Advance Version

COMPLIANCE COMMITTEE **CC/ERT/ARR/2012/31**
9 August 2012

Report of the individual review of the annual submission of Croatia submitted in 2011

Note by the secretariat

The report of the individual review of the annual submission of Croatia submitted in 2011 was published on 9 August 2012. For purposes of rule 10, paragraph 2, of the rules of procedure of the Compliance Committee (annex to decision 4/CMP.2, as amended by decision 4/CMP.4), the report is considered received by the secretariat on the same date. This report, FCCC/ARR/2011/HRV, contained in the annex to this note, is being forwarded to the Compliance Committee in accordance with section VI, paragraph 3, of the annex to decision 27/CMP.1.

United Nations FCCC/ARR/2011/HRV

Framework Convention on Climate Change

Distr.: General
9 August 2012

English only

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

* In the symbol for this document, 2011 refers to the year in which the inventory was submitted, and not to the year of publication.

Contents

I. Introduction and summary

A. Overview

1. This report covers the centralized review of the 2011 annual submission of Croatia, coordinated by the UNFCCC secretariat, in accordance with decision 22/CMP.1. The review took place from 12 to 17 September 2011 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. Kristina Saarinen (Finland); energy – Mr. Steven Oliver (Australia) and Mr. Pedro Torres (Portugal); industrial processes – Ms. Lisa Hanle (United States of America) and Mr. Samir Tantawi (Egypt); agriculture – Mr. Sorin Deaconu (Romania) and Mr. Dionisio Rodríguez (Spain); land use, land-use change and forestry (LULUCF) – Mr. Xiaoquan Zhang (China) and Mr. Vladimir Korotkov (Russian Federation); and waste – Mr. Baek Wonsoek (Republic of Korea). Ms. Romanovskaya and Mr. Zhang were the lead reviewers. The review was coordinated by Mr. Vitor Gois Ferreira (UNFCCC secretariat).

2. In accordance with the "Guidelines for review under Article 8 of the Kyoto Protocol" (decision 22/CMP.1) (hereinafter referred to as the Article 8 review guidelines), a draft version of this report was communicated to the Government of Croatia, which made no comment on it.

B. Emission profiles and trends

3. In 2009, the main greenhouse gas (GHG) in Croatia was carbon dioxide (CO_2), accounting for 75.4 per cent of total GHG emissions [1] expressed in carbon dioxide equivalent (CO_2 eq), followed by methane (CH_4) (12.0 per cent) and nitrous oxide (N_2O) (11.1 per cent). Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) collectively accounted for 1.5 per cent of the overall GHG emissions in the country. The energy sector accounted for 74.4 per cent of total GHG emissions, followed by the agriculture sector (11.5 per cent), the industrial processes sector (10.3 per cent), the waste sector (3.5 per cent) and the solvent and other product use sector (0.5 per cent). Total GHG emissions amounted to 28,867.28 Gg CO_2 eq and decreased by 8.2 per cent between the base year [2] and 2009. The trend follows the evolution of the economic activity in the country, with a decrease in emissions between 1990 and 1994 (emissions in 1994 were 29.4 per cent lower than in 1990) due to the war, and an increase in emissions towards 2007 (emissions in 2007 were 2.4 per cent higher than in 1990) following the subsequent economic recovery. In the wake of the recent global economic crisis, emissions decreased from 2007 to 2008 and from 2008 to 2009.

4. Tables 1 and 2 show GHG emissions from Annex A sources, emissions and removals from the LULUCF sector under the Convention and emissions and removals from activities under Article 3, paragraph 3, and, if any, Article 3, paragraph 4, of the Kyoto Protocol (KP-LULUCF), by gas and by sector and activity, respectively. In table 1, CO_2, CH_4 and N_2O emissions included in the rows under Annex A sources do not include emissions and removals from the LULUCF sector.

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

[2] "Base year" refers to the base year under the Kyoto Protocol, which is 1990 for all gases. The base year emissions include emissions from Annex A sources only.

Table 1

Greenhouse gas emissions from Annex A sources and emissions/removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, by gas, base year to 2009[a]

			Gg CO_2 eq								*Change*
		Greenhouse gas	*Base year*[a]	*1990*	*1995*	*2000*	*2005*	*2007*	*2008*	*2009*	*Base year–2009 (%)*
Annex A sources[b]		CO_2	23 089.58	23 089.58	16 982.59	19 919.17	23 371.01	24 836.64	23 626.08	21 755.39	–5.8
		CH_4	3 460.96	3 460.96	2 875.97	2 678.68	3 069.59	3 478.74	3 446.38	3 462.65	0.0
		N_2O	3 942.89	3 942.89	3 057.95	3 238.11	3 486.80	3 474.93	3 452.69	3 206.18	–18.7
		HFCs	NO	NO	49.19	170.68	333.64	405.03	423.43	428.74	NA
		PFCs	936.56	936.56	NO	NO	NA, NO	NA, NO	NA, NO	0.22	–100.0
		SF_6	10.95	10.95	11.66	12.18	13.66	13.68	13.95	14.11	28.8
KP-LULUCF	Article 3.3[c]	CO_2							–49.18	–70.10	
		CH_4							IE, NA, NE, NO	IE, NA, NE, NO	
		N_2O							IE, NA, NE, NO	IE, NA, NE, NO	
	Article 3.4[d]	CO_2	NA						–8 593.94	–8 641.96	NA
		CH_4	NA						0.00	0.00	NA
		N_2O	NA						0.00	0.00	NA

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

[a] "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.

[b] The table does not reflect the adjusted estimates for one category in the energy sector (see section II.G below) after the adjustment procedures under decision 20/CMP.1 were applied. It reflects the estimates contained in the submission of 31 October 2011 that was subject to this adjustment. The adjustment leads to an increase in total greenhouse gas emissions for 2009 of 113.72 Gg CO_2 eq.

[c] 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.

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

Table 2
Greenhouse gas emissions by sector and activity, base year to 2009[a]

			Gg CO_2 eq								*Change*
		Sector	*Base year*[a]	*1990*	*1995*	*2000*	*2005*	*2007*	*2008*	*2009*	*Base year–2009 (%)*
Annex A		Energy[b]	22 534.42	22 534.42	17 055.57	19 281.12	22 599.03	24 043.85	22 812.95	21 461.67	–4.8
		Industrial processes	3 808.51	3 808.51	2 011.71	2 854.25	3 271.25	3 603.96	3 570.09	2 961.76	–22.2
		Solvent and other product use	106.91	106.91	97.59	90.29	177.35	228.32	218.71	131.13	22.7
		Agriculture	4 379.47	4 379.47	3 068.82	3 137.51	3 478.96	3 440.63	3 428.95	3 316.27	–24.3
		Waste	611.63	611.63	743.67	655.64	748.13	892.27	931.84	996.44	62.9
		LULUCF	NA	–6 933.58	–6 862.77	–7 217.89	–8 100.01	–8 505.75	–8 643.11	–8 712.06	NA
		Total (with LULUCF)	**NA**	**24 507.37**	**16 114.59**	**18 800.92**	**22 174.70**	**23 703.28**	**22 319.42**	**20 155.22**	**NA**
		Total (without LULUCF)	**31 440.95**	**31 440.95**	**22 977.36**	**26 018.81**	**30 274.71**	**32 209.03**	**30 962.53**	**28 867.28**	**–8.2**
		Other[c]	NA	NA	NA	NA	NA	NA	NA	NA	NA
KP-LULUCF	Article 3.3[d]	Afforestation and reforestation							–140.47	–144.61	
		Deforestation							91.29	74.52	
		Total (3.3)							**–49.18**	**–70.10**	
	Article 3.4[e]	Forest management							–8 593.94	–8 641.96	
		Cropland management	NA						NA	NA	NA
		Grazing land management	NA						NA	NA	NA
		Revegetation	NA						NA	NA	NA
		Total (3.4)	**NA**						**–8 593.94**	**–8 641.96**	**NA**

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.

[a] "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.

[b] The table does not reflect the adjusted estimates for one category in the energy sector (see section II.G below) after the adjustment procedures under decision 20/CMP.1 were applied. It reflects the estimates contained in the submission of 31 October 2011 that was subject to this adjustment. The adjustment leads to an increase in total greenhouse gas emissions for 2009 of 113.72 Gg CO_2 eq.

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

[d] 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.

[e] 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.

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_2 eq

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]	*Accounting quantity*[c]
Commitment period reserve	144 327 427	144 336 409		133 900 653	
Annex A emissions for current inventory year					
CO_2	21 755 387		113 724	21 869 111	
CH_4	3 462 653			3 462 653	
N_2O	3 204 379	3 206 175		3 206 175	
HFCs	428 739			428 739	
PFCs	216			216	
SF_6	14 111			14 111	
Total Annex A sources	**28 865 485**	**28 867 282**	**113 724**	**28 981 005**	
Activities under Article 3, paragraph 3, for current inventory year					
3.3 Afforestation and reforestation on non-harvested land for current year of commitment period as reported	–144 615			–144 615	
3.3 Afforestation and reforestation on harvested land for current year of commitment period as reported	NA			NA	
3.3 Deforestation for current year of commitment period as reported	74 515			74 515	
Activities under Article 3, paragraph 4, for current inventory year[d]					
3.4 Forest management for current year of commitment period	–8 641 959			–8 641 959	
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 for base year					

Abbreviation: NA = not applicable.

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

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

[c] "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.

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

II. Technical assessment of the annual submission

A. Overview

1. Annual submission and other sources of information

6. The Party's 2011 annual inventory submission was submitted on 14 April 2011; it contains a complete set of common reporting format (CRF) tables for the period 1990–2009 and a national inventory report (NIR) (the NIR was submitted on 15 April 2011). Croatia 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, changes in the national system and in the national registry, and the minimization of adverse impacts under Article 3, paragraph 14, of the Kyoto Protocol. The standard electronic format (SEF) tables were submitted on 15April 2011. The annual submission was submitted in accordance with decision 15/CMP.1.

7. Croatia officially submitted revised emission estimates on 31 October 2011, in response to the list of potential problems and further questions raised by the expert review team (ERT) during the course of the review, including information on KP-LULUCF activities both under the Convention and under the Kyoto Protocol. The Party also submitted revised estimates of N_2O emissions from field burning of agricultural residues. The values used in this report are those contained in the Party's submission of 31 October 2011.

8. Where necessary, the ERT also used previous years' submissions during the review. 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.[3]

9. During the review, Croatia 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. Croatia has provided a complete set of CRF tables for the period 1990–2009 in accordance with the "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories" (hereinafter referred to as the UNFCCC reporting guidelines), and the CRF tables have been reported for all years of the time series.

11. The ERT noted that the Party's estimates of CO_2 emissions from consumption of gasoline used in road transportation and direct and indirect N_2O emissions from agricultural soils (use of synthetic fertilizers and crop residues) could be underestimated in the original 2011 submission. In response to the list of potential problems and further questions raised by the ERT, the Party provided clarifications and revised estimates that resolved the issues related to the potential underestimation of direct and indirect N_2O emissions from

[3] 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 (ITL) 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.

agricultural soils. The Party also provided further information to the ERT on CO_2 emissions from the use of gasoline in road transportation, but the ERT was not satisfied with the response provided by Croatia, and concluded that the emissions might still be underestimated and proceeded with the calculation of adjustments. The ERT also noted that Croatia reported several pools and categories under the LULUCF sector as not estimated ("NE"); these are discussed in detail in chapter II.E below.

12. Croatia has also provided the KP-LULUCF CRF tables for 2008 and 2009, including information on activities under Article 3, paragraph 3, of the Kyoto Protocol and on the elected activity forest management under Article 3, paragraph 4, of the Kyoto Protocol. The KP-LULUCF CRF tables are complete and notation keys have been used throughout; however, the ERT found that the Party has reported some pools as "NE" (see paras. 93, 94 and 131 below) and has not provided complete land-use change matrices.

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

Overview

13. The ERT concluded that the national system continues to perform its required functions. The Party reported that there have been no changes to the national system since the previous annual submission.

Inventory planning

14. The NIR describes the national system for the preparation of the inventory. The Ministry of Environmental Protection, Physical Planning and Construction (MEPPPC) has overall responsibility for the national inventory, including the overall functioning of the national system, the approval of the inventory and the submission of the inventory to the UNFCCC secretariat. The Croatian Environmental Agency (CEA) has overall responsibility for organizing the collection of activity data (AD), developing and implementing the quality assurance/quality control (QA/QC) plan, archiving all of the information used in the preparation of the GHG inventory, selecting the institution that prepares the inventory and reporting on any changes to the national system. CEA also oversees the administration of the national registry and the facilitation of the inventory reviews.

15. An institution is selected by public tender to carry out the preparation of the inventory for a three-year period. For the 2011 submission, this task was performed by the Energy and Environmental Protection Institute (Ekonerg). During the review, the ERT asked Croatia how it ensures the continuity of the inventory and its quality, in cases where the institution responsible for the inventory is replaced by a new one after the three-year period. In response to the ERT, the Party explained that all data collected and used for the emission estimates are archived at CEA, and one of the criteria for the selection of an institution to prepare the national inventory is experience in inventory preparation and knowledge of the Intergovernmental Panel on Climate Change (IPCC) guidelines and the UNFCCC reporting guidelines. The ERT recommends that Croatia include these explanations in the NIR of its next annual submission.

16. Other agencies and organizations are also involved in the preparation of the inventory, mostly as data providers. These are listed in table 1.4-1 of the NIR.

17. In its 2011 submission, Croatia did not provide complete land-use change matrices, thereby preventing the Party from estimating emissions and removals from the following categories: grassland converted to forest land; cropland; grassland; and all land uses

converted to settlements, except forest land converted to settlements, and other land. This lack of information may also affect the accuracy of the estimates for the KP-LULUCF activities. In addition, the ERT noted that some pools under the KP-LULUCF activities are reported as "NE" (e.g. litter, dead wood and soils in areas under afforestation and reforestation, deforestation and forest management). The ERT concluded that the national system does not ensure that the reporting of the KP-LULUCF activities is performed in accordance with decisions 15/CMP.1 and 16/CMP.1. In response to the list of potential problems and further questions raised by the ERT during the review, Croatia provided the ERT with a specific action plan containing a time schedule for the compilation and reporting of the land-use transition matrices, and specifying the responsibilities attributed to each institution. In accordance with the plan, Croatia will prepare, for its 2012 submission, land-use transition matrices for individual years of the period 1990–2010. In addition, the Party clarified that the provision of estimates of the emissions and removals from the missing categories under the LULUCF sector is planned for the 2014 submission. The ERT welcomes the Party's plans and recommends that it report annually on the implementation of the plan in its future annual submissions. The ERT also strongly recommends that Croatia give priority to the implementation of the plan and ensure that it is able to provide estimates for all areas and carbon pools for the KP-LULUCF activities in its next annual submission.

18. Croatia has provided information on planned inventory improvements in the NIR. However, the ERT noted, in line with the conclusions and recommendations in the previous review report,[4] that a more systematic documentation of the justification and time schedule for the planned improvements (e.g. in the form of a table of accomplished and remaining tasks) would improve the follow-up of these activities, both for the Party and for subsequent reviews. In addition, during the review, the ERT asked Croatia to provide an inventory improvement plan containing a time schedule for the implementation of the improvements as well as a description of the official procedure for implementing inventory improvements, but these documents were not made available to the ERT. Therefore, the ERT recommends that Croatia include clear documentation on the time schedule and official procedure for implementing inventory improvements in its next annual submission.

19. Croatia explained to the ERT how it is reorganizing its National System Committee in order to improve the timely delivery of basic information required for the preparation of the inventory, but detailed information on the Party's plans has not been included in the NIR. The ERT notes that the developments planned by Croatia could contribute to resolving some of the problems identified in previous review reports,[5] by increasing the exchange of information among sectoral experts, providing support on cross-cutting issues and ensuring the availability of backup staff. Therefore, the ERT encourages Croatia to provide further information on these plans in the NIR of its next annual submission.

Inventory preparation

Key categories

20. Croatia has reported key category tier 1 and tier 2 analyses, both level and trend assessment, as part of its 2011 submission. The tier 1 key category analysis performed by

[4] FCCC/ARR/2010/HRV, paragraph 14.
[5] FCCC/ARR/2010/HRV, paragraph 12.

the Party and that performed by the secretariat[6] produced similar results. Croatia has included the LULUCF sector in its key category analysis, which was performed in accordance with the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance) and the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF).

21. However, the ERT found that the key categories reported in the NIR (Annex A) do not match the list of key categories in CRF table 7, which is incorrect. The ERT recommends that Croatia ensure the consistency of its reporting in the next annual submission.

22. The key category analysis for KP-LULUCF activities was performed in accordance with the IPCC good practice guidance for LULUCF. The activity forest management was identified as a key category, together with the associated LULUCF category forest land remaining forest land.

23. According to the NIR, the results of the key category analysis are used in setting the annual quality objectives for the preparation of the inventory. The ERT recommends that Croatia also use the key category analysis as a driving factor for the preparation of the inventory, in particular to guide methodological choices and inventory improvements. The ERT also encourages the Party to improve its QA/QC procedures, in order to eliminate any mistakes in the key category analysis.

Uncertainties

24. Croatia has performed a quantitative tier 1 uncertainty analysis both for the level and for the trend using error propagation. The Party has also performed a tier 2 uncertainty analysis (Monte Carlo method) for the key categories. The cumulative uncertainty of the total estimated GHG emissions excluding LULUCF for 2009 is 16.5 per cent and the trend uncertainty is 4.2 per cent, in accordance with the tier 1 method. According to the tier 2 Monte Carlo analysis, the uncertainty of the total estimated GHG emissions excluding LULUCF for 2009 is consistent with the tier 1 analysis in terms of level (16.1 per cent) but larger in terms of trend (–117.0 per cent to +19.9 per cent). The uncertainty of the total estimated GHG emissions including LULUCF (tier 1) is 24.5 per cent for the level and 8.8 per cent for the trend. The ERT concludes that the uncertainty analysis has been performed in accordance with the IPCC good practice guidance and commends the Party for the development of the tier 2 uncertainty analysis. However, the ERT considers that the transparency of the uncertainty analysis could be improved (e.g. by providing, in the NIR, information on the uncertainty values that are based on expert judgement together with the rationale for their selection).

25. According to the NIR, the results of the uncertainty analysis are used to set the annual quality objectives for the preparation of the inventory, but the NIR does not specify how, in practice, the results are taken into account in the prioritization of inventory improvements. The ERT recommends that Croatia clarify, in the NIR of its next annual submission, how it uses the results of the uncertainty analysis in the prioritization of future inventory improvements.

[6] The secretariat identified, for each Party, the categories that are key categories in terms of their absolute level of emissions, applying the tier 1 level assessment as described in the IPCC *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

26. Recalculations have been performed and reported in accordance with the IPCC good practice guidance. The ERT noted that the recalculations reported by the Party of the time series 1990–2008 have been undertaken to take into account changes or refinements in methods, the replacement of adjustments applied to the emission estimates for 2008, the correction of errors, changes in the data available, and to improve the consistency of the inventory with the IPCC good practice guidance. The major changes, and the magnitude of the impact, include: a very small change in estimated total GHG emissions for 1990 (reported as 0.0 per cent) and a decrease in emissions for 2008 (0.6 per cent). The rationale for the recalculations is provided in the NIR and in CRF table 8(b). The ERT considers that the recalculations have improved the accuracy of the inventory since the previous annual submission.

Verification and quality assurance/quality control approaches

27. The ERT notes that Croatia has improved the description of its QA/QC activities in the NIR since its previous annual submission. The Party also confirmed to the ERT that the full establishment of the QA/QC system is under way and that all priority tasks have already been implemented, although the technical and human resources require further strengthening. The ERT strongly recommends that Croatia complete the establishment of the QA/QC system by providing the missing technical and human resources so as to ensure the full functioning of the QA/QC system for the next annual submission. The ERT also recommends that the Party report on the achievements realized in its next annual submission.

28. There is a lack of transparency in the NIR with regard to the information on the Party's QA/QC activities that were scheduled to be performed during the preparation of the inventory and those that have actually been implemented. Therefore, the ERT requested that the Party provide the documents listed in the NIR (e.g. the QA/QC programme, quality objectives document and QA/QC plan). Croatia provided the requested documents, which were available in Croatian only, during the review and explained that the translation of the documents in English would be available in October 2011. The ERT commends the Party for providing the documents and recommends that Croatia include more detailed information on its QA/QC procedures in the NIR of its next annual submission, for example by including a copy of the current annual QA/QC plan annexed to the NIR as well as examples of documentation on how the QA/QC activities were actually performed during the preparation of the inventory.

Transparency

29. The NIR is generally transparent and provides clear descriptions of the national system, key categories, QA/QC procedures, uncertainty assessment, sectoral methodologies, and AD and emission factors (EFs) for most categories. However, the ERT reiterates the recommendations in the previous review report[7] that Croatia improve the transparency of its reporting on the uncertainty analysis, QA/QC procedures, the follow-up to previous reviews and planned improvements, and the methodologies and assumptions used for the energy sector (e.g. the parameters used for the COPERT IV model), the industrial processes sector (e.g. limestone and dolomite use and iron and steel production), the agriculture sector (e.g. information on cattle types and parameters and the explanation of trends), the LULUCF sector (e.g. the decision to include or exclude certain land-use types in each land-use category) and the waste sector (e.g. information on the expert judgement used for the time series and parameters).

[7] FCCC/ARR/2010/HRV, paragraph 31.

Inventory management

30. Croatia 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 ERT could not conclude whether 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 keeping of archives is the responsibility of CEA. The ERT recommends that Croatia clarify the materials archived in the centralized archiving system in the NIR of its next annual submission.

3. Follow-up to previous reviews

31. The ERT noted that the information on how the recommendations from previous review reports have been taken into account is not presented in a systematic and transparent manner in the NIR, thereby making it difficult for the ERT to verify which recommendations have already been addressed and what the time schedule is for the implementation of the remaining recommendations, listed as future improvements. In response to questions raised by the ERT during the review, Croatia provided a document in Croatian, stating that the information includes the recommendations from previous review reports that have been resolved.

32. The ERT recommends that Croatia improve the follow-up to the recommendations from previous review reports, for example by listing all of the recommendations in a summary table and clarifying which ones have already been resolved, the action that was taken, and the expected time schedule for the implementation of the remaining ones.

33. The ERT concluded that Croatia has addressed the following recommendations from previous review reports:

(a) Moving part of the emissions from the use of natural gas in ammonia production from the industrial processes sector to the energy sector;

(b) Compiling new AD to estimate emissions of fluorinated gases (F-gases) from refrigeration and air-conditioning equipment, foam blowing, fire extinguishers and aerosols/metered dose inhalers;

(c) Recalculating CH_4 emissions from enteric fermentation and manure management using the IPCC default values for developed countries, in order to replace the adjustments applied to the emission estimates for 2008 in the 2010 submission;

(d) Recalculating N_2O emissions from agricultural soils, in order to correct detected problems in the fraction of livestock nitrogen (N) excretion that volatilizes as ammonia and nitrogen oxide ($Frac_{GASM}$);

(e) Extending the time series for the total amount of generated and disposed municipal solid waste to the year 1955 (the time series in previous submissions extended until 1970).

4. Areas for further improvement

Identified by the Party

34. The 2011 NIR identifies several areas for improvement. Croatia has prepared a national GHG inventory improvement strategy to identify the strengths and weaknesses of its national system and to determine realistic short- and long-term goals.

35. The ERT noted, however, that the information on inventory improvements is provided in a non-systematic manner in the NIR, thereby making it difficult for the ERT to

assess, from the sector-specific goals, the status of implementation of the improvements. Therefore, the ERT recommends that Croatia report the inventory improvements in a more systematic manner in future annual submissions. Major improvements identified by the Party include:

(a) Fuel combustion in the energy sector: in the short term, the use of more category-specific QA/QC procedures; and in the longer term (more than one year), the use of web-based software for data collection, and the move to the use of tier 2 and 3 methodologies and plant-specific data;

(b) Fugitive emissions: the use of a tier 3 methodology to estimate emissions from oil and natural gas;

(c) Industrial processes: for the next annual submission, the use of well-documented country-specific EFs, filling in the existing gaps in the time series, the implementation of more category-specific QA/QC procedures, and the improvement of the AD for F-gases; and in the longer term (more than one year), the implementation of category-specific verification procedures and research on the conversion factor used for the estimation of emissions from the conversion of non-methane volatile organic compounds into CO_2 (carbon content of volatile compounds);

(d) Agriculture: the improvement of the availability of AD and the use of a tier 2 methodology to estimate emissions from manure management;

(e) LULUCF: the improvement of the availability of AD, the use of higher-tier methodologies and the development of a land-use database;

(f) Waste: in the short term, the improvement of waste statistics and the development of sector-specific studies on solid waste disposal (tier 2), the adjustment of the classification of solid waste disposal sites (managed and unmanaged) and the improvement of AD collection and the methodology for the estimation of emissions from solid waste; in the longer term (more than one year), the establishment of a water information system to improve the information on wastewater handling and the improvement of the accuracy of the AD on the incineration of hazardous and clinical waste.

Identified by the expert review team

36. During the review, the ERT identified cross-cutting issues for improvement. These are listed in paragraph 161 below.

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

B. Energy

1. Sector overview

38. The energy sector is the main sector in the GHG inventory of Croatia. In 2009, emissions from the energy sector amounted to 21,461.67 Gg CO_2 eq, or 74.4 per cent of total GHG emissions. Since 1990, emissions have decreased by 4.8 per cent. The key drivers for the fall in emissions are the decreases in emissions from the category manufacturing industries and construction (a decrease of 2,478.34 Gg CO_2 eq, or 42.2 per cent, since the base year) and the category energy industries (a decrease of 751.44 Gg CO_2 eq, or 10.5 per cent, since the base year). These decreases were partly offset by the category transport, which showed an increase in emissions (2,097.1 Gg CO_2 eq, or 51.7 per cent, since the base year). Within the sector, 29.8 per cent of the emissions were from energy industries, followed by 28.7 per cent from transport, 16.5 per cent from other sectors

and 15.8 per cent from manufacturing industries and construction. The remaining 9.3 per cent were fugitive emissions from oil and natural gas. Emissions from the category other and fugitive emissions from solid fuels were reported as not occurring ("NO").

39. Croatia has made recalculations for the energy sector between the 2010 and 2011 submissions in response to the 2010 annual review report and due to revisions resulting from improvements to the methods used to estimate emissions. The impact of these recalculations on the energy sector is an increase in emissions of 1.5 per cent for 2008. The main recalculations took place in the following categories:

(a) Manufacturing industries and construction, as a result of the reallocation of emissions from natural gas used in ammonia production;

(b) Road transportation, due to the update to version 7.1 of the COPERT IV model;

(c) Fugitive emissions, in order to rectify an identified error in the AD.

40. The CRF tables and the NIR are complete. Croatia has reported emissions for all categories for which the IPCC *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines) and the IPCC good practice guidance provide estimation methodologies. However, the ERT noted that CO_2 emissions from consumption of gasoline in road transportation could be underestimated (see paras. 55–58 below). The ERT therefore recommends that the Party revise its estimates for this category in the next annual submission, in order to ensure the completeness of its reporting.

41. The NIR is generally transparent. Croatia has provided complete information on the EFs used, and the parameters and sources of AD have been clearly identified. However, the ERT notes that there is further room to improve the transparency of the NIR. For example, the ERT recommends that Croatia report on the reasons for the trends in road transportation, particularly the increase in N_2O emissions from road transportation and the decrease in emissions both from road transportation and from civil aviation in the later years of the time series (towards 2009). The ERT also recommends that the Party provide information on the background data for road transportation used as input data in the COPERT IV model, namely the kilometres driven per vehicle type and the comparison between the fuel consumption data estimated by the COPERT IV model and the fuel consumption data from the national energy balance prior to any fuel balance adjustments made by the software.

42. According to the information provided in the NIR, Croatia is planning several inventory improvements. In the short term, the Party intends to improve the quality of the AD used for the estimation of emissions from fuel combustion and, in the longer term, the Party is planning to use plant-specific data collected in the Register of Environmental Pollution. The ERT commends Croatia for its plans, but encourages the Party to anticipate long-term objectives, as far as possible.

2. Reference and sectoral approaches

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

43. CO_2 emissions from fuel combustion were calculated using the reference approach and the sectoral approach. For 2009, the CO_2 emissions estimated using the reference approach are 3.0 per cent larger than those estimated using the sectoral approach. This difference is explained by the Party in the NIR: CO_2 emissions from feedstock and non-energy fuel use are calculated under the reference approach, but are not accounted for under the sectoral approach. However, the Party's explanations in CRF table 1.A(c) do not

actually explain the identified difference. In addition, the emissions estimated using both approaches indicate that, in the period 1990–2009, the CO_2 emissions differ by more than 2.0 per cent for all years, except for 1995, 1997 and 1998. The ERT recommends that Croatia make efforts to minimize these discrepancies for future inventory years, and enhance the explanations for the differences, in particular if those differences are larger than 2 per cent, both in the NIR and in CRF table 1.A(c).

44. In response to the recommendations in previous review reports,[8] Croatia has changed the notation key used for gas works gas to "NO" in CRF table 1.A(b) as it is considered a secondary fuel. The ERT commends the Party for this correction.

45. The ERT noted that imports of refinery feedstocks are not reported in CRF table 1.A(b), even though values are available from the International Energy Agency (IEA) balance for 1999 onwards. The Party informed the ERT that refinery feedstocks are reported together with other oil in CRF table 1.A(b). In order to improve transparency, the ERT encourages Croatia to report refinery gas and other oil separately under the reference approach in its next annual submission.

46. The ERT also noted that the values for exports, and in some cases also for imports, of crude oil, as reported in CRF table 1.A(b) for the years prior to 1997, are different from the values reported to IEA. The ERT recommends that Croatia provide explanations for these differences in the NIR of its next annual submission.

47. The ERT found some apparent inconsistencies in the time series reported in the inventory and in the IEA data. For example, for 1993, the reported values of the natural gas stock changes are similar in both the IEA data and the CRF tables, but with opposite signs which affect the calculated and reported values for apparent consumption: the IEA value is 7 per cent lower than the value reported in the GHG inventory. During the review, Croatia explained to the ERT that this difference was due to an error in the CRF tables, and that the IEA value is correct. The ERT recommends that the Party correct this error in the next annual submission and improve its QA/QC procedures in order to detect any inconsistencies.

48. According to the information provided by Croatia to the ERT during the review, coal production steadily decreased during the period 1990–1999, and in 1999 only underground coal mines in the Istria region were in operation (Tupljak, Ripenda and Koromačno) and, according to the energy balance, those mines were producing around 0.015 Mt to 0.174 Mt of coal per year. However, the quantities of coal extracted from the mines, as reported to IEA, are half those reported in CRF table 1.B.1 for the years prior to 2000 and have been reported as "NO" for 2009. To improve transparency, the ERT recommends that Croatia investigate the reasons for the discrepancies between the CRF tables and the IEA data and provide information on any discrepancies in the NIR of its next annual submission.

International bunker fuels

49. The total apparent consumption reported for 2009 in CRF table 1.A(c) corresponds closely to the information reported to IEA, but with some differences: the main difference concerns consumption of jet kerosene in international aviation bunkers. During the review, the ERT concluded that this difference was due to the different approaches used by the Party for dividing total jet kerosene between domestic and international consumption. The ERT considers that the split between domestic and international fuel consumption in the inventory is in accordance with the IPCC good practice guidance, and encourages Croatia to improve the consistency between the data in the CRF tables and the data reported to IEA.

[8] FCCC/ARR/2010/HRV, paragraph 47.

Feedstocks and non-energy use of fuels

50. Croatia has reported information on non-energy use of fuels in CRF table 1.A(d). The ERT noted that the information in the CRF table is not fully consistent, since the quantity of carbon in some feedstocks is not stored in products in its totality, although the emissions have been reported as "NO" (e.g. naphtha, lubricants and liquefied petroleum gas). In addition, no detailed information has been provided in the NIR that could help the ERT to understand the allocation of feedstocks and non-energy use of fuels or the reasons behind it. Therefore, the ERT recommends that Croatia improve the transparency of its reporting of feedstocks and non-energy use of fuels in the next annual submission.

3. Key categories

Stationary combustion: liquid and gaseous fuels – CO_2, CH_4[9] and N_2O

51. Stationary combustion is a key category and petroleum refining is a significant contributor to the energy sector: in 2009, this subcategory accounted for about 26.0 per cent of total CO_2 emissions from energy industries. Nevertheless, Croatia uses a tier 1 approach to estimate emissions from this subcategory, which the ERT considers to be not in line with the IPCC good practice guidance. Therefore, the ERT recommends that Croatia improve the accuracy of its estimates by using an IPCC tier 2 method in its next annual submission.

52. Croatia states in the NIR that it used EFs based on technology and configuration assumptions to estimate the CH_4 and N_2O emissions from public electricity and heat production. However, the ERT noted that this information has not been included in the NIR. Croatia provided further information clarifying this issue during the review week. To improve the transparency of its reporting, the ERT recommends that Croatia include, in the NIR of its next annual submission, the appropriate information on the technology and configuration assumptions used to derive the CH_4 and N_2O EFs for public electricity and heat production.

Civil aviation: liquid fuels – CO_2, CH_4 and N_2O[10]

53. The ERT commends Croatia for having improved the accuracy of the estimates of emissions from domestic aviation using drivers such as the ratio of domestic and international passengers and taking into account the average distance travelled per passenger on domestic and international routes, in response to the recommendations from previous review reports.[11]

54. The ERT encourages Croatia to collect landing and take-off data on civil aviation and to improve the methodology used in order to fully comply with the IPCC tier 2a or tier 2b method in accordance with the IPCC good practice guidance.

[9] Not all emissions related to all gases under this category are key categories, particularly CH_4 emissions. However, since the calculation procedures for issues related to this category are discussed as a whole, the individual gases are not assessed separately.

[10] Not all emissions related to all gases under this category are key categories, particularly CH_4 and N_2O emissions. However, since the calculation procedures for issues related to this category are discussed as a whole, the individual gases are not assessed separately.

[11] FCCC/IRR/2008/HRV, paragraph 66.

Road transportation: liquid fuels – CO_2, CH_4[12] and N_2O

55. Croatia has estimated emissions from road transportation using the COPERT IV model for the whole period from 1990 to 2009. However, the ERT found that the Party did not report transparently on the parameters used as input for the COPERT IV model, and did not present a comparison between the total fuel consumption estimated by the COPERT IV model and the total fuel consumption provided in the energy balance prior to any fuel balance adjustments made by the software, which is necessary to ensure that the CO_2 emission estimates have been calculated in accordance with the IPCC good practice guidance (in accordance with this guidance, it is good practice to estimate CO_2 emissions from fuel consumption using a stand-alone tier 1 method or in parallel with a tier 2 bottom-up approach). Therefore, to improve transparency, the ERT recommends that Croatia include, in the NIR of its next annual submission, the values for the parameters used in the COPERT IV model and a comparison between the total fuel consumption as estimated by the model and the values reported in the energy balance, ensuring that the CO_2 emissions are estimated in accordance with the IPCC good practice guidance.

56. The trend of the N_2O implied emission factor (IEF) for gasoline used in road transportation is not stable: in 1990 the value of the IEF was 3.73 kg/TJ; in 2001, it was 11.28 kg/TJ; in 2004, 12.38 kg/TJ; in 2005, 12.56 kg/TJ; and in 2006, 12.94 kg/TJ. Although these values show an increasing trend, in 2008 the value of the IEF decreased to 4.73 kg/TJ, and in 2009 it decreased further to 3.75 kg/TJ. During the review, Croatia explained to the ERT that this trend results from the use of the COPERT IV model and that it depends mostly on emissions from passenger cars (the share in total emissions of this type of vehicle is about 98.0 per cent). The ERT considers that the explanation provided by the Party is insufficient, since the use of a model must always be verified against reality, and that the Party must make additional efforts to understand the results of the model and to assess the underlying reasons for the trend. The ERT strongly reiterates the recommendations from previous review reports that Croatia continue to investigate the reasons for the unexpected trend of the N_2O IEF and verify that the results from the model are accurate. The ERT also recommends that Croatia report on the outcome of such analysis in the NIR of the next annual submission.

57. The ERT also found that the trend of the CO_2 IEF for diesel use is increasing: the 2009 value (73.78 t/TJ) is 1.0 per cent higher than the 1990 value (73.05 t/TJ); the largest increase occurs between 2006 and 2007. In response to the ERT, Croatia explained that, from 2006 onwards, new diesel fuel quality specifications, which came into effect after 2005, were used as input data for the COPERT IV model. In addition, the ERT was informed that, between 2006 and 2007, consumption of diesel for conventional vehicles increased by 3.3 per cent, while consumption of diesel by EURO standard vehicles increased by 0.3 per cent only; and between 2006 and 2009, consumption of diesel for conventional vehicles decreased by 24.5 per cent, while consumption of diesel for EURO standard vehicles increased by 29.3 per cent. The ERT noted that the CO_2 EFs should depend on the type of fuel used and not on the technology used, and therefore recommends that Croatia revise the CO_2 emission estimates using representative country-specific EFs for diesel or, if these are not available, constant IPCC default CO_2 EFs. Further, the ERT recommends that the Party provide, in the NIR, transparent information on the CO_2 EFs used for consumption of diesel in road transportation and details on the emission calculations, showing that the estimates have been calculated in accordance with the Revised 1996 IPCC Guidelines and the IPCC good practice guidance.

[12] Not all emissions related to all gases under this category are key categories, particularly CH_4 emissions. However, since the calculation procedures for issues related to this category are discussed as a whole, the individual gases are not assessed separately.

58. Further, the ERT found that the CO_2 IEF for gasoline used in road transportation has a decreasing trend: the 2009 value (69.94 t/TJ) is 2.0 per cent lower than the 1990 value (71.39 t/TJ). In response to a question raised by the ERT during the review, Croatia explained that the CO_2 EF for gasoline used in pre-ECE and ECE standard vehicles is 71.39 t/TJ and for gasoline used in EURO vehicles the CO_2 EF is 70.09 t/TJ. The ERT noted, however, that the gasoline CO_2 EF depends on the type of fuel combusted and that there are no clear reasons why the value of the EF should depend on the vehicle technology if there are no different grades of gasoline used in the different types of vehicles. Considering that Croatia could not provide clear explanations for using this method during the review week, and considering that the decreasing trend in the value of the CO_2 IEF may imply an underestimation of emissions for 2009, the ERT included this finding in its list of potential problems and further questions. In response to the ERT, the Party provided additional information stating that two different gasoline grades are available in Croatia: leaded gasoline, used in older vehicles and with an oxygen:carbon (O:C) ratio of zero; and unleaded gasoline, used in recent technology vehicles, with an O:C ratio of 0.016. The ERT concluded that this explanation was insufficient since, for the period 2007–2009, only unleaded gasoline is reported in the energy balance (table A3-3 in the 2009, 2010 and 2011 NIRs), while the CO_2 IEF is not stable between 2007 and 2009 (70.53 t CO_2/TJ in 2007 and 69.94 t CO_2/TJ in 2009). The ERT concluded that this issue was not resolved by the Party during the review and that there is a possibility that the emissions for 2009 are underestimated and, therefore, proposed an adjustment for CO_2 emissions from gasoline used in road transportation (see paras. 116–126 below for further details).

4. Non-key categories

Navigation: liquid fuels – CO_2

59. The ERT noted that the trend of the CO_2 emissions from navigation is unstable and that the following inter-annual changes are very significant: 1990/1991 (–19.6 per cent), 1991/1992 (+56.0 per cent), 1992/1993 (–27.3 per cent), 1993/1994 (–28.1 per cent), 1995/1996 (+51.4 per cent), 1996/1997 (–20.7 per cent), 1997/1998 (–23.5 per cent), 2001/2002 (+20.6 per cent), and 2003/2004 (–18.0 per cent). Croatia explained to the ERT during the review that the trend of the CO_2 emissions follows the fuel consumption trend for the navigation sector, as it is recorded in the energy balances prepared by the Energy Institute Hrvoje Požar. However, the ERT notes that the methodology used to derive the domestic fuel consumption is not explained in the NIR and, in order to improve transparency, the ERT recommends that Croatia improve its explanations of this trend in the NIR of its next annual submission.

C. Industrial processes and solvent and other product use

1. Sector overview

60. In 2009, emissions from the industrial processes sector amounted to 2,961.76 Gg CO_2 eq, or 10.3 per cent of total GHG emissions, and emissions from the solvent and other product use sector amounted to 131.13 Gg CO_2 eq, or 0.5 per cent of total GHG emissions. Since the base year, emissions have decreased by 22.2 per cent in the industrial processes sector, and increased by 22.7 per cent in the solvent and other product use sector. The key driver for the fall in emissions in the industrial processes sector is the decrease in emissions from the following categories: metal production, with a decrease in emissions of 1,176.91 Gg CO_2 eq, or 99.0 per cent, since the base year; and chemical industry, with a decrease in emissions of 206.37 Gg CO_2 eq, or 16.1 per cent, since the base year. During the same period, emissions from consumption of halocarbons and SF_6 increased by 382.22 Gg CO_2 eq, and emissions from mineral products increased by 104.43 Gg CO_2 eq,

or 7.9 per cent, since the base year. A decrease in emissions was reported for 2007 onwards, which is explained by the decrease in economic activity since the global economic crisis and the consequent decrease in emissions from cement, lime, ammonia, and steel production: between 2007 and 2009 emissions decreased by 17.8 per cent. Within the industrial processes sector, 48.2 per cent of the emissions were from mineral products, followed by 36.4 per cent from chemical industry, 15.0 per cent from consumption of halocarbons and SF_6 and 0.4 per cent from metal production. Emissions from production of halocarbons and SF_6 were reported as "NO".

61. Croatia has made recalculations for the industrial processes sector between the 2010 and 2011 submissions in response to the 2010 annual review report, following changes in AD and EFs, and in order to rectify identified errors. The main recalculations took place in the category chemical industry where, following the recommendations from previous review reports, the natural gas used as fuel in ammonia production was reallocated to the energy sector (in previous submissions it was included under the industrial processes sector). The Party has made recalculations for the entire time series (1990–2008) in accordance with the IPCC good practice guidance. As a result of the recalculations, CO_2 emissions from ammonia production decreased by 16.1 per cent (412.12 Gg CO_2 eq) for 2008.

62. The inventory for the industrial processes and solvent and other product use sectors covers all categories for which there are methodologies and default EFs available in the Revised 1996 IPCC Guidelines and the IPCC good practice guidance. In response to recommendations from previous review reports, Croatia has carried out some improvements, in particular regarding F-gas emissions using new data from MEPPPC (e.g. actual emissions of HFC-227ea used in fire extinguishers; actual emissions of HFC-125 used in fire extinguishers; and actual emissions of HFC-134a used in aerosols/metered dose inhalers). The ERT encourages the Party to enhance the completeness of the inventory by estimating emissions from other categories for which there are no methodologies available in the Revised 1996 IPCC Guidelines and the IPCC good practice guidance, such as HFC-152a emissions from foam blowing. Croatia has reported CO_2 emissions from glass production as "NE", but has reported in the NIR that emissions from the use of carbonate materials in glass production are included in the emission estimates for the categories limestone and dolomite use and soda ash use. Therefore, the ERT encourages the Party to clarify which emissions are not estimated or revise the use of the notation key.

63. The ERT noted some discrepancies in the identification of key categories between CRF table 7 and the NIR (e.g. lime and dolomite use, ferroalloys production and aluminium production are not identified in CRF table 7). In response to a question raised by the ERT during the review, the Party confirmed the existence of mistakes in its reporting. The ERT recommends that Croatia improve the consistency between the CRF tables and the NIR in its next annual submissions, for example by enhancing the QC procedures.

2. Key categories

Ammonia production – CO_2

64. Since the previous submission, and following the recommendations in the previous review report,[13] Croatia has reallocated emissions from the part of natural gas used as fuel to the energy sector; in previous submissions it was reported under the industrial processes sector together with the use of natural gas as feedstock. The ERT commends the Party for this improvement, which enhances comparability with other reporting Parties.

[13] FCCC/ARR/2010/HRV, paragraph 57.

65. The inventory of emissions from this category has been reported in a transparent manner with a high level of accuracy. CO_2 emissions from ammonia production were estimated based on natural gas consumption, applying a country-specific EF derived from measurements of natural gas composition. Data on the consumption and composition of natural gas used as feedstock were collected from a survey on ammonia manufacturers (Petrokemija Fertilizer Company Kutina) and cross-checked with ammonia production data from annual industrial reports published by the Central Bureau of Statistics, Department of Manufacturing and Mining. The carbon content of gas has been estimated from the volume fraction of individual gases present in the natural gas resulting from the measurements. The ERT encourages the Party to continue to implement its improvement plans for this category.

Ferroalloys production – CO_2

66. Previous review reports noted high fluctuations in the CO_2 IEF for ferroalloys production. Croatia explained that the fluctuations were a result of interpolation between 1994 and 1996, and between 1999 and 2001 due to a lack of data. In addition, the Party informed the ERT that the fluctuations in this category occurred over the period 1990–2003, mainly as a result of discontinuous operation caused by the war in Croatia, and that production was halted in 2003, thereby making it difficult to review the AD for the entire time series. However, in line with previous review reports, the ERT recommends that Croatia examine the application of the interpolation method used and include, in its next annual submission, more information on the unusual trend of the CO_2 IEF.

Consumption of halocarbons and SF_6 – HFCs

67. Following the recommendations in the previous review report,[14] Croatia has provided, for the first time, estimates for the actual emissions of HFC-227ea used in fire extinguishers for the period 1995–2009, and the actual emissions of HFC-125 used in fire extinguishers and HFC-134a used in aerosols/metered dose inhalers for the period 2003–2009. Actual emissions of HFCs were estimated from data on the amount of gases in operating systems (average annual stocks) for fire extinguishers (HFC-227ea, HFC-125) and aerosols/metered dose inhalers (HFC-134a). Data on HFC-152a used in foam blowing was not available for the period 2006–2009, and the Party was therefore not able to report a complete inventory (emissions of this gas are reported as "NE" in CRF table 2(II)). The ERT encourages Croatia to continue to collect data in order to estimate actual HFC emissions from foam blowing to complete its inventory for this category in its next annual submission.

68. Croatia has reported potential emissions of SF_6 used in global information system (GIS) applications and high-voltage circuit-breakers for the period 2006–2009 only, for which data on the amount of consumed gas were compiled by MEPPPC, while data for previous years are not available. The ERT encourages Croatia to continue its work and to provide estimates of potential emissions from this category for the whole time series, as appropriate.

3. Non-key categories

Limestone and dolomite use – CO_2

69. The ERT found that the time series of emissions from limestone and dolomite use may not be consistent for several reasons. First, Croatia states in the NIR that the quantities of dolomite used in glass, brick, ceramic and refractory materials manufacture for the period 1990–1996 were obtained from annual industrial reports published by the Central Bureau of Statistics, Department of Manufacturing and Mining. After 1996, the national

[14] FCCC/ARR/2010/HRV, paragraphs 59 and 60.

classification of economic activities does not distinguish the dolomite use in the above-mentioned activities and the AD were obtained from a survey for manufacturers. On the other hand, data for 2009 are more detailed in comparison with the data for the period 1997–2008. The ERT welcomes the fact that the AD for 2009 are more complete, but recommends that Croatia review the way in which it constructs the time series of AD for the period 1997–2008 to ensure its consistency and to ensure that emissions for 2008 are not underestimated. The ERT recommends that the Party report, in the NIR of its next annual submission, how it has enhanced the consistency of the time series.

Iron and steel production – CO_2

70. Croatia currently reports CO_2 emissions from pig iron production under the energy sector since the coke oven gas is included in the energy balance and in order to avoid double counting. The ERT does not understand the Party's reasons for including CO_2 emissions from pig iron production under the energy sector and recommends that Croatia report the emissions that do not result from fuel use under the industrial processes sector. Otherwise, the ERT recommends that the Party provide detailed explanations, in the NIR of its next annual submission, as to why these emissions from production processes cannot be separated from the energy emissions for this category.

D. Agriculture

1. Sector overview

71. In 2009, emissions from the agriculture sector amounted to 3,316.27 Gg CO_2 eq, or 11.5 per cent of total GHG emissions. Since the base year, emissions have decreased by 24.3 per cent. The key driver for the fall in emissions is the decrease in the livestock population leading to a decrease in emissions from all categories, as follows: enteric fermentation by 427.82 Gg CO_2 eq, or 34.4 per cent, since the base year; agricultural soils by 409.51 Gg CO_2 eq, or 16.2 per cent, since the base year; and manure management by 225.87 Gg CO_2 eq, or 37.0 per cent, since the base year. Within the sector, 63.8 per cent of the emissions were from agricultural soils, followed by 24.6 per cent from enteric fermentation. The remaining 11.6 per cent were from manure management. Emissions from rice cultivation, prescribed burning of savannas and field burning of agricultural residues are reported as "NO".

72. The Party has made recalculations for the agriculture sector between the 2010 and 2011 submissions following changes in AD and EFs and in order to replace the adjustments applied to the emission estimates for 2008 during the review of the 2010 submission. The impact of these recalculations on the agriculture sector is an increase in emissions of 2.3 per cent for 2008. The main recalculations took place in the following categories:

(a) Enteric fermentation;

(b) Manure management;

(c) Agricultural soils.

73. The inventory is complete with respect to the coverage of categories, gases and years, and has generally been reported in a transparent manner: the sources of AD and EFs, the methodological issues and the AD and emissions trends have been clearly explained in the NIR. The uncertainties, recalculations, QA/QC procedures and planned improvements have also been reported in the NIR at the category level. However, there is room for the Party to improve the transparency of its reporting; corresponding recommendations are presented in the following paragraphs.

74. Although the Party has enhanced the transparency of its reporting on the agriculture sector, for example through the inclusion in the NIR of tables showing livestock population data, the ERT has identified room for the further improvement of transparency and recommends that the Party include, in its next annual submission: information on the EF for enteric fermentation for dairy cattle; information on the annual average N excretion ratio (Nex) and the fractions of Nex that are managed for each animal waste management system for each animal type and the source of information for these data; the reasons for the choice of parameters for different sources (e.g. numbers of goats and mules and asses, and crop production levels of cowpeas, lentils, peas and vetches); an explanation of how time-series consistency is ensured; information on how the four sources of information (page 159 of the NIR) were used to establish the dry matter content; information on the residue to crop product mass ratio; information on the N content for N fixing crops; and an explanation of which data information sources are used for the same parameters for non-N fixing crops. During the review week, Croatia provided the ERT with information related to all of the above-mentioned issues, and the ERT recommends that the Party include this information in the NIR of its next annual submission, together with the relevant data.

75. Also, the ERT noted that Croatia did not follow the recommendation in the previous review report regarding the provision of a detailed list of the cattle types included in each cattle group in the NIR. However, the Party provided the necessary information to the ERT during the review, and the ERT recommends that Croatia include this information on the detailed list of cattle types included in each cattle group in the NIR of its next annual submission.

76. Not all documentation on the choice of uncertainty values is reported in the NIR for all categories, in particular the underlying assumptions supporting the expert judgement used for the uncertainty of the AD. In response to a question raised by the ERT during the review week, the Party provided the relevant information, and the ERT recommends that Croatia include this information in the NIR of its next annual submission. In addition, the ERT encourages the Party to include data and information on aggregated uncertainties for the sector.

77. The emission estimates reported in the inventory are accurate and have been estimated generally in line with the provisions of the IPCC good practice guidance. The ERT noted some possible inconsistencies in the time series of some EFs. In particular, for the estimation of emissions from enteric fermentation for sheep and swine, and from manure management for sheep, goats, horses, mules and asses, swine and poultry, Croatia has used IPCC default EFs for developing countries for the period 1990–2007 and IPCC default EFs for developed countries for the period 2008–2009. In response to a question raised by the ERT during the review, the Party stated that it believes that the use of the EFs for developed countries is not appropriate for the conditions in Croatia, and that it only performed the recalculations due to the application of adjustments during the previous review (2010 submission). Further, the Party explained that a project proposal for the development of country-specific EFs is under development and will ensure time-series consistency in the future. The ERT notes that the consistency of the time series has not been ensured in the inventory, and therefore recommends that Croatia improve the time-series consistency of the next annual inventory in accordance with the IPCC good practice guidance.

78. The ERT found differences in the livestock numbers for cattle, sheep, goats, horses, mules and asses, swine and poultry between the data in the CRF tables and the data of the Food and Agriculture Organization of the United Nations (FAO). In response to a question raised by the ERT during the review, Croatia informed the ERT that further consultations with relevant organizations are needed. The ERT strongly recommends that the Party implement these verification procedures, include these checks in the sector-specific QA/QC

procedures and report on the results of the comparisons in the NIR of its next annual submission.

79. The ERT found that Croatia uses the notation key "NE" to report the livestock population size for "other" in CRF tables 4.A, 4.B(a) and 4.B(b), but no additional explanatory information is provided in the inventory. During the review, Croatia informed the ERT that the notation key "NE" is incorrect and will be replaced by the notation key "NO" in future annual submissions. The ERT recommends that Croatia change the notation key in the next annual submission.

80. The ERT found that Croatia reports a different list of key categories in annex 1 to the NIR and in NIR table 6.6-1. The ERT recommends that the Party ensure the transparency and consistency of its presentation of the results of the key category analysis in its next annual submission.

2. Key categories

Enteric fermentation – CH_4

81. The Party has used a tier 2 method with country-specific EFs to estimate emissions from mature dairy cattle, mature non-dairy cattle and young cattle (option B in the CRF tables), while a tier 1 method with default EFs has been used to estimate emissions from sheep, goats, horses, mules and asses, and swine. The AD are mainly provided by the Croatian Central Bureau of Statistics.

82. The ERT noted that Croatia revised the EF used to estimate emissions from sheep (from 5 kg/head/year to 8 kg/head/year) and swine (from 1 kg/head/year to 1.5 kg/head/year), in order to replace the adjustments applied to these subcategories for 2008 during the review of the 2010 submission: the Party moved from using IPCC default EFs for developing countries to IPCC default EFs for developed countries. However, the ERT noted that the Party only used the revised EF for 2008 and 2009 but kept the IPCC default EFs for developing countries for the period 1990–2007. The ERT concludes that this approach results in an inconsistent time series, and recommends that the Party revise the time series in order to ensure its consistency in line with the IPCC good practice guidance in its next annual submission.

Manure management – CH_4 and N_2O

83. Croatia has used a tier 1 method together with IPCC default EFs to estimate CH_4 emissions from manure management for cattle, sheep, goats, horses, mules and asses, swine and poultry. The ERT recommends that the Party develop tier 2 estimates with country-specific EFs for the most significant animal types: cattle, based on the gross energy intake associated with the relevant EF used for enteric fermentation, and swine.

84. The ERT noted that Croatia has revised the EF used to estimate emissions from sheep (from 0.10 kg/head/year to 0.19 kg/head/year), goats (from 0.11 kg/head/year to 0.12 kg/head/year), horses (from 1.1 kg/head/year to 1.4 kg/head/year), mules and asses (from 0.6 kg/head/year to 0.76 kg/head/year) and poultry (from 0.012 kg/head/year to 0.078 kg/head/year) in order to replace the adjustments applied to these subcategories for 2008 during the review of the 2010 submission. The Party moved from using the IPCC default EFs for developing countries to the IPCC default EFs for developed countries, both for cool climate regions. However, the ERT noted that the Party has only used the revised EFs for 2008 and 2009, but has kept the IPCC default EFs for developing countries for the period 1990–2007. The ERT concludes that this approach results in an inconsistent time series, and recommends that the Party revise the time series in order to ensure its consistency in line with the IPCC good practice guidance in its next annual submission.

85. In table 6.3-1 of the NIR, the Party has presented the values of the default EFs for sheep, goats, horses, mules and asses, and poultry for developing countries as being those for developed countries and vice versa. The ERT recommends that Croatia correct this error in the next annual submission.

86. The default method presented in the IPCC good practice guidance, together with country-specific and default AD and EFs, was used to estimate the N_2O emissions from livestock manure management. The ERT recommends that Croatia develop national values for the annual average Nex per head of species and for the fraction of total annual Nex for each livestock species that is managed for every manure management system.

Agricultural soils – N_2O

87. Croatia uses a tier 1 method to estimate N_2O emissions from agricultural soils together with IPCC default parameters, except for the fraction of synthetic fertilizer N applied to soils that volatilizes as ammonia and nitrogen oxide ($Frac_{GASF}$) (individual volatilization ratios for each N fertilizer type from the *EMEP/EEA Emission Inventory Guidebook*). The ERT considers that this approach is in line with the IPCC good practice guidance, but encourages the Party to move to the use of country-specific parameters to estimate N_2O emissions from animal manure applied to soils, atmospheric deposition and N leaching and run-off.

88. The ERT noted that in the period 2002–2009, the FAO statistical information on the amount of N synthetic fertilizers used is higher than the data used to calculate the N_2O emissions from synthetic fertilizers. In particular, for 2009, FAO states that Croatia used 173,489 t N in fertilizers, whereas the inventory states that Croatia used 108,295 t N. The ERT noted that this may indicate an underestimation of emissions for this category. In response to the list of potential problems and further questions raised by the ERT during the review, the Party responded that further consultations with relevant organizations are necessary, but that it will take time to complete those consultations. The ERT strongly recommends that the Party review the AD used to calculate the estimates of N_2O emissions from the application of synthetic fertilizers for the period 1990–2009 and justify the differences between the FAO data and the data reported in the NIR.

89. The ERT found that, in its original submission, Croatia did not include some crops in the calculation of N_2O emissions from crop residues, in particular cabbage, garlic, onion, rye, sorghum and watermelons, even though statistical information on these crops is available from the FAO database for the period 1992–2009. In response to the list of potential problems and further questions raised by the ERT during the review, the Party responded that it does not have national statistical information on these crops, but the Party submitted revised estimates on 31 October 2011, using the FAO statistical data and values of the dry matter fraction, residue/crop product ratio and N fraction from other reporting Parties, in cases where these are not available in the Revised 1996 IPCC Guidelines or the IPCC good practice guidance. The Party also informed the ERT that it plans to collect available national data on the production of these crops and to estimate the emissions in future annual submissions, in order to ensure the consistency and accuracy of the emission estimates. The revised estimates resulted in an increase in total N_2O emissions from agricultural soils for 2009 by 1.80 t C_2O eq, which is an increase of less than 0.1 per cent. The ERT recommends that the Party implement its plans to collect available national data and provide revised estimates, in accordance with the IPCC good practice guidance, in future annual submissions.

90. In response to a question raised by the ERT on the use of sewage sludge as fertilizer in agricultural soils, Croatia responded that, in accordance with the data from CEA, the Party does not use sewage sludge in agricultural soils, but that further consultations with relevant bodies will be conducted. The ERT encourages Croatia to include the response

provided to the ERT, together with additional information that may be available, in the next annual submission, in order to improve the transparency of its reporting.

E. Land use, land-use change and forestry

1. Sector overview

91. In 2009, net removals from the LULUCF sector amounted to 8,712.06 Gg CO_2 eq. Since 1990, net removals have increased by 25.7 per cent. The key driver for the rise in removals is the increase in removals from forest land remaining forest land, which have increased by 1,582.63 Gg CO_2 eq, or 22.4 per cent, since the base year. This increase occurred mostly during the period following the war in Croatia, due to the fact that forest management practices were revitalized from 1996 onwards. Over the same period, net removals from land converted to forest land increased by 133.38 Gg CO_2 eq, or around 10 times since the base year, and net emissions from land converted to settlements decreased by 62.27 Gg CO_2 eq, or 45.5 per cent, since the base year. Within the sector, net removals of 8,641.92 Gg CO_2 eq were from forest land remaining forest land, followed by net removals of 144.61 Gg CO_2 eq from land converted to forest land and net emissions of 74.52 Gg CO_2 eq from land converted to settlements. Croatia has reported the pools from all other categories using the notation keys "NE" and "NO".

92. Croatia has made recalculations for the LULUCF sector between the 2010 and 2011 submissions following the use of more disaggregated AD and EFs and in order to rectify errors identified in previous submissions. The impact of these recalculations on the LULUCF sector is a decrease in net removals of 22.6 per cent for 2008. The main recalculations took place in the following categories:

(a) Forest land remaining forest land;

(b) Land converted to settlements.

93. The ERT noted that the inventory for the LULUCF sector is not complete. Croatia has reported emissions and removals from the LULUCF sector for a limited number of categories only, namely CO_2 emissions from forest land remaining forest land, other land converted to forest land and forest land converted to settlements, and non-CO_2 emissions from wildfires on forest land. The emissions and removals from other land uses and land-use change areas are reported as "NE" or "NO". Complete land-use change matrices are not available due to the unavailability of complete land-use data. In this respect, Croatia states in the NIR that it plans to improve the completeness of the inventory and provide land-use transition matrices, but this has been identified by the Party as a long-term plan. However, the ERT noted that the Party has not provided an action plan or specific time schedule for these improvements. Therefore, the ERT reiterates the recommendations in the previous review report[15] that Croatia improve the completeness of the inventory for the LULUCF sector by providing estimates for all land-use categories and carbon pools and provide a complete land-use change matrix for all years since 1990 in line with the IPCC good practice guidance for LULUCF.

94. In addition, for the land uses that are reported, estimates are only available for the living biomass carbon pool. Although Croatia has provided information in the NIR demonstrating that the omitted pools do not result in net emissions, the ERT notes that the inventory is not complete, and also notes that the omission of estimates for dead organic matter and soil organic matter in mineral soils for forest land converted to settlements is likely to result in an underestimation of emissions, as emissions from the omitted pools are likely to occur. Therefore, the ERT recommends that Croatia estimate the carbon stock

[15] FCCC/ARR/2010/HRV, paragraphs 87 and 88.

changes and CO_2 emissions and removals for all carbon pools and categories in its next annual submission.

95. The ERT also reiterates the recommendation from the previous review report[16] that the Party review the use of the notation keys for land-use conversion categories (e.g. the conversion of land to forest land is reported as "NE" for grassland, but is reported as "NO" for cropland, wetlands and settlements), as it is not clear to the ERT whether these land-use conversions are not occurring because Croatia is not tracking the land-use change patterns throughout the time series. Similar issues related to the use of notation keys were identified for the categories land converted to cropland and grassland.

96. The ERT found that the Party's decision to include certain land-use types in each land-use category has not been transparently reported in the NIR. For example, although the land uses maquia and scrub comply with the definition of forest in Croatia, the Party has not included estimates of the carbon stock changes in these land uses and land-use conversions to and from this forest land. The ERT identified other cases where transparency has not been fully assured: the sources for the data in NIR tables 7.2-3, 7.2-6 and 7.3-2 and information on the growing stock for forest land converted to settlements were not provided in the NIR but were provided to the ERT during the review, although expert judgement was used to establish the conifer forest areas under land converted to forest land. Further, no information has been provided on the assumptions based on expert judgement that were used for the uncertainty assessment. Therefore, the ERT recommends that Croatia improve the transparency of its reporting on the LULUCF sector, in particular with regard to the issues identified above, in the next annual submission.

2. Key categories

Forest land remaining forest land – CO_2

97. This category was responsible for net removals of 8,641.96 Gg CO_2 eq in 2009, which have increased by 22.4 per cent since 1990 (7,059.33 Gg CO_2 eq). Croatia has used a tier 2 method to estimate the carbon stock changes in living biomass for high forests, cultures, plantations and coppices under this category, but the carbon stock changes in other forest types, such as maquia and scrub, have not been estimated. In addition, the carbon stock changes in dead organic matter and soils have been reported as "NE" for this category. Therefore, the ERT concludes that the LULUCF inventory is incomplete and reiterates the recommendation in previous review reports[17] that the Party report all carbon pools for forest land remaining forest land.

98. Country-specific data on the area and average annual increment were derived from the Forest Management Action Plan (FMAP) prepared by Croatian Forests Ltd (CF), which are disaggregated into land ownerships and forest types (broadleaf and conifer). For the preparation of FMAP, the forest area was determined based on cadastral maps on various scales together with aerial photography (scale 1:5,000), satellite images (scale 1:1,000,000) and the CORINE land cover project data. The ERT notes that the use of cadastral information may not be appropriate when determining the threshold of forest. The ERT noted, from the NIR, that the Croatian National Forest Inventory System (CRONFI) is still under consideration and not yet available for use in the GHG inventory: once the CRONFI data become official and are published, they could be used to report on all forests, regardless of ownership and protected status. The ERT recommends that Croatia advance its consideration of the CRONFI data so as to improve the completeness of the LULUCF inventory in its next annual submission.

[16] FCCC/ARR/2010/HRV, paragraph 89.
[17] FCCC/ARR/2010/HRV, paragraph 95.

99. All the EFs and parameters used by the Party are taken from the IPCC good practice guidance for LULUCF. The ERT recommends that Croatia make efforts to collect and use country-specific data to improve the accuracy of the LULUCF inventory in its next annual submission.

Land converted to forest land – CO_2

100. Net removals from land converted to forest land amounted to 144.61 Gg CO_2 eq in 2009 and have increased from 11.03 Gg CO_2 eq in 1990. The ERT noted that the inventory for this category is incomplete, since Croatia has provided estimates of the carbon stock changes and CO_2 emissions for the pool living biomass for the subcategory other land converted to forest land only: other land is defined as "forest land without tree cover". All other land-use conversions to forest land have been reported as "NO" or "NE". In addition, the carbon stock changes in land converted to other state forests and land converted to maquia and scrub forests, as well as the carbon stock changes in dead organic matter and soils, have not been estimated. The ERT recommends that the Party enhance the completeness of the LULUCF inventory by providing estimates for all pools and for land-use conversions to forest land, as appropriate, and also consider land conversions to all types of land classified as forest, including those defined as maquia, scrub or state forests, for the next annual submission.

101. The Party distinguishes forest land remaining forest land from other land converted to forest land using information in the FMAP database for the periods 1986–1995, 1996–2005 and 2006–2015. The Party used an IPCC tier 1 method and default parameters from the IPCC good practice guidance for LULUCF to estimate the carbon stock changes in living biomass. In its estimates, Croatia has assumed that the destination of the land-use conversion is conifer forest only, although no clear justification is provided for that assumption, and the parameters were selected for this forest type only. The ERT recommends that the Party develop a higher-tier method and country-specific parameters in its next annual submission. The ERT also recommends that Croatia collect data to improve the characterization of the types of forest that are the end use of the land-use conversion.

3. Non-key categories

Land converted to settlements – CO_2

102. Croatia only reported the carbon stock changes and net CO_2 emissions for the pool living biomass and only for forest land, which includes state forests, converted to settlements. The carbon stock changes due to land-use conversions to settlements from other state forests and private forests, and from maquia and scrub forests were not included in the inventory. The ERT considers, therefore, that the inventory for the LULUCF sector is incomplete and recommends that the Party enhance the completeness of its reporting by collecting data on the land-use conversions to settlements and estimate the corresponding emissions and removals in its next annual submission.

103. Croatia used a tier 1 method and default parameters from the IPCC good practice guidance for LULUCF to estimate the carbon stock changes in living biomass. The ERT recommends that the Party apply a higher-tier method and develop country-specific parameters to estimate these emissions and report the carbon stock changes in all carbon pools for all types of forest land converted to settlements in its next annual submission.

F. Waste

1. Sector overview

104. In 2009, emissions from the waste sector amounted to 996.44 Gg CO_2 eq, or 3.5 per cent of total GHG emissions. Since the base year, emissions have increased by 62.9 per cent. The key driver for the rise in emissions is the increase in emissions from solid waste disposal on land (emissions from solid waste disposal on land have increased by 475.52 Gg CO_2 eq, or 196.0 per cent, since the base year). Conversely, emissions from wastewater handling have decreased by 90.79 Gg CO_2 eq, or 24.6 per cent, since the base year, and emissions from waste incineration have remained almost stable. Within the sector, 72.1 per cent of the emissions were from solid waste disposal on land, followed by 27.9 per cent from wastewater handling and 0.01 per cent from waste incineration.

105. Croatia has made recalculations for the waste sector between the 2010 and 2011 submissions following changes in AD. The impact of these recalculations on the waste sector is an increase in emissions of 3.6 per cent for the base year and an increase in emissions of 0.3 per cent for 2008. The main recalculations took place in the following categories:

(a) Solid waste disposal on land, as result of the revision of the historical time series back to 1955;

(b) N_2O emissions from wastewater handling (human sewage), as a result of new data on protein intake available in the statistical database of FAO (FAOSTAT) for the period 1992–2007, which was performed in response to the recommendations of the previous review report.[18]

106. The inventory for the waste sector is generally complete and includes estimates for all gases and categories for which there are methodologies available in the Revised 1996 IPCC Guidelines and the IPCC good practice guidance. However, Croatia has reported the following categories as "NE" for which there are no methodologies available in the Revised 1996 IPCC Guidelines or the IPCC good practice guidance: CO_2 emissions from managed waste disposal on land; N_2O emissions from industrial wastewater; CO_2 emissions from the incineration of sewage sludge; and CH_4 and N_2O emissions from waste incineration for several categories of non-biogenic waste. The ERT encourages Croatia to estimate N_2O emissions from industrial wastewater in order to improve the completeness of the inventory for the waste sector in future annual submissions.

2. Key categories

Solid waste disposal on land – CH_4

107. Croatia uses an IPCC tier 2 methodology, or first-order decay (FOD) method, to estimate CH_4 emissions from solid waste disposal on land, using country-specific AD and a combination of country-specific EFs and IPCC default values. The ERT encourages the Party to conduct research in order to develop country-specific parameters for the FOD method to increase the accuracy of the emission estimates for this key category.

108. In the NIR, Croatia explains that the estimates of the total amount of municipal solid waste (MSW) generated and disposed in the historical period from 1955 to 1990 are based on country-specific waste generation rates: 0.34 kg/capita/day in 1955, 0.39 kg/capita/day in 1960, 0.46 kg/capita/day in 1970 and 0.55 kg/capita/day in 1980. These waste generation rates are based on expert judgement, but details of the expert judgement used are not included in the NIR. Therefore, the ERT recommends that Croatia improve the reporting of

[18] FCCC/ARR/2010/HRV, paragraph 99.

the assumptions based on expert judgement that were used to calculate the estimates in its next annual submission.

109. Croatia has reported in the NIR that it uses country-specific values for degradable organic carbon for MSW using the default carbon content from the Revised 1996 IPCC Guidelines for the fractions of waste. The composition of MSW in terms of paper, textiles, garden waste, and food waste has been used for the calculation of the estimates, but the ERT found that information has not been provided in the NIR. The ERT recommends that Croatia enhance the explanation of how these country-specific values are calculated in its next annual submission, in order to improve the transparency of its reporting.

Wastewater handling – CH_4

110. The ERT noted that CH_4 emissions from sludge from industrial wastewater and from domestic and commercial wastewater were reported as "NE" because data are not available in the required form. The ERT encourages Croatia to include emission estimates for sludge in order to improve the completeness of the inventory for the waste sector, or verify that these are not included in the estimates calculated for the wastewater fraction, in its next annual submission.

3. Non-key categories

Waste incineration – CO_2, CH_4 and N_2O

111. Croatia has reported the following emissions as "NE": CO_2 emissions from the incineration of sewage sludge; and CH_4 and N_2O emissions from the incineration of all other (non-biogenic) waste due to the absence of methodologies and AD (the categorization of waste and the technology used for the incineration of waste are not available). The ERT encourages Croatia to collect the necessary information and provide estimates in its next annual submission, in order to improve the completeness of the inventory.

G. Adjustments

112. The ERT identified underestimations in the emission estimates and recommended an adjustment in the energy sector for 2009. In accordance with the "Technical guidance on methodologies for adjustments under Article 5, paragraph 2, of the Kyoto Protocol" (hereinafter referred to as the guidance for adjustments under Article 5, paragraph 2, of the Kyoto Protocol) (decision 20/CMP.1), the adjustment to the energy sector was prepared by the ERT in consultation with Croatia. In addition, in accordance with the Article 8 review guidelines, the ERT officially notified Croatia of the calculated adjustment.

113. The underestimation leading to an adjustment in the energy sector for 2009 includes the category road transportation.

114. The adjusted estimate for GHG emissions from the energy sector for 2009 amounts to 21,575.40 Gg CO_2 eq, compared with 21,461.67 Gg CO_2 eq as originally reported by Croatia in its 2011 annual submission of 31 October 2011. The calculation of the adjustment leads to an increase in estimated total GHG emissions from Annex A sources by 0.4 per cent (113.72 Gg CO_2 eq) for 2009, from 28,867.28 Gg CO_2 eq as originally reported by Croatia to 28,981.01 Gg CO_2 eq as calculated by the ERT.

115. The ERT notes that Croatia may submit a revised estimate for the part of its inventory to which an adjustment was applied, in conjunction with its next inventory, or at the latest with the inventory for the year 2012. The revised estimate will be part of the review under Article 8 and, if accepted by the ERT, the revised estimate will replace the adjustment.

1. Road transportation – CO_2

The original estimate

116. In its 2011 submission, Croatia provided an estimate for CO_2 emissions from gasoline used in road transportation of 2,106.96 Gg CO_2 eq. To estimate its emissions, Croatia used the COPERT IV model software, version 7.1, resulting in an IEF of 69.94 kg/TJ. The fuel consumption, used as AD, is the same as the values in the energy balance.

The underlying problem

117. The ERT noted that Croatia reported a CO_2 IEF for gasoline used in road transportation with a decreasing trend: the 2009 value (69.94 t/TJ) is 2.0 per cent lower than the 1990 value (71.39 t/TJ). In addition, the decrease in the value of the IEF in a single year, between 2007 and 2008, was 0.8 per cent. The 2009 CO_2 IEF (69.94 t/TJ) is 4.2 per cent lower than the IPCC default value (73.00 t/TJ). The ERT could not find transparent information in the NIR justifying this trend and included this issue in its list of potential problems and further questions.

The recommendation to the Party

118. During the review week, the ERT recommended that Croatia revise its CO_2 emission estimates using appropriate country-specific CO_2 EFs for gasoline or, if these are not available, a constant IPCC default CO_2 EF. Otherwise, the ERT requested that Croatia provide the ERT with explicit information on the CO_2 EFs used for gasoline in road transportation, demonstrating that these are in accordance with the Revised 1996 IPCC Guidelines and the IPCC good practice guidance.

The rationale for adjustment

119. In response to the list of potential problems and further questions raised by the ERT during the review, Croatia informed the ERT that two different types of gasoline are used in the country (leaded and unleaded), and that the Party made the assumption that older vehicles (PRE ECE vehicles) use leaded gasoline, while recent technology vehicles (EURO standard vehicles) use unleaded gasoline. The two different types of gasoline have different specifications (e.g. the O:C ratio is 0 for leaded gasoline and 0.016 for unleaded gasoline), thereby resulting in a different CO_2 EF (71.39 t/TJ for leaded gasoline and 70.09 t/TJ for unleaded gasoline).

120. The ERT noted, however, that for the period 2007–2009 only unleaded gasoline used in road transportation is reported in the energy balance (table A3-3 in the 2009, 2010 and 2011 NIRs). The ERT also noted that the CO_2 EF usually depends only on the type of fuel combusted, and that there are no a priori reasons that it could depend on the technology of the vehicle. Therefore, if the gasoline combusted in the vehicles is the same, it is expected that PRE ECE, ECE and EURO vehicles have the same gasoline CO_2 EF. Finally, the ERT noted that the CO_2 EFs for both types of gasoline are higher than the CO_2 IEF reported for 2009.

121. The ERT concluded that the information provided by Croatia is not sufficiently transparent to ensure that the inventory of CO_2 emissions from gasoline used in road transportation are not underestimated, and recommended the calculation of an adjustment.

122. The ERT noted that, in accordance with paragraph 19 of the annex to decision 20/CMP.1, an adjustment procedure should be initiated if the information provided by the Party is not sufficiently transparent.

The assumptions, data and methodology used to calculate the adjustment

123. In accordance with the guidance for adjustments under Article 5, paragraph 2, of the Kyoto Protocol (decision 20/CMP.1), the ERT should calculate the adjustment at the level at which the problem was identified. In the case of Croatia, the problem was identified in relation to the CO_2 EF used to estimate emissions from consumption of gasoline used in road transportation.

124. In accordance with the guidance for adjustments under Article 5, paragraph 2, of the Kyoto Protocol (decision 20/CMP.1), the ERT calculated the adjustment using the IPCC tier 1 method from the IPCC good practice guidance. The calculation of the emissions estimate for the adjustment exercise was performed using the IPCC default EFs from the Revised 1996 IPCC Guidelines for CO_2 (73 t CO_2/TJ for gasoline) and the AD reported in CRF table 1.A(a) (2,106.96 TJ).

The adjusted estimate

125. Table 4 show the steps for the calculation of the adjustment.

Table 4
Description of the adjustment calculation for Annex A sources

Parameter/Estimate	*Value*	*Unit*	*Source*
Category: road transportation – gasoline – CO_2			
Party's estimate of the EF for CO2 emissions from gasoline used in road transportation	69.94	kg/TJ	CRF table 1.A(a)
Party's estimate of CO2 emissions from gasoline used in road transportation	2 106.96	Gg CO_2	CRF table 1.A(a)
Input parameter for the calculation of the adjustment: CO2 EF	73.00	kg/TJ	IPCC default EF from the Revised 1996 IPCC Guidelines, table I-36
Input parameter for the calculation of the adjustment: oxidation factor	0.99	ratio	IPCC default EF from the Revised 1996 IPCC Guidelines, table I-6
Input data – gasoline consumption in road transportation	30 125.12	TJ	CRF table 1.A(a)
Calculated estimate for CO2 emissions from gasoline used in road transportation	2 177.14	Gg CO_2 eq	Calculated by the ERT
Conservativeness factor	1.02		Table 2 of appendix III to decision 20/CMP.1
Adjusted conservative estimate for CO2 emissions from gasoline used in road transportation	2 220.69	Gg CO_2 eq	Calculated by the ERT

Total aggregated GHG emissions (excluding LULUCF) as reported by the Party	28 867.28	Gg CO_2 eq	CRF table 10, submission of 31 October 2011 (v2.1)
Total aggregated GHG emissions (excluding LULUCF) after application of the adjustment	28 981.01	Gg CO_2 eq	Calculated by the ERT
Difference between the original and adjusted total aggregated GHG emissions	113.72	Gg CO_2 eq	Calculated by the ERT
	0.4	%	Calculated by the ERT

Abbreviations: CRF = common reporting format, EF = emission factor, ERT = expert review team, GHG = greenhouse gas, IPCC = Intergovernmental Panel on Climate Change, LULUCF = land use, land-use change and forestry, Revised 1996 IPCC Guidelines = *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories.*

Conservativeness of the expert review team's calculation of the adjustment

126. In line with paragraph 5 of decision 20/CMP.1, conservativeness was ensured by applying a conservativeness factor of 1.02 (the EF for transport) from table 2 of appendix III to the guidance for adjustments under Article 5, paragraph 2, of the Kyoto Protocol (decision 20/CMP.1). The ERT therefore considers that the resulting adjusted values are conservative.

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

127. Croatia has accounted for mandatory activities under Article 3, paragraph 3, of the Kyoto Protocol (afforestation and reforestation, and deforestation). The Party has also elected to account for forest management under Article 3, paragraph 4, of the Kyoto Protocol, and has chosen to account for all activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol at the end of the commitment period.

128. Croatia has provided in the NIR complete information on the mandatory requirements outlined in paragraphs 5–9 of the annex to decision 15/CMP.1, except for paragraphs 6(b) and 6(e) of the annex to decision 15/CMP.1 and paragraph 20 of the annex to decision 16/CMP.1. In its 2011 submission, Croatia did not present complete land-use change matrices due to the fact that the corresponding data were not available, which has prevented Croatia from estimating the emissions and removals from cropland, grassland and wetlands, and for a part of forest land and settlements (land converted to and from maquia and scrub forests, and land-use conversions to settlements from other state forests and private forests). This has had consequences on the reporting of afforestation and reforestation activities under Article 3, paragraph 3, since the Party was unable to identify units of land converted to and from these forest types. In its list of potential problems and further questions, the ERT requested that Croatia provide information on its plans to develop a complete land-use change matrix. The Party has also not provided complete information to demonstrate that some of the pools that were not accounted for (e.g. litter, dead wood and soils) in deforested areas are not net sources.

129. In response to the list of potential problems and further questions raised by the ERT during the review, Croatia provided information on the actions included in the inventory improvement plan to compile land-use transition matrices that are sufficient to report on KP-LULUCF activities, including information on the responsible institutions and a time schedule for the implementation of the improvements, with the final report, which is due by March 2012, and will be available to prepare the LULUCF inventory for the next annual submission. The ERT strongly recommends that the Party implement its actions as planned in time for the next annual submission, and report on the improvements in the next annual submission. In its response to the ERT, Croatia provided additional information on how afforestation activities are identified (i.e. based on projects by owners and within FMAPs) and how deforestation is distinguished from harvesting or forest disturbances. The ERT recommends that Croatia include this information in the NIR of its next annual submission.

130. The methods, AD and EFs used to estimate GHG emissions and removals from the KP-LULUCF activities are the same as those used to report the emissions and removals from the LULUCF sector, and the ERT reiterates all relevant recommendations made for that sector (see paras. 94–103 above).

131. In particular, the ERT notes that estimates of emissions and removals from KP-LULUCF activities do not cover all pools: living biomass in above-ground biomass is the only carbon pool estimated, and only for state forests. Croatia has included some explanations in the NIR justifying that the omitted pools are not net sources, but the ERT considers that the reasons for omitting litter in afforestation/reforestation areas, and litter, dead wood and soils in deforestation areas are not well justified. The ERT also considers that the omission of estimates for the litter, dead wood and soils pools could lead to the underestimation of emissions from deforestation and that the Party is not providing the necessary information required by paragraph 6(e) of decision 15/CMP.1. The ERT strongly recommends that Croatia estimate the carbon stock changes in all carbon pools for which verifiable information is not presented, showing that these pools are not a net source of GHG emissions, in its next annual submission.

132. The NIR includes an analysis of the uncertainties for the removals and emissions, and for the AD and EFs for KP-LULUCF activities, but the ERT notes that the level of uncertainty was not quantitatively reported. The ERT encourages Croatia to develop a quantitative uncertainty analysis for its next annual submission.

133. The Party has made recalculations for KP-LULUCF activities between the 2010 and 2011 submissions following changes in AD and EFs and in order to rectify identified errors. The impact of these recalculations on each KP-LULUCF activity for 2008 is as follows:

(a) Afforestation and reforestation: the correction of identified errors, resulting in a decrease in CO_2 of net removals of 72.7 per cent;

(b) Deforestation: changes in EFs and the correction of identified errors, resulting in a decrease in net CO_2 emissions of 74.4 per cent;

(c) Forest management: the correction of identified errors, and the use of new spatial disaggregation and more detailed AD, thereby enabling a more reliable methodological approach, resulting in a decrease in net removals of 78.8 per cent.

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

Afforestation and reforestation – CO_2

134. The ERT noted from the inventory data that the estimates for this activity are not complete, for example: estimates of the carbon stock changes in the above-ground biomass pool were only partially estimated (losses were reported as “NE” for private forests and as

"NO" for state forests managed by CF); the carbon stock changes in below-ground biomass were only partially estimated and the losses in private forests and gains in state forests (CF) were reported as "NE"; the AD and emissions for the third type of forest available in the country, state forests (managed by other legal bodies), were reported as "NE" for all pools and the area was also reported as "NE"; and Croatia reported all other pools (litter, dead wood and soils) as "NE". The justification for this assumption is that the nature of forest management practices, as well as the legal framework, do not allow these pools to be net sources. In line with the conclusions in the previous review report,[19] the ERT considers this explanation to be insufficient. In addition, during the review week, the Party reported the carbon stock changes for afforestation and reforestation activities on land converted to other state forests and land converted to maquia and scrub forests as "NE". The ERT recommends that the Party improve the completeness of the estimates of removals and emissions for areas subject to afforestation and reforestation and report the carbon stock changes for all areas in its next annual submission. The ERT also recommends that Croatia include estimates for all pools for which verifiable information is not presented, demonstrating that these pools are not a net source of GHG emissions.

Deforestation – CO_2

135. The ERT also concluded from the inventory data that, from the three types of forest reported (private, state (CF) and state (other)), estimates of the carbon stock changes are only available for state forests (CF): values are reported only for gains and losses in above-ground biomass, while gains and losses in below-ground biomass are reported as "NO". All other pools and forest types are reported as "NE".

136. In addition, the carbon stock changes in and CO_2 emissions from deforested land (e.g. to settlements) from other state forests and private forests, and from maquia and scrub forests, were not included in the estimates, which may indicate that the estimates for KP-LULUCF activities are underestimated. Therefore, the ERT recommends that the Party improve the inventory of removals and emissions for areas subject to deforestation and estimate the carbon stock changes for all deforested areas in its next annual submission. The ERT also recommends that Croatia include estimates for all pools for which verifiable information is not presented, demonstrating that these pools are not a net source of GHG emissions.

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

Forest management – CO_2

137. Croatia has reported the carbon stock changes in the above-ground and below-ground biomass pools, and has reported all other pools as "NE"; justification for doing so has been provided in the NIR. The ERT noted that the carbon stock change balance has not been completed: estimates of gains in one forest type ("FD Split"), covering 74.96 kha, are reported as "NE", and losses in "state forest (other)", covering 63.48 ka,[20] are also reported as "NE". In addition, during the review week, the ERT noted that the carbon stock changes in other forest types (i.e. maquia and scrub), were not considered in the estimates calculated by Croatia for forest management. Therefore, the ERT recommends that the Party provide estimates for the carbon stock changes in all managed forest types in its next annual submission.

[19] FCCC/ARR/2010/HRV, paragraph 134.

[20] The total area under forest management in 2009 amounts to 1,891.62 kha.

2. Information on Kyoto Protocol units

Standard electronic format and reports from the national registry

138. Croatia has reported information on its accounting of Kyoto Protocol units in the required SEF tables, as required by decisions 15/CMP.1 and 14/CMP.1. The ERT took note of the findings included in the SIAR on the SEF tables and the SEF comparison report.[21] 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.

139. Information on the accounting of Kyoto Protocol units has been prepared and reported in accordance with chapter I.E of the annex to decision 15/CMP.1, and reported in accordance with decision 14/CMP.1 using the SEF tables. This information is consistent with that contained in the national registry and with the records of the international transaction log (ITL) and the clean development mechanism registry and meets the requirements set out in paragraph 88(a–j) of the annex to decision 22/CMP.1. The transactions of Kyoto Protocol units initiated by the national registry are in accordance with the requirements of the annex to decision 5/CMP.1 and the annex to decision 13/CMP.1. No discrepancy has been identified by the ITL and no non-replacement has occurred. The national registry has adequate procedures in place to minimize discrepancies. The ERT noted that Croatia has not reported information on its accounting of Kyoto Protocol units in the SEF tables, since it has not yet transferred or acquired any Kyoto Protocol units, which is in accordance with paragraph 3 of the annex to decision 14/CMP.1.

140. The ERT notes that the Party has addressed the recommendations from the previous review report[22] on changes to the national registry and on information related to the Network Time Protocol (NTP).

National registry

141. The ERT took note of the SIAR and its finding that the reported information on the national registry is complete and has been submitted in accordance with the annex to decision 15/CMP.1. The ERT further noted from the SIAR and its finding that the national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with decisions 16/CP.10 and 12/CMP.1. The national registry also has adequate security, data safeguard and disaster recovery measures in place and its operational performance is adequate. However, the SIAR identified the following problem: the national registry has not fulfilled all of the requirements regarding the public availability of information in accordance with section II.E of the annex to decision 13/CMP.1. Therefore, the ERT recommends that Croatia make the required information publicly available, at least when the national registry has transferred or acquired Kyoto Protocol units.

142. The ERT notes that Croatia has taken actions to implement the recommendations from the previous review report[23] regarding the reporting of changes to the national registry and the reporting of more complete and detailed information on NTP.

[21] 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.

[22] FCCC/ARR/2010/HRV, paragraph 145.

[23] FCCC/ARR/2009/HRV, paragraphs 85 and 88, and FCCC/ARR/2010/HRV, paragraphs 147 and 149.

Calculation of the commitment period reserve

143. Croatia has reported its commitment period reserve in its 2011 annual submission. The Party reported its commitment period reserve to be 144,327,427 t CO_2 eq based on the national emissions in its most recently reviewed inventory (28,865,485.43 Gg CO_2 eq). The ERT disagrees with this figure. In a letter to the secretariat dated 21 December 2011, Croatia confirmed its acceptance of the value of its initial assigned amount, as determined by the ERT that reviewed Croatia's initial report.[24]

144. Therefore, the ERT noted that the commitment period reserve should be calculated in accordance with paragraphs 6 and 8 of the annex to decision 11/CMP.1, and should be based on the lowest value between 90 per cent of the initial assigned amount (133,900,653 t CO_2) or 100 per cent of five times the emissions in its most recently reviewed inventory. The commitment period reserve, based on the submission of revised emission estimates on 31 October 2011, including adjustments was calculated by the ERT to be 144,905,027 t CO_2. The ERT concluded that the Party's commitment period reserve is 133,900,653 t CO_2 eq as this is the lowest of the two values.

3. Changes to the national system

145. Croatia reported that there have been no changes to its national system since the previous annual submission. The ERT concluded that the Party's national system continues to be in accordance with the requirements of national systems outlined in decision 19/CMP.1.

4. Changes to the national registry

146. Croatia reported that there have been no changes to its national registry since the previous annual submission, except that the Party provided more information on projects under Article 6 of the Kyoto Protocol in relation to paragraph 46 of the annex to decision 13/CMP.1. The ERT concluded that the Party's national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant decisions of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP).

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

147. Croatia did not provide information on changes in its reporting of the minimization of adverse impacts in accordance with Article 3, paragraph 14, in its annual submission. However, the ERT noted that the text on this matter in the NIR is unchanged from the previous annual submission.

148. The reported information is generally complete and transparent and includes information on policy elements for the mitigation of climate change in order to fulfil the Party's commitments under Article 3, paragraph 1, of the Kyoto Protocol, and information on the 33 measures included in the Air Quality Protection and Improvement Plan of the Republic of Croatia. The ERT reiterates its encouragement from the previous review report that the Party improve the completeness and transparency of its inventory by reporting on how it gives priority, in implementing its commitments under Article 3, paragraph 14, to the actions listed in paragraph 24 of the annex to decision 15/CMP.1.

[24] FCCC/IRR/2008/HRV, paragraph 3.

III. Conclusions and recommendations

149. Croatia made its annual submission on 14 April 2011. The annual submission contains the GHG inventory (comprising CRF tables and an NIR) and supplementary information under Article 7, paragraph 1, of the Kyoto Protocol (information on: activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, Kyoto Protocol units, and changes to the national system and the national registry and the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol). This is in line with decision 15/CMP.1.

150. The ERT concludes that the inventory submission of Croatia has been prepared and reported in accordance with the UNFCCC reporting guidelines. The inventory submission is complete and the Party has submitted a complete set of CRF tables for the years 1990–2009 and an NIR; these are complete in terms of geographical coverage, years and sectors, as well as complete in terms of categories and gases. However, the LULUCF sector is incomplete, since the carbon stock changes have been reported for forest land and for forest land converted to settlements only.

151. The submission of information required under Article 7, paragraph 1, of the Kyoto Protocol has been prepared and reported in accordance with decision 15/CMP.1.

152. The Party's inventory is generally in line with the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF. However, the time-series consistency of the EFs for CH_4 emissions from enteric fermentation (sheep and swine) and for CH_4 emissions from manure management (sheep, goats, horses, mules and asses, and poultry) was not ensured in accordance with the IPCC good practice guidance, and the Party did not provide complete land-use change matrices.

153. The Party has made recalculations for the inventory between the 2010 and 2011 submissions in response to the 2010 annual review report, in order to lift applied adjustments, following changes in AD and EFs, and in order to rectify identified errors. The impact of these recalculations on the national total GHG emissions is a decrease in emissions of 0.6 per cent for 2008. The main recalculations took place in the following categories:

(a) Manufacturing industries and construction;

(b) Fugitive emissions from oil and natural gas;

(c) Chemical industry;

(d) Enteric fermentation.

154. Croatia reported emissions and removals related to activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol for 2008 and 2009, but the ERT concluded that the Party did not provide complete information with respect to the requirements outlined in paragraphs 5–9 of the annex to decision 15/CMP.1. In particular, Croatia did not provide complete information in relation to paragraph 6(d) of the annex to decision 15/CMP.1, and did not provide complete information with regard to paragraph 20 of the annex to decision 16/CMP.1. The Party was unable to completely identify all units of land that should be listed under Article 3, paragraphs 3 and 4, of the Kyoto Protocol due to a lack of information on some forest types (e.g. maquia and scrub and "state forest (other)"). In addition, Croatia reported the litter, dead wood and soils pools for all KP-LULUCF activities as "NE", which could lead to a potential underestimation of emissions from deforestation, at the least, and the Party did not provide complete information showing that these pools were not net sources. Therefore, Croatia's reporting of KP-LULUCF activities

does not meet the requirements set out in paragraph 6(e) of the annex to decision 15/CMP.1.

155. The Party has made recalculations for the KP-LULUCF activities between the 2010 and 2011 submissions following changes in AD and EFs, and in order to rectify identified errors. The impact of these recalculations on each KP-LULUCF activity for 2008 is as follows.

(a) Afforestation and reforestation: the correction of identified errors, resulting in a decrease in CO_2 removals of 72.7 per cent;

(b) Deforestation: changes in EFs and the correction of identified errors, resulting in a decrease in CO_2 emissions of 74.4 per cent;

(c) Forest management: the correction of identified errors, and the use of new spatial disaggregation and more detailed AD, resulting in a decrease in net GHG removals of 78.8 per cent.

156. Croatia 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.

157. The national system continues to perform its required functions as set out in the annex to decision 19/CMP.1.

158. 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.

159. Croatia has reported information under chapter I.H of the annex to decision 15/CMP.1, "Minimization of adverse impacts in accordance with Article 3, paragraph 14" as part of its 2011 annual submission. The information was provided on 15 April 2011. The reported information is unchanged from the previous submission and is transparent and generally complete (see para. 0 above).

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

(a) Enhance the transparency of reporting with regard to issues such as: the provision of additional information supporting the uncertainty values, in particular when these are based on expert judgement, as well as information on the QA/QC procedures, the follow-up to previous reviews and planned improvements, and the methodologies and assumptions used for the energy sector (e.g. the parameters used for the COPERT IV model), the industrial processes sector (e.g. limestone and dolomite use and iron and steel production), the agriculture sector (e.g. information on cattle types and parameters and the explanation of trends), the LULUCF sector (e.g. the decision to include or exclude certain land-use types in each land-use category) and the waste sector (e.g. information on the expert judgement used for the time series and parameters);

(b) Increase the transparency of reporting on planned inventory improvements and on how the Party has addressed the recommendations from previous review reports;

(c) Provide information on how the results of the key category analysis and the uncertainty analysis are taken into account in the prioritization of inventory improvements;

(d) Further enhance the QA/QC system and include more detailed information on the QA/QC procedures in the NIR;

(e) Give priority to the implementation of the plan to prepare land-use transition matrices and to obtain complete estimates for all KP-LULUCF categories and pools, which is scheduled for 2014, and report annually on the implementation of this plan;

(f) Fulfil all requirements outlined in paragraphs 5–9 of the annex to decision 15/CMP.1, in particular for paragraphs 6(b) and 6(e) of the annex to decision 15/CMP.1 and paragraph 20 of the annex to decision 16/CMP.1.

161. In the course of the review, the ERT formulated a number of recommendations relating to the completeness and transparency of the annual submission, and the information on KP-LULUCF activities presented in Croatia's annual submission. The key recommendations are that Croatia:

(a) Revise its estimates of CO_2 emissions from consumption of diesel oil and gasoline used in road transportation (see paras. 57 and 58 above) and N_2O emissions from road transportation (see para. 56 above);

(b) Ensure the consistency of the time series for the industrial processes sector (see para. 69 above) and the agriculture sector (see para. 77 above);

(c) Estimate and report SF_6 emissions used in GIS applications and high-voltage circuit-breakers for the whole time series (see para. 0 above);

(d) Verify and explain any differences between livestock numbers and estimates of the use of N synthetic fertilizers provided in the inventory with those included in FAOSTAT;

(e) Enhance the completeness of the inventory for the LULUCF sector by providing estimates for all land-use categories and carbon pools, and provide a complete land-use change matrix for all years since 1990 and use higher-tier methods to estimate the emissions and removals from the LULUCF sector;

(f) Report the estimates of emissions and removals from all missing pools under KP-LULUCF activities which are currently reported as "NE" and for which verifiable information is not provided in the NIR, demonstrating that these pools are not a net source of GHG emissions, in particular for deforestation.

IV. Adjustments

162. The ERT concludes, based on the review of the 2009 inventory, that for the category CO_2 emissions from gasoline used in road transportation, the EFs used are not fully 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 the Party submit revised estimates or provide further justifications for its calculations for the identified category as a way of resolving the identified potential problem. The ERT, following the review of the additional information provided by Croatia during and after the review, concluded that the Party did not satisfactorily correct the problem through the submission of acceptable revised estimates and decided to calculate and recommend one adjustment in accordance with the guidance for adjustments under Article 5, paragraph 2, of the Kyoto Protocol (decision 20/CMP.1). Croatia failed to notify the secretariat of its intention to accept or reject the calculated adjustment. In accordance with the Article 8 review guidelines, this failure was considered as acceptance by Croatia of the adjustment, and the ERT applied the calculated adjustment.

163. The application of the calculated adjustment resulted in a change in the estimate of the 2009 emissions from the category CO_2 emissions from gasoline used in road transportation – from 2,106.96 Gg CO_2 eq, as originally reported by the Party, to

2,220.69 Gg CO_2 eq, or an increase of 5.4 per cent. This in turn resulted in a change in the estimated total GHG emissions of Croatia for 2009 – from 28,867.28 Gg CO_2 eq, as originally reported by the Party, to 28,981.01 Gg CO_2 eq, or an increase of 0.4 per cent.

V. Questions of implementation

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

Annex I

Documents and information used during the review

A. Reference documents

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

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

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

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

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

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

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

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

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

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

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

FCCC/ARR/2010/HRV. Report of the individual review of the greenhouse gas inventory of Croatia submitted in 2010. Available at <http://unfccc.int/resource/docs/2011/arr/hrv.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>.

B. Additional information provided by the Party

Responses to questions during the review were received from Mr. Davor Vesligaj (Energy and Environmental Protection Institute (Ekonerg)), including additional material on the methodologies and assumptions used.

Annex II

Acronyms and abbreviations

AD	activity data
CH_4	methane
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
CRF	common reporting format
EF	emission factor
ERT	expert review team
FAO	Food and Agriculture Organization of the United Nations
F-gas	fluorinated gas
FOD	first-order decay
GHG	greenhouse gas; unless indicated otherwise, GHG emissions are the sum of CO_2, CH_4, N_2O, HFCs, PFCs and SF_6 without GHG emissions and removals from LULUCF
HFCs	hydrofluorocarbons
IE	included elsewhere
IEA	International Energy Agency
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
ITL	international transaction log
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
kg	kilogram (1 kg = 1,000 grams)
LULUCF	land use, land-use change and forestry
MSW	municipal solid waste
Mt	million tonnes
N	nitrogen
NA	not applicable
NE	not estimated
Nex	nitrogen excretion ratio
NO	not occurring
N_2O	nitrous oxide
NIR	national inventory report
PFCs	perfluorocarbons
QA/QC	quality assurance/quality control
SEF	standard electronic format
SF_6	sulphur hexafluoride
SIAR	standard independent assessment report
TJ	terajoule (1 TJ = 10^{12} joule)
UNFCCC	United Nations Framework Convention on Climate Change