustion, and recommends that the Party provide further information on these analyses in the NIR and the annexes to the next NIR, including: further information on the EU ETS as implemented in Romania (e.g. relevant laws and decisions on monitoring, reporting and verification and/or QA/QC procedures); the national organization responsible for the implementation of the EU ETS and any data-sharing arrangements with agencies responsible for calculating the emissions for the energy sector inventory; a comparison of the data from the operators under the EU ETS with the national energy balance statistics on fuel use.

78. Romania continues to report aggregated emissions from energy industries and manufacturing industries and construction in the NIR and the CRF tables, without further disaggregating the emissions to specific subcategories as listed in the CRF tables. During the review week, the Party presented the ERT with information stating that the data for the energy balance are collected and presented based on specific industry classifications in Romania that includes many subcategories listed in the CRF tables (e.g., food, beverages, tobacco, pulp, paper and cardboard, and metallurgy). Given that this information is already provided in the energy balance, the ERT recommends that Romania examine the disaggregated data included in the energy balance, and calculate and report the emission estimates at the disaggregated subcategory level in the NIR and the CRF tables, where applicable.

#### Road transportation: liquid and gaseous fuels – CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O

79. Romania has implemented the recommendations of the previous review report by using a tier 2 method, the COPERT III model, for the estimation of emissions from road transportation. The ERT commends the Party for the introduction of a higher-tier method for this key category, in line with the IPCC good practice guidance. Romania has provided very limited information on the use of the COPERT III model in the annexes to the NIR, stating only that “for the years 1990–2004 AD for population were taken from the link [www.emisia.com/Copert/Vehicle Fleets/ Road Data for Romania](http://www.emisia.com/Copert/Vehicle_Fleets/Road_Data_for_Romania) and compared with data for Bulgaria and Hungary (neighbouring countries)” and “for the years 2005–2009 AD were provided by Romanian Auto Register (RAR)”. The NIR further states that Romania used aggregated raw data on mileage, speed and other parameters for the COPERT III model. The ERT does not consider this information to be transparent to allow for an understanding of the steps taken to derive the inputs for the COPERT III model that are then used to calculate the emissions from road transportation. The ERT recommends that Romania provide additional explanatory information in annex 8.2 to the NIR to include specific data sets provided by RAR, any steps taken to maintain time-series consistency between the EMISIA data for the COPERT III model and the RAR data inputs, and further document the assumptions and expert judgement used in the COPERT III model, as applicable. The ERT also notes that the website address listed in the NIR for the data used

from EMISIA is incorrect, and recommends that Romania include the correct website address in the NIR of the next annual submission.

#### Civil aviation: liquid fuels – CO<sub>2</sub>

80. As explained in paragraphs 71–73 above, the ERT noted that limited information is provided in the NIR on the method used to calculate emissions from civil aviation. The ERT strongly recommends that, in the next annual submission, Romania improve its description of the data used to differentiate domestic and international aviation fuel use, and confirm that the data used from the Romanian Civil Aeronautical Authority and the *National Statistical Yearbook* are in line with the definitions for dividing domestic use from international bunker fuels as described in the IPCC good practice guidance and, if needed, recalculate the estimates for the entire time series.

#### Fugitive emissions from oil and natural gas – CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O

81. Romania has reported CO<sub>2</sub> emissions from venting of natural gas, CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O emissions from flaring of oil, and CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O emissions from flaring of natural gas as “NE”, which was identified in the previous review report as an issue that needed to be addressed by the Party. During the review, the ERT noted that the estimates of CH<sub>4</sub> emissions from flaring of natural gas are actually included under venting of gas, in line with the footnote in CRF table 1.B.2. The ERT recommends that Romania change the notation key to included elsewhere (“IE”) for CH<sub>4</sub> emissions from flaring of natural gas, in order to be in line with the guidance provided in the Revised 1996 IPCC Guidelines on the use of the default EF.

82. Romania has reported CO<sub>2</sub> and CH<sub>4</sub> emissions from venting of oil, calculated using the CO<sub>2</sub> and CH<sub>4</sub> EFs of Bulgaria as suggested by the European Commission. No further information was provided by the European Commission or Romania on the EF derived from the Bulgarian EF, and on whether or not the venting CH<sub>4</sub> EF of Bulgaria also includes CH<sub>4</sub> emissions from flaring. Furthermore, during the review week, the ERT noted that the EFs applied in the calculation of the Party’s estimates do not match the EFs reported by Bulgaria in its inventory submission. As Romania has not provided justification of or further details on what is covered by the EF used, the ERT assumes that the EF only includes venting and does not include flaring; this was further confirmed by the ERT as Bulgaria has reported emissions separately for flaring of oil in its 2011 inventory submission. However, the use of the European Commission applied EF does not appear to be in line with the IPCC good practice guidance, and the ERT also notes that it appears to significantly overestimate CO<sub>2</sub> and CH<sub>4</sub> emissions from venting of oil. The ERT recommends that Romania further examine the appropriateness of the EF used and replace it with a justified country-specific or regional EF used by other Parties with economies in transition (EITs) in line with the IPCC good practice guidance, and revise its estimate for CO<sub>2</sub> and CH<sub>4</sub> emissions from venting of oil in the next annual submission, as appropriate.

83. Emissions from the remaining subcategories of fugitive emissions from oil and natural gas (CO<sub>2</sub> emissions from venting of gas, CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O emissions from flaring of oil, and CO<sub>2</sub> and N<sub>2</sub>O emissions from flaring of natural gas) have not been reported, although default EFs for these subcategories and gases are provided in the IPCC good practice guidance. The ERT notes that, in the IPCC good practice guidance, the EFs provided for these subcategories are based on North American practices. However, the IPCC good practice guidance also states that: “Even where moderate regional differences exist, the new factors may still offer more reliable results than those obtained from use of the factors given in the IPCC Guidelines.” In response to the list of potential problems and further questions raised by the ERT during the review week, Romania provided the missing estimates that increased the emissions from oil and natural gas by 46.48 Gg CO<sub>2</sub> eq. The

ERT welcomes this effort by Romania to provide more complete emission estimates for this category.

84. Further, in line with the IPCC good practice guidance, the ERT recommends that Romania examine other available regional factors and additional information overall for fugitive emissions from oil and natural gas that would allow the Party to implement a higher-tier method for the estimation of emissions from this key category.

#### **4. Non-key categories**

##### Fuel combustion: other fuels – CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O

85. Romania has not reported emissions from fuel combustion activities under any of the energy categories for “other fuels” (emissions from “other fuels” are reported under transportation in the CRF tables, but this is biomass combustion from railways mistakenly aggregated under “other fuels” and not biomass in the totals). The previous review report recommended that Romania confirm with the institution responsible for the elaboration of the energy balance whether other fuels are consumed and, if so to coordinate with that institution, so that these fuels are accounted for both in the energy balance and in the inventory. In response to this recommendation, the Party changed the notation key for emissions from “other fuels” from “NE” to not occurring (“NO”) in the 2011 inventory submission. Information on the energy balance compiled by NIS shows the domestic consumption of “other fuels”, as provided under the listing of “alți combustibili” in the energy balance. Information provided to the ERT during the review week indicated that the fuels included under the listing of “alți combustibili” in the energy balance are: peat, biofuels, non-regenerative industrial waste, regenerative urban waste and non-regenerative urban waste. The ERT concluded that not including estimates of emissions from fuel combustion for all fuels and all categories identified within the Revised 1996 IPCC Guidelines is not in line with the guidance on completeness contained in the IPCC good practice guidance and could result in a potential underestimation of emissions. This issue has been raised consistently by previous ERTs, including in the initial review report of 2007, but Romania has not yet acted upon the recommendations from the previous review reports to provide estimates for these fuels.

86. In response to the list of potential problems and further questions raised by the ERT during the review, Romania provided revised estimates for “other fuels” using disaggregated data from the energy balance compiled by NIS. Based on the disaggregated data, the Party has now included estimates of biofuels and peat, as included in other fuels within the energy balance, for energy industries, manufacturing industries and construction, and other sectors, that increased the emissions from the sector by 42.60 Gg CO<sub>2</sub> eq. The ERT agrees with these estimates and welcomes this effort by Romania to use disaggregated data to provide more complete estimates of fuel combustion from other fuels, and recommends that the Party continue to work with NIS to provide updated emission estimates in future inventory submissions.

#### **5. Areas for further improvement**

##### Identified by the Party

87. Romania expects to continue its analysis of data from the EU ETS operators through a study conducted by the Institute for Studies and Power Engineering (ISPE), and to complete its development of country-specific EFs from that data. The Party plans to collect the appropriate AD in order to implement its use of the COPERT IV model for emissions from road transportation. Romania has also stated that it will make efforts to collect more information on “other fuels” listed in the energy balance.

Identified by the expert review team

88. The ERT recommends that Romania further improve the calculations and reporting for the energy sector by:

(a) Investigating and fully explaining the differences in the comparison of the reference approach and the sectoral approach;

(b) Implementing additional QA/QC measures for the energy sector on the use of the fuel consumption data from the energy balance;

(c) Confirming that the approach and data used to differentiate domestic aviation and maritime navigation from international bunker fuels is in line with the IPCC good practice guidance;

(d) Improving the analysis and inclusion of feedstocks and non-energy use of fuels, and the QA/QC procedures with regard to cross-sectoral considerations for the calculations in the industrial processes sector;

(e) Improving transparency by fully describing the methodologies, EFs and data used for the estimation of emissions using higher tiers, primarily for energy industries, manufacturing industries and construction, and road transportation;

(f) Implementing higher-tier methods for the estimation of emissions from all remaining key categories for which tier 1 methods are currently used, including categories such as residential (CO<sub>2</sub> emissions from solid, liquid and gaseous fuels, and CH<sub>4</sub> emissions from biomass fuels), commercial/institutional (CO<sub>2</sub> emissions from gaseous fuels), agriculture/forestry/fisheries (CO<sub>2</sub> emissions from liquid fuels) and fugitive emissions from oil and natural gas (CH<sub>4</sub> emissions);

(g) Investigating country-specific or appropriate regional EFs to improve the estimates for fugitive emissions from oil and natural gas;

(h) Continuing to investigate the inclusion of other fuels combusted in Romania, and calculate and report emission estimates where appropriate.

## **C. Industrial processes and solvent and other product use**

### **1. Sector overview**

89. In 2009, emissions from the industrial processes sector amounted to 12,039.40 Gg CO<sub>2</sub> eq, or 9.3 per cent of total GHG emissions, and emissions from the solvent and other product use sector amounted to 122.33 Gg CO<sub>2</sub> eq, or 0.1 per cent of total GHG emissions. Since the base year, emissions have decreased by 71.8 per cent in the industrial processes sector, and decreased by 81.1 per cent in the solvent and other product use sector. The key driver for the fall in emissions in the industrial processes sector is the decrease in industrial production during the period of transition to a market economy in Romania, most notably for iron and steel production, nitric acid production and ammonia production. Within the industrial processes sector, 42.3 per cent of the emissions were from mineral products, followed by 33.2 per cent from metal production and 18.6 per cent from chemical industry. The remaining 5.9 per cent were from consumption of halocarbons and SF<sub>6</sub>.

90. Romania has made recalculations for the industrial processes sector between the 2010 and 2011 submissions in response to the 2010 annual review report following changes in EFs in order to apply higher-tier methods to the estimation of emissions from aluminium production. The Party also corrected an error in the application of the methodology for emissions from iron and steel production. The impact of these recalculations, on the

industrial processes sector is a decrease in emissions of 1.3 per cent for 2008. The main recalculations took place in the following categories:

(a) Aluminium production (PFC and CO<sub>2</sub> emissions), due to the upgrading of the methodology.

(b) Iron and steel production (CO<sub>2</sub> emissions), due to an improved methodology and the elimination of double counting for the entire time series.

91. In response to the list of potential problems and further questions raised by the ERT during the review week the Party provided revised estimates for the category consumption of halocarbons and SF<sub>6</sub> (see para. 106 below).

92. The recalculations were justified but not sufficiently documented in the NIR. The ERT recommends that Romania include further quantitative information on the recalculations undertaken and their impacts in the next annual submission.

93. Romania has made recalculations for the solvent and other product use sector between the 2010 and 2011 submissions following in order to rectify identified errors. The impact of these recalculations on the solvent and other product use sector is an increase in emissions of 0.3 per cent for 2008. The only recalculation took place in the category paint application.

94. In general, the inventory of CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O emissions for the industrial processes sector and the solvent and other product use sector is complete and emissions have been reported for all categories for which IPCC default methodologies are available. A number of categories are still reported as "NE", for which no methodologies are available in either the Revised 1996 IPCC Guidelines or the IPCC good practice guidance. The ERT noted that the potential emissions of F-gases are reported as "NO", even when actual emissions from the same categories are reported and encourages Romania to estimate potential emissions of F-gases. In addition, some of the actual emissions are reported as "NO" based on the results of questionnaires. During the review, the ERT concluded that some of the categories reported as "NO" could be a source of emissions (see para. 106 below).

95. The ERT noted that Romania has transparently documented the reported data in the documentation boxes of the CRF tables and has included relevant explanations of the notation keys used. The ERT noted that the Party has improved the explanations of the trends in emissions in the NIR following a recommendation of the previous review report. However, the ERT recommends that the Party continue to enhance transparency by including clearer information on the AD, parameters and EFs used, particularly for cement production, iron and steel production and aluminium production.

96. The ERT noted that some double counting of emissions in the inventory may occur in related categories, such as lime production with limestone and dolomite use, and ferroalloys production with fuel combustion in the energy sector. The ERT recommends that Romania enhance its QA/QC efforts in relation to the AD collected from different data providers, for example by comparing the information from operators against official reports, and using the carbon balance to limit possible occurrences of double counting. In particular, the ERT recommends that the Party implement improved QA/QC measures and cross-sectoral checks for emissions from categories calculated using tier 1 default EFs that do not specifically account for the sources of carbon, such as coke or limestone.

## **2. Key categories**

### Cement production – CO<sub>2</sub>

97. Romania has used the IPCC good practice guidance tier 2 methodology to estimate CO<sub>2</sub> emissions for 2008 and 2009; the NIR states that the estimates of CO<sub>2</sub> emissions from

this category are similar to those reported under the EU ETS. The IEFs for these two years were higher than those for the other years of the time series, where Romania used a tier 1 approach. The previous ERT raised this inconsistency issue and recommended that the Party provide consistent estimates for the whole time series, report in the NIR the annual calcium oxide (CaO) and magnesium oxide (MgO) content of clinker, and improve the documentation on the cement kiln dust (CKD) correction factor. These recommendations were not followed; however, during the review week, Romania provided the ERT with access to confidential data for this category. According to these data, all the plants but one reported that the CKD was completely recycled to the kiln. The one plant that did not recycle the CKD used different correction factors for the CKD (higher than those suggested by the IPCC good practice guidance for inefficient plants) and was closed in 2004. Following the recommendation of the ERT on the use of the average of the IEFs for 2008 and 2009 for the other years of the time series and the information on the correction factors for CKD, the Party provided the ERT with revised estimates for the years 1989–2007. The average increase in annual emissions was by 1.5 per cent. The ERT recommends that Romania include the improved time-series estimates in its next annual submission.

#### Lime production – CO<sub>2</sub>

98. During the review week, the ERT found that at least one iron and steel plant in Romania, which has an integrated lime production process for its own use, reports to NIS both lime production and the use of limestone and dolomite as feedstock. Romania has estimated both CO<sub>2</sub> emissions from lime production and CO<sub>2</sub> emissions from limestone and dolomite use, resulting in double counting, because the emissions used for the internal production of lime in the integrated iron and steel plant should have been discounted from the emissions from limestone and dolomite use. The ERT recommends that Romania refine its data for this category and provide a revised time series for this subcategory as well as for limestone and dolomite use in its next annual submission.

#### Ammonia production – CO<sub>2</sub>

99. Emissions from this category were estimated using a tier 1 methodology, with no reference of the source of feedstock carbon used in the process. The ERT noted that there has been no cross-checking with the energy sector regarding the possible double counting of emissions. The ERT recommends that Romania use a higher-tier method for this category, and conduct further QA/QC checks on the use of feedstock fuels for this category to ensure the consistent and accurate reporting of feedstocks and non-energy use of fuels in the inventory.

#### Iron and steel production – CO<sub>2</sub>

100. Romania has used an IPCC tier 2 methodology to estimate emissions from this category based on the carbon balance with country-specific EFs. During the review week, the ERT detected an error in the formula used to calculate emissions for the entire time series, since the carbon content of steel was not discounted from the carbon emissions but added to them. The Party promptly recognized the issue and provided the ERT with revised estimates: the CO<sub>2</sub> emissions decreased by an average of 13.9 per cent for the whole time series. The ERT recommends that Romania keep this correction for the next annual submission, and enhance its QA/QC efforts to eliminate such errors in future calculations.

101. The previous review report recommended that Romania include the complete time series of the carbon content of pig iron and crude steel in the NIR, so that the trend and variations could be assessed. The ERT reiterates the recommendation that the Party include this information in the NIR of its next annual submission, together with information on the production from electric arc furnaces.

### Aluminium production – PFCs

102. Romania has reported that there is only one plant included under this category in Romania and it changed its technology for aluminium production across the time series: for the period 1989–1996 only the side worked pre-baked technology was used and for the period 1997–2002 a gradual change was made to the centre worked pre-baked (CWPB) technology. In more recent years, only the CWPB technology has been used.

103. Following the recommendation of the previous review report, Romania has estimated PFC emissions for the period 2003–2009 using a tier 2 approach. However, the approach has not been applied to the entire time series, and for the previous years, tier 1 default EFs have been used, which results in an IEF much higher than that used in the more recent years. During the review week, Romania provided the ERT with access to confidential information used for the time-series calculation. The ERT assessed the information and concluded that, for the period where a tier 2 method was used, no detailed parameters were available, and the emission estimates provided by the plant could not be verified. The ERT recommends that the Party further document all the parameters used for the tier 2 calculation and improve the time-series consistency of the category in the next annual submission.

### **3. Non-key categories**

#### Carbide production – CO<sub>2</sub>

104. During the review week, Romania provided the ERT with access to confidential data, which allowed the ERT to assess the calculation method. The ERT noted that the Party had erroneously used the EF for calcium carbide use rather than the EF for calcium carbide production for the entire time series. Conversely, the ERT also noted that the production data were mixed with import data. The ERT strongly recommends that the Party revise its estimates, in accordance with the Revised 1996 IPCC Guidelines, by using the correct AD for the production of calcium carbide with the EF for its production and the AD for calcium carbide use (taking into account imports) with the EF for its use, in the next annual submission.

#### Consumption of halocarbons and SF<sub>6</sub> – PFCs, HFCs and SF<sub>6</sub>

105. The previous review report pointed to the instability of the emissions from the consumption of HFCs, PFCs and SF<sub>6</sub>, highlighting the insufficiency of the documentation in the NIR to explain the trends. The review report recommended that Romania provide more transparent information on how the surveys were implemented, the QC procedures in place to ensure the consistency and completeness of the AD and emission estimates, and further discussion and justification of the trends. During the review week, the ERT assessed the questionnaire used by Romania for the data collection and concluded that it is insufficient for the collection of the necessary AD to implement a tier 2a bottom-up methodology, as it was not suitable for assessing the quantity of F-gases in operating systems (the average annual stocks) and the quantity remaining in products at decommissioning. The ERT also noted that the coverage of agents using the F-gases, to whom the questionnaire to identify the amounts of F-gases imported/exported was distributed, may not be complete. For the four subcategories refrigeration and air-conditioning equipment, foam blowing, fire extinguishers and aerosols/ metered dose inhalers, the ERT made a comparison with other reporting Parties on an emissions per capita basis, and concluded that Romania's approach underestimates emissions from these subcategories.

106. In response to the list of potential problems and further questions raised by the ERT during the review week, the Party submitted revised estimates, using an average emissions

rate from clusters of EIT countries (excluding those with no emissions or those which had adjustments) with the gross domestic product (GDP) as the proxy, for the time series 1995–2009 and for those four subcategories. This method was used up to 2008, which is the last year available from the reviewed 2010 submissions; for 2009, the GDP growth from 2008 was applied to the 2008 estimates. The revised estimated resulted in an increase in total HFC emissions by 4,239.4 per cent (869.76 Gg CO<sub>2</sub> eq) for 2008 and 2,698.6 per cent (677.98 Gg CO<sub>2</sub> eq) in 2009. The ERT recognizes that this is an interim solution and strongly recommends that Romania make efforts to collect the required national data for the estimation of these subcategories in the next annual submission and to report emissions per chemical and in a disaggregated way in CRF table 2(II).F, in order to improve the transparency of its reporting.

#### **4. Areas for further improvement**

##### Identified by the Party

107. In the NIR, Romania indicates its commitment to filling in the gaps in AD and to using higher-tier methods for the key categories as a general statement for the sector, in particular regarding ammonia production and F-gas consumption.

##### Identified by the expert review team

108. The ERT recommends that Romania further improve the calculations and reporting for the industrial processes sector by:

(a) Strengthening the institutional arrangements across the experts representing different governmental institutions and reporting under different reporting schemes (e.g the Convention on Long-range Transboundary Air Pollution) to ensure consistent reporting and experience-sharing;

(b) Enhancing its QA/QC efforts before submitting the inventory, in order to reduce the number of errors and inconsistencies;

(c) Improving transparency in the reporting of methodologies, assumptions, data collection and calculations, and in particular the documentation in the calculation spreadsheets, in order to allow all members of the inventory team to easily understand the calculations;

(d) Improving its QA measures to include an assessment of the sectoral emissions by unbiased experts;

(e) Ensuring the availability of AD for the calculation of F-gas emissions in Romania and providing clear documentation on the methodologies applied and assumptions made;

(f) Ensuring that the questionnaires used in the calculations of emissions from consumption of halocarbons and SF<sub>6</sub> cover the whole target audience.

## **D. Agriculture**

### **1. Sector overview**

109. In 2009, emissions from the agriculture sector amounted to 25,205.70 Gg CO<sub>2</sub> eq, or 19.4 per cent of total GHG emissions. Since the base year, emissions have decreased by 49.3 per cent. The key drivers for the fall in emissions are the decreases in the livestock population and crop production and the decrease in nitrogen (N) fertilizer application to soils. These changes occurred as a result of the transition to a market economy, causing a

fall in agricultural production. Within the sector, 61.3 per cent of the emissions were from agricultural soils, followed by 24.4 per cent from enteric fermentation, 14.2 per cent from manure management and 0.1 per cent from rice cultivation. Emissions from prescribed burning of savannas are reported as “NO” as there are no savannas in Romania, while emissions from field burning of agricultural residues are reported as “NA” and “NO”.

110. Romania has made recalculations for the agriculture sector between the 2010 and 2011 submissions following changes in AD. The impact of these recalculations on the agriculture sector is an increase in emissions of 0.8 per cent for 2008. The recalculations only affected the category agricultural soils for the entire time series and are documented in CRF table 8(b) and in the NIR.

111. The inventory for the sector is complete in terms of gases and geographical coverage and Romania has provided estimates for all categories for which IPCC default methodologies are available.

112. The ERT noted a lack of transparency in the agriculture chapter of the NIR in terms of documenting the applied methodologies, assumptions and country-specific parameters used, as well as the emission trends. During the review week, Romania provided the ERT with additional information which, if included in its NIR, would increase the transparency of its annual submission. The ERT commends the Party for providing its calculation sheets during the review, which enhanced the ERT’s understanding of the emission calculations. The ERT recommends that Romania include, in the next NIR, information on the sectoral quality checks performed and the results of comparisons between the AD used in the inventory and the data compiled by FAO, with explanations for any differences, in its future annual submissions.

113. Romania continues to use IPCC default methodologies and EFs to estimate emissions for all categories within the agriculture sector, including the key categories and all relevant subcategories. The ERT considers that this approach is not consistent with the IPCC good practice guidance. During the review, Romania provided the ERT with details of a study (see para. 26 above), that was due to be completed by October 2011. The scope of the project includes the provision of tier 2 estimates where applicable for the key categories (e.g. enteric fermentation and manure management) and the provision of development of country-specific parameters with respect to N<sub>2</sub>O emissions from agricultural soils. The ERT acknowledges that the results from the study were provided to the ERT upon its finalization. The ERT commends the Party for this development and recommends that Romania, in its next annual submission, use the results of the study in the estimation of emissions from the agriculture sector and provide detailed information with respect to the AD, EFs and methodologies used.

114. The ERT found some inconsistencies between the information reported in the main body of the text in the NIR and that presented in the data tables in the NIR (e.g. table 6.10 – Implication of recalculations on emission estimates). The ERT recommends that the Party enhance the implementation of QC measures in the NIR, so as to increase the quality and transparency of reporting in its next annual submission.

115. Romania indicates in its NIR that the uncertainty values of the AD for all categories are based on expert judgement, but no further information is provided concerning the rationale or background data supporting the values used. During the review week, the Party provided the ERT with the rationale for the values used. The ERT recommends that Romania provide relevant explanations in the NIR of its next annual submission in line with the information provided to the ERT during the review week.

## 2. Key categories

### Enteric fermentation – CH<sub>4</sub>

116. Romania uses a tier 1 methodology, including basic livestock characterization and default EFs for the developed countries (Eastern Europe) as provided in the Revised 1996 IPCC Guidelines and further elaborated in the IPCC good practice guidance, to estimate emissions from almost all livestock species. The only exception is dairy cattle, where the EFs are interpolated using the dairy cattle EFs presented in table 4-4 of the Revised 1996 IPCC Guidelines using data on milk yields. The previous review reports noted that enteric fermentation is a key category, and recommended that Romania make efforts to develop enhanced population characteristics and use higher-tier methodologies and country-specific EFs to estimate emissions from cattle and sheep. Following the recommendation, the Party initiated a study (see para. 113 above) aimed at providing the relevant parameters for the calculation of tier 2 estimates for this category. The ERT recommends that the Party implement and document the results of the study in the next annual submission. The ERT also recommends that Romania follow the decision tree in the IPCC good practice guidance and obtain the necessary data to prepare an enhanced livestock population characterization and develop country-specific parameters (e.g. gross energy intake (MJ/head/day) and methane conversion rate), giving priority to the most relevant livestock species.

117. Romania states in its NIR that, for the period 1989–2003, buffalos for milk production are included in the population of dairy cattle, but that the two animal species are separated for the period 2004–2009. During the review week, the Party provided the ERT with an explanation for this approach. The ERT reiterates the recommendation from the previous review report that Romania improve the explanation of the derivation of the dairy cattle and buffalo populations, in line with the explanation provided to the ERT during the review, in the NIR of its next annual submission.

### Manure management – CH<sub>4</sub> and N<sub>2</sub>O

118. Romania uses a tier 1 methodology, including basic livestock characterization and default EFs (for temperate climate region, Eastern Europe) as provided in the Revised 1996 IPCC Guidelines and further elaborated in the IPCC good practice guidance, to estimate emissions from all livestock species. Following the recommendations of the previous review reports, Romania has initiated a study to allow the reporting of emissions using a tier 2 methodology for this key category. The ERT recommends that the Party use, in its next annual submission, where appropriate, the results of the ongoing study (see para. 113 above), and follow the decision tree in the IPCC good practice guidance in this regard by preparing an enhanced livestock population characterization and develop country-specific parameters (e.g. the share of animal waste management systems, volatile solids and N excretion rates) for the relevant livestock categories, and provide this information in the NIR of its next annual submission.

119. The Party uses the default EFs from the Revised 1996 IPCC Guidelines (table 4-6) for developed countries in temperate climates, whereas the average annual temperature in Romania of 11°C indicates that, for Romania, the EFs from the Revised 1996 IPCC Guidelines (table 4-6) for “cool climate” are more appropriate. The ERT considers this to be a conservative approach and encourages the Party to investigate whether all regions are situated in the “cool climate” or “temperate climate” category and to consider, document and discuss this parameter in the next annual submission.

### Direct soil emissions – N<sub>2</sub>O

120. Romania uses IPCC default parameters to estimate N<sub>2</sub>O emissions from agricultural soils. The ERT encourages Romania to develop country-specific values for the fraction of

N that volatilizes from synthetic fertilizers ( $\text{Frac}_{\text{GASF}}$ ) and animal manure ( $\text{Frac}_{\text{GASM}}$ ) for its next annual submission. The derivation of these values falls within the scope of the project outlined in paragraph 113 above.

121. The ERT commends Romania for undertaking a review of its emission estimate for the cultivation of histosols and for the recalculation undertaken for the time series 1989–2007. The ERT encourages the Party to continue to refine the emission estimates for this category by maintaining consistency with the AD used for the estimation of emissions from organic soils in the LULUCF sector.

122. The ERT encourages Romania to investigate and use, if available, the necessary AD to allow the estimation of  $\text{N}_2\text{O}$  emissions from N in sewage sludge application to agricultural land based on data from the European Union (EU) sewage sludge directive 86/78/EEC and in line with the IPCC good practice guidance.<sup>7</sup> The ERT also encourages the Party to maintain consistency with the emission estimates undertaken in the waste sector in this regard.

#### Indirect emissions – $\text{N}_2\text{O}$

123. The ERT encourages the Party to develop country-specific values for the fraction of N that volatilizes from synthetic fertilizers ( $\text{Frac}_{\text{GASF}}$ ) and animal manure ( $\text{Frac}_{\text{GASM}}$ ) which are used in the calculation of emissions from this category in its next annual submission. The derivation of these values falls within the scope of the project outlined in paragraph 113 above.

### **3. Areas for further improvement**

#### Identified by the Party

124. The sector-specific improvement plans for Romania include the use of the results of the ongoing study “Elaboration of national EFs and other relevant parameters relevant to NGHGI sectors, Energy, Industrial Processes, Agriculture and Waste”, which will allow the Party to calculate the emission estimates using higher-tier methodologies, particularly for emissions from dairy cattle, non-dairy cattle, buffalo and swine from enteric fermentation and manure management. The scope of the study also includes the provision of relevant country-specific parameters for the improved estimation of  $\text{N}_2\text{O}$  emissions from soils.

#### Identified by the expert review team

125. To further improve the calculations and the reporting for the agriculture sector, the ERT recommends that Romania:

- (a) Implement the improvements planned with regard to moving towards the use of higher-tier methods in its next annual submission;
- (b) Ensure that the assumptions and parameters used to develop the higher-tier methods are justified and transparently documented in the NIR, including information on the trend and national circumstances;
- (c) Improve the transparency of reporting by providing further explanation of the trends, changes in methodological approaches, and assumptions used for the selection of EFs and AD.

<sup>7</sup> See page 4.54 of the IPCC good practice guidance.

## **E. Land use, land-use change and forestry**

### **1. Sector overview**

126. In 2009, net removals from the LULUCF sector amounted to 27,861.96 Gg CO<sub>2</sub> eq. Since the base year, net removals have increased by 29.7 per cent. The key drivers for the rise in net removals are the ongoing changes in the age class structure and harvest rates in Romania's forests. Within the sector, net removals of 24,831.02 Gg CO<sub>2</sub> eq were from forest land followed by net removals of 4,276.95 Gg CO<sub>2</sub> eq from cropland, and 43.84 Gg CO<sub>2</sub> eq from wetlands. Grassland accounted for net emissions of 128.11 Gg CO<sub>2</sub> eq, settlements of 406.79 Gg CO<sub>2</sub> eq and other lands of 754.95 Gg CO<sub>2</sub> eq. Compared to the other sectors of the inventory, the total emissions for the LULUCF sector have been relatively stable since 1990. Overall, the LULUCF sector offsets 21.4 per cent of the total national emissions.

127. The Party has made recalculations for the LULUCF sector between the 2010 and 2011 submissions in response to the 2010 annual review report. This includes changes in AD and EFs. The impact of these recalculations on the LULUCF sector is a reduction in net removals by 30.4 per cent taking into account the changes for 2008. The main recalculations took place in the following categories:

(a) Forest land remaining forest land, due to changes in the land area and improvements in the estimation of the change in living biomass;

(b) Cropland remaining cropland, which was previously reported as "NA"/"NE" and is now included in the inventory;

(c) Land converted to forest land, which was previously reported as "NA"/"NE" and is now included in the inventory.

128. The ERT noted that the recalculations were applied to all reporting years to ensure time-series consistency. In particular, the reporting of emissions and removals for cropland remaining cropland and land converted to forest land represents a significant improvement in the completeness of the inventory. The recalculations are justified; however, documentation on the methods used to estimate emissions and removals from cropland remaining cropland and land converted to forest land could be further improved.

129. During the review, the ERT noted the DOM and soil carbon pools were reported as "NO" or "NE" in the land converted to forest land and forest land converted to other land categories. During the 2010 review, Romania calculated tier 1 estimates for several of these pools, but these estimates were not included in the 2011 submission. In response to questions raised by the ERT during the review, the Party provided revised CRF tables which include the estimates for the DOM and mineral soil carbon pools. The ERT commends Romania for the efforts made during the review week to ensure the completeness of the inventory and recommends that the Party include all of the pools in its next annual submission.

130. Romania reported the changes in the DOM and mineral soil carbon pools under forest land remaining forest land as "NE". During the review, the Party showed the ERT ongoing research plans to allow the reporting of these categories in future annual submissions. The ERT notes that Romania is currently working on improving soil carbon change estimates across the LULUCF sector. The ERT strongly recommends that Romania continue these studies and provide an estimate for the changes in the DOM and mineral soil carbon pools in the next annual submission. The ERT notes that, if these pools are not reported, the inventory cannot be regarded as fully complete. The ERT recommends that the Party continue its efforts to produce estimates for these pools and transparently document the process of improvement in the next annual submission.

131. The LULUCF chapter of the NIR is largely transparent and includes the key parameters used to estimate emissions and removals. However, the ERT noted that Romania did not include a clear definition of forest in the NIR. The ERT strongly recommends that Romania include a detailed explanation of the forest definition (as provided during the review), including the detailed and comprehensive data collected by Romania on forests in the National Forest Fund (NFF). To increase transparency, the ERT further recommends that the Party expand the NIR to include details of the methods used to estimate the changes in mineral soil carbon stocks using tier 1 and tier 2 methods for forest land converted to settlements and forest land converted to other land and of the types of forests and their management, in particular rotation ages.

132. The ERT notes that Romania has a well-functioning system for tracking the movements of land between land uses, the management of forest areas and a detailed history of forest management. The ERT found that the system had the ability to identify areas of forest which are no longer part of the national forest estate due to a change in land use. However, the ERT noted that this is not well documented in the NIR. The ERT commends Romania for maintaining the NFF system and recommends that the Party provide a summary of the methods used to spatially and temporally track forest management activities using the NFF system in the NIR of the next annual submission.

133. The ERT found a number of inconsistencies between the KP-LULUCF and Convention CRF tables; for example, the AD for forest management and forest land remaining forest land are the same, yet the emission estimates differ. Romania noted that these issues were caused by transcription errors between the spreadsheets used to calculate the emissions. The ERT strongly recommends that the Party improve its QC processes prior to the next annual submission, in order to ensure that such errors do not occur, and document these processes in the NIR.

134. Romania has estimated the uncertainty for forest land remaining forest land and land converted to forest land but has not estimated the uncertainty for any of the other categories. Further, while the inclusion of estimates for the DOM and soil carbon pools in the land converted to forest land and forest land converted to other land categories has increased the completeness of the reporting, there remains a high degree of uncertainty around these estimates. The ERT recommends that Romania conduct a full uncertainty analysis for each land use and determine which pools and subcategories require further improvement. A description of the uncertainty analysis and improvement plan should be included in the NIR.

135. In the NIR, Romania has provided a list of each of the recommendations from the 2010 review report and details of how these are being addressed. The majority of the issues raised in the 2010 review report have been at least partially addressed. The key improvements in the 2011 submission include: increased completeness; the inclusion of annual land-use matrices showing the transition of land between management types (which requires further improvement in order to comply with the IPCC land-use categories); the improved use of notation keys; the removal of the biomass expansion factor from the estimate of living biomass in forest land remaining forest land; the verification of the basic density values used in the calculation of living biomass; the improvement of the estimates of the areas under each land-use category, and of the transparency of the description of the methods and data in the NIR and on the source of harvesting data used to estimate losses from forest land. The ERT noted that Romania is still working to implement some of the recommendations from previous review reports, such as: the use of remote-sensing and spatial information tools to improve the land use and land-use change information; the use of NFI data for estimating emissions in the forest land category; and the move towards the use of tier 2 and tier 3 methods for the change in soil carbon.

136. The ERT notes the improvements made by the Party (e.g. the use of more detailed spatial information for the identification of forest areas, and the ongoing implementation of a soil carbon measurement inventory) and encourages Romania to continue its work and fully implement, verify and report the results of its ongoing work in the next annual submission.

## 2. Key categories

### Forest land remaining forest land – CO<sub>2</sub>

137. The methodologies used by Romania to estimate emissions and removals from forest land remaining forest land are a combination of tier 1 and 2 methods with country-specific data, and are largely consistent with the IPCC good practice guidance for LULUCF and comparable with the methods used by other reporting Parties. The ERT welcomes the recalculations undertaken for the 2011 submission. The estimates use country-specific data for the volume increment, area, harvest rates and root:shoot ratios. However, the ERT notes that, while much of these data have not been updated since 1984, they represent the best available data for the 2011 submission. The ERT notes that, in 2012, Romania is due to complete its first NFI since 1984. The ERT recommends that the Party make use of the new data to improve the accuracy of the estimates for the LULUCF sector. Further, the ERT encourages Romania to consider and describe the options for integrating the NFI data with the detailed stand data held in the management plans in the next annual submission.

138. Romania reported the changes in organic soil carbon for forest land remaining forest land as “NO”. However, the AD show that forest land does occur on organic soils in Romania. During the review, the Party explained that, while forest land occurs on organic soils, they are specifically protected from management due to issues of access and regeneration of the forest following harvesting. The ERT notes this explanation and recommends that Romania provide evidence of this explanation in the next NIR.

### Land converted to forest land – CO<sub>2</sub>

139. The ERT notes that the current estimates for living biomass are based on two data sources: the estimates of carbon stocks based on field measurements from the joint implementation (JI) project (“Romania afforestation/reforestation Kyoto Protocol flexible Joint Implementation project 2003–2017”)<sup>8</sup> for ages 1–7; and the estimates of carbon stocks using a stand-based model (CO2fix). This is consistent with the IPCC good practice guidance for LULUCF. The ERT notes the effectiveness of this approach and encourages Romania to consider the ongoing use of an integrating model such as CO2Fix to maximize the utility of the data collected under the JI project.

140. In the 2011 NIR, the change in soil carbon in mineral soils was reported as “NO”. In response to questions raised by the ERT during the review, Romania implemented a method for estimating the change in the carbon stock of mineral soils using a combination of IPCC default and country-specific data. While this method allowed the Party to ensure the completeness of the inventory, the estimates are highly uncertain and potentially biased due to the use of differing data sources. The ERT therefore strongly recommends that Romania develop a method which ensures consistency and removes the potential for bias in the results in the next annual submission. In making this recommendation, the ERT notes the need for coordination between agricultural and forestry soil researchers in this work in

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<sup>8</sup> The JI project includes a monitoring plan that includes methods for estimating living biomass, DOM and soils using field measurements. The monitoring plan uses a series of permanent sample plots which will be routinely measured to track the change in carbon stocks over time. The monitoring plan has been approved under the JI project. A national research project has also been established and uses the same methods as those applied in the JI project.

order to ensure consistency in the methods used to estimate the change in soil carbon for lands under conversion and to avoid any potential bias in the estimates.

141. Romania reported emissions from organic soils for land converted to forest land as “NO”. The Party explained that there is no planting of peat soils in forest land. The ERT accepts this explanation and encourages Romania to transparently document this in the next annual submission.

142. During the review, Romania informed the ERT that around 30 per cent of the JI project area had been damaged by flood. Given the planned extensive use of data from these sites for the development of the inventory, the ERT recommends that the Party thoroughly describe the effects of the flood and how these are being accounted for in the inventory.

### 3. Non-key categories

#### Grassland remaining grassland – CO<sub>2</sub>

143. Romania reports emissions for all pools under grassland remaining grassland as “NO”. The ERT notes that activities are occurring on grassland in Romania and, therefore, the use of the notation key “NO” is incorrect. The ERT recommends that the Party provide an estimate for the changes in carbon stock in the mineral soils pool in the next annual submission.

144. Woody vegetation outside the NFF (VF AFF) is reported under grassland remaining grassland. The ERT notes that the area of VF AFF varies considerably between 1990 and 2009, but there is no associated loss or gain reported in the carbon stock of living biomass, DOM or soils. The ERT recommends that Romania clarify the reason for the change in VF AFF in the NIR and provide estimates for the change in living biomass, DOM and soils in the areas of VF AFF in the next annual submission. Further, the ERT recommends that, in the next submission, the Party provide evidence that there are no areas within the areas of VF AFF that meet the definition of forest. Otherwise, Romania should identify the areas of VF AFF that meet the forest definition and report them under the forest land or forest land converted to other land categories.

#### CO<sub>2</sub> emissions from agricultural lime application – CO<sub>2</sub>

145. Romania currently reports emissions from lime application as “NO” for cropland and grassland. The ERT notes that lime application is a common practice worldwide and that there is some evidence that liming does occur in Romania. The ERT recommends that the Party verify whether liming occurs in cropland or grassland and, if so, provide an estimate of the emissions in the next annual submission.

146. The ERT notes that lime application for forest land is reported as “NO”. During the review week, Romania produced documentation indicating that lime application does not occur on forest land. The ERT accepts this response and recommends that the Party include this explanation in the NIR of the next annual submission.

#### Biomass burning – CO<sub>2</sub>

147. Romania reported emissions from biomass burning for wildfires in forest land only. In the NIR, the Party notes that burning of agricultural residues is illegal but may still occur on a small scale. Further, the ERT notes that it is common practice in many countries to burn residue following the conversion of forest land to cropland or grassland. The ERT encourages Romania to provide information showing that burning is not occurring for the other categories.

#### 4. Areas for further improvement

##### Identified by the Party

148. Romania identified several planned improvements for the LULUCF sector:

- (a) Remeasuring and modelling the soil, litter and dead wood carbon pools in the JI project areas;
- (b) Implementing the JI project methodology to other areas of land converted to forest land;
- (c) Updating the average carbon stocks for land conversion categories;
- (d) Improving the data on revegetation activity back to 1985;
- (e) Using data from the NFI to estimate the changes in carbon stocks in forest land categories.

##### Identified by the expert review team

149. The main areas for further improvement identified by the ERT for the LULUCF sector include:

- (a) Continuing to develop methods and collect data that will allow the reporting of the changes in mineral soil carbon stocks, and in the litter and dead wood pools for categories where these estimates are currently reported as “NE”, in particular forest land remaining forest land;
- (b) The improvement of the sector-specific QC procedures and the inclusion of detailed information on these procedures in the NIR;
- (c) The improvement of the land-use matrices by noting the land-use category under which each of the vegetation or management types is included and the provision of a description of each of these subcategories.

## F. Waste

### 1. Sector overview

150. In 2009, emissions from the waste sector amounted to 4,896.54 Gg CO<sub>2</sub> eq, or 3.8 per cent of total GHG emissions. Since the base year, emissions have increased by 46.3 per cent. The key drivers for the rise in emissions are the growth in personal consumption, the increase in managed solid waste disposal sites and the increase in the population number connected to the sewerage system. Within the sector, 67.9 per cent of the emissions were from solid waste disposal on land, followed by 31.9 per cent from wastewater handling. The remaining 0.2 per cent were from waste incineration.

151. The Party has made recalculations for the waste sector in the 2011 submission following changes in methodologies and AD. Romania provided explanations in the NIR and in CRF table 8(b). The impact of these recalculations on the waste sector was a decrease in emissions of 26.3 per cent for 2008. The main recalculations took place in the following categories:

- (a) Solid waste disposal on land (CH<sub>4</sub> emissions), due to the implementation of a tier 2 first order decay (FOD) method and the update of AD for 2008;
- (b) Waste incineration (CO<sub>2</sub> emissions), due to changes in AD for industrial hazardous waste for the period 2006–2009.

152. In response to the list of potential problems and further questions raised by the ERT during the review week, an additional recalculation was performed by the Party regarding the N<sub>2</sub>O emissions from human sewage (see para. 163 below).

153. The descriptions in the NIR are generally transparent. However, the ERT considers that insufficient information and explanations are provided on: waste disposal and treatment (e.g. industrial waste, unsewered wastewater, final disposal of wastewater treatment sludge); the data and assumptions used in the estimation of emissions (e.g. the fraction of municipal solid waste (MSW) disposed to solid waste disposal sites); the development of the time series (e.g. the amount of waste disposed to unmanaged deep and shallow sites during the period 1989–2002); and the trends in emissions. The ERT recommends that Romania provide additional information and explanations in the NIR of its next annual submission.

154. IPCC default EFs and parameters were used in the estimation of emissions from solid waste disposal on land, wastewater handling and waste incineration. The ERT strongly encourages Romania to consider developing and using country-specific EFs and parameters, particularly for the key categories, such as the methane generation rate constant (k) for the estimation of CH<sub>4</sub> emissions from solid waste disposal on land.

155. The ERT noted that the waste inventory shows significant inter-annual changes in AD and emissions, which are insufficiently explained in the NIR, such as the sudden inter-annual changes in CH<sub>4</sub> emissions from solid waste disposal on land and the decrease of 99.4 per cent in the amount of incinerated hazardous waste in 2006–2007. The ERT reiterates the recommendation of the previous review report that Romania improve the consistency of the time series and provide supporting explanations in its next annual submission.

156. Romania has implemented sector-specific QA/QC procedures and documented them in the NIR. However, the ERT encourages the Party to strengthen the sector-specific QA/QC activities, in particular to in relation to the AD and any unusual trends, and to document them in the NIR.

## 2. Key categories

### Solid waste disposal on land – CH<sub>4</sub>

157. The ERT noted that Romania uses the IPCC tier 2 FOD method to estimate CH<sub>4</sub> emissions from MSW disposed to managed waste disposal sites, and reports CH<sub>4</sub> recovery rates for the period 2001–2009. The ERT welcomes the efforts made by the Party in implementing the recommendations of the previous review report<sup>9</sup> by calculating the emissions using a tier 2 methodology and including information on CH<sub>4</sub> recovery rates. The ERT noted that Romania uses a tier 1 method to estimate CH<sub>4</sub> emissions from MSW disposed to unmanaged waste disposal sites and recommends that the Party use an IPCC tier 2 FOD method for unmanaged waste disposal sites as well, in order to improve the accuracy of the estimates of emissions from solid waste disposal on land.

158. Romania has reported CH<sub>4</sub> emissions only from MSW disposed to solid waste disposal sites. The ERT strongly encourages the Party to make efforts to collect the necessary data and information on non-MSW in order to consider the emissions from all types of solid waste material, including MSW, industrial waste, sludge, and construction and demolition waste disposed to solid waste disposal sites.

159. The NIR states that, since there are no data on the amount of MSW disposed to solid waste disposal sites for the period 1989–1997, the AD were estimated. However, the NIR

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<sup>9</sup> FCCC/ARR/2010/ROU, paragraphs 121 and 123.

provides insufficient information on the fraction of MSW disposed to solid waste disposal sites used in the estimation. The ERT also considers that the information and explanations provided on the estimation of unavailable data on MSW disposed to unmanaged deep and shallow sites for the period 1989–2002 are insufficient. The ERT recommends that Romania provide more detailed information on the data time series and on how time-series consistency is ensured (e.g. the gap-filling methods used for the missing AD, and the assumptions and parameters used in the estimates), in order to improve the transparency of the NIR.

160. The ERT also noted sudden inter-annual changes in the CH<sub>4</sub> emissions from this category, such as a 13.8 per cent decrease in the period 1997–1998 followed by a 17.9 per cent increase in the period 1998–1999, and reiterates the recommendation from the previous review report that Romania improve the consistency of the time series for MSW and improve the explanations of the trend in the NIR.

#### Wastewater handling – CH<sub>4</sub>

161. Romania uses the default method provided in the Revised 1996 IPCC Guidelines to estimate emissions from wastewater handling and documents its estimates in the NIR. However, the ERT noted that the information provided in the NIR on the data and assumptions used (the fraction of domestic/commercial degradable organic component removed as sludge, the use by the population connected to urban sewerage with treatment) are not fully transparent and recommends that Romania provide more detailed information and explanations in the NIR of its next annual submission.

162. The ERT also considered that the information on wastewater treatment systems and discharge pathways provided in the NIR is insufficient. Therefore, the ERT reiterates the recommendation from the previous review report that Romania provide more detailed information on the wastewater fraction that is unsewered (treated on site in latrines and septic systems, and untreated) in the NIR of the next annual submission.

### **3. Non-key categories**

#### Wastewater handling –N<sub>2</sub>O

163. Romania has estimated and reported the N<sub>2</sub>O emissions from human sewage using the default method provided in the Revised 1996 IPCC Guidelines. The Party estimated the sewage N using data on the total population connected to sewage systems. The ERT considered that this could lead to a potential underestimation of N<sub>2</sub>O emissions from human sewage disposal. In response to the list of potential problems and further questions raised by the ERT during the review week, Romania provided a revised estimate for the entire time series (1989–2009) based on the population in the country. The revised estimate increased the emissions from wastewater handling by 427.87 Gg CO<sub>2</sub> eq, or 74.8 per cent in 1989 and by 382.35 Gg CO<sub>2</sub> eq, or 32.4 per cent in 2009. The ERT concluded that the revised estimate is in line with the Revised 1996 IPCC Guidelines.

#### Waste incineration –N<sub>2</sub>O

164. Romania reported N<sub>2</sub>O emissions from incineration as “NE” and explained that there are no default IPCC EFs available. The ERT encourages the Party to use other reliable means of developing EFs and estimate the N<sub>2</sub>O emissions using the advice provided in the IPCC good practice guidance.<sup>10</sup>

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<sup>10</sup> See pages 5.27–5.30 of the IPCC good practice guidance.

#### 4. Areas for further improvement

##### Identified by the Party

165. During the review, Romania informed and provided the ERT with a list of planned activities for improving the sectoral estimates, such as moving to higher-tier methods and obtaining historical data (for the period 1950–1989) on the amount and composition of MSW and sludge disposed to solid waste disposal sites.

##### Identified by the expert review team

166. The ERT identified the following areas for improvement:

- (a) The improvement of the time-series consistency of the AD used in the emission estimates, such as the amount of MSW disposed to solid waste disposal sites;
- (b) The improvement of transparency in the reporting and documentation in the NIR (e.g. the provision of an explanation on the data and assumptions used in developing the emission estimates, and on the emission trends).

### 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

167. Romania has included information on anthropogenic GHG emissions from sources and removals by sinks from LULUCF activities under Article 3, paragraph 3, of the Kyoto Protocol and for the selected activities under Article 3, paragraph 4, of the Kyoto Protocol (forest management and revegetation). The Party has chosen to account for activities under Article 3, paragraphs 3 and 4, at the end of the Kyoto Protocol first commitment period.

168. Romania has made recalculations for the KP-LULUCF activities between the 2010 and 2011 submissions in response to the 2010 annual review report. The recalculations are the result of changes in both AD and EFs and in order to rectify identified errors. Some additional recalculations took place during the review. The impact of the recalculations on each KP-LULUCF activity for 2008 is as follows:

- (a) Removals from afforestation and reforestation increased by 310.4 per cent (843.37 Gg CO<sub>2</sub>);
- (b) Emissions from deforestation increased by 2,725.6 per cent (2,015.74 Gg CO<sub>2</sub>);
- (c) Removals from forest management decreased by 39.4 per cent (14,278.99 Gg CO<sub>2</sub>), but are still in excess of Romania's forest management cap;
- (d) Removals from revegetation increased by 2,151.1 per cent (1,032.47 Gg CO<sub>2</sub>).

169. In response to the list of potential problems and further questions raised by the ERT during the review week, Romania also provided revised estimates, primarily to increase completeness by including the litter, dead wood (deforestation only) and mineral soil pools in the revised estimates. The impact of the recalculations on each KP-LULUCF activity for 2009 is as follows:

- (a) Removals from afforestation and reforestation increased by 687.15 per cent (1,189.69 Gg CO<sub>2</sub>);
- (b) Emissions from deforestation increased by 1,957.2 per cent (456.44 Gg CO<sub>2</sub>);
- (c) Removals from forest management decreased by 4.2 per cent (973.61 Gg CO<sub>2</sub>), but are still in excess of Romania's forest management cap;
- (d) Removals from revegetation increased by 998.5 per cent (878.49 Gg CO<sub>2</sub>).

170. The ERT recommends that Romania provide more detailed information on the methods and recalculations in the next annual submission.

171. The ERT noted that the definition of forest as elected by Romania in its initial report and how lands that meet this definition are identified was not transparently described in the submission. In response to questions raised by the ERT, the Party provided evidence that the forest areas within the NFF will meet the definition of forest, in particular the crown cover selection. Romania also described existing policies to put in place remedial actions for any area in the NFF that has a crown cover of less than 10 per cent. As such, these areas can be considered as temporally destocked and therefore still forest. The ERT accepts this explanation and strongly recommends that the Party include this description in the NIR of its next annual submission.

172. Romania has revised its methods for identifying areas of reforestation, deforestation and forest management compared to the 2010 submission so that these areas are based on the transfer of land in and out of the NFF. The revised method greatly improves the representation of lands for the LULUCF sector, in particular the consistency of the reporting between categories and the prevention of double counting of lands, and is consistent with the IPCC good practice guidance for LULUCF. However, there are areas of woody vegetation outside the NFF that may meet Romania's definition of forest and that meet the definition of reforestation and deforestation but are not included in the area estimates. The ERT recommends that the Party conduct an analysis of these areas and include the results in the next annual submission. The ERT notes the ongoing efforts by Romania to produce a consistent land-use map for future reporting.

173. The ERT initially found that the 2011 reporting by Romania was largely incomplete. In particular, Romania did not estimate the changes in the carbon stocks for the litter, dead wood or mineral soil carbon pools for any activity, and little information was included in the NIR to indicate that the non-accounted pools were not net sources. Thus, Romania reported the carbon stock change under reforestation and deforestation as "NO" (mineral soils) or "IE" (below-ground biomass, litter). These issues were raised in the 2010 review report, which concluded that the Party was not complying with the requirements in paragraph 21 of the annex to decision 16/CMP.1 and the requirements of paragraph 6(e) of the annex to decision 15/CMP.1. In response to the list of potential problems and further questions raised by the ERT during the review week, Romania calculated estimates using tier 1 and tier 2 methods for reforestation (litter and mineral soils; dead wood is reported as "NO" due to the age of the trees), deforestation (litter, dead wood and mineral soils) and revegetation (litter and mineral soils; dead wood is reported as "NO" due to the age and type of vegetation). The ERT commends the efforts of the Romanian experts to produce these estimates during the review and strongly recommends that the Party include all of these estimates in the next annual submission together with the relevant supporting documentation. Romania also provided some evidence to the ERT that the dead wood, litter and soil carbon pools under forest management were not net sources and therefore did not need to be estimated. While this evidence suggests that these pools may not be net sources, the ERT recommends that the Party continue its research and either provide definitive evidence to prove this assumption or provide estimates in the next annual submission.

174. Romania did not report emissions from organic soils for any activity (reported as “NO”). The ERT accepts the Party’s explanation that reforestation, deforestation and revegetation do not occur in organic soils. However, organic soils do occur in the area under forest management. The ERT therefore recommends that Romania provide, in the next annual submission, evidence that emissions are not occurring from these areas, or provide an estimate of emissions from organic soils under forest management.

175. Uncertainty analyses carried out under the Convention reporting for forest land remaining forest land and land converted to forest land were used to assess the uncertainty for forest management and reforestation, respectively. Romania did not provide an estimate of the uncertainty for revegetation and deforestation. The ERT recommends that the Party provide uncertainty estimates for deforestation and revegetation in the next annual submission.

#### Activities under Article 3, paragraph 3, of the Kyoto Protocol

##### *Afforestation and reforestation – CO<sub>2</sub>*

176. Romania uses a detailed system of tracking movements of land in and out of the NFF. To be included as afforestation and reforestation in Romania, land must be moved into the NFF from another land classification. The ERT encourages the Party to provide further evidence that this assumption is valid in the next annual submission, in particular that all of the land transferred to the NFF will be established with vegetation that meets the definition of forest. Further, the ERT notes that there may be some time between the land entering the NFF and the commencement of reforestation activities. To increase transparency, the ERT also encourages Romania to clarify the length of time between the land entering the NFF and the commencement of reforestation activities.

177. Romania also uses the NFF data to determine whether the land meets the definition of reforestation set out by the Marrakesh Accords. The ERT recommends that the Party transparently describe how it ensures that only lands that did not contain forest on 31 December 1989 are considered for reforestation.

178. The ERT notes that Romania has a JI project as per Article 6 of the Kyoto Protocol (“Romania afforestation/reforestation Kyoto Protocol flexible Joint Implementation project 2003–2017”) (see para. 139 above). This project has its own sampling regime that is different, but still consistent with, that applied to the areas of reforestation outside the project. To increase transparency, the ERT recommends that Romania disaggregate the reporting on reforestation in the next annual submission to allow the identification of the emissions and removals associated with areas included in the JI project. The ERT also recommends that the Party provide a transparent description of how the reforestation areas included in the JI project are identified and separated from the rest of the reforestation areas.

179. The ERT noted that Romania does not report any lands subject to afforestation and reforestation as harvested during the commitment period (table 5(KP-1)A.1.2). The Party explained to the ERT that, as the minimum rotation age for forests is 20 years, it is unlikely that any lands subject to afforestation and reforestation have been harvested, or that they may be harvested prior to 2012. The ERT notes that this approach is conservative, but suggests that Romania consider methods of identifying afforested and reforested lands subject to harvest between 2008 and 2012.

##### *Deforestation– CO<sub>2</sub>*

180. The ERT noted that, in the land-use matrices, there is a considerable area of land (55 kha) that is reported as moving from VFAFF (the area of forest outside the NFF) to

pastures and hayfields. It is possible that a proportion of this clearing could be considered as deforestation. In response to the questions raised by the ERT during the review, Romania stated that it believes that there is no deforestation in lands outside the NFF and that the issue is simply due to the inconsistent reporting of land within each category (e.g. transfers from wooded land to pastures within the cropland category). The ERT notes that, while this may be the case, no data were provided to show that there was no deforestation in these areas. The ERT strongly recommends that Romania clarify this situation in the next annual submission using the NFI and other data sources to ensure that there is no underestimation of areas and emissions from deforestation.

181. The area of deforestation reported by Romania includes both land converted to settlements and land converted to other land under the Convention reporting. The estimates of the area of land changing from forest land to other land are highly variable, which leads to considerable variation in the deforestation estimates between 2008 and 2009. The Party explained that this variation is because forest land converted to other land occurs by natural disasters, especially the erosion of banks along the Danube River. The ERT notes that such changes may not meet the definition of human-induced deforestation, unless there is an actual land-use change after the natural disaster. While the inclusion of all forest land converted to other land as deforestation is a conservative approach, the ERT encourages Romania to determine if these areas represent human-induced deforestation in the next annual submission.

182. Romania reports lands as deforestation upon their removal from the NFF. While the assumption that all land that leaves the NFF is deforested is a conservative approach, the ERT encourages the Party to provide further evidence that this assumption is valid in the next annual submission. Further, the ERT notes that there may be some time between the land leaving the NFF and the actual deforestation and change in land use. To increase transparency, the ERT also encourages Romania to clarify the time between the land leaving the NFF and the time of actual deforestation.

183. The ERT notes that the dead wood pool only includes the dead wood that is on the ground. Standing dead wood is included in the estimate of above-ground biomass as it is included in the harvest statistics used to estimate emissions. The ERT notes that this is not consistent with the definition in the IPCC good practice guidance for LULUCF (table 3.1.2), but that the definition can be modified to meet national circumstances. In such circumstances, it is good practice to clearly report the definitions applied. The ERT recommends that Romania transparently document what is included in each carbon pool in the next annual submission.

184. The estimates of the changes in the carbon stock in living biomass due to deforestation is based on the average carbon stock in living biomass for all forests in the NFF (71.4 t C/ha). To increase accuracy, the ERT encourages Romania, wherever possible, to use the estimates of the actual volume for each stand leaving the NFF in order to calculate the emissions from deforestation in next annual submission.

#### Activities under Article 3, paragraph 4, of the Kyoto Protocol

##### *Forest management – CO<sub>2</sub>*

185. Previous ERTs, in particular the 2010 ERT, found that Romania did not provide estimates for the changes in the carbon stock of litter, dead wood or soil carbon under forest management and did not provide sufficient justification to show that these pools were not net sources. The 2011 ERT notes that the carbon stock changes in litter, dead wood and mineral soils for forest management are still reported as “NE”. However, in the 2011 NIR and during the review, Romania provided some evidence based on field sampling that the mineral soil pool under forest management is not a net source and could therefore be

reported as “NE”. The Party also provided some explanations during the review to confirm that the ongoing increase in living biomass under forest management is also likely to lead to an increase in litter and debris. While the ERT notes that the preliminary data and explanations provided by Romania are an improvement on the reporting in previous years and that these data do suggest little change, the ERT considers that this is insufficient to prove that the pool is not a net source. The ERT therefore strongly recommends that the Party provide an estimate for the changes in the litter, dead wood (as expected from the use of the results of the NFI) and mineral soil carbon stocks in the next annual submission, or provide definitive evidence that the pool is not a net source. The ERT also notes the inclusion of an improvement plan to allow the future reporting of these pools, including data collected through the NFI and additional soil sampling.

186. Romania has improved the estimates of the change in the carbon stock of living biomass by updating the factors used in converting the estimates of volume to carbon (see para. 137 above). However, the ERT notes that the estimates are still based on data from the 1984 NFI. While this represents the best data currently available to Romania, the ERT strongly reiterates the recommendation in previous review reports that the Party use data from the new NFI as soon as it is available.

187. To increase transparency, the ERT encourages Romania to disaggregate the area under forest management for each management type (e.g. available for harvest, protected) and to further disaggregate by species or forest type in the CRF tables. This will allow future ERTs to assess the effects of forest management on emissions and removals.

#### *Revegetation – CO<sub>2</sub>*

188. The ERT found that the calculation of the base year removals for revegetation was not in line with the IPCC good practice guidance for LULUCF, since the calculation of emissions in the base year requires all transitions that meet the definition of revegetation since 1970 to be included (see section 4.2.10.2), while Romania has included only the area established in the base year. The use of a single year for the base year estimate will lead to the underestimation of removals in the base year, which, in turn, will lead to an overestimation of the accountable removals for revegetation over the commitment period. In response to questions raised by the ERT during the review, the Party revised the estimate of the base year emissions to include the areas subject to revegetation since 1970. The ERT commends Romania for correcting this estimate and encourages the Party to further improve the estimates of areas established prior to 1989 in the next annual submission.

189. In the revised submission (of 14 November 2011) Romania has also included all the areas subject to revegetation since 1970 in the emission estimates for 2008 and 2009. The Marrakesh Accords state that only revegetation activities since 1990 should be included in the estimates for the first commitment period (2008–2012), not all areas since 1970. While the inclusion of all areas since 1970 has little effect on the emission estimates for 2008 and 2009 (due to the use of a growth estimate which reaches 0 at age 20), the ERT strongly recommends that Romania only report emissions and removals for areas which have been subject to revegetation since 1990 in the 2012 annual submission.

190. The ERT noted that only estimates for living biomass were included in the original submission. During the review, Romania developed estimates for the litter, dead wood (reported as “NO” as the sites are too young for dead wood to occur) and mineral soil carbon pools. The ERT commends Romania for developing these estimates for the 14 November submission and recommends that the Party include them in the next annual submission. The ERT further notes that, while these estimates ensure completeness, they require further improvement in the next annual submission.

191. During the review, the ERT noted that Romania had used 1990 instead of 1989 as the base year for the purposes of estimating emissions under the net-net construct for revegetation. The Party confirmed that it agreed that the estimate for the accounting should be 1989 but that it was unable to provide the correct value due to an issue with the CRF Reporter software. Romania provided the ERT with the 1989 estimate (net removals of 1,999.35 Gg CO<sub>2</sub> eq) during the review.

## 2. Information on Kyoto Protocol units

### Standard electronic format and reports from the national registry

192. 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 SIAR on the SEF tables and the SEF comparison report.<sup>11</sup> 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.

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

194. The ERT noted that Romania has implemented the recommendation from the previous review report regarding the provision of transparent information on the list of individual units held in the registry at the end of the year that are not valid for use towards compliance.

### National registry

195. The ERT took note of the SIAR and its finding that the reported information on the national registry is complete and has been submitted in accordance with the annex to decision 15/CMP.1. The ERT further noted from the SIAR and its finding that 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 decisions 16/CP.10 and 12/CMP.1. The national registry also has adequate security, data safeguard and disaster recovery measures in place and its operational performance is adequate. However, the SIAR identified that the national registry has not fulfilled the requirements regarding the public availability of information in accordance with section II.E of the annex to decision 13/CMP.1, and particularly pertaining to: paragraph 46(d) for the provision of JI project public reports and documentation in English; paragraph 47(k) for the inclusion of a statement on the public website stating that no units were carried over; and paragraph 47(l) for the provision of information on current unit holdings. Some of this information (the provision of JI project public reports and documentation in English), was made available

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<sup>11</sup> The SEF comparison report is prepared by the 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.

during the review week. The ERT recommends that Romania address these problems and report the results in its next annual submission.

#### Calculation of the commitment period reserve

196. Romania has reported its commitment period reserve in its 2011 annual submission. The Party reported its commitment period reserve to be 643,729,573 t CO<sub>2</sub> eq based on the national emissions in its most recently reviewed inventory (128,745.91 Gg CO<sub>2</sub> eq). The ERT disagrees with this figure.

197. During the review Romania provided revised estimates in response to the potential problems and other questions raised by the ERT during the review, for the entire time series and a revised value of its commitment period reserve. The revised commitment period reserve is equal to 649,476,664 t CO<sub>2</sub> eq and is based on the most recently reviewed inventory (2009) (129,895.33 Gg CO<sub>2</sub> eq). The ERT agrees with this figure.

### **3. Changes to the national system**

198. Romania provided information on the changes to its national system in its annual submission. In terms of overall structure, there have not been considerable changes but Romania has undertaken several measures to meet the requirements for the complete performance of the general and specific functions of the national system, as specified in the annex to decision 19/CMP.1.

199. Specifically, the Government of Romania has commissioned several research studies to collect sufficient AD, parameters and EFs as are necessary to support the methods selected for the estimation of anthropogenic GHG emissions by sources and removals by sinks and to develop information useful to implement higher-tier methods for the estimation of emissions and removals from the key categories. The results of these studies allowed for an overall improvement in the Romanian GHG inventory for the 2011 submission, in accordance with the methodologies described in the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF. The Party has also implemented higher-tier methods for some of the key categories, thereby fulfilling the requirements in paragraphs 14(b) and (c) of the annex to decision 19/CMP.1. Further improvements are expected in the next few years, according to the scheduled implementation of the remaining studies.

200. New permanent staff have been employed at NEPA; it can be assumed that the agency now has a sufficient allocation of human resources that, once trained, could enhance the technical capacity of the inventory team and help in assuring the accuracy of the inventory, as defined in the UNFCCC reporting guidelines.

201. The ERT commends Romania for its efforts to strengthen the national system and appreciates Governmental Decision no. 23615 of 28 September 2011 funding additional studies for the KP-LULUCF and waste sectors,<sup>12</sup> and the memorandum by the Minister of Environment and Forest<sup>13</sup> expressing the determination of the Romanian Government and MEF to implement measures to support the continuity and ensure the appropriate performance of the activities and functions of the national system up to 2014.

202. The ERT concludes that the confirmed changes in the national system have strengthened the national system and improved the national GHG inventory allowing for the fulfilling of the inventory general and specific preparation functions as set out in

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<sup>12</sup> Governmental Decision no. 23615 of 28 September 2011 funding further studies on the forestry and waste sectors.

<sup>13</sup> Memorandum of the Ministry of Environment and Forests to strengthen the continuity and ensure the appropriate performance of the activities and functions of the national system.

decision 19/CMP.1 (including paragraphs 10 (b) and 14(b) and (c) of the annex to decision 19/CMP.1). However, the ERT notes that there is a need for further improvements to ensure the continuity of the proper functioning of the national system.

#### **4. Changes to the national registry**

203. Romania provided information on the changes to its national registry, in particular: the update of the website of the national registry, including the update of publicly accessible information; and a test on the national registry to verify its ability to perform the processes required under the EU ETS. The ERT considers these changes to be in accordance with the requirements of national registries as defined in the annex to decision 13/CMP.1.

204. The ERT concluded that the Party'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 CMP decisions.

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

205. Romania reported information on the minimization of adverse impacts in accordance with Article 3, paragraph 14, in its 2011 annual submission, but it did not identify the changes in its reporting compared with that in its previous annual submission in accordance with decision 15/CMP.1. The ERT recommends that Romania include such information in its next annual submission.

206. The ERT noted that Romania has implemented the recommendation of the previous review report and has reported information on the specific national actions on the minimization of adverse effects. The Party has reported in the NIR that the levels of GHG emissions in the period 1989–2009 were below the reduction commitment taken within the framework of the Kyoto Protocol, and that this reduction was mainly the result of the reduction in the level of economic activity, the upgrading of technologies, and 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 policy.

207. Romania also reports that national actions on the minimization of adverse impacts relate to the JI mechanisms, the upgrading and refurbishment of old technologies and energy efficiency with 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's funding for developing countries. In this context, the EUR 15 million contribution by Romania, planned for the fast-start financing mechanism, will be used for energy efficiency and transport infrastructure projects. This contribution will strengthen the cooperation for the development of climate change policy in Europe and will support the EU integration of the Republic of Moldova. The ERT concluded that, taking into account the changes in the reporting, the information provided is transparent and generally complete.

### **III. Conclusions and recommendations**

208. Romania made its original annual submission on 15 April 2011. The Party resubmitted the CRF tables and the NIR on 25 August and 15 September 2011 and the NIR was further updated on 22 September 2011. The ERT reviewed the latest (third) submission (the CRF tables of 15 September and the NIR of 22 September). The annual submission

contains the GHG inventory (comprising CRF tables and an NIR) and supplementary information under Article 7, paragraph 1, of the Kyoto Protocol (information on: activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, Kyoto Protocol units, changes to the national system and the national registry and the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol. This is in line with decision 15/CMP.1.

209. The ERT concludes that the inventory submission of Romania has been prepared and reported in accordance with the UNFCCC reporting guidelines. The Party has submitted a complete set of CRF tables for the years 1989–2009 and an NIR; these are complete in terms of geographical coverage, years and sectors, as well as generally complete in terms of categories (see para. 21 above) and gases. The ERT commends Romania for the improved completeness of its 2011 submission.

210. 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.

211. The Party's inventory is generally in line with the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF. The ERT commends Romania for the efforts undertaken to implement higher-tier methods for the key categories in response to the recommendations in the previous review report. The 2011 inventory submission is generally of a good quality, but the ERT noted a need for further improvements, especially with regard to the transparency of the reporting on the methodologies and assumptions applied in the estimation process, and the overall accuracy of the inventory, through a better implementation of QA/QC activities and verification procedures.

212. The Party has made recalculations for the inventory between the 2010 and 2011 submissions in response to the 2010 annual review report and following changes in AD and EFs. The impact of these recalculations on the national totals is a decrease in emissions in 2008 of 1.1 per cent excluding LULUCF or an increase in 2008 of 8.0 per cent including LULUCF. The main recalculations took place in the following categories:

- (a) Energy industries and fugitive emissions from oil and natural gas (in the energy sector);
- (b) Metal production (in the industrial processes sector).
- (c) Forest land (in the LULUCF sector);
- (d) Solid waste disposal on land (in the waste sector);

213. Romania has reported the information on activities under Article 3, paragraph 3, of the Kyoto Protocol and the elected activities under Article 3, paragraph 4, of the Kyoto Protocol. The ERT notes the significant improvements made by Romania in the inventory for the KP-LULUCF activities since the 2010 submission, in particular the improved representation of lands, and the improvements in completeness and transparency. The ERT also notes that further improvements are still required and that many of these have already been identified by Romania and form part of an ongoing inventory improvement plan. The ERT concludes that the methods used to estimate emissions and removals for the KP-LULUCF activities, including forest management, while requiring improvement, are largely in line with the IPCC good practice guidance for LULUCF.

214. The Party has made recalculations for the KP-LULUCF activities between the 2010 and 2011 submissions in response to the 2010 annual review report and due to changes in AD and EFs. The impact of these recalculations on each KP-LULUCF activity for 2008, also taking into account the changes undertaken during the review, is as follows:

- (a) Removals from afforestation and reforestation increased by 310.4 per cent (843.37 Gg CO<sub>2</sub>);
- (b) Emissions from deforestation increased by 2,725.6 per cent (2,015.74 Gg CO<sub>2</sub>);
- (c) Removals from forest management decreased by 39.4 per cent (14,278.99 Gg CO<sub>2</sub>), but are still in excess of Romania's forest management cap;
- (d) Removals from revegetation increased by 2,151.1 per cent (1,032.47 Gg CO<sub>2</sub>).

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

216. The 2011 inventory submission shows significant improvement in the functions of the national system, and the ERT concludes that the national system performs its required functions as set out in the annex to decision 19/CMP.1. However, the ERT notes the need for further improvements ensuring the continuity of the proper functioning of the national system.

217. 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. However, the ERT identified that the national registry has not fulfilled some of the requirements regarding the public availability of information in accordance with section II.E of the annex to decision 13/CMP.1.

218. Romania has reported information under chapter I.H of the annex to decision 15/CMP.1, "Minimization of adverse impacts in accordance with Article 3, paragraph 14" as part of its 2011 annual submission. The ERT considers that the information provided is transparent and generally complete.

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

- (a) Reviewing the elements of its national inventory system that would enable the timely submission of its inventory report, and submit its next annual submission by 15 April 2012 (see para. 17 above);
- (b) Continuing to ensure the functionality of the national system by allocating sufficient resources for the funding of specific medium- and long-term studies providing background data for the inventory (see para. 32 above);
- (c) Ensuring the full implementation of the results of the ongoing studies and development plans (see para. 26 above);
- (d) Guaranteeing the proper and efficient training of new staff at NEPA (see para. 30 above);
- (e) Improving the transparency of reporting on the methodologies, assumptions and data used in the emission calculations, as well as the assumptions behind the uncertainty values and EFs (see paras. 52, 53 and 58 above);
- (f) Continuing to improve the completeness of the inventory and applying higher-tier methods using the results of the key category analysis for the prioritization of the inventory improvements (see para. 38 above);
- (g) Ensuring the close collaboration between the external contractors, data providers and NEPA and among internal NEPA sectoral experts (see para. 34 above);

(h) Developing a sector-specific QA/QC plan and characterizing the data, EFs and parameters actually used in the sector/category estimation process so that the QA/QC procedures and verification activities may be checked and/or implemented by experts other than the relevant sectoral ones (see paras. 48–51 above);

(i) Ensure consistency in methods, data and estimates between LULUCF reporting and the relevant KP-LULUCF activities (see para. 133 above).

220. In the course of the review, the ERT formulated a number of sector-specific recommendations relating to the completeness of the annual submission and the transparency of the information presented in Romania's annual submission. The key recommendations are that Romania:

(a) Investigate and fully explain any differences in the comparison of the reference approach and the sectoral approach in the energy sector (see paras. 68–70 above);

(b) Confirm the approach and data used to differentiate domestic aviation and navigation from international bunker fuels in Romania in the energy sector (see paras. 71–73 and 80 above);

(c) Improve the analysis and inclusion of feedstocks and non-energy use of fuels in the energy sector, and improve the QA/QC checks performed with regard to cross-sectoral considerations for the calculations in the industrial processes sector (see paras. 74 and 96 above);

(d) Ensure that the questionnaires used in the calculations of emissions from consumption of halocarbons and SF<sub>6</sub> cover the whole target audience in the industrial processes sector (see para. 105 above);

(e) Enhance verification efforts in the industrial processes sector (see para. 96 above);

(f) Continue to develop methods and collect data that will allow the reporting of the changes in mineral soil carbon stocks, and in the litter and dead wood pools for forest land, cropland and grassland in the LULUCF sector (see para. 130 above);

(g) Ensure consistency in the AD between the agriculture and LULUCF sectors, where applicable (see para. 121 above);

(h) Improve the land-use matrices by noting the land-use category under which each of the vegetation or management types is included and provide a description of each of these subcategories in the LULUCF sector (see paras. 135, 149 above);

(i) Ensure the time-series consistency of AD used in the emission estimates, such as the amount of MSW disposed to solid waste disposal sites in the waste sector (see paras. 155, 160 above).

#### **IV. Questions of implementation**

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

## Annex I

### Documents and information used during the review

#### A. Reference documents

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

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

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

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

“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>>.

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

“Guidelines for review under Article 8 of the Kyoto Protocol”. Decision 22/CMP.1. Available at <<http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf#page=51>>.

Status report for Romania 2011. Available at <<http://unfccc.int/resource/docs/2011/asr/rou.pdf>>.

Synthesis and assessment report on the greenhouse gas inventories submitted in 2011. Available at <<http://unfccc.int/resource/webdocs/sai/2011.pdf>>.

FCCC/ARR/2010/ROU. Report of the individual review of the greenhouse gas inventory of Romania submitted in 2010. Available at <<http://unfccc.int/resource/docs/2011/arr/rou.pdf>>.

UNFCCC. *Standard Independent Assessment Report*, parts I and II. Available at <[http://unfccc.int/kyoto\\_protocol/registry\\_systems/independent\\_assessment\\_reports/items/4061.php](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 (National Environmental Protection Agency (NEPA), including additional material on the methodologies and assumptions used. Besides the NEPA inventory team, the review was attended by representatives from the Romanian Civil Aeronautic Authority, the National Administration “Romanian Waters”, the National Agency for Cadastre and Land Registration, the Forest Research and Management Planning Institute, the National Institute of Research and Development for Pedology, Agrochemistry and Environment Protection, the National Agricultural Research and Development Institute, the National Institute for Statistics, the National Institute for Public Health, the Institute for Studies and Power Engineering, the Ministry of Economy, Trade and Environment Business, the Ministry of Environment and Forests, the General Directorate Forests, the Climate Change and Sustainable Development Directorate, the Waste, Dangerous Substances, Soil and Subsoil Directorate and the Air Quality Directorate. The following documents<sup>1</sup> were also provided by Romania:

### General documentation

- Governmental Decision no. 1570/December 2007 for establishing the National System for estimating GHG emissions;
- NEPA’s President Decision no. 24/2009 for approving the QA/QC Procedure related to the NGHGI;
- NEPA, 2011. Romanian GHG preparation plan 2011;
- NEPA, 2011. Romanian inventory improvement plan 2011-2012;
- NEPA, 2011. Romanian inventory improvement plan 2010-2011;
- NEPA, 2011. Romanian Greenhouse Gas Inventory preparation plan 212;
- NEPA, 2011. QA/QC Programme for the National GHG Inventory of Romania;
- QC lists for each of the inventory sector;
- Contract by MEF “Elaboration of national emission factors/other parameters relevant to NGHGI Sectors Energy, Industrial Processes, Agriculture and Waste, to allow for the higher tier calculation methods” and Terms of References of the outcomes of each specific sector . n.75 16/8/2011. Intermediate reports of the contract for general issues, Energy and Industry;
- Contract by MEF for the LULUCF sector “NGHGI LULUCF both under the UNFCCC and KP obligations” and term of References. n. 46 23/05/2011;
- NEPA, 2011. Job fiches and contracts of the new staff employed at NEPA;
- Procedure n. 23 27 September 2009 for the approval of the estimation process;
- Procedure n. 1376 29 October 2008 on the provision of data and the archiving;
- Government Decision 23615 28 September 2011 funding further studies on the forest and waste sectors;
- Request to the MEF by NEPA for implementing COPERT IV for estimating road transport emissions for 2012;
- Memorandum of the Ministry ensuring to strengthen the continuity and assure the appropriate performance of the activities and functions of the National System;
- NEPA, 2011. Schedule for training of the new staff;
- NEPA, 2011. Updated QA/QC Programme for the National GHG Inventory of Romania.

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<sup>1</sup> Reproduced as received from the Party.

### **Industrial processes**

- Clinker production from HOLCIM plants, dated 03/03/2006, with data from 1989 to 2004, showing also correction factors for CKD losses for one of them. [2 printed pages];
- Spreadsheet for Romanian IP estimates, digital format, provided through the ERT leader;
- Spreadsheet with the compilation of the f-gases questionnaires, provided via e-mail by the Romanian IP expert;
- Information on improvements on ammonia production, digital format, provided through the ERT leader;
- MEF – General Industrial Policy Directory document n. 579453/16.10.2008, with data of carbide production and ammonia production from 2001 to 2007, two printed pages.

### **Agriculture**

- National Institute for Statistics – Statistical Yearbook of Romania, 1989 – 2010;
- [http://en.wikipedia.org/wiki/Rice\\_production\\_in\\_Romania](http://en.wikipedia.org/wiki/Rice_production_in_Romania);
- Calculation sheets (in excel format) as used by Romania in the calculation of emission estimates.

### **(KP) LULUCF**

- Forest management plans from the Institutul de Cercetare si Amenajari Silvice (ICAS);
- Signed contract between the Ministry of environment and forests and ICAS dated 23/5/2011 for the purposes of developing inventory estimates for the LULUCF sector;
- Letter from the Ministry of environment and forests regarding use of lime on lands subject to afforestation, reforestation and deforestation.

## Annex II

### Acronyms and abbreviations

AD	activity data
CH <sub>4</sub>	methane
CO <sub>2</sub>	carbon dioxide
CO <sub>2</sub> eq	carbon dioxide equivalent
CRF	common reporting format
EIT	economy in transition
EF	emission factor
ERT	expert review team
EU	European Union
F-gas	fluorinated gas
GHG	greenhouse gas; unless indicated otherwise, GHG emissions are the sum of CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O, HFCs, PFCs and SF <sub>6</sub> without GHG emissions and removals from LULUCF
HFCs	hydrofluorocarbons
IEA	International Energy Agency
IPCC	Intergovernmental Panel on Climate Change
kg	kilogram (1 kg = 1,000 grams)
LULUCF	land use, land-use change and forestry
NA	not applicable
N <sub>2</sub> O	nitrous oxide
NIR	national inventory report
PFCs	perfluorocarbons
QA/QC	quality assurance/quality control
SEF	standard electronic format
SF <sub>6</sub>	sulphur hexafluoride
SIAR	standard independent assessment report
UNFCCC	United Nations Framework Convention on Climate Change