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**Report of the individual review of the annual submission of  
Ukraine submitted in 2010\***

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\* In the symbol for this document, 2010 refers to the year in which the inventory was submitted, and not to the year of publication.

## Contents

	<i>Paragraphs</i>	<i>Page</i>
I. Introduction and summary .....	1–5	3
A. Overview .....	1–2	3
B. Emission profiles and trends.....	3–5	3
II. Technical assessment of the annual submission.....	6–168	7
A. Overview .....	6–38	7
B. Energy .....	39–58	16
C. Industrial processes and solvent and other product use.....	59–74	20
D. Agriculture.....	75–87	24
E. Land use, land-use change and forestry.....	88–100	27
F. Waste.....	101–109	30
G. Adjustments.....	110–137	31
H. Supplementary information required under Article 7, paragraph 1, of the Kyoto Protocol .....	138–168	41
III. Conclusions and recommendations.....	169–180	49
IV. Adjustments .....	181–183	52
V. Questions of implementation .....	184–191	53
 Annexes		
I. Documents and information used during the review.....		55
II. Acronyms and abbreviations.....		57

## I. Introduction and summary

### A. Overview

1. This report covers the centralized review of the 2010 annual submission of Ukraine, coordinated by the UNFCCC secretariat, in accordance with decision 22/CMP.1. The review took place from 30 August to 4 September 2010 in Bonn, Germany, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalists – Ms. Anna Romanovskaya (Russian Federation) and Ms. Erasmia Kitou (European Union); energy – Mr. Hristo Vassilev (Bulgaria), Mr. Leonidas Osvaldo Girardin (Argentina), Ms. Ayse Yasemin Orucu (Turkey) and Mr. Leif Hockstad (United States of America); industrial processes – Ms. Valentina Idrissova (Kazakhstan) and Ms. Sina Wartmann (Germany); agriculture – Ms. Batima Punsalmaa (Mongolia) and Mr. Bernard Hyde (Ireland); land use, land-use change and forestry (LULUCF) – Mr. Richard Volz (Switzerland), Ms. Marina Vitullo (Italy) and Ms. Marina Shvangiradze (Georgia); and waste – Ms. Tatiana Tugui (Republic of Moldova) and Ms. Kyoko Miwa (Japan). Mr. Hockstad and Ms. Tugui were the lead reviewers. The review was coordinated by Ms. Inkar Kadyrzhanova and Mr. Javier Hanna (UNFCCC secretariat).

2. In accordance with the “Guidelines for review under Article 8 of the Kyoto Protocol” (decision 22/CMP.1), a draft version of this report was communicated to the Government of Ukraine, which provided comments that were considered and incorporated, as appropriate, into this final version of the report.

### B. Emission profiles and trends

3. In 2008, the main greenhouse gas (GHG) in Ukraine was carbon dioxide (CO<sub>2</sub>), accounting for 76.2 per cent of total GHG emissions<sup>1</sup> expressed in CO<sub>2</sub> eq, followed by methane (CH<sub>4</sub>) (16.9 per cent) and nitrous oxide (N<sub>2</sub>O) (6.9 per cent). Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF<sub>6</sub>) collectively accounted for 0.05 per cent of the overall GHG emissions in the country. The energy sector accounted for 68.4 per cent of total GHG emissions, followed by the industrial processes sector (21.2 per cent), the agriculture sector (8.1 per cent), the waste sector (2.2 per cent) and the solvent and other product use sector (0.1 per cent). Total GHG emissions amounted to 427,842.68 Gg CO<sub>2</sub> eq and decreased by 53.9 per cent between the base year<sup>2</sup> and 2008. The expert review team (ERT) found that the overall decreasing trends of GHG emissions in Ukraine are reasonable and comparable with those of other Parties with economies in transition.

4. Tables 1 and 2 show GHG emissions from Annex A sources of the Kyoto Protocol and emissions and removals from activities under Article 3, paragraph 3, and, if any, Article 3, paragraph 4, of the Kyoto Protocol (KP-LULUCF), by gas and by sector, respectively. In addition, table 2 shows emissions and removals from the LULUCF sector under the Convention. 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.

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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 1990 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 2008<sup>a, b</sup>**

	Greenhouse gas	Gg CO <sub>2</sub> eq								Change	
		Base year	1990	1995	2000	2005	2006	2007	2008	Base year–2008 (%)	
Annex A sources	CO <sub>2</sub>	716 360.77	716 360.77	389 674.16	289 318.90	322 647.22	339 008.90	340 735.04	325 899.46	–54.5	
	CH <sub>4</sub>	152 239.81	152 239.81	96 803.86	77 495.60	74 323.08	74 685.17	72 458.50	72 367.12	–52.5	
	N <sub>2</sub> O	59 322.55	59 322.55	38 797.90	26 207.65	25 888.18	26 513.40	27 089.72	29 376.96	–50.5	
	HFCs	NA, NE, NO	NA, NE, NO	0.00	5.98	76.69	41.41	46.24	27.48	NA	
	PFCs	203.23	203.23	153.45	99.74	122.66	95.80	133.33	150.16	–26.1	
	SF <sub>6</sub>	0.02	0.02	0.91	2.11	6.59	9.64	14.10	21.50	114 701.5	
KP-LULUCF	Article 3.3 <sup>c</sup>	CO <sub>2</sub>							–1 609.15		
		CH <sub>4</sub>							NA		
		N <sub>2</sub> O							NA		
	Article 3.4 <sup>d</sup>	CO <sub>2</sub>	NA							–47 760.37	NA
		CH <sub>4</sub>	NA							33.60	NA
		N <sub>2</sub> O	NA							8.68	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, 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 1990 for all gases. The “base year” for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol is 1990.

<sup>b</sup> The table does not reflect the adjusted estimates for a number of categories in the industrial processes sector (see section II.G) after adjustment procedures under decision 20/CMP.1 were applied. It reflects the estimates contained in the submission of 17 October 2010 that was subject to these adjustments. The adjustments lead to an increase of total GHG emissions for 2008 by 1,104.79 Gg CO<sub>2</sub> eq.

<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. Ukraine has elected forest management.

Table 2

**Greenhouse gas emissions by sector and activity, base year to 2008**

	Sector	Gg CO <sub>2</sub> eq								Change	
		Base year <sup>a</sup>	1990	1995	2000	2005	2006	2007	2008	Base year–2008 (%)	
Annex A	Energy	685 870.33	685 870.33	388 229.51	271 828.76	294 614.74	304 597.99	298 303.42	292 683.49	–57.3	
	Industrial processes <sup>b</sup>	128 712.45	128 712.45	60 344.88	75 179.29	85 626.58	92 515.95	99 778.63	90 572.96	–29.6	
	Solvent and other product use	376.80	376.80	372.11	354.89	340.38	338.52	336.35	334.73	–11.2	
	Agriculture	104 738.55	104 738.55	67 935.30	37 082.40	33 232.20	33 509.11	32 580.14	34 636.39	–66.9	
	Waste	8 428.24	8 428.24	8 548.48	8 684.65	9 250.52	9 392.75	9 478.39	9 615.11	14.1	
	Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	LULUCF	NA	–68 540.35	–46 567.02	–51 525.37	–40 087.17	–39 816.64	–50 145.46	–16 585.27	NA	
	<b>Total (with LULUCF)</b>	<b>NA</b>	<b>859 586.02</b>	<b>478 863.27</b>	<b>341 604.62</b>	<b>382 977.24</b>	<b>400 537.68</b>	<b>390 331.47</b>	<b>411 257.42</b>	<b>NA</b>	
	<b>Total (without LULUCF)</b>	<b>928 126.37</b>	<b>928 126.37</b>	<b>525 430.29</b>	<b>393 129.99</b>	<b>423 064.42</b>	<b>440 354.32</b>	<b>440 476.92</b>	<b>427 842.68</b>	<b>–53.9</b>	
KP-LULUCF	Article 3.3 <sup>c</sup>	Afforestation & reforestation							–1 758.93		
		Deforestation							149.77		
		<b>Total (3.3)</b>							<b>–1 609.15</b>		
	Article 3.4 <sup>d</sup>	Forest management								–47 718.08	
		Cropland management	NA							NA	NA
		Grazing land management	NA							NA	NA
		Revegetation	NA							NA	NA
	<b>Total (3.4)</b>	<b>NA</b>							<b>–47 718.08</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 1990 for all gases. The “base year” for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol is 1990.

<sup>b</sup> The table does not reflect the adjusted estimates for a number of categories in the industrial processes sector (see section II.G) after adjustment procedures under decision 20/CMP.1 were applied. It reflects the estimates contained in the submission of 17 October 2010 that was subject to these adjustments. The adjustments lead to an increase of total GHG emissions for 2008 by 1,104.79 Gg CO<sub>2</sub> eq.

<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. Ukraine has elected forest management.

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.

Table 3

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

	<i>As reported</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>	2 138 995 595		2 144 737 386	
<b>Annex A emissions for current inventory year</b>				
CO <sub>2</sub>	325 899 456		325 899 456	
CH <sub>4</sub>	72 323 560		72 367 123	
N <sub>2</sub> O	29 376 965		29 376 965	
HFCs	27 478	1 074 275	1 101 753	
PFCs	150 158	30 520	180 678	
SF <sub>6</sub>	21 502		21 502	
<b>Total Annex A sources</b>	<b>427 799 119</b>	<b>1 104 795</b>	<b>428 947 477</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	-3 431 144		-986 842	
3.3 Afforestation and reforestation on harvested land for current year of commitment period as reported	-6 156 742		-772 085	
3.3 Deforestation for current year of commitment period as reported	1 257 463		149 775	
<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	-35 822 508		-47 718 084	
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				
3.4 Revegetation in base year				

*Abbreviation:* NA = not applicable.

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

<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 or more of these activities. Technical assessment of the annual submission

## II. Technical assessment of the annual submission

### A. Overview

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

6. The 2010 annual inventory submission was submitted on 12 April 2010 (national inventory report (NIR)) and 13 April 2010 (common reporting format (CRF) tables). It contains a complete set of CRF tables for the period 1990–2008 and an NIR. Ukraine resubmitted its CRF tables on 22 and 25 May 2010 and its NIR on 22 May 2010. Ukraine 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, accounting of Kyoto Protocol units and changes in the national system and in the national registry. On 16 August 2010, Ukraine resubmitted information on accounting of Kyoto Protocol units, changes in the national system and further information on the national registry, and included information on the minimization of adverse impacts under Article 3, paragraph 14, of the Kyoto Protocol (part II of the NIR with revised and added chapters 12, 14, 15 and annex 6). The standard electronic format (SEF) tables were submitted on 12 April 2010 and resubmitted on 8 and 9 July 2010. The annual submission was submitted generally in accordance with decision 15/CMP.1.

7. Ukraine officially submitted revised emission estimates on 17 October 2010 in response to the list of potential problems and further questions raised by the ERT during the centralized review (see paras. 55 and 56 below). The overall impact of these revised estimates is an increase in total GHG emissions of 43.56 Gg CO<sub>2</sub> eq (0.01 per cent) in 2008 and an increase of 396.17 Gg CO<sub>2</sub> eq (0.04 per cent) in 1990. Ukraine also submitted revised information and data for KP-LULUCF on 17 October 2010 in response to the list of potential problems and further questions raised by the ERT during the centralized review (see paras. 141 and 149 below). Where necessary, the ERT also used the previous year's submission during the review. The values in this report are based on the submission of 17 October 2010.

8. In addition, the ERT used the standard independent assessment report (SIAR), parts I and II, to review information on the accounting of Kyoto Protocol units (including the SEF tables and their comparison report) and on the national registry.<sup>3</sup>

9. During the review, Ukraine provided the ERT with additional information and documents which are not part of the annual submission but are in many cases referenced in the NIR. The full list of information and documents used during the review is provided in annex I to this report.

#### Completeness of inventory

10. The inventory covers most source and sink categories for the period 1990–2008 and is complete in terms of gases, years and geographical coverage. Ukraine has included all relevant CRF tables for the period 1990–2008. The reporting in the CRF tables is complete and notation keys are used throughout. The ERT commends the efforts made by Ukraine in the current submission to improve the completeness of the reporting by including CRF table

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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.

8(b) with explanations of the recalculations. Ukraine has also provided the CRF tables for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol for 2008. The reporting in these CRF tables is complete and notation keys are used throughout.

11. In its 2010 submission, Ukraine reported estimates for categories previously reported as “not estimated” (“NE”) including: CO<sub>2</sub> emissions and removals from land converted to land-use categories other than forest land and SF<sub>6</sub> from electrical equipment. The ERT appreciates this improvement. However, there is still a long list of categories reported as “NE” in the GHG reporting of Ukraine. In response to questions raised by the ERT during the centralized review Ukraine noted that a number of the categories reported as “NE” had been put in a list of priority investigations for financing at the end of 2009 by the National Environmental Investment Agency (NEIA), but this plan had not been realized due to lack of finances caused by the continued economic crisis in the country.

12. The ERT noted that categories reported by Ukraine as “NE” include: fugitive CO<sub>2</sub> and CH<sub>4</sub> emissions from oil exploration (and, when relevant, N<sub>2</sub>O emissions); CO<sub>2</sub> emissions from oil production; CO<sub>2</sub> emissions from oil refining and storage; CO<sub>2</sub> and CH<sub>4</sub> emissions from oil venting; CO<sub>2</sub> and N<sub>2</sub>O emissions from oil flaring (reported as “included elsewhere” (“IE”)); CO<sub>2</sub> and CH<sub>4</sub> emissions from natural gas exploration, and CO<sub>2</sub> and CH<sub>4</sub> emissions from venting of natural gas; HFC, PFC and SF<sub>6</sub> emissions from foam blowing, fire extinguishers, aerosols/metered dose inhalers and solvents; CO<sub>2</sub> emissions from dead organic matter and mineral soils in forest land remaining forest land; CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O emissions from biomass burning on land converted to forest land, on land converted to cropland, on forest land converted to cropland, on grassland and on wetlands. The ERT strongly recommends that Ukraine include estimates for these categories in its next annual submission. The ERT noted that CO<sub>2</sub> emissions from natural gas transmission and HFC, PFC, and SF<sub>6</sub> emissions from refrigeration and air conditioning equipment (except for HFC-134a) are reported as “not occurring” (“NO”). The ERT considers that some of these emissions are likely to occur in the country and recommends that Ukraine revise its assumptions and report emissions from these categories in its next annual submission or provide in the NIR substantial explanations on the non-occurrence of these emissions.

13. As indicated above, Ukraine reported CH<sub>4</sub> emissions from venting of natural gas as “NE” in its 2010 submission. In response to the list of potential problems and further questions raised by the ERT, Ukraine provided revised estimates for this category (see paras. 55 and 56 below) after the centralized review. The ERT agreed with these emission estimates. In addition, Ukraine reported HFC, PFC and SF<sub>6</sub> emissions from foam blowing, fire extinguishers, aerosols/metered dose inhalers and solvents under the category consumption of halocarbons and SF<sub>6</sub> as “NO”. During the centralized review the ERT recommended that Ukraine check whether these subcategories and other subcategories and relevant related gases under consumption of halocarbons and SF<sub>6</sub> occur in the country (in particular, for the subcategory refrigeration and air conditioning equipment) and provide estimates for those categories and gases occurring in the country, in accordance with the IPCC good practice guidance. In response to the list of potential problems and further questions raised by the ERT, after the centralized review, Ukraine informed the ERT that, “due to the lack of activity data (AD), emissions in the categories refrigeration and air conditioning equipment, foam blowing, fire extinguishers, aerosols/metered dose inhalers and solvents are not estimated” and that “investigations aimed at evaluating the AD for these categories are planned to be executed at the expense of the assigned amount units (AAUs) sale”. Taking this information into account and in accordance with the “Guidelines for review under Article 8 of the Kyoto Protocol” (decision 22/CMP.1), the ERT decided to recommend adjustments for these categories (see paras. 110–137 below).

14. The ERT noted many gaps in the KP-LULUCF reporting, including mandatory carbon pools. Parties to the Kyoto Protocol are required to estimate carbon stock changes



for each pool unless transparent and verifiable information is provided to demonstrate that the missing pool is not a net source of emissions, in accordance with paragraph 6(e) of the annex to decision 15/CMP.1 (see paras. 144–146, 151, 154 and 155 below). The ERT strongly recommends that Ukraine complete its reporting under Article 3, paragraphs 3 and 4, of the Kyoto Protocol in its next annual submission.

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

Overview

15. The ERT concluded that the national system of Ukraine continued to perform most of its required functions in accordance with the annex to decision 19/CMP.1. However, the ERT noted that some general and specific functions of the national system are not fully operative; for example, most of recommendations made in the previous review report are still not addressed and the GHG inventory of Ukraine is not complete (see paras. 11–14 above). Furthermore, the ERT noted the lack of transparency in the descriptions of AD used for the energy and industrial processes sectors, particularly due to the absence of an energy balance (see para. 41 below) and a coke balance (which both were recommended to be provided in the previous review report), increased number of confidential AD in the industrial processes sector (see para. 64 below), as well as the lack of information and completeness in LULUCF and KP-LULUCF mandatory reporting (see paras. 89, 90, 92, 144 and 147 below). The ERT also noted that over the last few years Ukraine has not been able to collect the AD, process information and EFs necessary to estimate the relevant missing GHG emissions by sources and removals by sinks, as applicable. The ERT further noted that Ukraine has, in the past and current NIRs, consistently presented plans to estimate the missing GHG emissions, but these have not been implemented in its 2010 submission.

16. Therefore, in the list of potential problems and further questions the ERT recommended that Ukraine ensure the collection of sufficient AD, information and EFs for estimating all the missing and underestimated GHG emissions. After the centralized review, in its response, Ukraine informed the ERT that, as a result of economic crisis and limited public funds in the country, the investigations aimed to support the national system had not been funded. Currently, part of the financial resources from the sale of AAUs is planned to be used for supporting the national GHG inventory. In the ERT's view, the response provided by Ukraine does not address the potential problem and the ERT considers this problem as unresolved. The ERT concluded that the national system of Ukraine requires urgent improvements to address the issues mentioned above in order to comply with the requirements set out in the annex to decision 19/CMP.1 including: ensuring the transparency and completeness of the inventory; timeliness of submission; supporting compliance with Kyoto Protocol commitments relating to the estimation of anthropogenic GHG emissions by sources and removals by sinks under Article 3, paragraphs 3 and 4; and responding to any issues raised by the inventory review process under Article 8 of the Kyoto Protocol (decision 22/CMP.1).

17. As part of its response to the previous stages of the review, Ukraine described the changes in the legal basis of the national system since the previous annual submission and these changes are discussed in paragraph 161 of this report. In particular, the changes in the national system include the reinforcement of the powers of the single national entity that is responsible for its operation. Decree No. 325 of the Cabinet of Ministers of Ukraine "On Changes to Cabinet of Ministers of Ukraine Decrees of April 4, 2007 No. 612 and from 30 June 2007 No. 977" of 26 April 2010 defines the NEIA as an authority of the central executive power independent from the Ministry for Environmental Protection.

### Inventory planning

18. The NIR and additional information submitted by Ukraine during the centralized review described the national system for the preparation of the inventory. NEIA has overall responsibility for the national inventory. In response to a question raised by the ERT during the centralized review, Ukraine noted that NEIA is now also responsible for the official approval of the annual submission. The ERT recommends that Ukraine include this information in its next annual submission. Ministries, agencies and regional administrations, the Ukrainian academy of science and related scientific institutes, the Ukrainian Hydrometeorological Research Institute, the Ukrainian Forestry Research Institute, independent experts and non-governmental organizations are also involved in the preparation of the inventory, the collection of AD, the development of country-specific emission factors (EFs) and quality assurance procedures. The team that compiles the inventory is mainly located in the Ukrainian Hydrometeorological Research Institute.

19. The ERT noted that the list and role of private companies in the national system is not clarified in the NIR, as had been recommended in the previous review report. During the centralized review, in response to a question raised by the ERT, Ukraine noted that a major private company involved in the preparation of the GHG inventory is the Environmental (Green) Investments Fund, which provides expertise relating to climate change mitigation strategies and policies for businesses, governmental and civil organizations. This organization is a subcontractor of Ukrainian Hydrometeorological Institute and it developed the Ukrainian inventory 2010 submission under contract with the Ministry for Environmental Protection of Ukraine. The structure of the national system in relation to the preparation and reporting of KP-LULUCF activities is not specified in the NIR.

20. During the centralized review, Ukraine clarified that the national system for the compilation of the KP-LULUCF inventory has the same structure as for the LULUCF inventory under the Convention and that it is under the joint responsibility of the Ministry for Environmental Protection, the Ukrainian Forestry Research Institute and NEIA. AD for the preparation of the annual GHG inventory are obtained from the State Committee on Statistics, ministries, agencies and regional administrations based on questionnaires which are sent annually by the Ukrainian Hydrometeorological Research Institute's inventory team. After the compilation of the GHG inventory, it is submitted to the Ministry for Environmental Protection, NEIA and other ministries, agencies, governmental and non-governmental organizations for comment. NEIA is responsible for the final approval and the Ministry for Environmental Protection officially submits the annual GHG inventory to the UNFCCC secretariat. The ERT recommends that Ukraine include all the necessary information regarding institutional arrangements of the national system in the NIR of its next annual submission.

### Inventory preparation

#### *Key categories*

21. Ukraine has reported a key category tier 1 analysis, both level and trend assessments, as part of its 2010 submission. The key category analysis performed by the

Party and that performed by the secretariat<sup>4</sup> produced the same results. The only difference is for the category road transportation (N<sub>2</sub>O emissions), which is defined by Ukraine as key based on a qualitative analysis. Ukraine has included the LULUCF sector in its key category analysis, which was performed in accordance with the Intergovernmental Panel on Climate Change (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). The ERT noted that Ukraine has used the key category analysis to prioritize plans for future improvements in the inventory. The ERT encourages Ukraine to develop a tier 2 key category analysis for future submissions.

22. Ukraine has identified two key categories for activities under Article 3, paragraphs 3 and 4, under the Kyoto Protocol: forest management and afforestation and reforestation activities. This is in full agreement with the analysis performed by the secretariat and in accordance to the guidance on establishing the relationship between the activities under the Kyoto Protocol and the associated key categories in the Convention inventory as provided in chapter 5.4.4 of the IPCC good practice guidance for LULUCF.

#### *Uncertainties*

23. In its 2010 submission, Ukraine provided quantitative uncertainty estimates using the tier 1 method of the IPCC good practice guidance, including uncertainty estimates for AD and EFs. The uncertainty values used are defaults from the Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories (hereinafter referred to as the Revised 1996 IPCC Guidelines), the IPCC good practice guidance, the *2006 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the 2006 IPCC guidelines) and IPCC good practice guidance for LULUCF or based on expert assumptions, although references on the sources for uncertainty values and explanations for the assumptions made are lacking in the NIR. The LULUCF sector is included in the uncertainty analysis of the Party for the first time. The ERT appreciates this effort made by Ukraine. The cumulative uncertainty of the total GHG emissions for 2008 is 5.0 per cent without LULUCF and 6.3 per cent with the LULUCF sector. Overall uncertainties in the trend are 1.6 and 2.3 per cent, respectively, without and with the LULUCF sector. The total uncertainty is close to the value reported for 2007 in the previous annual submission (5.4 per cent without LULUCF). The increase of overall uncertainty for 2008 was clarified by Ukraine during the centralized review, as a result of updated uncertainty values for agriculture taken from the 2006 IPCC Guidelines. The ERT encourages Ukraine to provide explanatory information on the increase of the overall uncertainty in the NIR of its next annual submission.

24. The ERT noted that the recommendation from the previous review report, that the Party provide references in the NIR for the sources of the uncertainty values and the assumptions used for the uncertainty estimates in different sectors, had not been implemented. The ERT reiterates that this recommendation be implemented in Ukraine's next annual submission.

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<sup>4</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 Intergovernmental Panel on Climate Change *Good Practice Guidance for Land Use, Land-Use Change and Forestry*. Key categories according to the tier 1 trend assessment were also identified for Parties that provided a full set of CRF tables for the base year or period. Where the Party performed a key category analysis, the key categories presented in this report follow the Party's analysis. However, they are presented at the level of aggregation corresponding to a tier 1 key category assessment conducted by the secretariat.

*Recalculations and time-series consistency*

25. Recalculations have been performed in the energy, industrial processes, agriculture and LULUCF sectors and reported in accordance with the IPCC good practice guidance. The ERT noted that recalculations reported by the Party of the time series 1990 to 2007 have been undertaken to take into account improvements in AD and EFs and the reallocation of some categories of the industrial processes sector to an aggregate category in order to protect confidential data (e.g. CH<sub>4</sub> emissions from carbon black were reallocated to ethylene and other production). The recalculations performed in the 2010 submission had no impact on the consistency of the time series as they were made for all years of the reported period. The impact of the recalculations includes: an increase in the estimated total GHG emissions in 1990 (0.2 per cent) and an increase in 2007 (1.0 per cent). The rationale for these recalculations is provided in the sectoral chapters and chapter 10 of the NIR and in CRF table 8(b). The ERT appreciates the transparent reporting of recalculations performed by Ukraine.

26. The ERT noted that for the years 1991–1997 the inventory lacks complete data on fuel consumption by category, which the Party explained was caused by changes that occurred in the Ukrainian statistical system. For instance, in the CRF tables for this period AD, implied emission factors (IEFs) and emissions of liquid, solid, gaseous, other fuels and biomass from energy industries, manufacturing industries and construction, transport and other sectors are reported as “NE”. The ERT strongly reiterates the recommendation from previous review reports that, in its next annual submission, Ukraine use the splicing techniques recommended in the IPCC good practice guidance to make the time series consistent, thus enhancing the comparability of the emission estimates.

*Verification and quality assurance/quality control approaches*

27. Ukraine has provided information on quality assurance/quality control (QA/QC) procedures in the NIR, as recommended in the previous review report. This is in line 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). Annual procedures include tier 1 and tier 2 checks, and the elaborated QA/QC plan is in accordance with decision 19/CMP.1 and the IPCC good practice guidance. However, the ERT noted that the information in the NIR does not include an annual schedule for the implementation of QA/QC procedures. During the centralized review, Ukraine provided the ERT with a decree from the Ministry for Environmental Protection of Ukraine, which includes the deadlines for the annual cycle of GHG inventory preparation, its annual checks and the responsible organizations for each stage. The ERT found that this schedule is in line with decision 19/CMP.1 and the IPCC good practice guidance. The ERT recommends that Ukraine include this information in the NIR of its next annual submission.

28. Ukraine provided information in the NIR about reviews which were conducted as a part of annual QA procedures by independent experts for the 2010 submission, covering the industrial processes sector (nitric and adipic acid production), the agriculture sector (manure management) and the waste sector (solid waste disposal). However, from the NIR it is unclear whether any recommendations for improvements were made by reviewers. In response to a question from the ERT during the centralized review, Ukraine provided the ERT with five reports from the independent national reviews, covering the industrial processes, agriculture, LULUCF and waste sectors; these contain some recommendations for future improvements, particularly on the implementation of national EFs. The ERT recommends that, in the NIR of its next annual submission, Ukraine include all related information about the recommendations made by independent reviewers and how the recommendations were addressed in the inventory compilation.

### *Transparency*

29. The NIR provides most of the required information on the national system, key categories, QA/QC procedures, uncertainty assessment, methodologies, and AD and EFs for most categories. The ERT noted that the NIR is structured in accordance with the outline of the NIR provided in the UNFCCC reporting guidelines and the suggested annotated NIR.

30. However, the ERT noted that the reporting for the energy and industrial processes sectors still lacks transparency and a strong recommendation made in the previous review report, that the Party provide an energy balance and a coke balance, has not yet been implemented. The ERT notes that the transparency of the AD and EFs used in the industrial processes sector decreased in the 2010 submission, because limited information was provided for some categories due to the confidentiality of data, and also because of the aggregation of these categories with likely non-confidential categories, with no additional explanations on the increased confidentiality provided in the NIR (see para. 64 below). During the centralized review, in response to a question from the ERT regarding access to confidential data (e.g. carbide production, dolomite use), Ukraine explained that it is not possible for the country to make this information available and provided access to the “Law of Ukraine on State Statistics, with amendments and additions introduced by Law of Ukraine of 13 July 2000 No. 1922-III” (2006), which relates to the confidentiality of state statistics. According to this law, information on production values from industrial activities with limited number of plants remains confidential.

31. The ERT noted that, in accordance with decisions 25/CMP.1 and 18/CP.10, Parties included in Annex I to the Convention (Annex I Parties) whose inventories contain information that is designated as confidential are requested to provide this information during centralized and in-country reviews, at the request of an ERT, in accordance with the code of practice for the treatment of confidential information adopted by decision 12/CP.9. During the centralized review, in its response to the ERT’s questions, Ukraine informed the ERT that confidential information may be provided only during an in-country review. After the centralized review, in its response to the ERT’s list of potential problems and further questions, Ukraine agreed to provide the confidential information to the ERT upon official request by the secretariat. The ERT strongly recommends that Ukraine improve the transparency of the inventory in the industrial processes sector and provide the data in future reviews, at the request of the ERT.

32. The ERT further noted that the land representation in the LULUCF sector and the identification of areas under KP-LULUCF activities are not consistent and reporting in the sectoral LULUCF and KP-LULUCF CRF tables is not transparent (see paras. 89 and 139 below). Explanations for the country-specific parameters (e.g.  $Frac_{GASF}$ ) used in the agriculture sector had not been improved, as had been recommended in the previous review report (see para. 78 below). The ERT also noted some inconsistencies between the reporting in the NIR and CRF tables in the LULUCF sector relating to different land-use categories (see para. 89 below). Furthermore, the ERT noted that there are a number of categories reported by Ukraine as “NE” (see para. 12). The ERT reiterates the strong recommendation from the previous review report that, in its next annual submission, Ukraine improve the transparency of its reporting in relation to the issues mentioned above.

### Inventory management

33. In the NIR, the Party reports that it 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. The archive is kept at NEIA. During the centralized review, the ERT was provided with the requested additional archived information in due course (except confidential information).

### 3. Follow-up to previous reviews

34. The ERT noted that some recommendations of the previous review report have been addressed by Ukraine in its 2010 submission, including the reporting of previously not estimated categories in the LULUCF sector (e.g. CO<sub>2</sub> emissions and removals from land converted to land-use categories other than forest land) and in the industrial processes sector (SF<sub>6</sub> from electrical equipment), and additional explanatory information on QA/QC procedures. In response to a recommendation from the previous review report, Ukraine conducted an uncertainty analysis including LULUCF categories. The ERT appreciates these efforts made by the Party.

35. However, a number of strong recommendations in the previous review report have not yet been implemented, particularly those relating to the transparency of AD and EFs in the energy and industrial processes sectors, the provision of the energy and coke balances (see paras. 41 and 72 below), and improvements required for LULUCF and KP-LULUCF reporting (e.g. ensuring a consistent land representation and identification of areas of KP-LULUCF activities in line with the IPCC good practice guidance for LULUCF and reporting of information on the geographical location of the areas used for calculation of the units of land subject to afforestation, reforestation, deforestation and forest management activities) (see paras. 139–143 below). Furthermore, in the previous review report, Ukraine was recommended to verify its country-specific approach, based on the balance of nitrogen (N) fluxes, and to estimate emissions and removals from soils (preferably by comparing the current method with the tier 2 approach in the IPCC good practice guidance for LULUCF) for the key category cropland remaining cropland. The ERT strongly recommends that Ukraine address all the recommendations made in the current and previous review reports in its next annual submission.

### 4. Areas for further improvement

#### Identified by the Party

36. The 2010 NIR identifies several areas for improvement in the GHG inventory in the sectoral chapters. The ERT encourages Ukraine to also report planned improvements in chapter 10 of the NIR in the next annual submission. Improvements identified by the Party include:

(a) The development of country-specific EFs for a number of categories, such as CO<sub>2</sub> emissions from combustion of natural gas, fugitive CH<sub>4</sub> emissions from natural gas leakage from end-users, CO<sub>2</sub> emissions from cement production, CO<sub>2</sub> emissions from limestone and dolomite use, CO<sub>2</sub> emissions from aluminium production, CO<sub>2</sub> emissions from ferroalloys, CO<sub>2</sub> and N<sub>2</sub>O emissions from manure management and direct N<sub>2</sub>O emissions from agricultural soils;

(b) The improvement of AD and parameters for a number of categories and activities, including ammonia production, adipic acid production, refrigeration, SF<sub>6</sub> use in electrical equipment, N<sub>2</sub>O use in medicine and wastewater handling; and the updating of the areas of forest land, cropland and grassland (areas of different soil types by climatic zone);

(c) The implementation of a national model for solid waste disposal on land and the use of higher tier methods for the estimation of emissions from road transportation.

Identified by the expert review team

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

(a) The improvement of completeness of the GHG inventory by estimating all categories currently reported as “NE” and those categories reported as “NO” that are likely to occur in the country (see paras. 12 and 14 above);

(b) The improvement and enhancement of the relevant functions of the national system to allow timely implementation of the recommendations made in the current and previous review reports for the GHG inventory and to ensure that the national system has the capacity to collect sufficient AD necessary to support the methods selected for estimating emissions;

(c) The provision of the information on the structure of the national system for the compilation and reporting of KP-LULUCF activities;

(d) The reporting of information on the geographical location of the areas used for calculating the units of land subject to afforestation, reforestation and deforestation and forest management activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol (see paras. 139–143 below);

(e) The provision of a schedule for the annual implementation of QA/QC procedures and additional information on the recommendations made by independent reviewers during QA checks and how those were addressed in the inventory compilation;

(f) The reporting of relevant GHG emissions and removals for all mandatory land-use conversions in the LULUCF sector (see para. 90 below);

(g) The improvement of the completeness of reporting under Article 3, paragraphs 3 and 4, of the Kyoto Protocol by reporting all missing carbon pools (see para. 14 above);

(h) The provision of a matrix of land-use conversions for the LULUCF sector for the representation of areas of land-use categories;

(i) The improvement of the national system to ensure that areas of land subject to LULUCF activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol are identifiable in accordance with paragraph 20 of the annex to decision 16/CMP.1;

(j) The improvement of the descriptions of the national system related to the role of single ministries, organizations and private companies within the national system and the institutional arrangements for the compilation and reporting of KP-LULUCF activities;

(k) The achievement of complete reporting of GHG emission and removal estimates for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, including all the mandatory missing pools identified in this report;

(l) The provision of reference sources for uncertainty values and assumptions used for the uncertainty estimates;

(m) The reporting of all relevant AD used in the inventory, particularly for the energy and industrial processes sectors (see paras. 41, 46, 62 and 72 below), including the energy and coke balances;

(n) The aggregation of confidential AD and emissions in a coherent way for confidential categories in the industrial processes sector;

(o) The enhancement of consistency of the time series and the comparability of emission estimates in the energy sector by using the splicing techniques recommended in the IPCC good practice guidance.

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

## **B. Energy**

### **1. Sector overview**

39. The energy sector is the main sector in the GHG inventory of Ukraine. In 2008, emissions from the energy sector amounted to 292,683.49 Gg CO<sub>2</sub> eq, or 68.4 per cent of total GHG emissions. Since 1990, emissions from this sector have decreased by 57.3 per cent. The key drivers for the fall in emissions are the fuel switch from residual oil to natural gas and a decrease in electricity and heat consumption by industries and the population in general because of the economic crisis following the transition of the country to a market economy. Within the sector, 37.4 per cent of the emissions were from energy industries, followed by 17.8 per cent from fugitive emissions from fuels (9.9 per cent from solid fuels and 7.9 per cent from oil and natural gas), 15.1 per cent from transport, 14.7 per cent from other sectors and 14.5 per cent from manufacturing industries and construction. The remaining 0.4 per cent was from the category other.

40. The ERT noted that Ukraine is a major producer and importer of bituminous coal and natural gas, and imports most of the crude oil and oil products used in the country. Significant amounts of natural gas are transported through the country from the Russian Federation to other European countries.

41. Reporting of the energy sector in the NIR is not fully transparent. Annex 2 of the NIR provides description of methods, EFs and parameters (oxidation factors) used in the calculations. However, actual AD used in the emission calculations are not provided in the NIR; instead there is only a detailed description of national statistical forms and their use as data sources, including precise references to them and additional bibliographic references. An energy balance is not provided in the NIR nor is there detailed energy consumption data for the entire time series (1990–2008). Ukraine explained in the NIR that energy balances are lacking in the country, except for 1990. The ERT reiterates the recommendation made in previous review reports that Ukraine provide relevant information on the national energy balance, and use the splicing techniques recommended in the IPCC good practice guidance to make the time series consistent in its next annual submission, thus enhancing the comparability of emission estimates (see para. 26 above) in the NIR of its next annual submission.

42. In addition, the ERT noted from the NIR that for all fuels, except hard coal, Ukraine uses default values for carbon content (CO<sub>2</sub> EFs) and oxidation factors, as well as default values for CH<sub>4</sub> and N<sub>2</sub>O EFs. The ERT strongly recommends that Ukraine develop and use country-specific CO<sub>2</sub> EFs and oxidation factors in its estimates for its next annual submission. The ERT also encourages Ukraine to make the necessary efforts for developing and use country-specific CH<sub>4</sub> and N<sub>2</sub>O EFs. In its comments on the draft annual review report, Ukraine provided additional information on AD, net calorific values, carbon contents and carbon oxidation factors used in its estimates, and indicated that a national consultation process has been initiated to improve the energy balance. The ERT encourages Ukraine to report additional details on the results of this process in its future annual submissions.

43. The ERT noted that, in the CRF tables, most of the categories for the energy sector are estimated and reported, with the exception of several categories of fugitive emissions from oil and natural gas. These include CO<sub>2</sub> and CH<sub>4</sub> emissions from oil exploration and when relevant N<sub>2</sub>O emissions, CO<sub>2</sub> emissions from oil production, CO<sub>2</sub> emissions from oil refining and storage, CO<sub>2</sub> and CH<sub>4</sub> emissions from oil venting, CO<sub>2</sub> and N<sub>2</sub>O emissions



from oil flaring (reported as “IE”), CO<sub>2</sub> and CH<sub>4</sub> emissions from natural gas exploration, CO<sub>2</sub> emissions from natural gas transmission (reported as “NO”) and CO<sub>2</sub> and CH<sub>4</sub> emissions from venting of natural gas. The ERT strongly recommends that, in its next annual submission, Ukraine estimate and include CO<sub>2</sub> and CH<sub>4</sub> emissions from these categories or clarify whether or not these emissions occur in the country or whether they are included under other categories. During the centralized review, the ERT recommended that Ukraine estimate and include CH<sub>4</sub> emissions from venting of natural gas or clarify if these emissions do not occur or are included under other category. In response to the list of potential problems and further questions raised by the ERT, after the centralized review Ukraine provided revised estimates for this category (see paras. 55 and 56 below).

44. The NIR provides information on general QA/QC procedures and verification activities for the energy sector. However, there is no indication of the implementation of tier 2 quality control (QC) procedures for key categories in the sector in line with the IPCC good practice guidance. The ERT encourages Ukraine to continue to improve the implementation of QA/QC procedures and verification activities, in particular using tier 2 QC procedures for key categories and to provide the relevant information in the NIR of its next annual submission.

45. The NIR reports that uncertainties for aggregated categories (e.g. energy industries) were assessed using a tier 1 methodology at the fuel level for each gas, in accordance with the IPCC good practice guidance, and in most cases using default uncertainty values. The ERT encourages the Party to make further improvements in its assessment of uncertainties, especially using country-specific values for uncertainty values.

46. For the calculations, a fuel losses factor is applied, together with the net calorific value, oxidation factor and carbon content of the fuels, in order to convert the fuel quantity from natural units to energy units. The origin of the losses factor and the procedures for its calculation from statistical data forms is provided in the NIR; however, the value of the losses factor for different fuels and the amount of losses in the transformation of different fuel types are not provided in the NIR. Therefore, the ERT could not assess whether they have been properly included in calculations and reported in the CRF tables. The ERT reiterates the recommendation made in previous review reports that, in its next annual submission, Ukraine explain in detail the reason and importance for these losses and provide further information on the calculation approach used for emission estimates and the allocation principles.

47. After the centralized review, in its comments on the draft annual review report, Ukraine informed the ERT that many recommendations in the 2010 annual review report and improvements for the energy sector will be implemented in its 2011 annual submission or as soon as practicable or in its future annual submissions.

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

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

48. The ERT noted that Ukraine has provided a comparison of the reference approach and the sectoral approach in the CRF tables. In the 2010 submission, in the CRF tables for the year 2008, energy consumption and CO<sub>2</sub> emissions from fuel combustion estimated using the reference approach were reported as 0.94 per cent higher and 2.76 per cent lower, respectively, compared with those estimated using the sectoral approach in the CRF. The difference is especially pronounced for gaseous fuels, where the consumption of gaseous fuels and CO<sub>2</sub> emissions reported using the reference approach is 11.59 per cent higher than that estimated using the sectoral approach. The ERT noted that the NIR briefly explains the absence of an energy balance as the main reason for the differences in CO<sub>2</sub> emission

estimates between these two approaches, because this absence makes it necessary to use energy consumption data that are not always consistent for calculations in both approaches.

49. The ERT reiterates the recommendation made in previous review reports that, in its next annual submission, Ukraine: further explore the possible reasons for the difference in the estimates for emissions from the consumption of solid fuels; clarify whether double counting of carbon stored in products has occurred, whether or not emission sources were included in calculations using the reference approach and whether emission estimates calculated using the sectoral approach have been overestimated; provide detailed data for the production, import, export and consumption of coke and coking coal (a coke balance is not provided in the current submission); and explain clearly and in detail the reasons for the differences between the reference and sectoral approaches. Apparent consumption in Ukraine's reference approach for year 2008 corresponds closely (5.0 per cent lower) to the International Energy Agency (IEA) data. This discrepancy is mainly due to natural gas (production and imports) and solid fossil production. The apparent consumption reported by Ukraine shows differences up to 17 per cent with the IEA data for all the years for which a reference approach is available (1990 and 1998–2007). The ERT recommends that Ukraine clarify in the NIT of its next annual submission the reasons for such discrepancies and the steps taken to minimize them.

#### International bunker fuels

50. The ERT noted that Ukraine estimates fuel consumption for international and civil aviation using the EMEP core inventory of air emissions (EMEP/CORINAIR) methodology, which corresponds to the IPCC tier 2b method, and uses default IPCC EFs for CO<sub>2</sub> and N<sub>2</sub>O emissions and the EMEP/CORINAIR approach to estimate CH<sub>4</sub> emissions. Detailed data from aviation authorities are only available for 1996–2008 for international and civil aviation; data for 1990 were taken from the energy balance and based on total consumption of aviation fuels. Data for the years 1991–1995 were calculated using linear interpolation between 1990 and 1996. The ERT recommends that Ukraine continue in its efforts to improve the consistency of the time series of data and encourages the Party to develop country-specific EFs for its calculations.

51. In the NIR, Ukraine states that emissions of CO<sub>2</sub> from international marine bunkers and domestic navigation (including sea and river transport) are calculated on the basis of data from statistical forms. In addition, for coastal navigation between ports within the country and for international shipping it was assumed that fuel consumption is directly dependent of freight turnover. Therefore the ERT considers that the method used for splitting fuel consumption between international marine bunkers and domestic navigation is not fully transparent in the NIR and the lack of the background data used prevents the ERT from being able to fully understand and assess the estimates. The ERT recommends that Ukraine examine and improve its method and the appropriate use of AD, and report transparently and in detail the calculations made for marine bunkers and domestic navigation in the NIR of its next annual submission.

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

52. The NIR provides a short description of feedstocks and non-energy use of fuels. The ERT noted that some CO<sub>2</sub> emissions from feedstocks and non-energy use of fuels are reported under the industrial processes sector: CO<sub>2</sub> emissions from coke are reported under iron and steel production and CO<sub>2</sub> emissions from natural gas are reported under ammonia production. From the information provided in the NIR, the ERT could not conclude that there is no double counting between the energy and the industrial processes sectors. In addition, as indicated in previous review reports, the ERT noted that inconsistent information was provided on the consumption of coke in the energy and industrial

processes sectors. In order to ensure that there is no double counting and that the emissions are reported in a transparent manner, the ERT recommends that Ukraine provide a mass balance of coking coal and coke and natural gas in its next annual submission. Also, the ERT reiterates the recommendation made in previous review reports that Ukraine provide further information on the method used to calculate and allocate emissions from coke production and use in its next annual submission. In its comments on the draft annual review report, Ukraine indicated that a mass balance of coking coal and coke will be reported in its future annual submissions.

53. Under non-energy use of fuels, the NIR explains that “losses in fuel transport, storage, transformation, processing and for other reasons” and non-energy use are defined by data in the statistical forms and for this reason, Ukraine used for the calculations, carbon storage factors equal to 1 for all fuels except lubricants. However, the NIR does not provide further information or details. The ERT reiterates the recommendation made in previous review reports that Ukraine explain more clearly the estimation methods used and include supporting background data in its next annual submission.

### 3. Key categories

#### Stationary combustion: solid fuels – CO<sub>2</sub>

54. The ERT notes that the CO<sub>2</sub> IEF for solid fuels reported in 2008 under iron and steel (64.47 t/TJ) is below the IPCC default range (94.6–106.7 t/TJ). No additional information was provided in the NIR. In response to the previous stages of the review, Ukraine stated that coke oven gas is the most significant part of solid fuel used in this category (66 per cent of solid fuel consumption in 2008) as it is considered a solid fuel in the Revised 1996 IPCC Guidelines. Ukraine also indicated that it used the IPCC default CO<sub>2</sub> EF for coke oven gas (47.67 t/TJ). The ERT recommends that, to further improve transparency in the NIR of its next annual submission, Ukraine provide further information on how it allocates and reports fuels and their emissions under stationary combustion, in particular in the manufacturing industries and construction category and make the necessary efforts to use country-specific CO<sub>2</sub> EFs for key categories in accordance with the IPCC good practice guidance.

#### Oil and natural gas: gaseous fuels – CH<sub>4</sub>

55. The NIR states that the country-specific CH<sub>4</sub> EF (6,458 m<sup>3</sup>/km) for natural gas transmission used in its calculations includes all fugitive emissions related to this activity and therefore Ukraine reports venting from natural gas as “NE” in CRF table 1.B.2. No further explanations were provided in the NIR about these assumptions. In response to a question raised by the ERT during the centralized review, Ukraine clarified to the ERT that the country-specific EF covers both fugitive and venting emissions for gas transmission, citing language in table 2.16 of the IPCC good practice guidance on natural gas production, and affirming that venting emissions were indicated as “NE” in the CRF tables to avoid double counting. The ERT noted that the use of Ukraine’s country-specific EF for fugitive emissions to estimate gas transmission and venting CH<sub>4</sub> emissions differs from the IPCC good practice guidance, as table 2.16 provides separate EFs for fugitive emissions and venting from gas transmission. In its response to this remark Ukraine informed the ERT that the appropriate notation key for venting should be “IE”. The ERT recommends that Ukraine use the appropriate notation key for venting of natural gas in its next annual submission, as well as check the proper use of notation keys for all categories and gases in accordance with the UNFCCC reporting guidelines.

56. In response to the list of potential problems and further questions raised by the ERT, after the centralized review, Ukraine conducted a QC study of its data and methodological

approaches for the natural gas transmission category through an independent expert not involved in the development of the inventory. Using the results of this QC study, Ukraine provided a revised submission with updated emissions calculations based on the expert opinion data for the complete time series, providing separately CH<sub>4</sub> emissions for transmission and venting of natural gas. This resulted in an increase in emissions for the oil and natural gas category in 2008 of 43.56 Gg CO<sub>2</sub> eq (0.2 per cent) and an increase of 396.17 Gg CO<sub>2</sub> eq (0.04 per cent) in 1990. The ERT commends Ukraine for conducting this QC study and providing revised estimates based on its results and agrees with the revised estimates. The ERT recommends that Ukraine use these data sources for future annual submissions and transparently document the methodology, EFs and AD used for the revised calculations.

#### 4. Non-key categories

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

57. Ukraine uses the IPCC tier 1 method with default CH<sub>4</sub> EFs from the Revised 1996 IPCC Guidelines for the road transportation calculations. The ERT noted that the IEF for CH<sub>4</sub> for liquefied petroleum gas (LPG) in road transportation reported by Ukraine in the CRF tables is equivalent to that reported for natural gas and appears to be taken from the default EF for natural gas in table 1-7 of the Reference Manual of the Revised 1996 IPCC Guidelines (50 kg/TJ). This is not the correct EF to use for calculating CH<sub>4</sub> emissions from LPG used by road transportation, so the ERT recommends that Ukraine revise its approach in its next annual submission and instead use the appropriate LPG and natural gas CH<sub>4</sub> EFs, if possible using country-specific values or those as listed in tables 1-43 and 1-45 of the Revised 1996 IPCC Guidelines.

58. The ERT noted that the N<sub>2</sub>O EF used in the calculations for gasoline cars (0.6 kg/TJ) for the complete time series is below the IPCC default range (1–20 kg/TJ) and that the EF used for diesel cars (0.6 kg/TJ) for the complete time series is below the IPCC default range (3–4 kg/TJ). These EFs may be appropriate to use for certain age and technology classes of vehicles; however, the ERT noted that Ukraine has not provided information in a transparent manner on the number of new and used vehicles equipped with different technologies that would justify the use of lower or higher EFs. Some age and technology classes of vehicles have significantly higher N<sub>2</sub>O emissions and the EFs used in the inventory may not be representative of the actual condition of the vehicle fleet, and may lead to an underestimation of emissions from some vehicle age and technology classes. The ERT strongly recommends that Ukraine, in line with the IPCC good practice guidance, estimate the amount of fuel combusted by vehicle type and in particular assign EFs in line with the number of vehicles by each age class and technology class, then revise its N<sub>2</sub>O emission estimates using appropriate N<sub>2</sub>O EFs in its next annual submission.

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

#### 1. Sector overview

59. In 2008, emissions from the industrial processes sector amounted to 90,572.96 Gg CO<sub>2</sub> eq, or 21.2 per cent of total GHG emissions. Emissions from the industrial processes sector decreased by 29.6 per cent between 1990 and 2008 mainly due to the economic recession in the country following the transition to a market economy, which reduced emissions from iron and steel production by 48.5 per cent, cement production by 47.7 per cent, and ammonia production by 11.2 per cent between 1990 and 2008.

60. In 2008, emissions from the solvent and other product use sector amounted to 334.73 Gg CO<sub>2</sub> eq, or 0.08 per cent of total GHG emissions. Emissions from this sector

decreased by 11.2 per cent between 1990 and 2008. In this sector, Ukraine has estimated only the use of N<sub>2</sub>O for anaesthesia category and non-methane volatile organic compound emissions from paint application, degreasing and dry cleaning, and chemical products, manufacture and processing. CO<sub>2</sub> emissions were reported as “NE” due to the absence of an IPCC methodology, as explained by the Party in the NIR.

61. Within the industrial processes sector, 61.6 per cent of GHG emissions were from iron and steel production, 11.9 per cent were from ammonia production, 8.8 per cent were from limestone and dolomite use and 6.9 per cent were from cement production as the main contributing categories. CO<sub>2</sub> emissions accounted for 95.5 per cent of the sectoral GHG emissions (mostly from metal production and mineral products) and N<sub>2</sub>O emissions for 3.4 per cent (from adipic and nitric acid production under the chemical industry category). Emissions of CH<sub>4</sub> and fluorinated gases (F-gases) accounted for 0.9 and 0.2 per cent of the sectoral GHG emissions, respectively.

62. The ERT noted that Ukraine only reported actual emissions of PFCs (CF<sub>4</sub> and C<sub>2</sub>F<sub>6</sub>) from aluminium and ferroalloys production and HFC-134a emissions from refrigeration under the consumption of halocarbons and SF<sub>6</sub> category, while the NIR reported planned improvements to estimate emissions from air-conditioning equipment. The ERT also noted that Ukraine followed the recommendation of the previous review report and estimated actual SF<sub>6</sub> emissions from electrical equipment under the consumption of halocarbons and SF<sub>6</sub> category. There is no halocarbons and SF<sub>6</sub> production in Ukraine. Emissions from consumption of HFCs, PFCs and SF<sub>6</sub> for foam blowing, fire extinguishers, aerosols/metered dose inhalers and solvents are reported as “NE”. The NIR states that data about the use of HFCs, PFCs and SF<sub>6</sub> in these categories in Ukraine are absent. However, it is not clear whether AD are not available to estimate emissions or whether these substances are not used in the country. For instance, as the Party explained during the centralized review, foam materials are imported to Ukraine. Therefore, the ERT is of the view that “NO” be reported for foam blowing if all the imports are referred to open-cell foams, otherwise if at least part of the imports are referred to closed-cell foams, emissions should be estimated.

63. During the centralized review, the ERT recommended that Ukraine check whether these subcategories and other subcategories and relevant related gases under consumption of halocarbons and SF<sub>6</sub> occur in the country, in particular for the subcategory refrigeration and air conditioning equipment; and for those categories and gases occurring in the country provide estimates in accordance with the IPCC good practice guidance. In response to the list of potential problems and further questions raised by the ERT, after the centralized review Ukraine informed the ERT that, “due to the lack of activity data (AD), emissions in the categories refrigeration and air conditioning equipment, foam blowing, fire extinguishers, aerosols/metered dose inhalers and solvents are not estimated” and that “investigations aimed at evaluating the AD for these categories are planned to be executed at the expense of the AAUs sale”. Taking this information into account and in accordance with the guidelines for review under Article 8 of the Kyoto Protocol, the ERT decided to recommend adjustments for these categories (see paras. 110–137 below).

64. The ERT noted that Ukraine followed the recommendation of the previous review report and estimated CO<sub>2</sub> and CH<sub>4</sub> emissions from silicon carbide production. However, due to lack of transparency in the reporting, it was difficult for the ERT to assess the accuracy of the estimates. Ukraine reports as confidential (“C”) the AD for 17 categories (soda ash use, asphalt roofing, glass production, nitric acid production, adipic acid production, calcium carbide, carbon black, ethylene, methanol, ferroalloys production, aluminium production and PFCs from aluminium production, as well as dolomite use, propylene, polypropylene, phthalic anhydride and polystyrene). The number of categories reported as “C” has increased since the previous submission. Emissions from these

categories are aggregated in a manner which reduces the overall transparency of the industrial processes sector and makes it difficult for the ERT to assess the accuracy of the estimates in these categories. For example, emissions of CO<sub>2</sub> from asphalt roofing are reported as “NE” with AD reported as “C” and seem to be included under the aggregated category “ethylene and other production”, as indicated in the documentation box of table 2(I).A-G, whereas CO<sub>2</sub> emissions for this aggregated category are reported as “NO”. In other cases, such as CO<sub>2</sub> emissions from silicon carbide production, it is unclear if these emissions are included under an aggregated category, because the information in documentation box of table 2(I).A-G indicates that calcium carbide production is aggregated with soda ash use, but no reference is made to silicon carbide. At the same time, table 9(a) reports that CO<sub>2</sub> emissions from silicon carbide production are aggregated with soda ash use emissions, while CH<sub>4</sub> emissions from silicon carbide production are reported under the category “ethylene and other production”.

65. During the centralized review, in its responses to the questions from the ERT regarding access to confidential data, Ukraine explained that the AD used to estimate emissions in these categories are confidential and can only be provided during an in-country review and therefore did not provide the requested information. Ukraine further explained with reference to the Law on State Statistics (see para. 30 above) that AD are considered confidential due to the limited number of enterprises in these categories. The ERT notes that, in accordance with decisions 25/CMP.1 and 18/CP.10, Annex I Parties whose inventories contain information that is designated as confidential are requested to provide this information during centralized and in-country reviews, at the request of an ERT, in accordance with the code of practice for the treatment of confidential information adopted by decision 12/CP.9. The ERT strongly recommends that Ukraine aggregate emissions in a coherent and systematic way so that emissions corresponding to confidential categories are grouped under the same category where their AD are reported, that fewer categories are reported as confidential and allow provision of data in future reviews at the request of ERT.

66. After the centralized review, in its comments on the draft annual review report, Ukraine informed the ERT that many recommendations in the 2010 annual review report and improvements for the industrial processes sector will be implemented in its 2011 annual submission or as soon as practicable or in its future annual submissions.

## 2. Key categories

### Lime production – CO<sub>2</sub>

67. The ERT noted that for 1990–2003 data for lime production disaggregated into types of lime were not available and the country-specific ratio for hydrated/quicklime of 2004 (55/45) was used for all these years. However, since 2004, data disaggregated by type of lime have been available and applied, resulting in some CO<sub>2</sub> IEF fluctuations after 2004 (0.6–2.5%). However, these data were not provided in the NIR. During the centralized review, Ukraine provided to the ERT the country-specific ratios used, showing that they are consistent with the 1990–2003 time series. The ERT recommends that Ukraine include data on hydrated/quicklime production in the NIR of its next annual submission to increase the transparency of the report. After the centralized review, in its comments on the draft annual review report, Ukraine informed the ERT that it will report additional information on lime production for key years in its 2011 submission.

68. According to the explanations in the NIR, the IPCC tier 2 method with default EFs was used. However, the CRF tables report an IEF of 0.6526 t/t for lime production in 2008, which is lower than the default values (0.75 t/t for high-calcium quicklime and 0.86 t/t for dolomitic lime). The ERT understood and Ukraine confirmed that, in the CRF tables,

Ukraine reported total lime production as AD which led to a low IEF. Though emissions were estimated using a default water content correction factor for the country-specific share of hydrated lime, as recommended in the IPCC good practice guidance. The ERT recommends that Ukraine provide a detailed description of the calculation method in its next annual submission.

#### Limestone and dolomite use – CO<sub>2</sub>

69. The NIR explains that Ukraine estimated emissions from limestone and dolomite use in metal production and glass production. However, the CRF tables present only limestone use as AD under this category. During the centralized review, in its response to the ERT questions regarding the provision of data on dolomite use, Ukraine explained that because glass production is confidential, dolomite data are also confidential and thus cannot be reported or provided. This exclusion of the amount of dolomite used led to a higher CO<sub>2</sub> IEF (0.4845 t/t), although default EFs were used to estimate emissions (0.440 t/t for limestone and 0.477 t/t for dolomite). The ERT recommends that Ukraine report the total amount of limestone and dolomite used as AD in the CRF tables of its next annual submission to increase transparency and comparability regarding IEFs. After the centralized review, in its comments on the draft annual review report, Ukraine informed the ERT that information about limestone and dolomite use will be taken into account in its 2011 annual submission. Furthermore, Ukraine is planning to improve transparency by reporting emissions from glass production separately.

70. The ERT noted a mistake in the estimation of total consumption of limestone in table 4.2 of the NIR, which might have led to an underestimation of emissions. However, during the centralized review, Ukraine explained to the ERT that although the data for export had been put into the rows for import and vice versa, the resulting figures were not affected. The ERT recommends that Ukraine improve its QC procedures and report the correct AD on limestone use in its next annual submission.

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

71. Ukraine used the amount of natural gas feedstock to estimate emissions from ammonia production, which is in line with the Revised 1996 IPCC Guidelines. The ERT noted that the CO<sub>2</sub> IEF reported by Ukraine in 2008 (2.19 t/t) is higher than the IPCC default values (1.5 and 1.6 t/t) although the value had decreased from 2.45 t/t to 2.19 t/t over the period 1990–2008. The ERT also noted that CO<sub>2</sub> emissions from both the energy use for the ammonia production process and for the feedstock consumption of natural gas are reported under this category. As AD are collected directly from producers, the ERT considers that energy and non-energy use of natural gas could have been separated. The ERT encourages Ukraine to report emissions from natural gas used as fuel for ammonia production under the energy sector in its next annual submission.

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

72. Ukraine used the tier 2 method with IPCC default EFs and country-specific parameters (e.g. carbon content in coke and pig iron) to estimate CO<sub>2</sub> emissions from iron and steel production. The ERT noted that table 4.5 of the NIR reports that 8,865.5 Mt of coke was used as a reducing agent in pig iron production and 9,018.6 Mt of coke was used as fuel. However, even though disaggregated AD on coke use is available, all CO<sub>2</sub> emissions from coke use for both energy and non-energy purposes in iron and steel are reported under this category. The ERT encourages Ukraine to report emissions from coke used for energy for iron and steel production under the energy sector and strongly reiterates the recommendation of previous review reports that Ukraine provide a coke balance

(carbon in coke) to increase the transparency of the estimates in its next annual submission and ensure that there is no double counting or omission of emissions.

### 3. Non-key categories

#### Silicon carbide production – CO<sub>2</sub> and CH<sub>4</sub>

73. Ukraine reports that the AD for silicon carbide and soda ash production are confidential. CRF table 2(I).A-G reports aggregated CO<sub>2</sub> emissions for soda ash use and carbide production (both silicon and calcium, as explained in the NIR). CH<sub>4</sub> emissions from silicon carbide production are reported under the aggregated category ethylene and other production, but the AD for this category do not include silicon carbide production. The NIR provides methodological explanations only for calcium carbide production and use. The ERT concluded that the reporting of emissions from carbide production is not transparent and not in line with the IPCC good practice guidance, and the fact that the categories were not aggregated in a systematic way makes it difficult for the ERT to assess the consistency, comparability and accuracy of estimates. The ERT recommends that Ukraine improve the transparency and appropriateness of the reporting by including all relevant explanations and any other appropriate information in the NIR of its next annual submission.

#### Nitric acid production – N<sub>2</sub>O

74. The ERT noted that the AD for nitric acid production and adipic acid production are reported as “C”, while N<sub>2</sub>O IEFs are reported as “IE”. N<sub>2</sub>O emissions for these two categories are reported aggregated under one category. The NIR reports that the IPCC default EF was used to estimate emissions from adipic acid production and country-specific EFs were used for nitric acid production, which the Party states are in line with the average of the IPCC default range (2–19 kg/t). During the centralized review, Ukraine provided the ERT with the country-specific EF of 4.5 t/t, which is equal to the default value in the IPCC good practice guidance for atmospheric pressure plants. The NIR reports that emission estimates were assessed by an independent expert, although no further information or descriptions are provided, for example on the abatement technology used in the country. The ERT recommends that Ukraine include transparent descriptions on the production technology used in the country to support the use of this country-specific EF in its next annual submission.

## D. Agriculture

### 1. Sector overview

75. In 2008, emissions from the agriculture sector amounted to 34,636.39 Gg CO<sub>2</sub> eq, or 8.1 per cent of total GHG emissions. Since 1990, emissions have decreased by 66.9 per cent. The key drivers for the fall in emissions are decreases in livestock population, fertilizer application, cultivated land and changes in practice for animal waste management systems (AWMS). Within the sector, 59.1 per cent of the emissions were from agricultural soil, followed by 26.3 per cent from enteric fermentation, 12.6 per cent from manure management, 1.7 per cent from other (indirect N<sub>2</sub>O emissions from manure management) and 0.2 per cent from rice cultivation.

76. The inventory is complete in terms of gases, categories, years and geographical coverage. For its emission estimates, Ukraine has used country-specific methodologies which are consistent with the IPCC good practice guidance, using a combination of country-specific EFs and IPCC default EFs, except for the estimates from rice cultivation. Ukraine reported indirect N<sub>2</sub>O emissions from manure management systems under the



category other, which is an additional category to those listed in the Revised 1996 IPCC Guidelines.

77. Prescribed burning of savannas does not occur in the country and field burning of agricultural residues is prohibited by law in Ukraine; thus these categories were reported as “NO”.

78. In general, descriptions of the AD, methodologies and EFs used which are provided in the NIR are transparent, but there was not sufficient information on the methodologies used to estimate country-specific EFs and parameters (e.g.  $Frac_{GASF}$ ). Ukraine has implemented most of the recommendations made in the previous review report regarding transparency. However, the ERT noted that explanations on fluctuations of emissions time series are still lacking in the NIR. Thus the ERT recommends that Ukraine provide justifiable explanations on fluctuations of emissions time series with supporting charts or tables when necessary in its next annual submission.

79. There is no descriptive information on uncertainty analysis or on the methodologies used for calculating the uncertainties of estimates performed using tier 3 methods for CH<sub>4</sub> emissions from enteric fermentation, even though it was recommended in the previous review report to provide such information. Therefore the ERT reiterates that this recommendation be implemented in Ukraine’s next annual submission.

80. Recalculations performed in the 2010 submission relate to the use of updated AD for all types of animal populations, cultivated and harvested areas, nitrogen (N) fixed by N-fixing crops, area of organic soils, national allocation of manure for sheep, horses and goats to AWMS and the inclusion of emissions from by-products in the inventory. These recalculations resulted in an increase in emissions from the agriculture sector of 0.9 per cent in 1990 and an increase of 13.2 per cent in 2007. Also, the recalculation led to an increase in total emissions of 0.05 per cent (with and without LULUCF) in 1990 and an increase of 0.78 per cent excluding LULUCF and 0.88 per cent including LULUCF in the year 2007. The ERT noted that Ukraine reports in the NIR the result of recalculations as a change, but it did not indicate whether the recalculations result in a decrease or an increase in emissions. The ERT recommends that, in its next annual submission, Ukraine report clearly and accurately the increase or decrease resulting from the recalculations for categories and for the sector, as well as the impact on the national total.

81. After the centralized review, in its comments on the draft annual review report, Ukraine informed the ERT that many recommendations in the 2010 annual review report for the agriculture sector will be implemented in its 2011 annual submission or as soon as practicable.

## 2. Key categories

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

82. Ukraine used a country-specific methodology to estimate CH<sub>4</sub> emissions for dairy and non-dairy cattle. The country-specific methodology estimates gross energy in feed intake which takes into account the amount, chemical composition and structure of feed. This allows Ukraine to estimate CH<sub>4</sub> emissions independently of livestock performance characteristics. Ukraine used enhanced characterization of cattle for its estimates. The population of animals has been updated for all types of animals using annual averaged data, as recommended in the previous review report. Following the recommendation of the previous review report, Ukraine has corrected milk production for suckling lambs on the base of expert judgement and provided references to this in its NIR. Emissions from poultry are reported using the notation key “NA”, as there is no IPCC methodology to estimate emissions from this category.

83. Ukraine developed country-specific EFs for rabbits and fur animals using parameters described in the 2006 IPCC Guidelines. EFs for fur farming were adjusted using EFs for swine and the EFs for rabbits were adjusted using EFs for mules and asses taking into account their similarity in digestibility. The ERT welcomes the Party's efforts to develop country-specific EFs and encourages Ukraine to provide more detailed explanations in methodologies used to estimate the EFs. The ERT also encourages Ukraine to conduct a peer review of country-specific EFs and document the results in the NIR of its next annual submission.

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

84. Ukraine used the IPCC tier 2 method for estimating CH<sub>4</sub> emissions for cattle, swine and poultry and the tier 1 method for other animal categories. This is in line with the IPCC good practice guidance. Ukraine identified the types of AWMS that are used in the country and developed country-specific data on the allocation of manure to different types of AWMS on the base of expert judgement. The CH<sub>4</sub> IEFs for non dairy cattle for 1990–2008 (ranging from 0.87 to 15.14 kg/head/year) fluctuate every year. The 2008 value (2.17 kg/head/year) is 85.6 per cent lower than the value in 1990. As explained in the NIR, this is due to changes of AWMS practices, mainly in modern dairy farms which have been built in recent years; however, the ERT notes that the explanation is not sufficiently clear. Therefore, the ERT recommends that Ukraine improve the explanation of the fluctuations in EFs in the NIR of its next annual submission, in particular, by including supporting tables or charts when necessary to increase the transparency of the information.

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

85. In the 2009 submission, Ukraine used a country-specific methodology to estimate N fixation by pulses. During the previous review it was noted that the amount of N in the roots of all pulses is also estimated under the subcategory crop residues left on fields and the Party was recommended to investigate a potential double counting. In its 2010 submission, Ukraine has included all emissions from N-fixing crops in the crop residue subcategory, as the country-specific methodology includes the amount of N in roots of N-fixing crops that are estimated under the subcategory crop residue. The ERT welcomes this correction of emission estimates and the improvement in the completeness of the inventory.

86. Ukraine has used the IPCC default fraction of livestock N-excretion that volatilizes as NH<sub>3</sub> and NO<sub>x</sub> instead of the country-specific fraction (Frac<sub>GASM</sub> = 0.33) which resulted in the double counting in the 2009 submission, and the Party has corrected the formula used for the calculation of N<sub>2</sub>O emissions from synthetic fertilizers and provided explanations on this, as recommended in the previous review report and in line with the IPCC good practice guidance.

87. Ukraine has updated the area of cultivated organic soils for the entire time series using data provided by the National Water Committee for the period 2000–2008, and in order to obtain a complete time series it extrapolated linearly for 1990–1999, excluding the available data for 1994 (148,100 ha) which were reported in the previous NIR. Accordingly, the area of cultivated organic soil increased by 4.1–8.1 per cent throughout the time series. The ERT noted that no explanations have been provided in the NIR on the differences of area cultivated organic soils or on the reliability of the data used for the current inventory. The ERT recommends that Ukraine provide a detailed description on the differences of area cultivated organic soils and the reliability of the data on area of cultivated organic soils in its next annual submission.

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

### 1. Sector overview

88. In 2008, net removals from the LULUCF sector amounted to 16,585.27 Gg CO<sub>2</sub> eq. Since 1990, net removals have decreased by 75.8 per cent. The key reason for the fall in removals is the growth in emissions from soils in cropland (cropland soils were responsible for the removal of 11,349.37 Gg CO<sub>2</sub> in 1990, while in 2008 the emissions from cropland soils were equal to 41,848.90 Gg CO<sub>2</sub>, not taking into account liming). Within the sector, net removals from forest land accounted for 55,378.51 Gg CO<sub>2</sub> eq, followed by emissions from cropland accounting for 36,397.54 Gg CO<sub>2</sub> eq, 2,302.13 Gg CO<sub>2</sub> eq from grassland, 39.98 Gg CO<sub>2</sub> eq from wetlands and 41.77 Gg CO<sub>2</sub> eq from settlements. The remaining 11.83 Gg CO<sub>2</sub> eq were emissions from other land.

89. The ERT noted that land representation remains a critical issue for the Party's reporting for the LULUCF sector. Discrepancies were identified between land-use areas reported in the NIR and those reported in the CRF tables. In response to a question raised by the ERT during the centralized review, Ukraine clarified that different sources of information were used to identify land-use areas (annual statistics form "6-zem" and form "3-1g" concerning reforestation area). Regional land-use area assessments have been carried out and reported in the NIR (table П3.2.4) but the ERT noted that the national land representation seems to be inconsistent, as double counting or omission of an area might have occurred, leading to the incorrect estimation of emissions or removals. In response to a question raised by the ERT during the centralized review, Ukraine stated that, in its next annual submission, inconsistencies will be resolved, although the Party did not provide details of the methods it plans to use. In addition, Ukraine ensured the ERT that it will provide, in its next annual submission, summary tables on the land-use areas under different land categories for each year of the reported period for the entire country and land-use changes matrices related to the reported period. The ERT welcomes these planned improvements, which are critical for reporting the LULUCF sector in accordance with the IPCC good practice guidance for LULUCF.

90. Among the categories of land converted to other land uses, only conversion to forest land was reported in the 2010 submission, while for all the remaining land uses the notation key "NE" was used. The Party explained in the CRF tables that the use of "NE" was due to a lack of AD or because of the assumption that land-use changes were realized by conversion to unmanaged areas. In response to a question raised by the ERT during the centralized review, Ukraine stated that management of lands included in each land use category constantly decreased (i.e. arable land decreased during the reporting period, therefore, it was assumed that the conversion results in a change to unmanaged land). The ERT notes that the land representation has to cover the total national territory; managed and unmanaged lands have to be accounted for in the LULUCF sector. Ukraine also clarified that land converted to forest land was deduced using data from a special programme conducted by the Ukrainian Government ("Forests of Ukraine 2010–2015"), which is still ongoing. The ERT recommends that Ukraine provide, in its next annual submission, a detailed explanation on the assumptions and approaches used to detect land converted to forest land. Furthermore, the ERT strongly recommends that Ukraine include in its reporting all mandatory land-use conversions in its next annual submission.

91. Ukraine reported in the NIR national definitions for land-use categories and their relationship to the IPCC categories definitions. The ERT noted that Ukraine classified temporary fallow (class 10 of tables П3.2.1 of the NIR) in the grassland category, which is different from the definitions applied to the grassland and cropland categories in the IPCC good practice guidance for LULUCF. In response to a question raised by the ERT during the centralized review, Ukraine stated that fallow lands are reported, in national statistics,

as annual and perennial grasses. The ERT recommends that, in its next annual submission, Ukraine classify temporary fallow under the cropland category in accordance with the IPCC good practice guidance for LULUCF.

92. The ERT noted that direct N<sub>2</sub>O emissions from N fertilization of forest land are reported as “NE”, following the assumption that N<sub>2</sub>O emissions from N fertilization of forest land were negligible. CO<sub>2</sub> emissions from the application of limestone on grassland have been reported also as “NE”, and the Party explained in the CRF tables that the data for the application of limestone on grassland are not available. In the previous review report it was recommended that Ukraine estimate and report all mandatory categories reported as “NE” in its next annual submission. The ERT reiterates this recommendation. After the centralized review, in its comments on the draft annual review report, Ukraine informed the ERT that inquiries were made to ascertain that no lime application on grassland neither N fertilization of forest land have taken place in Ukraine. The ERT recommends that Ukraine include this information in the NIR of its next annual submission and use the appropriate notation key for these categories in the CRF tables.

93. Ukraine reported an uncertainty assessment for all land use categories, following the tier 1 approach, on the basis of expert judgement. In response to a question raised by the ERT during the centralized review, Ukraine stated that calculations were carried out following the methodology described in the IPCC good practice guidance for LULUCF. The ERT recommends that Ukraine provide, in its next annual submission, additional information on the method and assumptions used in the uncertainty assessment, to clarify how values, especially those based on expert judgement, are selected, considering that the reported values are considerably lower than the uncertainty default values.

94. After the centralized review, in its comments on the draft annual review report, Ukraine informed the ERT that many recommendations in the 2010 annual review report and improvements for the LULUCF sector will be implemented in its 2011 annual submission or in its future annual submissions.

## **2. Key categories**

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

95. The ERT noted discrepancies between that forest land areas reported in the NIR (table II3.2.20) and those reported in the CRF tables; for example, in the CRF tables a forest land area of 10,025 kha in 1990 was reported, while in the NIR the area was reported to be 10,195 kha; similarly, in 2000, 9,969 kha was reported under the forest land category in the CRF tables, while 10,413 kha was reported in the NIR; and finally, in the CRF tables a forest land area of 9,960 kha was reported for 2008 compared with the 10,570 kha reported in NIR. In response to a question regarding this issue raised by the ERT during the centralized review, Ukraine stated that these discrepancies, which were due to a mistake in table II3.2.20, will be corrected in its next annual submission. The ERT strongly recommends that Ukraine verify the effectiveness of the land uses assessment used by the Party, at regional and national level, assuring consistency between different data sources and coherence of the reported data in its next annual submission.

96. Ukraine estimated carbon stock changes from forest land remaining forest land using national statistical data and country-specific parameters. The country-specific data on biomass increment and root-to-shoot ratio are reported for major forest types and natural zones. The ERT noted that the NIR does not report details on the used methodology to estimate carbon stock changes, or on biomass expansion factors and ratio; therefore, during the centralized review, the ERT asked Ukraine to clarify whether the carbon stock changes assessment for biomass was done at the national level or, if otherwise, it results from the sum of district level assessments, detailing also how the administrative districts (reported in

table II3.2.20) are grouped into the different ecological zones reported in table II3.2.21). In response to this question, Ukraine provided a table showing distribution of administrative districts by the different natural zones. The ERT recommends that Ukraine include this table in the NIR of its next annual submission. Nevertheless, the ERT notes that the information provided is not sufficient to allow an evaluation of the carbon stock changes estimates and strongly reiterates the recommendation from the previous review report that Ukraine further verify its set of biomass expansion factors and ratios and recommends that Ukraine provide, in its next annual submission, information on the emissions/removals estimation process (use of growth equations, model approaches or other) in order to improve transparency.

#### Cropland remaining cropland – CO<sub>2</sub>

97. Ukraine used a country-specific approach, based on the balance of N fluxes, to estimate emissions and removals from soils. The ERT noted an increasing trend in the total emissions in cropland remaining cropland, not taking into account liming: in 1990 the category was reported as a removal of 14,668.07 Gg CO<sub>2</sub>, while an emission of 36,240.18 Gg CO<sub>2</sub>, was reported for 2008 (essentially related to the increase of emissions in the soil pool: soil removals were equal to 11,349.37 Gg CO<sub>2</sub> in 1990, while in 2008 the emissions from soils were equal to 41,848.90 Gg CO<sub>2</sub>), resulting in a decrease in total removals of 347.1 per cent. In the NIR, Ukraine explained that this significant change was a consequence of the variation of several factors, such as the volume of harvested crops, the amount of added organic residues and fertilizers and the dynamics of garden planting. The ERT notes that this change is mainly occurring in mineral soils. The ERT also notes that, in the period 1990–2008, the Party reported a decrease of 2.1 per cent in cropland area.

98. The previous review report recommended that Ukraine verify its estimates (preferably by comparing the current method with the tier 2 approach in the IPCC good practice guidance for LULUCF) in order to increase transparency. The ERT notes that the recommendation has not been implemented and, during the centralized review, asked Ukraine to provide additional information so that it could better understand the methodology used in the estimates, focussing on the relation C:N used. In response to the question from the ERT during the centralized review, Ukraine informed the ERT that it used a country-specific approach to estimate emissions and removals from cropland soils, based on the N fluxes balance, an approach that is different from the methods proposed in the IPCC good practice guidance for LULUCF. Ukraine stated that the applied methodology utilizes the same approach and parameters used in the estimation of N<sub>2</sub>O from soils in the agriculture sector, and it is connected with the calculation of N<sub>2</sub>O emission from soil for land converted to cropland. The ERT considers that the information provided does not properly address the issue raised and strongly recommends that Ukraine provide, in its next annual submission, additional information explaining the emissions/removals trend of cropland soils and the methodology used in the estimates, focussing on the relation C:N used, reiterating the recommendation from the previous review report that the Party compare the current method with the tier 2 approach in the IPCC good practice guidance for LULUCF, in order to increase transparency.

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

99. Ukraine used a country-specific approach, based on the balance of N fluxes, to estimate emissions and removals from soils, similar to the approach used for the cropland remaining cropland category. The ERT noted a significant difference (300.6 per cent of decrease) in the estimate of CO<sub>2</sub> emissions and removals from the grassland remaining grassland category in 2007, between the 2009 and 2010 submissions. In response to a question on this issue raised by the ERT during the centralized review, Ukraine clarified that the main reason for the recalculation was the availability of updated AD for grassland

remaining grassland area, and the revision of the time series of organic soils area. The ERT considers that the information reported in NIR and the additional information provided during the centralized review does not properly address the raised issue and strongly recommends that Ukraine provide detailed explanations on the recalculations in its next annual submission.

100. Ukraine reported carbon stock changes in living biomass and in dead organic matter (not mandatory) as “NE” for the period 1990–2008, explaining that data on perennial trees do not exist in Ukraine. The ERT recommends that Ukraine use the notation key “NO” instead of “NE”.

## **F. Waste**

### **1. Sector overview**

101. In 2008, emissions from the waste sector amounted to 9,615.11 Gg CO<sub>2</sub> eq, or 2.2 per cent of total GHG emissions. Since 1990, emissions have increased by 14.1 per cent. The key driver for the rise in emissions is the increase in solid waste disposed on landfills, which resulted in an increase in CH<sub>4</sub> emissions (by 33.9 per cent) since 1990. Emissions from wastewater handling have decreased by 19.0 per cent since 1990 due to the transition to a market economy reducing the wastewater streams and strong decrease in population of the country and protein consumption.

102. Within the sector, 73.4 per cent of the emissions were from solid waste disposal on land, followed by 26.6 per cent from emissions from wastewater handling. Emissions from waste incineration for the purpose of energy recovery are reported in the energy sector.

103. The information in the NIR covers emissions from all categories and describes the methods and assumptions, and AD and EFs used for estimating emissions. The CRF tables include estimates of all gases and categories of emissions from the waste sector; however, CH<sub>4</sub> emissions from incineration and N<sub>2</sub>O emissions from wastewater handling are not estimated due to the lack of IPCC methods and/or EFs. The ERT noted that no recalculations have been performed since the last submission, and also noted that no further improvements to emission estimates are planned for the waste sector. The ERT encourages Ukraine to make further efforts to improve the inventory for the waste sector as it considers there is room for improvements as identified by the ERT in paragraphs 105 and 109 below.

104. Ukraine used the tier 1 method from the IPCC good practice guidance for the uncertainty estimates for the waste sector, including uncertainty estimates for AD and EFs. Tier 1 QA/QC activities were applied for emission estimates in the waste sector and tier 2 QC procedures were applied for the key category solid waste disposal on land. The ERT commends Ukraine for implementing these activities.

### **2. Key categories**

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

105. CH<sub>4</sub> emissions from solid waste disposal on land is a key category by level and trend and amounted to 7,058.48 Gg CO<sub>2</sub> eq in 2008. Ukraine applies the IPCC first order decay (FOD) method and IPCC default EFs and parameters to estimate CH<sub>4</sub> emissions from solid waste disposal on land. The ERT welcomes the provision in the 2010 submission of detailed information on the collection and calculation of AD and references for this, however the ERT recommends that Ukraine enhance its efforts and use country-specific parameters and EFs for its estimates in its next annual submission.

106. In its previous submission, Ukraine had used one of the lowest coefficients of waste density ( $250 \text{ kg/m}^3$ ) of all reporting Parties to convert the volume of waste generated into mass units of waste. In the previous review report it was encouraged that Ukraine use weighed quantities of disposed municipal solid waste for reporting the amount of waste. In its 2010 submission, Ukraine used weighed quantities of disposed municipal solid waste, for the years 2006–2008, based on AD from the State Committee on Statistics. The ERT agreed that these data, which reflect real disposed waste quantities, are in line with the IPCC good practice guidance.

### 3. Non-key categories

#### Wastewater handling – CH<sub>4</sub> and NO<sub>2</sub>

107. Emissions from wastewater handling amounted to 2,556.64 Gg CO<sub>2</sub> eq in 2008. Emissions from wastewater handling have decreased by 19.9 per cent since the base year, mainly due to a reduction of wastewater streams and industry's collapse during the transition period to market economy. In the 2010 submission no methodological changes have been made for this category, and Ukraine used country-specific EFs and the tier 2 method to estimate CH<sub>4</sub> emissions. N<sub>2</sub>O emissions from wastewater handling are not estimated due to the lack of IPCC methods and/or EFs. No recalculations have been performed since the last submission for the wastewater handling category.

108. N<sub>2</sub>O emissions from human sewage have been estimated based on population data. As the population has decreased between 1990 and 2008, by 10 per cent, and protein consumption has also decreased, from 105.2 g/person/day in 1990 to 80.3 g/person/day in 2008, N<sub>2</sub>O emissions have decreased by 32.3 per cent during this period.

#### Waste incineration – CO<sub>2</sub>

109. Emissions from waste incineration are reported under the energy sector, as all energy obtained from the incinerated waste is recovered and used for heating purposes. The NIR contains a description of the AD and EFs used. The differentiation between biogenic and non-biogenic waste is made based on the default values of carbon content and the percentage share of the carbon of fossil origin in the incinerated waste. Given that the data on the composition of waste are available, the ERT reiterates the recommendation from the previous review report that Ukraine use these data to differentiate biogenic and non-biogenic waste and estimate emissions accordingly in its next annual submission.

## G. Adjustments

110. The ERT identified and recommended four adjustments in the industrial processes sector for 2008 of the 2010 annual submission of Ukraine. The ERT calculated these adjustments in accordance with the technical guidance on methodologies for adjustments under Article 5, paragraph 2 of the Kyoto Protocol (annex to decision 20/CMP.1). Also, in accordance with the guidelines for review under Article 8 of the Kyoto Protocol (annex to decision 22/CMP.1), the ERT prepared the adjustments in consultation with Ukraine and officially notified Ukraine of the calculated adjustments. The ERT recommended adjustments for the following subcategories of the consumption of halocarbons and SF<sub>6</sub> category of the industrial processes sector for 2008: HFC and PFC emissions from refrigeration and air-conditioning equipment; HFC emissions from foam blowing; HFC and PFC emissions from fire extinguishers; and HFC emissions from aerosols/metered dose inhalers. The solvents subcategory was also taken into consideration by the ERT; however, it concluded that it will not recommend an adjustment for this subcategory, following an analysis on the likelihood of these emissions occurring in the country.

111. The adjusted estimate for GHG emissions from the industrial processes sector in 2008 amounts to 91,677.755 Gg CO<sub>2</sub> eq, compared with 90,572.960 Gg CO<sub>2</sub> eq originally reported by Ukraine in its 2010 annual submission (a 1.2 per cent increase). The application of the adjustments leads to an increase in the estimated total GHG emissions for 2008 of 0.3 per cent (1,104.795 Gg CO<sub>2</sub> eq), from 427,842.682 Gg CO<sub>2</sub> eq as reported by Ukraine to 428,947.477 Gg CO<sub>2</sub> eq as calculated by the ERT.

112. In its response to the draft annual review report Ukraine notified the secretariat of its intention to accept the calculated adjustments.

113. The ERT notes that Ukraine may submit revised estimates for a part of its inventory to which adjustments were applied, in conjunction with its next annual inventory, or at the latest with the inventory for the year 2012. The revised estimates will be part of the Article 8 review and if accepted by the ERT the revised estimates will replace the adjustments.

#### **1. The original estimate provided by the Party**

114. In its 2010 annual submission, Ukraine reported 48.98 Gg CO<sub>2</sub> eq for 2008 under the category consumption of halocarbons and SF<sub>6</sub> (see CRF table Summary 2); of this, 27.48 Gg CO<sub>2</sub> eq corresponded to HFC emissions (HFC-134a) from refrigeration and air conditioning equipment and 21.50 Gg CO<sub>2</sub> eq to SF<sub>6</sub> emissions from electrical equipment.

#### **2. The underlying problem**

115. In its 2010 inventory submission, for 2008 Ukraine did not report either actual or potential emissions of HFCs, PFCs and SF<sub>6</sub> from refrigeration and air conditioning equipment (all gases were reported as “NO” with the exception of HFC-134a), foam blowing (all gases were reported as “NE”), fire extinguishers (all gases were reported as “NE”), aerosols/metered dose inhalers (all gases were reported as “NE”) and solvents (all gases were reported as “NE”). These subcategories probably would not be key categories, although emissions of F-gases are increasing rapidly in many countries in recent years.

116. During the centralized review, in the list of potential problems and further questions, the ERT recommended that Ukraine check whether these activities do occur in the country for all subcategories and relevant gases under the category consumption of halocarbons and SF<sub>6</sub>. If there were cases where these activities and gases do not occur, Ukraine was recommended to change the notation keys used to “NO” and provide supporting information. For the remaining activities and gases that occur in Ukraine, the ERT recommended that Ukraine collect relevant AD and estimate HFCs, PFCs and SF<sub>6</sub> emissions using the approaches recommended in chapter 3.7 of the IPCC good practice guidance.

#### **3. The rationale for the adjustment**

117. In its response to the list of potential problems and further questions raised by the ERT, Ukraine informed the ERT that: “Due to the lack of activity data, emissions in categories «Consumption of Halocarbons and SF<sub>6</sub>: Refrigeration and air conditioning (2.F.1), Foam Blowing (2.F.2.), Fire extinguishers (2.F.3.), Aerosols/Metered dose inhalers (2.F.4.), Solvents (2.F.5)» are not estimated. Investigations aimed at evaluation of activity data for above mentioned categories are planned to be executed at the expense of the AAUs sale”. In addition, Ukraine informed the ERT that HFCs, PFCs and SF<sub>6</sub> are not produced in the country.

118. The ERT assessed the information provided by Ukraine in response to the identified potential problem and concluded that the information provided does not adequately correct the problem because the Party did not provide estimates or made changes in the notation keys. The ERT considered the explanation provided insufficient and decided to recommend



adjustments for the identified subcategories with potential problems. The ERT noted the methodological guidance from the IPCC good practice guidance (page 3.79) indicating that: “*Good practice is to use the tier 2 actual method for all sub-source categories within this source category.*” and “*If an inventory agency is unable to implement actual methods for all sub-source categories, it is good practice to calculate and report potential estimates for all sub-source categories...*”.

119. The rationale for the adjustment is that the inventory data submitted by Ukraine are incomplete due to missing and incomplete estimates of emissions for the year 2008 for the identified subcategories.

#### **4. The assumptions, data and methodology used to calculate the adjustment**

120. In accordance with paragraph 80(c) of the annex to decision 22/CMP.1, the ERT asked Ukraine to provide information on the F-gases used in Ukraine, data on production, export and import of equipment containing HFCs and PFCs, as well as proxy data, including the numbers of households and vehicles with air-conditioning equipment for the calculation of adjustments. The ERT also asked Ukraine to state which countries the Party considers are comparable with Ukrainian circumstances regarding the considered uses of F-gases. However, in its response to the ERT on 21 November 2011, Ukraine was not able to provide the data requested, explaining that special research aimed at obtaining data had not been performed at the time of the ERT’s request. Ukraine named Belarus, Kazakhstan and Romania as countries with comparable national circumstances (technologies and equipment).

121. In accordance with table 1 of the technical guidance on methodologies for adjustments under Article 5, paragraph 2 of the Kyoto Protocol (annex to decision 20/CMP.1), the ERT decided to use adjustment method 5: “Average emission rate from a cluster of countries based on a driver” for calculating the missing emission estimates for the identified subcategories.

122. In accordance with the technical guidance on methodologies for adjustments under Article 5, paragraph 2, of the Kyoto Protocol, the cluster of countries should cover a minimum number of countries and, to the extent possible, take into account similar national circumstances. In order to choose the cluster of countries, the ERT considered the information provided by Ukraine as well as the climate and geographic conditions, population, economic indicators (gross domestic product (GDP) per capita and gross national income per capita based on purchasing power parity) estimated by the World Bank<sup>5</sup> and the availability of emission estimates for each country.

123. The ERT considered data on emissions of HFCs, PFCs and SF<sub>6</sub> from the relevant subcategories available in the latest year (2007) of the reviewed 2009 annual submissions of the Annex I Parties with economies in transition, namely Belarus, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Russian Federation, Slovakia and Slovenia.

124. The ERT concluded that Belarus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Russian Federation, Slovakia and Slovenia are the countries to be included in the cluster for the calculations in line with paragraphs 35–40 of the technical guidance on methodologies for adjustments under Article 5, paragraph 2, of the Kyoto Protocol, which provide guidance on the choice of drivers and clusters. Bulgaria and Croatia did not report emissions for the considered subcategories in their 2009 submissions and therefore were not taken into account in the cluster.

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<sup>5</sup> <<http://data.worldbank.org/indicator/NY.GDP.PCAP.CD>>.

125. Due to a lack of disaggregated data for the countries in the cluster and given that Ukraine had failed to provide additional information to facilitate the adjustment calculations, the ERT applied adjustments to the whole subcategory refrigeration and air-conditioning equipment, although estimates (probably underestimated) were reported by Ukraine for the use of HFC-134a in refrigeration (27.48 Gg CO<sub>2</sub> eq). Final adjusted values for this subcategory exclude the reported estimates to avoid double counting.

126. Only HFC and PFC emissions at the level of each subcategory were subject to adjustments, because SF<sub>6</sub> emissions from the considered subcategories of all countries in the cluster were reported as “NO” in the latest year of their 2009 submission. Emissions from solvents were reported as “NO” or “NE” in all countries in the cluster except for the Czech Republic. The ERT decided not to apply adjustments to the subcategory solvents, because it is very unlikely that HFC and PFC emissions from solvents production occur in Ukraine, as is the case for most of the Parties with economies in transition.

127. During the centralized review, in its response to a question from the ERT, Ukraine stated that foams are not produced in the country and only imported. The ERT considers that closed cell foams have to be imported and used in Ukraine for foam applications such as insulating, cushioning and packaging, and therefore emissions from closed cell foams that extend into the in-use phase do occur in the country. Therefore the ERT adjusted emissions from foam blowing based on the data on HFC emissions from stocks in foam blowing in the cluster of countries. For Slovenia and the Russian Federation such detailed data were not reported in their 2009 submissions, therefore the total HFCs emissions from the foam blowing category for these countries were taken for the calculations.

128. Calculations of adjustments were applied separately to the HFC and PFC emissions from each considered subcategory. The ERT decided to use emissions per capita as a driver for all identified subcategories. In addition, for the subcategory refrigeration and air conditioning equipment, the ERT applied a correction factor to the HFC and PFC per capita emission estimates, calculated as a ratio of the GDP per capita of Ukraine and the GDP per capita of the considered country in the cluster, to take into account the economic capacity of the population of Ukraine to acquire and use refrigeration and air-conditioning appliances in comparison with economic capacity of the population of the countries in the cluster.

129. The following data were collected for Ukraine and the cluster of countries: (1) actual HFC emissions in 2007 from the relevant subcategories, expressed in CO<sub>2</sub> eq from the 2009 annual submissions of each Party<sup>6</sup>; (2) actual PFC emissions in 2007 from the relevant subcategories expressed in CO<sub>2</sub> eq from the 2009 annual submissions of each Party; (3) total population in 2007 from the 2009 annual submissions of each Party; and (4) GDP per capita from the World Bank<sup>7</sup>. In addition, the total population from the 2010 annual submission and the GDP per capita from the World Bank in 2008 were collected for Ukraine. As the total population of Romania for 2007 in its 2009 submission was reported incorrectly, the reported 2007 population from its 2010 submission was used for the calculations.

130. The ERT calculated HFC and PFC emissions per capita for all countries in the cluster, including the corrected HFC per capita emissions for the subcategory refrigeration and air conditioning equipment. The average per capita HFC and PFC emissions of all countries in the cluster were then applied to Ukraine’s total population in 2007 to estimate the total HFC and PFC emissions in each identified subcategory for Ukraine. Then, the ERT used the GDP per capita growth between 2007 and 2008 to calculate the total HFC

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<sup>6</sup> <[http://unfccc.int/national\\_reports/annex\\_i\\_ghg\\_inventories/national\\_inventories\\_submissions/items/4771.php](http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/4771.php)>.

<sup>7</sup> <<http://data.worldbank.org/indicator/NY.GDP.PCAP.CD>>.

emissions in 2008 from refrigeration and air conditioning equipment and the change in total population of Ukraine between 2007 and 2008 to estimate the total PFC emissions in 2008 from refrigeration and air conditioning equipment, the total HFC emissions in 2008 from foam blowing, the total HFC and PFC emissions in 2008 from fire extinguishers and the total HFC emissions in 2008 from aerosols/metered dose inhalers.

131. Table 4 below presents background data and assumptions used for the calculation of the adjustments for refrigeration and air conditioning equipment, foam blowing, fire extinguishers and aerosols/metered dose inhalers.

Table 4  
Background data for calculation of adjustments

Party	Total population (2007), inhabitants	GDP per capita (2007) USD	GDP per capita/GDP per capita Ukraine (2007)	Total emissions (2007), Gg CO <sub>2</sub> eq											
				Refrigeration and air conditioning equipment				Foam blowing (stocks)				Fire extinguishers			Aerosols/metered dose inhalers
				HF Cs	Emissions /capita x 10 <sup>6</sup>	PF Cs	Emissions /capita x 10 <sup>6</sup>	HF Cs	Emission s/capita x 10 <sup>6</sup>	HF Cs	Emission s/capita x 10 <sup>6</sup>	PF Cs	Emission s/capita x 10 <sup>6</sup>	HF Cs	Emission s/capita x 10 <sup>6</sup>
Slovenia	2 025 866	23 445	0.131	130.23	8.41	NO	–	0.50	0.25	0.18	0.09	NO	–	NO	–
Czech Republic	10 322 689	16 858	0.182	1 518.32	26.78	6.31	0.111	3.25	0.31	1	2.62	O	–	50.77	4.92
Poland	38 125 000	11 157	0.275	2 676.06	19.31	NO	–	3.37	0.09	8	0.35	15.73	0.41	1	9.06
Estonia	1 342 409	15 938	0.193	107.66	15.44	NO	–	24.20	18.02	0.86	0.64	NO	–	3.16	2.36
Slovakia	5 400 998	15 608	0.197	223.19	8.13	NO	–	NO	–	3.80	0.70	NO	–	NO	–
Hungary	10 066 158	13 799	0.222	597.60	13.20	2.38	0.053	2.06	0.20	NO	–	NO	–	9.22	0.92
Latvia	2 281 305	12 638	0.243	48.52	5.16	NO	–	NO	–	NO	–	NO	–	2.76	1.21
Lithuania	3 375 600	11 584	0.265	24.05	1.89	NO	–	NE	–	NE	–	NO	–	NE	–
Russian Federation	142 221 000	9 149	0.335	3 216.47	7.59	NO	–	3	0.86	53	0.92	76.93	0.54	51.05	0.36
Romania	21 537 563	7 856	0.391	14.44	0.26	0.03	0.001	NO	–	0.60	0.03	NO	–	NO	–
Belarus	9 690 000	4 667	0.658	31.08	2.11	NE	–	NE	–	NE	–	NE	–	NE	–
<b>Average</b>	–	–	–	–	<b>9.84</b>	–	<b>0.055</b>	–	<b>3.29</b>	–	<b>0.76</b>	–	<b>0.48</b>	–	<b>3.14</b>
Ukraine (2007)	46 372 700	3 069	–	–	–	–	–	–	–	–	–	–	–	–	–
Ukraine (2008)	46 143 714	3 891	–	–	–	–	–	–	–	–	–	–	–	–	–

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

<sup>a</sup> Emissions per capita have been corrected using a ratio: GDP per capita/GDP per capita Ukraine (2007).

## 5. The adjusted estimates

132. Tables 5, 6, 7 and 8 below describe the steps for the calculation of the adjustments, in line with paragraph 7 of decision 20/CMP.1. These tables present the results of the ERT's calculation, including the original estimate or the notation keys used for HFC and PFC emissions from refrigeration and air conditioning equipment, HFC emissions from foam blowing, HFC and PFC emissions from fire extinguishers and HFC emissions from aerosols/metered dose inhalers as reported by Ukraine, the adjusted estimate as calculated by the ERT, and the impact of the adjustment on total estimated GHG emissions in 2008.

133. As table 5 shows, the adjusted estimate for HFC and PFC emissions from refrigeration and air conditioning equipment in 2008 amounts to 704.183 Gg CO<sub>2</sub> eq compared with 27.478 Gg CO<sub>2</sub> eq reported by Ukraine. The application of the adjustment leads to an increase in total GHG emissions estimated for 2008 of 676.705 Gg CO<sub>2</sub> eq, or 0.16 per cent.

134. As table 6 shows, the adjusted estimate for HFC emissions from foam blowing in 2008 amounts to 183.684 Gg CO<sub>2</sub> eq compared with "NE" reported by Ukraine. The application of the adjustment leads to an increase in total GHG emissions estimated for 2008 of 183.684 Gg CO<sub>2</sub> eq, or 0.04 per cent.

135. As table 7 shows, the adjusted estimate for HFC and PFC emissions from fire extinguishers in 2008 amounts to 69.246 Gg CO<sub>2</sub> eq compared with "NE" reported by Ukraine. The application of the adjustment leads to an increase in total GHG emissions estimated for 2008 of 69.246 Gg CO<sub>2</sub> eq, or 0.02 per cent.

136. As table 8 shows, the adjusted estimate for HFC emissions from aerosols/metered dose inhalers in 2008 amounts to 175.160 Gg CO<sub>2</sub> eq compared with "NE" reported by Ukraine. The application of the adjustment leads to an increase in total GHG emissions estimated for 2008 of 175.160 Gg CO<sub>2</sub> eq, or 0.04 per cent.

## 6. Conservativeness of the calculation of the adjustment

137. In line with paragraph 5 of decision 20/CMP.1, conservativeness was ensured by applying the conservativeness factor of 1.21 (for emission estimates of PFCs and HFCs under consumption of halocarbons and SF<sub>6</sub>) from table 2 of appendix III to the technical guidance on methodologies for adjustments under Article 5, paragraph 2 of the Kyoto Protocol (annex to decision 20/CMP.1). The ERT therefore considers that the resulting adjusted values are conservative.

Table 5

**Description of the adjustments calculation for the HFC and PFC emissions from refrigeration and air conditioning equipment**

<i>Parameter/Estimate</i>	<i>Value</i>	<i>Unit</i>	<i>Source</i>
<b>Category: Refrigeration and air conditioning equipment</b>			
Ukraine's HFCs emissions estimate	27.48	Gg CO <sub>2</sub> eq	2010 annual submission of Ukraine v3.1, CRF table2(I)s2
Ukraine's PFCs emissions estimate	NO		2010 annual submission of Ukraine v3.1, CRF table2(I)s2
Average HFC emissions per capita corrected by the ratio of GDP per capita in 2007	0.00000984	Gg CO <sub>2</sub> eq/capita	ERT's calculation (see table 4 above)
Average PFC emissions per capita corrected by the ratio of GDP per capita in 2007	0.00000005	Gg CO <sub>2</sub> eq/capita	ERT's calculation (see table 4 above)
Population of Ukraine in 2007	46 372 700	inhabitants	2009 annual submission of Ukraine, Additional information box of CRF table 6.A
Calculated HFC emissions in Ukraine in 2007	456.48	Gg CO <sub>2</sub> eq	ERT's calculation
Calculated PFC emissions in Ukraine in 2007	2.54	Gg CO <sub>2</sub> eq	ERT's calculation
GDP per capita growth for Ukraine between 2007 and 2008	26.78	%	<a href="http://data.worldbank.org">http://data.worldbank.org</a> (see table 4 above)
Calculated adjusted HFC emissions in Ukraine for 2008	578.75	Gg CO <sub>2</sub> eq	ERT's calculation
Calculated adjusted PFC emissions in Ukraine for 2008	3.22	Gg CO <sub>2</sub> eq	ERT's calculation
Conservativeness factor	1.21	–	Table 2 of appendix III to the technical guidance on methodologies for adjustments under Article 5, paragraph 2 of the Kyoto Protocol
Adjusted conservative estimate of HFC emissions in Ukraine for 2008	700.28	Gg CO <sub>2</sub> eq	ERT's calculation
Adjusted conservative estimate of PFC emissions in Ukraine for 2008	3.90	Gg CO <sub>2</sub> eq	ERT's calculation
Adjusted conservative estimate of HFC and PFC emissions in Ukraine for 2008	704.18	Gg CO <sub>2</sub> eq	ERT's calculation
Total aggregated GHG emissions (excluding LULUCF) as reported by Ukraine in 2008	427 842.68	Gg CO <sub>2</sub> eq	2010 annual submission of Ukraine v3.1, CRF table Summary 2
Total aggregated GHG emissions (excluding LULUCF) after application of the adjustment in 2008	428 519.39	Gg CO <sub>2</sub> eq	ERT's calculation
Difference between original and adjusted total aggregated GHG emissions	676.71	Gg CO <sub>2</sub> eq	ERT's calculation
	0.16	%	ERT's calculation

Table 6

**Description of the adjustments calculation for the HFC emissions from foam blowing**

<i>Parameter/Estimate</i>	<i>Value</i>	<i>Unit</i>	<i>Source</i>
<b>Category: Foam blowing</b>			
Ukraine's HFCs emissions estimate	NE		2010 annual submission of Ukraine v3.1, CRF table2(I)s2
Average HFC emissions per capita in 2007	0.00000329	Gg CO <sub>2</sub> eq/ capita	ERT's calculation (see table 4 above)
Population of Ukraine in 2007	46 372 700	inhabitants	2009 annual submission of Ukraine, Additional information box of CRF table 6.A
Calculated HFC emissions in Ukraine in 2007	152.56	Gg CO <sub>2</sub> eq	ERT's calculation
Decrease in population in Ukraine between 2007 and 2008	0.49	%	<a href="http://data.worldbank.org">http://data.worldbank.org</a> (see table 4 above)
Calculated adjusted HFC emissions in Ukraine for 2008	151.80	Gg CO <sub>2</sub> eq	ERT's calculation
Conservativeness factor	1.21	–	Table 2 of appendix III to the technical guidance on methodologies for adjustments under Article 5, paragraph 2 of the Kyoto Protocol
Adjusted conservative estimate of HFC emissions in Ukraine for 2008	183.68	Gg CO <sub>2</sub> eq	ERT's calculation
Total aggregated GHG emissions (excluding LULUCF) as reported by Ukraine in 2008	427 842.68	Gg CO <sub>2</sub> eq	2010 annual submission of Ukraine v3.1, CRF table Summary 2
Total aggregated GHG emissions (excluding LULUCF) after application of the adjustment in 2008	428 026.37	Gg CO <sub>2</sub> eq	ERT's calculation
Difference between original and adjusted total aggregated GHG emissions	183.68	Gg CO <sub>2</sub> eq	ERT's calculation
	0.04	%	ERT's calculation

Table 7

**Description of the adjustments calculation for the HFC and PFC emissions from fire extinguishers**

<i>Parameter/Estimate</i>	<i>Value</i>	<i>Unit</i>	<i>Source</i>
<b>Category: Fire extinguishers</b>			
Ukraine's HFCs emissions estimate	NE		2010 annual submission of Ukraine v3.1, CRF table2(I)s2
Ukraine's PFCs emissions estimate	NE		2010 annual submission of Ukraine v3.1, CRF table2(I)s2
Average HFC emissions per capita in 2007	0.00000076	Gg CO <sub>2</sub> eq/ capita	ERT's calculation (see table 4 above)
Average PFC emissions per capita in 2007	0.00000048	Gg CO <sub>2</sub> eq/ capita	ERT's calculation (see table 4 above)
Population of Ukraine in 2007	46 372 700	inhabitants	2009 annual submission of Ukraine, Additional information box of CRF table 6.A
Calculated HFC emissions in Ukraine in 2007	35.40	Gg CO <sub>2</sub> eq	ERT's calculation
Calculated PFC emissions in Ukraine in 2007	22.11	Gg CO <sub>2</sub> eq	ERT's calculation
Decrease in population in Ukraine between 2007 and 2008	0.49	%	<a href="http://data.worldbank.org">http://data.worldbank.org</a> (see table 4 above)
Calculated adjusted HFC emissions in Ukraine for 2008	35.23	Gg CO <sub>2</sub> eq	ERT's calculation
Calculated adjusted PFC emissions in Ukraine for 2008	22.00	Gg CO <sub>2</sub> eq	ERT's calculation
Conservativeness factor	1.21	–	Table 2 of appendix III to the technical guidance on methodologies for adjustments under Article 5, paragraph 2 of the Kyoto Protocol
Adjusted conservative estimate of HFC emissions in Ukraine for 2008	42.63	Gg CO <sub>2</sub> eq	ERT's calculation
Adjusted conservative estimate of PFC emissions in Ukraine for 2008	26.62	Gg CO <sub>2</sub> eq	ERT's calculation
Adjusted conservative estimate of HFC and PFC emissions in Ukraine for 2008	69.25	Gg CO <sub>2</sub> eq	ERT's calculation
Total aggregated GHG emissions (excluding LULUCF) as reported by Ukraine in 2008	427 842.68	Gg CO <sub>2</sub> eq	2010 annual submission of Ukraine v3.1, CRF table Summary 2
Total aggregated GHG emissions (excluding LULUCF) after application of the adjustment in 2008	427 911.93	Gg CO <sub>2</sub> eq	ERT's calculation
Difference between original and adjusted total aggregated GHG emissions	69.25	Gg CO <sub>2</sub> eq	ERT's calculation
	0.02	%	ERT's calculation



Table 8

**Description of the adjustments calculation for the HFC emissions from aerosols/metered dose inhalers**

<i>Parameter/Estimate</i>	<i>Value</i>	<i>Unit</i>	<i>Source</i>
<b>Category: Aerosols/metered dose inhalers</b>			
Ukraine's HFCs emissions estimate	NE		2010 annual submission of Ukraine v3.1, CRF table2(I)s2
Average HFC emissions per capita in 2007	0.00000314	Gg CO <sub>2</sub> eq/capita	ERT's calculation (see table 4 above)
Population of Ukraine in 2007	46 372 700	inhabitants	2009 annual submission of Ukraine, Additional information box of CRF table 6.A
Calculated HFC emissions in Ukraine in 2007	145.48	Gg CO <sub>2</sub> eq	ERT's calculation
Decrease in population in Ukraine between 2007 and 2008	0.49	%	<a href="http://data.worldbank.org">http://data.worldbank.org</a> (see table 4 above)
Calculated adjusted HFC emissions in Ukraine for 2008	144.76	Gg CO <sub>2</sub> eq	ERT's calculation
Conservativeness factor	1.21	–	Table 2 of appendix III to the technical guidance on methodologies for adjustments under Article 5, paragraph 2 of the Kyoto Protocol
Adjusted conservative estimate of HFC emissions in Ukraine for 2008	175.16	Gg CO <sub>2</sub> eq	ERT's calculation
Total aggregated GHG emissions (excluding LULUCF) as reported by Ukraine in 2008	427 842.68	Gg CO <sub>2</sub> eq	2010 annual submission of Ukraine v3.1, CRF table Summary 2
Total aggregated GHG emissions (excluding LULUCF) after application of the adjustment in 2008	428 017.84	Gg CO <sub>2</sub> eq	ERT's calculation
Difference between original and adjusted total aggregated GHG emissions	175.16	Gg CO <sub>2</sub> eq	ERT's calculation
	0.04	%	ERT's calculation

**H. 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

138. The ERT noted that Ukraine submitted estimates for afforestation, reforestation and deforestation activities under Article 3, paragraph 3, of the Kyoto Protocol. Ukraine also submitted estimates for forest management, the only elected activity under Article 3, paragraph 4, of the Kyoto Protocol for the first commitment period. Ukraine has chosen to account for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol at the end of the commitment period.

139. During the centralized review, the ERT noted that in Ukraine's reporting, land uses and land-use changes are not properly represented, resulting in overlapping areas of

different categories and conversion categories, leading to double counting and consequently to a potential overestimation of removals by sinks and underestimation of emissions by sources. In the reporting, the sum of areas subject to Article 3, paragraphs 3 and 4, of the Kyoto Protocol is total forest land area; the area under forest management is quite different from the forest land remaining forest land area under the Convention (forest land remaining forest land area was reported as 9,960 kha, while the forest management area was reported to be 8,148 kha in CRF tables submitted on 25 May 2010 and 10,098 kha in CRF tables submitted on 17 October 2010); and the total country area reported in table NIR-2 amounts to 60,355 kha, while a different value (59,617 kha) can be deduced by the reporting of the different land uses under the Convention reporting. In particular, according to the ERT, Ukraine has not ensured a consistent land representation and has not ensured that areas of land subject to activities under Article 3, paragraphs 3 and 4, are identifiable, adequately reported and tracked during the commitment period in accordance with paragraph 6 of the annex to decision 15/CMP.1.

140. The ERT further noted that the national system under Article 5, paragraph 1, of the Kyoto Protocol, shall ensure that areas of land subject to LULUCF activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol are identifiable, and information about these areas should be provided by each Annex I Party in their national inventories in accordance with Article 7 (see para. 20 of annex to decision 16/CMP.1). Taking into account the issues identified above, the ERT considered that Ukraine did not meet the mandatory requirements regarding the national system for Article 3, paragraphs 3 and 4, of the Kyoto Protocol in its 2010 submission, or the mandatory reporting requirements included in decision 15/CMP.1 indicated above. Therefore, during the centralized review, the ERT recommended that Ukraine provide the necessary information in accordance with the requirements of paragraph 20 of decision 16/CMP.1.

141. After the centralized review, in its response to the list of potential problems and further questions formulated by the ERT, Ukraine provided revised data on afforestation, reforestation and deforestation activities for 1998–2008, and resubmitted its CRF tables for KP-LULUCF (17 October 2010). Comparing the revised data and the originally submitted data (25 May 2010) for 2008 the ERT noted that the afforestation and reforestation area was reported as 229 kha against 1,074 kha of the original submission, and that the deforestation area changed from 29 kha, as originally reported to 10 kha. Regarding forest management, the revised area was 10,098 kha compared with 8,148 kha originally reported. In the revised data, the emissions/removals related to Article 3, paragraph 3 activities decreased by 80.7 per cent, (the removals related to afforestation/reforestation activities decreased by 81.7 per cent, while the emissions from deforestation activities decreased by 88.1 per cent), while the removals for Article 3, paragraph 4 activities increased by 33.2 per cent. Detailed information supporting these substantial changes was not provided.

142. In the ERT's view, the revised estimates do not address the issue identified by the ERT in the list of potential problems and further questions, moreover considering that these data did not result from the "special investigation" for the elaboration of the database which had just started in Ukraine, and which had been referred to in its response to the ERT. The ERT notes that, according to the IPCC good practice guidance for LULUCF, approach 1 for representing land areas which Ukraine intends to use does not meet the land area identification requirements under the Kyoto Protocol; in fact, approach 1 can only be applied to reporting method 1 if additional spatial data at the required spatial resolution are available as a result of re-compiling the inventory information, and if the gross land-use transitions (rather than the net changes in land-use categories) are quantified (IPCC good practice guidance for LULUCF, section 4.2.2.3.1, page 4.25). The ERT recommends that Ukraine check the availability of additional spatial data as noted in the IPCC good practice guidance for LULUCF (section 4.2.2.3.1).

143. After assessing the information provided by Ukraine after the centralized review, in the ERT's view, Ukraine still does not meet the mandatory reporting requirements for Article 3, paragraphs 3 and 4, of the Kyoto Protocol as indicated in paragraph 139 above. In particular, the ERT notes that the national system is not able to ensure a consistent land representation, or to ensure that areas of land subject to LULUCF activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol are identifiable in accordance with paragraph 20 of annex to decision 16/CMP.1. The ERT considers this problem as unresolved.

144. The ERT noted that in its 2010 submission Ukraine has not accounted for all carbon stock changes in the following mandatory carbon pools: dead wood (for the units of land subject to afforestation, reforestation and deforestation activities); and litter, dead wood and soil (for the units of land subject to forest management activities). The ERT noted that a Party may choose not to account for a given pool in a commitment period if transparent and verifiable information is provided that the pool is not a net source (para. 21 of the annex to decision 16/CMP.1). The ERT also noted that Ukraine did not provide transparent and verifiable information demonstrating that these unaccounted pools were not net sources of emissions. Therefore Ukraine did not meet the mandatory reporting requirements stated in decisions 15/CMP.1 and 16/CMP.1. During the centralized review, the ERT recommended that Ukraine provide the necessary information in accordance with the requirements of decisions 15/CMP.1 and 16/CMP.1.

145. After the centralized review, in its response to the list of potential problems and further questions formulated by the ERT, Ukraine provided a document containing an expert opinion relating to the carbon stocks in the dead wood, litter and soil pools in forest. In particular, Ukraine referred to a study<sup>8</sup> on the dynamics of carbon stocks in plantations. In the ERT's view, this study and the graph reported on "Dynamics of carbon stocks in modal pine plantations on left-bank of wooded steppe regions in Ukraine" do not demonstrate that the dead wood, litter and soil pools are not net sources of emissions for the Ukrainian national territory, as carbon stocks are correlated to different management practices and climatic conditions and a single study (on plantations) cannot be representative of the national territory. Furthermore, this study does not consider the effects of harvesting at the end of a production cycle and during the following years with low biomass on that land.

146. In the ERT's view, the response provided by Ukraine does not address the potential problem, because the additional information provided was not sufficient to demonstrate that the pools indicated above were not net sources of emissions; therefore the ERT considers this problem to be unresolved. As indicated in the statement made by Ukraine in its response to the list of potential problems and further questions, the ERT considers that a forest monitoring system, with continuous observations, should be implemented to supply the supporting information required by the rules of reporting for KP-LULUCF activities.

147. The ERT noted that, the inclusion of a land under Article 3, paragraph 3, of the Kyoto Protocol (and the related emissions by sources and removals by sinks occurring on that land) is specifically guided by the presence of a direct human-induced activity (para. 2 of annex to decision 16/CMP.1). Consequently, carbon stock changes and non-CO<sub>2</sub> emissions reported under afforestation and reforestation shall result from direct human-induced land-use change activities (Article 3, paragraph 3 of the Kyoto Protocol). Ukraine provided information on its forest definition and forest management rules in its 2010 annual submission and in responses the Party provided to the ERT during the centralized review. However, the ERT considered that the information provided did not demonstrate that activities of planting, seeding and/or human-induced promotion of natural seed sources

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<sup>8</sup> Buksha IF, Butrym OV, Pasternak VP. 2008. *Inventory of Greenhouse Gases in Land Use and Forestry Sector*. Monograph KhNAU: Kharkiv, p.232.

have been carried out in the units of land in conversion to forest (para. 1(b) and 1(c) of the annex to decision 16/CMP.1). The ERT considered that this may lead to an overestimation of removals by sinks in the areas under afforestation and reforestation activities and recommended that Ukraine provide documentation demonstrating that all the afforestation and reforestation activities included in the identified units of land under these activities are directly human induced.

148. After the centralized review, in its response to the list of potential problems and further questions formulated by the ERT, Ukraine informed the ERT that it has started a special investigation for elaborating a database with cartographic components which will include information on evidence of the direct human component in these types of activities. Ukraine also indicated that afforestation activities in Ukraine are conducted according to: Instructions for designing, acceptance, recording and evaluating the quality of the cultivated sites (approved by the Ministry of Forestry of Ukraine on 8 July 1997, No. 62) and Rules of forest reproduction (approved by the Cabinet of Ministers of Ukraine on 1 March 2007, No. 303). Under these requirements, special documentation for projects of afforestation should be prepared for each case and for different periods of this activity, according to the requirements of the law. Ukraine also indicated that this documentation may be used for the demonstration of direct human-induced components.

149. In the ERT's view, the response provided by Ukraine does not address the potential problem. In particular, no information has been supplied to demonstrate that all natural regeneration of forests is the consequence of direct human-induced activities or that a decision was taken to allow trees to grow as a promotion of natural seed sources on each unit of land reported under afforestation and reforestation activities. Therefore the ERT considers this problem as unresolved. The ERT recommends that, in its next annual submission, Ukraine provide documentation demonstrating that all afforestation and reforestation activities included in the identified units of land under these activities are directly human induced.

150. After the centralized review, in its comments on the draft annual review report, Ukraine informed the ERT that many recommendations in the annual review report and improvements for KP-LULUCF will be implemented in its 2011 annual submission or in its future annual submissions.

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

##### *Afforestation and reforestation – CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O*

151. Ukraine reported carbon stock changes in above-ground biomass, litter and soil pools, but the Party reported below-ground carbon stock changes as "IE" and did not provide estimates for the dead wood pool. In response to a question raised by ERT during the centralized review, Ukraine stated that below-ground carbon stock changes were included in above-ground carbon stock changes, while for the dead wood pool Ukraine plans to conduct special research to obtain transparent and verifiable information that this pool is not a net source of emissions. In the ERT's view, the response provided by Ukraine does not address these issues. The ERT strongly recommends that Ukraine provide transparent and detailed information supporting the fact that below-ground carbon stock changes are included in estimates of above-ground carbon stock changes and demonstrating that dead wood pool is not a net source of emissions in its next annual submission.

152. Ukraine did not report GHG emissions from biomass burning. During the centralized review, Ukraine clarified that data on burned areas are available only for land covered by forest, without distinction between area under afforestation/reforestation or forest management activities. Ukraine also acknowledged the need to conduct special research to obtain data on fire events on afforested or reforested areas. The ERT strongly

recommends that Ukraine report CO<sub>2</sub> and non-CO<sub>2</sub> emissions from biomass burning in its next annual submission.

153. In its 2010 submission, Ukraine did not provide information on emissions and removals of GHG from lands harvested during the first commitment period following afforestation and reforestation on these units of land since 1990. Therefore, the ERT considered that Ukraine did not meet the mandatory reporting requirements stated in paragraph 8(c) of the annex to decision 15/CMP.1 and recommended that the Party provide this required information. After the centralized review, in its response to the list of potential problems and further questions formulated by the ERT, Ukraine provided the required information in the revised CRF tables and informed the ERT that it has started a special investigation for elaborating a database with cartographic components which will include data on lands harvested during the first commitment period following afforestation and reforestation on units of land since 1990. The ERT considered that this issue has been adequately addressed by Ukraine in its response and recommends that Ukraine report this explanation and background information in its next annual submission.

#### *Deforestation – CO<sub>2</sub>*

154. Ukraine reported carbon stock changes in above-ground biomass, litter and soil pools, but the Party reported below-ground carbon stock changes as “IE” and did not provide estimates for the dead wood pool. In response to a question raised by ERT during the centralized review, Ukraine stated that below-ground carbon stock changes were included in above-ground carbon stock changes while for the dead wood pool Ukraine plans to conduct special research to obtain transparent and verifiable information that this pool is not a source. In the ERT’s view, the response provided by Ukraine does not address these issues. The ERT strongly recommends that Ukraine provide transparent and detailed information supporting the fact that below-ground carbon stock changes are included in estimates of above-ground carbon stock changes and demonstrating that dead wood pool is not a net source of emissions in its next annual submission.

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

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

155. Ukraine reported carbon stock changes only for above-ground biomass, and did not report below-ground carbon stock changes. Ukraine did not provide estimates for carbon stock changes in the dead wood, litter and soil pools. After the centralized review, in its response to the list of potential problems and further questions formulated by the ERT, Ukraine provided a document containing an expert opinion relating to the carbon stocks in the dead wood, litter and soils pools in forests. In the ERT’s view, the response provided by Ukraine does not address the potential problem, because the additional information provided was not sufficient to demonstrate that the pools indicated above were not net sources of emissions (see para. 145 above); therefore the ERT considers this problem to be unresolved.

## **2. Information on Kyoto Protocol units**

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

156. Ukraine 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>9</sup> The SIAR was forwarded to the ERT prior to the review, pursuant to decision 16/CP.10. The ERT reiterated the main findings contained in the SIAR. The ERT noted that the SIAR initially provided to the ERT did not have a complete assessment on the accounting of Kyoto Protocol units because information reported by Ukraine was originally only provided in Russian and completion of the SIAR Part I report had not been possible before the SIAR was provided to the ERT. Information provided by Ukraine during the centralized review indicated that a subsequent English translation of the relevant parts of the NIR had been submitted on 16 August 2010 allowing for the SIAR to be completed subsequently.

157. 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. Information reported by Ukraine on records of any discrepancies and on any records of non-replacement was found to be consistent with information provided to the secretariat by the ITL.

#### National registry

158. The ERT took note of the updated information provided by Ukraine to the ERT during the centralized review, 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 Ukraine had not fulfilled all the requirements regarding publicly available information in accordance with section II.3 of the annex to decision 13/CMP.1 on Ukraine's registry website.

159. During the centralized review, the ERT reviewed Ukraine's registry website and found that the quality of publicly available information had been improved, including, but not limited to, providing public information on accounts, joint implementation projects, and unit holdings and transactions. The ERT took note of these improvements and encourages Ukraine to report this updated information in the NIR of its next annual submission. In addition, the ERT recommends that Ukraine report on any changes to its registry and publicly available information directly in the NIR of its next annual submission. In addition, the ERT recommends that Ukraine specifically state in its NIR how each recommendation from the previous review report was addressed. The ERT encourages Ukraine to report the relevant sections of the NIR translated into English by 15 April, in order to facilitate a prompt, thorough and accurate SIAR assessment.

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<sup>9</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.

### Calculation of the commitment period reserve

160. In its 2010 submission, Ukraine originally reported that its commitment period reserve (CPR) is 2,180,026,350 t CO<sub>2</sub> eq, based on the national emissions from the 2007 inventory, as reported in its 2009 annual submission. This was not in line with decision 11/CMP.1, which stipulates that Parties shall use the most recently reviewed inventory, if lower than the CPR estimated based on 90 per cent of their assigned amount. This means that the CPR should be based on the national emissions from the 2008 inventory, as reported in the 2010 submission. In its resubmission of parts of the NIR on 16 August 2010, Ukraine reported that its CPR is 2,138,995,595 t CO<sub>2</sub> eq, based on the national emissions in its 2008 inventory, as reported in its 2010 annual submission. After the centralized review, in its response to the list of potential problems and further questions formulated by the ERT, Ukraine reported that its revised CPR is 2,139,213,411 t CO<sub>2</sub> eq, based on the national emissions in its revised 2008 inventory (427, 842.68 Gg CO<sub>2</sub> eq). The ERT disagrees with this figure. The ERT's calculation of the CPR is 2,144,737,386 t CO<sub>2</sub> eq, based on the national emissions in the 2008 inventory taking into account the recommended adjustments (428,947.48 Gg CO<sub>2</sub> eq) (see para. 111 above).

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

161. Ukraine did not report changes to its national system in its annual submission, however the Party in response to the previous stages of the review, acknowledged the following changes in the national system: reinforcement of the powers of the single national entity that is responsible for its operation. Decree No. 325 of the Cabinet of Ministers of Ukraine "On Changes to Cabinet of Ministers of Ukraine Decrees of April 4, 2007 No. 612 and from 30 June 2007 No. 977" of 26 April 2010 defines the NEIA as an authority of the central executive power independent from the Ministry for Environmental Protection. During the centralized review, in its response to a question raised by the ERT, Ukraine clarified that NEIA is now responsible for the official approval of annual submissions.

162. However, the ERT taking into account the stated reinforcement of the powers of the single national entity, noted that most of the recommendations made in the previous review report had still not been addressed and that the GHG inventory of Ukraine is not complete (see paras. 12 and 14). Further, the ERT noted a lack of transparency in the NIR, in particular for the energy and industrial processes sectors, as well as the lack of reporting of mandatory information in the LULUCF sector and KP-LULUCF (see sections II.E and II.H.1 of this report). The ERT also noted that over the last few years Ukraine has not been able to collect the AD, process information and EFs necessary to estimate the relevant missing GHG emissions by sources and removals by sinks, as applicable. The ERT further noted that Ukraine has, in the past and current NIRs, consistently presented plans to estimate the missing GHG emissions, but these have not been implemented in its 2010 submission.

163. After the centralized review, in its response to the list of potential problems and further questions, Ukraine informed the ERT that, as a result of economic crisis and limited public funds in the country, the investigations aimed to support the national system had not been funded. Currently, part of the financial resources from the sale of AAUs is planned to be used for supporting the national GHG inventory. In the ERT's view, the response provided by Ukraine does not address the potential problem and the ERT considers this problem as unresolved. The ERT concluded that the national system of Ukraine requires urgent improvements in addressing issues mentioned above to comply with the requirements set out in annex to decision 19/CMP.1, including: ensuring transparency and completeness of the inventory, timeliness of submission, supporting compliance with Kyoto Protocol commitments relating to the estimation of anthropogenic GHG emissions by

sources and removals by sinks under Article 3, paragraphs 3 and 4, and responding to any issues raised by the inventory review process under Article 8 of the Kyoto Protocol.

164. The ERT concluded that, taking into account the confirmed changes in the national system, the Ukrainian national system is not fully performing its functions in accordance with the requirements of national systems set out in the annex to decision 19/CMP.1, and a question of implementation regarding the national system is listed in section V of this report. The ERT recommends that Ukraine report in its next annual submission any changes in its national system in accordance with chapter I.F of the annex to decision 15/CMP.1.

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

165. In its original 2010 submission, Ukraine did not report changes in its national registry during the reporting period since the previous annual submission. The ERT noted that information provided during the centralized review, and in the resubmission of parts of the NIR on 16 August 2010, indicated that changes to the registry had occurred during the current reporting period or more recently, which should be reported in the next annual submission. These changes are not significant and include: name and contact information of the registry administrator, list of the information publicly accessible and the Internet address of the interface to Ukraine's national registry. The ERT concluded that, taking into account the confirmed changes in the national registry, Ukraine's national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1 and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant decisions of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP). The ERT recommends that Ukraine report in its next annual submission these and any other changes in its national registry in accordance with chapter I.G of the annex to decision 15/CMP.1.

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

166. In its original 2010 submission, Ukraine did not report 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. The Party submitted this information on 16 August 2010 in part II of the NIR and confirmed that, as an Annex I Party it strives to fulfil its obligations under the Kyoto Protocol and makes efforts to participate in the international process of minimization of adverse social, environmental and economic impacts in developing countries. However, the ERT noted that the information provided in table 15.1 (page 11 of chapter 15 of part II of the NIR), which summarizes the implementation of selected actions in 2009, as identified in paragraph 24 of the annex to decision 15/CMP.1, does not contain any consistent information on implemented activities. Moreover, most of the actions are reported using the statement: "Ukraine does not take part in any such activity". During the centralized review, Ukraine provided the ERT with additional information clarifying these issues. The ERT recommends that Ukraine improve the transparency of the information and include the additional information provided in its next annual submission.

167. The reported information is considered complete and transparent. Ukraine plans and implements policies and measures aimed at preventing human-induced climate change and reducing the impact on the climate system, in conjunction with taking decisions on such tasks as improving overall economic efficiency, environmental protection and public health. Ukraine is taking measures to reduce the carbon intensity of GDP, through the development of economic mechanisms that will encourage the reduction of GHG emissions per unit of production. Currently under consideration at the Verkhovna Rada (Parliament) of Ukraine is a draft law on the "Regulation of anthropogenic emissions and absorption of



greenhouse gases” and a draft law on “Environmental Ukrainian market”, according to which, among other things, an order on issuance and revocation of permits for GHG emissions will be established.

168. In addition, in its role in strengthening capacity to prevent climate change in developing countries, Ukraine is training qualified specialists in the field of ecology, climatology, meteorology and energy efficiency from developing countries as well as from the Commonwealth of Independent States (CIS) countries. The ERT welcomes these efforts.

### III. Conclusions and recommendations

169. The 2010 annual inventory submission was submitted on 12 April 2010 (NIR) and 13 April 2010 (CRF tables). Ukraine resubmitted its CRF tables on 22 and 25 May 2010 and its NIR on 22 May 2010. Ukraine also submitted 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, accounting of Kyoto Protocol units and changes in the national system and in the national registry). Ukraine resubmitted information on the accounting of Kyoto Protocol units, changes in the national system and further information on the national registry on 16 August 2010, and included information on minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol (part II of the NIR). This is not fully in line with decision 15/CMP.1. The ERT strongly encourages Ukraine to submit its next inventory by 15 April 2011, including all supplementary information under Article 7, paragraph 1, as required by decision 15/CMP.1.

170. The ERT concludes that the inventory submission of Ukraine has been prepared and reported generally in accordance with the UNFCCC reporting guidelines. The inventory submission is generally complete and Ukraine has submitted a complete set of CRF tables for the years 1990–2008 and an NIR; these are complete in terms of gases, years, sectors and geographical coverage, but generally complete in terms of categories. Some of the categories were reported as “NE”, particularly: in the energy sector (fugitive CO<sub>2</sub> and CH<sub>4</sub> emissions from oil exploration (and when relevant N<sub>2</sub>O emissions), CO<sub>2</sub> emissions from oil production, CO<sub>2</sub> emissions from oil refining and storage, CO<sub>2</sub> and CH<sub>4</sub> emissions from oil venting, CO<sub>2</sub> and N<sub>2</sub>O emissions from oil flaring (reported as “IE”), CO<sub>2</sub> and CH<sub>4</sub> emissions from natural gas exploration, and CO<sub>2</sub> and CH<sub>4</sub> emissions from venting of natural gas); in the industrial processes sector (HFC, PFC and SF<sub>6</sub> emissions from foam blowing, fire extinguishers, aerosols/metered dose inhalers and solvents); and in the LULUCF sector (CO<sub>2</sub> emissions from dead organic matter and mineral soils in forest land remaining forest land, CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O emissions from biomass burning on land converted to forest land, on land converted to cropland, on forest land converted to cropland, on grassland and wetlands categories). The ERT strongly recommends that Ukraine provide estimates for these categories in its next annual submission. The ERT also noted that CO<sub>2</sub> emissions from natural gas transmission and HFC, PFC, and SF<sub>6</sub> emissions from refrigeration and air-conditioning equipment (except for HFC-134a) are reported as “NO”.

171. The submission of information required under Article 7, paragraph 1, of the Kyoto Protocol has been prepared and reported generally in accordance with decision 15/CMP.1. The ERT noted some issues regarding timeliness and accuracy of the submission of information on minimization of adverse impacts under Article 3, paragraph 14, of the Kyoto Protocol and accuracy of the information on changes in the national system and in the national registry.

172. The Party's inventory is generally in line with the UNFCCC reporting guidelines, the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF. Many key categories are estimated using higher tier and country-specific methodologies, in accordance with the IPCC good practice guidance, and completeness of the inventory increased in the 2010 submission. The ERT commends Ukraine for the efforts made. However, the ERT noted: a number of key categories in the energy sector that are still estimated using lower tier methods; a lack of completeness in the coverage of categories for which methods are provided in the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and/or the IPCC good practice guidance for LULUCF; a lack of transparency in describing country-specific methods, EFs and AD used (in particular for the energy, industrial processes and LULUCF sectors); a decrease in the transparency of the reporting for the industrial processes sector with the addition of new categories reported as "C"; and a lack of time-series consistency in the manufacturing industries and construction category in the energy sector, which reduces comparability. After the centralized review, Ukraine officially submitted revised emission estimates on 17 October 2010 in response to the list of potential problems and further questions raised by the ERT for the oil and natural gas category (see paras. 55 and 56 above).

173. The ERT noted many gaps in the KP-LULUCF reporting. The ERT noted that, in its 2010 submission, Ukraine has not accounted for all carbon stock changes in the following mandatory carbon pools: dead wood (for land subject to afforestation, reforestation and deforestation activities); and litter, dead wood and soil (for land subject to forest management activities). Ukraine did not provide transparent and verifiable information demonstrating that these unaccounted pools were not net sources of emissions in accordance with mandatory reporting requirements stated in decisions 15/CMP.1 and 16/CMP.1. According to the ERT, the information and the document with an expert opinion provided by Ukraine after the centralized review do not demonstrate that the dead wood, litter and soil pools are not net sources of emissions for the Ukrainian national territory. In the ERT's view, the response provided by Ukraine does not address the potential problem and considers this problem as unresolved.

174. The ERT noted that, in its 2010 submission, Ukraine did not provide information demonstrating that all afforestation and reforestation activities are directly human-induced and that the information provided by the Party on forest definition and forest management rules in its 2010 annual submission and during the centralized review did not demonstrate that activities of planting, seeding and/or human-induced promotion of natural seed sources have been carried out in the units of land in conversion to forest (para. 1(b) and 1(c) of the annex to decision 16/CMP.1). The ERT considered that this may lead to an overestimation of removals by sinks in the areas under afforestation and reforestation activities. The ERT considers that the information provided by Ukraine after the centralized review, which referred to a special investigation for elaborating a database with cartographic components, together with the Ukrainian regulations for afforestation activities do not demonstrate that all natural regeneration of forests is the consequence of direct human-induced activities or that a decision was taken to allow trees to grow as a promotion of natural seed sources on each unit of land reported under afforestation and reforestation activities and the ERT therefore considers this problem as unresolved.

175. Ukraine 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.

176. The national system continues to perform most of its required functions as set out in the annex to decision 19/CMP.1. However, the ERT identified some general and specific functions of the national system that need to be addressed by the Party as a matter of priority, including ensuring transparency, accuracy, consistency, comparability and

completeness of the GHG inventory, supporting compliance with Kyoto Protocol commitments relating to the estimation of GHG emissions and removals, ensuring sufficient capacity for data collection and information processing to prepare annual GHG inventories in a timely manner, including KP-LULUCF and supplementary information in accordance with Article 5 and Article 7, paragraphs 1 and 2, of the Kyoto Protocol and to respond to and clarify any issues raised by the inventory review process under Article 8 of the Kyoto Protocol. The ERT concluded that the national system of Ukraine requires urgent improvements in addressing issues mentioned above to comply with all requirements set out in decision 19/CMP.1.

177. In addition, the ERT concluded that the national system of Ukraine is not able to ensure a consistent land representation, or to ensure that areas of land subject to LULUCF activities under Article 3, paragraphs 3 and 4, are identifiable in accordance with paragraph 20 of annex to decision 16/CMP.1. The information and revised data on afforestation, reforestation and deforestation activities for 1998–2008, and resubmitted CRF tables for KP-LULUCF activities, provided by Ukraine after the centralized review do not, in the opinion of the ERT, address the issues identified, and in the ERT's view, Ukraine continues to fail to meet the mandatory reporting requirements for Article 3, paragraphs 3 and 4, of the Kyoto Protocol. The ERT concluded that the Ukraine's national system is not performing some of its functions in accordance with the mandatory requirements of national systems set out in decision 19/CMP.1 and 16/CMP.1, and a question of implementation regarding the national system is listed in section V below.

178. 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.

179. Ukraine did not report the information requested in 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 original 2010 annual submission. Ukraine submitted this information on 16 August 2010 in part II of the NIR stating that, as an Annex I Party, it strives to fulfil its obligations under the Kyoto Protocol and makes efforts to participate in the international process of the minimization of adverse social, environmental and economic impacts in developing countries. However, no consistent information on implemented activities identified in paragraph 24 of the annex to decision 15/CMP.1 was provided. On request from the ERT, this information was provided during the centralized review on 3 September 2010. The reported information is considered complete and transparent.

180. In the course of the review, the ERT formulated a number of recommendations relating to the completeness of the annual submission (including Article 7, paragraph 1 supplementary information), accuracy, consistency, comparability and transparency (particularly in the energy, industrial processes and LULUCF sectors) of the information presented in Ukraine's annual submission. The key recommendations are that Ukraine:

(a) Ensure the inclusion of the emissions for all categories currently reported as "NE" indicated in this report and the categories reported as "NO" that probably do occur in the country, revising assumptions for the latter or providing substantial explanations on non-occurrence of these emissions in the NIR.

(b) Improve and enhance the relevant functions of the national system to allow the timely implementation of the recommendations made in the current and previous review reports for the GHG inventory, to ensure that the national system has the capacity to collect sufficient AD necessary to support the transparent, accurate, consistent, comparable and complete estimation of emissions and removals, to support compliance with Kyoto Protocol

reporting commitments, including KP-LULUCF and supplementary information in accordance with Article 5, paragraphs 1 and 2, and Article 7, paragraphs 1 and 2, of the Kyoto Protocol and to respond and clarify any issues raised by the inventory review process under Article 8 of the Kyoto Protocol;

(c) Improve the national system to ensure that areas of land subject to LULUCF activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol are identifiable in accordance with paragraph 20 of the annex to decision 16/CMP.1;

(d) Improve the descriptions of the national system covering the roles of single ministries, organizations and private companies in the national system and the institutional arrangements for the compilation and reporting of KP-LULUCF activities;

(e) Improve the descriptions of the implementation of QA/QC procedures and elements of the QA/QC plan and references for uncertainty values and assumptions used for the uncertainty estimates;

(f) Improve the transparency of the descriptions of methods, AD and country-specific EFs, particularly in the energy and industrial processes sectors;

(g) Ensure the reporting of all relevant AD used in the inventory, particularly for the energy and industrial processes sectors (see paras. 41, 46, 62 and 72 above), including the energy and coke balances;

(h) Ensure the aggregation of confidential AD and emissions in a coherent and systematic way for confidential categories in the industrial processes sector;

(i) Provide a matrix of land-use conversions for the LULUCF sector for the representation of areas of land-use categories;

(j) Ensure the reporting of relevant GHG emissions and removals for all mandatory land-use conversions in LULUCF sector (see para. 90 above);

(k) Achieve complete reporting of GHG emission and removals estimates for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol including all the mandatory missing pools identified in this report;

(l) Improve the reporting of information on the geographical location of the areas used for the calculation of the units of land subject to afforestation, reforestation and deforestation, and forest management activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol;

(m) Enhance the consistency of the time series and the comparability of emissions estimates in the energy sector by using the splicing techniques recommended in the IPCC good practice guidance.

## **IV. Adjustments**

181. Based on the review of the 2008 inventory, the ERT concludes that for HFC and PFC emissions from refrigeration and air conditioning equipment, HFC emissions from foam blowing, HFC and PFC emissions from fire extinguishers and HFC emissions from aerosols/metered dose inhalers, the lack of estimates and use of notation keys are not in line with the Revised 1996 IPCC Guidelines and the IPCC good practice guidance, as required by Article 5, paragraph 2, of the Kyoto Protocol. The ERT recommended that Ukraine submit emission estimates or provide further justifications for not providing estimates for the categories identified above in order to resolve the identified potential problems. Following the review of the additional information provided by Ukraine after the centralized review, the ERT concluded that the Party did not correct the problem and

therefore the ERT decided to calculate and recommend four adjustments in accordance with the guidance for adjustments under Article 5, paragraph 2, of the Kyoto Protocol (decision 20/CMP.1).

182. Ukraine in its communication of 10 May 2011 accepted the calculated adjustments. In accordance with the guidelines for review under Article 8 of the Kyoto Protocol, the ERT applied the calculated adjustments.

183. The application of adjustments by the ERT resulted in a change in the estimate of 2008 HFC and PFC emissions from refrigeration and air conditioning equipment – from 27.478 Gg CO<sub>2</sub> eq, as originally reported by Ukraine, to 704.183 Gg CO<sub>2</sub> eq, or a 0.16 per cent increase in total GHG emissions; HFC emissions from foam blowing – from “NE”, as originally reported by Ukraine, to 183.684 Gg CO<sub>2</sub> eq, or a 0.04 per cent increase in total GHG emissions; HFC and PFC emissions from fire extinguishers – from “NE”, as originally reported by Ukraine, to 69.246 Gg CO<sub>2</sub> eq, or a 0.02 per cent increase in total GHG emissions; and HFC emissions from aerosols/metered dose inhalers – from “NE”, as originally reported by Ukraine, to 175.160 Gg CO<sub>2</sub> eq, or a 0.04 per cent increase in total GHG emissions. This in turn resulted in a change in the estimated total emissions of Ukraine for 2008 – from 427,842.682 Gg CO<sub>2</sub> eq, as originally reported by Ukraine, to 428,947.477 Gg CO<sub>2</sub> eq or 0.26 per cent.

## V. Questions of implementation

184. From the information contained in the NIR, CRF tables and the additional information received during and after the centralized review the ERT concludes that the Ukrainian national system does not fully comply with the guidelines for national systems under Article 5, paragraph 1 of the Kyoto Protocol (decision 19/CMP.1) and the guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol (decision 15/CMP.1). The ERT concludes that some general and specific functions of the national system did not ensure that the 2010 annual submission of Ukraine was sufficiently transparent, consistent, comparable, complete and accurate, as required by the guidelines mentioned above, the UNFCCC reporting guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF.

185. In particular, the ERT concludes that the following general and specific functions required for national systems did not operate fully in accordance with requirements set out in the annex to decision 19/CMP.1: ensure sufficient capacity for data collection for estimating anthropogenic GHG emissions by sources and removals by sinks (para. 10(b)); prepare national annual inventories and supplementary information in a timely manner in accordance with Article 5 and Article 7, paragraphs 1 and 2, and relevant decisions of the COP and/or Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (COP/MOP) (para. 10(d)); prepare estimates in accordance with the methods described in the Revised 1996 IPCC Guidelines, as elaborated by the IPCC good practice guidance and the IPCC good practice guidance for LULUCF, and ensure that appropriate methods are used to estimate emissions from key categories (para. 14(b)); collect 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)); provide ERTs under Article 8 with access to all archived information used by the Party to prepare the inventory, in accordance with relevant decisions of the COP and/or COP/MOP (para. 16(b)); and respond to requests for clarifying inventory information resulting from the different stages of the review process of the inventory information in accordance with Article 8 (para. 16(c)).

186. In this respect, the ERT notes that over the last few years Ukraine has not been able to collect the necessary AD, process information and EFs to estimate the relevant missing GHG emissions by sources and removals by sinks, as applicable. The ERT further notes that Ukraine has, in the past and current NIRs, consistently presented plans to estimate the missing GHG emissions, but these have not been implemented in its 2010 submission. The ERT also notes that in response to the list of potential problems and further questions formulated by the ERT, Ukraine stated that, as a result of economic crisis and limited public funds in the country, the investigations aimed to support the national system had not been funded and that part of the financial resources from the sale of AAUs is planned to be used for the support of the national GHG inventory.

187. After the centralized review, in its comments on the draft annual review report, the Party informed the ERT that Ukraine strongly disagrees with the conclusion of the ERT that Ukrainian national system does not fully comply with the guidelines for national systems under Article 5, paragraph 1 of the Kyoto Protocol (decision 19/CMP.1) and the guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol (decision 15/CMP.1). Ukraine considers that this conclusion is not justified and that the specific reasons on the basis of which the ERT has made this conclusion have not been made sufficiently transparent.

188. The ERT also concludes from the information contained in the NIR, CRF tables and the additional information received during and after the centralized review that the Ukrainian national system is not able to ensure that areas of land subject to LULUCF activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol are identifiable in accordance with paragraph 20 of annex to decision 16/CMP.1.

189. In accordance with paragraphs 68 and 69 of the annex to decision 22/CMP.1, the ERT identified categories in the industrial processes sector for which emissions probably occur in Ukraine and for which methodologies to estimate emissions are available in the Revised 1996 IPCC Guidelines and the IPCC good practice guidance and recommended that Ukraine submit emission estimates or provide further justifications for not providing estimates for the identified categories for resolving the potential problems. In addition, the ERT identified a category in the energy sector for which 2008 emissions have been underestimated. Following the review of the additional information provided by Ukraine after the centralized review, the ERT concluded that the Party did correct the problem for the category in the energy sector, but it did not correct the problem for the categories in the industrial processes sector and therefore the ERT decided to calculate and recommend four adjustments in accordance with the guidance for adjustments under Article 5, paragraph 2, of the Kyoto Protocol.

190. Ukraine in its communication of 10 May 2011 accepted the calculated adjustments. In accordance with the guidelines for review under Article 8 of the Kyoto Protocol, the ERT applied the calculated adjustments.

191. Based on its assessment of the information contained in Ukraine's 2010 submission and the additional information provided by the Party during and after the centralized review until the publication of this annual review report, the ERT concluded that the problems identified in paragraphs 184–186 and 188 above with regard to the general and specific functions of the national system of Ukraine remain as unresolved problems and therefore list them as a question of implementation.

## 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 Ukraine 2010. Available at <http://unfccc.int/resource/docs/2008/asr/ukr.pdf>.

Synthesis and assessment report on the greenhouse gas inventories submitted in 2010. Available at <http://unfccc.int/resource/webdocs/sai/2010.pdf>.

FCCC/ARR/2009/UKR. Report of the individual review of the greenhouse gas inventory of Ukraine submitted in 2009. Available at <http://unfccc.int/resource/docs/2010/arr/UKR.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. Georgiy Panchenko and Ms. Marina Bereznytska (National Environmental Investment Agency of Ukraine), including additional material on the methodology and assumptions used. The following documents<sup>1</sup> were also provided by Ukraine:

Cabinet of Ministers decree №325 from April 26. <http://zakon.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=325-2010-%EF> , modifications of the decrees №612 and №977: <http://zakon.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=612-2007-%EF> and <http://zakon.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=977-2007-%EF>

Наказ Міністерства охорони навколишнього природного середовища України, від 31.05.2007, р. № 268. План проведення робіт з щорічної підготовки та ведення Національного кадастру викидів та поглинання парникових газів. План робіт із забезпечення та контролю якості первинних даних та розрахунків з щорічної підготовки Національного кадастру викидів та поглинання парникових газів.

Ministry of environmental protection decree № 268. УКРАЇНА МІНІСТЕРСТВО ОХОРОНИ НАВКОЛИШНЬОГО ПРИРОДНОГО СЕРЕДОВИЩА УКРАЇНИ Н А К А З 31 травня 2007 р. м. Київ Про затвердження Плану проведення робіт з щорічної підготовки та ведення Національного кадастру викидів та поглинання парникових газів та Плану робіт із забезпечення та контролю якості первинних даних та розрахунків з щорічної підготовки Національного кадастру викидів та поглинання парникових газів № 268

ЗАКОН УКРАЇНИ Про державну статистику Із змінами і доповненнями, внесеними Законом України від 13 липня 2000 року N 1922-III (Законом України від 13 липня 2000 року N 1922-III цей Закон викладено в новій редакції). <http://www.minagro.gov.ua/page/?2658>

OA/QC for GHG Inventory Industrial Processes Sector, 12.04.2010

OA/QC for GHG Inventory Agriculture Sector, 22.01.2010

OA/QC for GHG Inventory LULUCF Sector, 31.03.2010

OA/QC for GHG Inventory Waste Sector, 2.04.2010

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



## 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
EF	emission factor
ERT	expert review team
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
IPCC	Intergovernmental Panel on Climate Change
kg	kilogram (1 kg = 1,000 grams)
LULUCF	land use, land-use change and forestry
m <sup>3</sup>	cubic metre
Mt	million tonnes
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
TJ	terajoule (1 TJ = 10 <sup>12</sup> joule)
UNFCCC	United Nations Framework Convention on Climate Change