



**Report on the individual review of the annual submission of Croatia
submitted in 2014**

Note by the secretariat

The report on the individual review of the annual submission of Croatia submitted in 2014 was published on 15 June 2015. 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 decisions 4/CMP.4 and 8/CMP.9), the report is considered received by the secretariat on the same date. This report, FCCC/ARR/2014/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.



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Croatia submitted in 2014***

* In the symbol for this document, 2014 refers to the year in which the inventory was submitted, and not to the year of publication.

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I. Introduction and summary

1. This report covers the review of the 2014 annual submission of Croatia, coordinated by the UNFCCC secretariat, 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). The review took place from 22 to 27 September 2014 in Bonn, Germany, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalists – Mr. Riccardo de Laetis (Italy) and Mr. Simon Eggleston (United Kingdom of Great Britain and Northern Ireland); energy – Mr. Kennedy Amankwa (Ghana), Ms. Emilia Hanley (Ireland), Mr. Michael Smith (New Zealand) and Mr. Hongwei Yang (China); industrial processes and solvent and other product use – Mr. Samir Tantawi (Egypt) and Mr. David Thistlethwaite (United Kingdom); agriculture – Ms. Savitri Garivait (Thailand) and Mr. Steen Gyldenkærne (Denmark); land use, land-use change and forestry (LULUCF) – Ms. Andrea Brandon (New Zealand), Mr. Nguyen Dinh Hung (Viet Nam) and Mr. Xiaoquan Zhang (China); and waste – Ms. Juliana Bempah (Ghana) and Ms. Katja Pazdernik (Austria). Ms. Bempah and Mr. Eggleston were the lead reviewers. The review was coordinated by Mr. Vlad Trusca (UNFCCC secretariat).

2. In accordance with the Article 8 review guidelines, a draft version of this report was sent to the Government of Croatia, which provided comments that were considered and incorporated, as appropriate, into this final version of the report. All encouragements and recommendations in this report are for the next annual submission, unless otherwise specified.

3. All recommendations and encouragements included in this report are based on the expert review team’s (ERT’s) assessment of the 2014 annual submission against the Article 8 review guidelines. The ERT has not taken into account the fact that Parties will prepare the submissions due by 15 April 2015 using the revised “Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual greenhouse gas inventories” adopted through decision 24/CP.19. Therefore, when preparing the next annual submissions, Parties should evaluate the implementation of the recommendations and encouragements in this report, in the context of those guidelines.

4. In 2012, the main greenhouse gas (GHG) emitted by Croatia was carbon dioxide (CO₂), accounting for 72.7 per cent of total GHG emissions¹ expressed in carbon dioxide equivalent (CO₂ eq), followed by methane (CH₄) (12.9 per cent) and nitrous oxide (N₂O) (12.5 per cent). Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF₆) collectively accounted for 1.9 per cent of the overall GHG emissions in the country. The energy sector accounted for 71.5 per cent of total GHG emissions, followed by the agriculture sector (12.8 per cent), the industrial processes sector (10.8 per cent), the waste sector (4.3 per cent) and the solvent and other product use sector (0.6 per cent). Total GHG emissions amounted to 26,449.62 Gg CO₂ eq and decreased by 17.3 per cent between the base year² and 2012. The ERT concluded that the description in the national inventory report (NIR) of the trends for the different gases and sectors is reasonable.

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

² “Base year” refers to the base year under the Kyoto Protocol, which is 1990 for all gases. The base year emissions include emissions from sources included in Annex A to the Kyoto Protocol only.

5. Tables 1 and 2 show GHG emissions from sources included in Annex A to the Kyoto Protocol (hereinafter referred to as Annex A sources), emissions and removals from the LULUCF sector under the Convention and emissions and removals from activities under Article 3, paragraph 3, and, if any, elected activities under Article 3, paragraph 4, of the Kyoto Protocol (KP-LULUCF), by gas and by sector and activity, respectively.
6. Information to be included in the compilation and accounting database can be found in annex I to this report.

Table 1

Greenhouse gas emissions from Annex A sources and emissions/removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol by gas, base year^a to 2012

		<i>Gg CO₂ eq</i>								<i>Change (%)</i>	
		<i>Greenhouse gas</i>	<i>Base year</i>	<i>1990</i>	<i>1995</i>	<i>2008</i>	<i>2009</i>	<i>2010</i>	<i>2011</i>	<i>2012</i>	<i>Base year–2012</i>
Annex A sources		CO ₂	23 339.56	23 339.56	17 213.76	23 770.70	21 991.10	21 330.41	20 918.00	19 233.20	-17.6
		CH ₄	3 696.55	3 696.55	3 086.83	3 631.17	3 633.41	3 686.79	3 626.13	3 422.54	-7.4
		N ₂ O	3 993.42	3 993.42	3 182.67	3 593.44	3 360.73	3 431.29	3 539.80	3 298.63	-17.4
		HFCs	NO	NO	49.37	424.42	435.68	472.25	484.91	485.62	NA
		PFCs	936.56	936.56	NO	NA, NO	0.20	0.03	0.01	0.02	-100.0
		SF ₆	10.95	10.95	11.66	12.55	8.39	9.32	9.82	9.60	-12.4
KP-LULUCF	Article 3.3 ^b	CO ₂				-3.40	0.06	-41.00	-74.51	-115.34	
		CH ₄				0.21	0.15	0.05	0.16	0.72	
		N ₂ O				0.11	0.17	0.18	0.23	0.37	
	Article 3.4 ^c	CO ₂	NA			-8 505.62	-8 725.30	-8 525.90	-7 455.85	-7 044.12	NA
		CH ₄	NA			10.76	6.03	2.03	19.12	45.08	NA
		N ₂ O	NA			2.46	1.38	0.47	4.37	10.31	NA

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

^a The base year for Annex A sources refers to the base year under the Kyoto Protocol, which is 1990 for all gases. For activities under Article 3, paragraph 3, of the Kyoto Protocol and forest management under Article 3, paragraph 4, only the inventory years of the commitment period must be reported.

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

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

Table 2
Greenhouse gas emissions by sector and activity, base year^a to 2012

		<i>Gg CO₂ eq</i>								<i>Change (%)</i>	
<i>Sector</i>		<i>Base year</i>	<i>1990</i>	<i>1995</i>	<i>2008</i>	<i>2009</i>	<i>2010</i>	<i>2011</i>	<i>2012</i>	<i>Base year–2012</i>	
Annex A sources	Energy	22 797.11	22 797.11	17 264.19	22 902.11	21 649.26	21 039.69	20 749.87	18 923.16	–17.0	
	Industrial processes	3 769.49	3 769.49	2 008.26	3 590.93	2 979.76	3 204.93	3 004.19	2 850.61	–24.4	
	Solvent and other product use	116.98	116.98	108.34	238.17	151.76	151.32	143.05	155.57	33.0	
	Agriculture	4 682.71	4 682.71	3 496.04	3 646.52	3 552.98	3 446.17	3 563.15	3 394.67	–27.5	
	Waste	610.76	610.76	667.44	1 054.53	1 095.75	1 087.98	1 118.42	1 125.61	84.3	
	LULUCF	NA	–7 181.12	–9 832.95	–8 080.60	–8 304.30	–8 069.52	–6 996.35	–6 544.44	NA	
	Total (with LULUCF)	NA	24 795.93	13 711.33	23 351.67	21 125.21	20 860.57	21 582.32	19 905.18	NA	
	Total (without LULUCF)	31 977.05	31 977.05	23 544.28	31 432.27	29 429.51	28 930.09	28 578.67	26 449.62	–17.3	
	Other ^b	NA	NA	NA	NA	NA	NA	NA	NA	NA	
KP-LULUCF	Article 3.3 ^c	Afforestation and reforestation			–82.15	–70.73	–105.42	–118.92	–176.41		
		Deforestation			79.07	71.11	64.65	44.80	62.16		
		Total (3.3)			–3.08	0.38	–40.77	–74.12	–114.25		
	Article 3.4 ^d	Forest management				–8 492.40	–8 717.89	–8 523.40	–7 432.35	–6 988.73	
		Cropland management	NA			NA	NA	NA	NA	NA	NA
		Grazing land management	NA			NA	NA	NA	NA	NA	NA
		Revegetation	NA			NA	NA	NA	NA	NA	NA
	Total (3.4)	NA			–8 492.40	–8 717.89	–8 523.40	–7 432.35	–6 988.73	NA	

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, NA = not applicable.

^a The base year for Annex A sources is the base year under the Kyoto Protocol, which is 1990 for all gases. For activities under Article 3, paragraph 3, of the Kyoto Protocol and forest management under Article 3, paragraph 4, only the inventory years of the commitment period must be reported.

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

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

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

II. Technical assessment of the annual submission

A. Overview

1. Annual submission and other sources of information

7. The 2014 annual submission was submitted on 11 April 2014; it contains a complete set of common reporting format (CRF) tables for the period 1990–2012 and an NIR. Croatia further submitted a revised NIR on 2 June 2014. Croatia also submitted the information required under Article 7, paragraph 1, of the Kyoto Protocol, including information on: activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, accounting of Kyoto Protocol units, changes in the national system and in the national registry and the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol. The standard electronic format (SEF) tables were submitted on 14 April 2014. The annual submission was submitted in accordance with decision 15/CMP.1.

8. Croatia submitted revised emission estimates and a revised NIR on 19 January 2015 in response to the list of potential problems and further questions raised by the ERT. Croatia also submitted revised estimates on 19 January 2015 for KP-LULUCF, in response to the list of potential problems and further questions raised by the ERT. The values used in this report are those submitted by Croatia on 19 January 2015.

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

2. Questions of implementation raised in the 2013 annual review report

10. The ERT noted that no questions of implementation have been raised in the 2013 annual review report.

3. Overall assessment of the inventory

11. Table 3 contains the ERT's overall assessment of the annual submission of Croatia. For recommendations for improvements for specific categories, please see the paragraphs cross-referenced in the table.

Table 3

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

<i>Issue</i>	<i>Expert review team assessment</i>	<i>General findings and recommendations</i>
The ERT's findings on completeness		
Annex A sources ^a	Not complete	<p>Mandatory: "NO" is reported for CO₂ emissions from incineration of plastic waste in the period 1990–2006; "NE" is reported for N₂O emissions from hazardous waste incineration in the period 1990–2010</p> <p>Please see paragraphs 82 and 83 below for category-specific findings</p> <p>The ERT recommends that the Party estimate and report emissions from all mandatory categories</p>

<i>Issue</i>	<i>Expert review team assessment</i>	<i>General findings and recommendations</i>
		<p>Non-mandatory: "NE" is reported for: CO₂ emissions from asphalt roofing and road paving with asphalt; CH₄ and N₂O emissions from glass production (other mineral production); CO₂, CH₄ and N₂O emissions from sulphuric acid production; CO₂ emissions from food and drink; CH₄ emissions from steel production; N₂O emissions from degreasing and dry-cleaning and other solvent use; and CH₄ and N₂O emissions from incineration of hazardous and hospital waste</p> <p>The ERT encourages the Party to estimate and report emissions from all non-mandatory categories</p>
Land use, land-use change and forestry ^a	Complete	Mandatory: none
KP-LULUCF	Complete	Non-mandatory: none
The ERT's findings on recalculations and time-series consistency		
Transparency of recalculations	Sufficiently transparent	Please see paragraphs 20, 47, 50 and 61 below for category-specific findings
Time-series consistency	Sufficiently consistent	Please see paragraphs 30, 40, 48, 59, 78, 81 and 82 below for category-specific findings
The ERT's findings on QA/QC procedures		
	Sufficient	<p>Croatia has elaborated a QA/QC plan and has implemented tier 1 QA/QC procedures in accordance with that plan</p> <p>Please see paragraphs 13, 53, 59 and 81 below for category-specific recommendations</p>
The ERT's findings on transparency		
	Not sufficiently transparent	Please see paragraphs 16, 21, 24, 26, 31, 32, 35, 39, 40, 41, 49, 50, 61, 64, 78, 79, 82, 93, 95, 96 and 98 below for category-specific recommendations

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, ERT = expert review team, KP-LULUCF = land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, NE = not estimated, NO = not occurring, QA/QC = quality assurance/quality control.

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

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

Inventory planning

12. The NIR and additional information provided by the Party during the review described the national system for the preparation of the inventory. There were changes to the national system for the 2014 annual submission, as identified by the Party in its NIR and clarified in response to questions raised by the ERT during the review (see paragraph 108). The Ministry of Environmental and Nature Protection (MENP) has overall responsibility for the national inventory. The Croatian Environment Agency (CEA) is responsible for data collection, quality assurance/quality control (QA/QC) and archiving while the Energy and Environmental Protection Institute (Ekoneg) is responsible for the preparation of the inventory and inventory report. To improve the management of the national system, Croatia established the National System Committee in 2014 (OG 06/2014). Croatia, as member State of the European Union (EU), is obliged to apply all EU legislation (e.g. 525/2013/EU, 529/2013/EU) that defines reporting obligations for the GHG inventory as well as for projections and for policies and measures. The national regulation on GHG emission monitoring and policies and measures for emission reduction in Croatia (OG 87/2012) prescribes reporting roles and the responsibilities of competent authorities and has established a national inventory system and a system for policies and measures.

13. CEA has appointed a QA/QC coordinator; the role is an official element of the national system and the coordinator has overall responsibility for ensuring the objectives of the QA/QC programme are met. In addition, Ekoneg has a QA/QC manager who has responsibility for the implementation of QC procedures. MENP has oversight of QA/QC relating to the national inventory process, inventory preparation decisions regarding method selection, procedures and national system supplements, and is responsible for the submission of the inventory report.

Inventory preparation

14. Table 4 contains the ERT's assessment of Croatia's inventory preparation process.

Table 4

Assessment of inventory preparation by Croatia

<i>Issue</i>	<i>ERT assessment</i>	<i>ERT findings and recommendations</i>
<i>Key category analysis</i>		
Was the key category analysis performed in accordance with the IPCC good practice guidance and the IPCC good practice guidance for LULUCF?	Yes	Level and trend analysis performed, including and excluding LULUCF
Approach followed?	Both tier 1 and tier 2	
Were additional key categories identified using a qualitative approach?	No	
Has the Party identified key categories for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol following the guidance on establishing the relationship between the activities under the Kyoto Protocol and the associated key	Yes	

<i>Issue</i>	<i>ERT assessment</i>	<i>ERT findings and recommendations</i>
<i>categories in the UNFCCC inventory?</i>		
Does the Party use the key category analysis to prioritize inventory improvements?	Yes	Croatia reports that the key category analysis is used to drive inventory improvements, but no details are provided. The ERT reiterates the recommendation made in the previous review report that Croatia include more information in the NIR on how the key category analysis is used to prioritize the development and improvement of the inventory
<i>Assessment of uncertainty analysis</i>		
Approach followed?	Both tier 1 and tier 2	The tier 2 approach was applied only to key categories
Was the uncertainty analysis carried out in accordance with the IPCC good practice guidance and the IPCC good practice guidance for LULUCF?	Yes	
Quantitative uncertainty (including LULUCF)	Level = 31.1% Trend = 36.3%	
Quantitative uncertainty (excluding LULUCF)	Level = 16.1% Trend = 19.4%	

Abbreviations: ERT = expert review team, IPCC good practice guidance = the Intergovernmental Panel on Climate Change (IPCC) *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*, IPCC good practice guidance for LULUCF = IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*, LULUCF = land use, land-use change and forestry, NIR = national inventory report.

Inventory management

15. Croatia has a centralized archiving system, held by CEA, which includes the archiving of disaggregated emission factors (EFs) and activity data (AD), and documentation on how these factors and data have been generated and aggregated for the preparation of the inventory. The archived information also includes internal documentation on QA/QC procedures, external and internal reviews, and documentation on annual key categories and key category identification and planned inventory improvements. The previous review report noted that Croatia had difficulty responding to requests made by ERTs in a timely manner and recommended that Croatia ensure its inventory management system functions in such a way as to allow the timely provision of responses to ERT requests. The present ERT notes that timely provision of responses has been achieved.

5. Follow-up to previous reviews

16. Croatia provides in its NIR an overview table showing which of the recommendations made in the previous review report³ were taken into consideration in the preparation of its 2014 annual submission and which will be taken into consideration in the next or future annual submissions. The ERT commends Croatia for the overview, but recommends that the Party improve transparency by providing in the table references (e.g. section or paragraph numbers) to indicate where such recommendations are covered in the NIR.

17. The ERT acknowledges that many recommendations made in the 2013 review report have been addressed by Croatia in its 2014 annual submission, enhancing the transparency of the inventory across all sectors. In particular, Croatia has improved its reporting: in the energy sector for the comparison between the reference and sectoral approaches and by providing documentation for the sources of EFs and AD used; in the industrial processes sector for the N₂O emission estimates from nitric acid production and by using more accurate AD and EFs; and in the LULUCF sector for the identification of land-use change, and by including below-ground biomass emission estimates, reporting biomass burning emissions from wildfires on land converted to forest land, and applying country-specific wood densities for coniferous and deciduous species. The ERT commends Croatia for these improvements.

18. Recommendations from previous reviews that have not yet been implemented, as well as issues the ERT identified during the 2014 annual review, are discussed in the relevant sectoral chapters of the report and in table 9 below.

B. Energy

1. Sector overview

19. The energy sector is the main sector in the GHG inventory of Croatia. In 2012, emissions from the energy sector amounted to 18,923.16 Gg CO₂ eq, or 71.5 per cent of total GHG emissions. Since 1990, emissions have decreased by 17.0 per cent. The key drivers for the fall in emissions were the consequences of war in Croatia, the reduction or phasing out of production in some energy intensive industries and the effects of the global financial crisis of 2008, which resulted in a decrease in fuel consumption mainly in the manufacturing and construction sector as well as in the transport sector. Within the sector, 30.2 per cent of the emissions were from transport, followed by 29.7 per cent from energy industries, 16.2 per cent from other sectors and 14.8 per cent from manufacturing industries and construction. Fugitive emissions from oil and natural gas accounted for 9.2 per cent of emissions. Fugitive emissions from solid fuels were reported as “NO” (not occurring).

20. Croatia has made recalculations between the 2013 and 2014 annual submissions for this sector. The most significant recalculations made by Croatia between the 2013 and 2014 annual submissions were in the following categories: manufacturing industries and construction (2010 and 2011); fugitive emissions from coal mining and handling; and emissions from road transportation. The recalculations were made in response to recommendations made in the 2013 annual review report on the use of the tier 1 approach for road transport emission estimations and following changes in AD for coal production. Compared with the 2013 annual submission, the recalculations increased emissions in the energy sector by 34.52 Gg CO₂ eq (0.17 per cent), and increased total national emissions by

³ FCCC/ARR/2013/HRV.

0.12 per cent. The recalculations in the category manufacturing industries and construction were not adequately explained.

21. The information reported under the energy sector of the NIR is generally complete. Croatia improved its reporting in this annual submission by explaining the differences between the reference and sectoral approaches and by providing documentation for the sources of EFs and AD used in the emission calculations. However, the ERT identified some concerning aspects regarding the transparency of reporting in natural gas use in ammonia production under feedstocks and non-energy use of fuels. Specifically, the NIR does not clearly explain the approach used to derive natural gas used as fuel in ammonia production from non-energy use of natural gas in ammonia production industries. The ERT recommends that Croatia improve the transparency of its reporting under feedstocks and non-energy use of fuel with regards to natural gas used as fuel in ammonia production.

22. Croatia has indicated in the NIR that it plans to improve the accuracy of its inventory by using country-specific EFs (e.g. country-specific carbon content values and oxidation factor values for estimating emissions for the main fuel types and the tier 3 approach for calculating fugitive emissions from oil and natural gas operations). The ERT found inconsistencies in the use of AD in the Party's reporting of fuel use in manufacturing industries and construction, as well as in the type of AD used for the estimation of CO₂ emissions from gas transmission pipelines. The ERT recommends that Croatia take steps to ensure the consistency of these AD.

2. Reference and sectoral approaches

23. Table 5 provides a review of the information reported under the reference approach and the sectoral approach, as well as comparisons with other sources of international data. Issues identified in table 5 are more fully elaborated in paragraphs 24–27 below.

Table 5

Review of reference and sectoral approaches

<i>Issue</i>	<i>Expert review team assessment</i>	<i>Paragraph cross-references</i>
Difference between the reference approach and the sectoral approach	Energy consumption: –0.47 PJ, –0.19% CO ₂ emissions: –449.75 Gg CO ₂ , –2.65%	
Are differences between the reference approach and the sectoral approach adequately explained in the NIR and the CRF tables?	No	See paragraph 24 below
Are differences with international statistics adequately explained?	Yes	See paragraph 25 below
Is reporting of bunker fuels in accordance with the UNFCCC reporting guidelines?	No	See paragraph 26 below
Is reporting of feedstock and non-energy use of fuels in accordance with the UNFCCC reporting guidelines?	No	See paragraph 27 below

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

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

24. Croatia reported that the CO₂ emissions calculated under the sectoral approach are higher compared with those calculated under the reference approach. The differences range from 0.06 per cent (2004) to 3.85 per cent (1995). Croatia attributes the differences in the CO₂ emissions to the fact that higher values of natural gas AD were used for the estimation of CO₂ emissions under the sectoral approach (bottom-up approach) than the reference approach (top-down approach). In addition, the values of natural gas AD used for the calculation of CO₂ emissions under the reference approach excluded natural gas used for feedstocks and non-energy purposes. However, the ERT did not find in the NIR consistent data and comprehensive information supporting the explanations provided by Croatia. Another reason provided by Croatia for the observed differences is the use of standard net calorific values (NCV) of 34.00 TJ/10⁶ m³ for the estimation of energy consumption under the reference approach and the use of thermal power plant specific NCVs for the estimation of CO₂ emissions under the sectoral approach. The documentation box of CRF table 1.A(c) on the comparison of CO₂ emissions from fuel combustion does not provide references to the sections of the NIR where explanations have been given for the differences in CO₂ calculations under the reference and sectoral approaches. The ERT therefore reiterates the recommendation made in the previous review report that Croatia provide a more detailed and transparent explanation for the observed CO₂ emission differences between the reference approach and the sectoral approach. The ERT further recommends that Croatia take steps to resolve the issue regarding the allocation of natural gas used as fuel and as non-energy use in the energy balance to improve the accuracy of its reporting.

25. Croatia acknowledged the discrepancies raised by the previous ERT between the data submitted to the International Energy Agency (IEA) and the data reported by Croatia in its energy balance. The discrepancies relate to values reported for liquid fuel production in the energy balance and the classification of imported sub-bituminous coal and lignite. The Party explained that the main cause of the discrepancies is the difference in data compilation approaches between Croatia and IEA. Croatia explained in the NIR that the differences in data reported for the production of liquid fuels result from the differences in the methodologies used to generate the total consumption of crude oil for IEA and for the national energy balance. Croatia further explained in the NIR that the variations in the reported imported coal figures arose from the different classifications used for reporting to IEA and for the energy balance. IEA classifies imported sub-bituminous coal and lignite coal as lignite, while the energy balance disaggregates coal into bituminous, hard and lignite. The ERT considers that the data discrepancies were adequately explained by Croatia in the NIR as recommended in the previous review report.

International bunker fuels

26. In its NIR, Croatia compared the values of international marine bunkers reported by IEA with the CRF tables and explained that the differences result from the rounding of figures to whole numbers by IEA. The previous ERT had identified discrepancies in the values for aviation bunker fuels reported by IEA and in the CRF tables. Croatia did not provide in its current NIR a comparison between the aviation bunker fuels reported by IEA and those reported in the CRF tables or an explanation for the discrepancies, as it did for marine bunker fuels. The current ERT noted that international aviation and marine bunker fuel consumption and associated CO₂ emissions have experienced a significant decline: in 2012, bunker fuels and associated CO₂ emissions decreased by about 42 per cent from the 1990 levels. A decline of about 46 per cent in the consumption of aviation bunker fuels was observed from 1990 to 1995, but the ERT noted that Croatia did not provide an adequate explanation of this in its NIR. In response to a question raised by the present ERT during the review, Croatia indicated that the decline was caused by the war in Croatia. The ERT recommends that Croatia compare the aviation bunker fuels of IEA and the CRF tables and

explain any discrepancies observed. The present ERT also reiterates the recommendation made in the previous review report that Croatia provide a detailed explanation of the factors contributing to decreases in bunker fuel consumption and associated CO₂ emissions.

Feedstocks and non-energy use of fuels

27. Croatia reported that natural gas is used in ammonia production as feedstock and as fuel. The natural gas used as fuel in ammonia production is obtained by calculating the difference between the total amount of natural gas specified in the national energy balance under the section on non-energy fuel consumption in the petrochemical industry and the consumption of natural gas used as feedstock, which is collected by surveying ammonia manufacturers. The ERT considers that this approach of obtaining data for natural gas used as fuel from reported non-energy use of natural gas could be misleading and is not sufficiently transparent. In response to a question raised by the ERT during the review, Croatia indicated that it has initiated measures to collect data for the natural gas actually used as a fuel for the period 1990–2013 from Petrokemija (a chemical company headquartered in Kutina that specializes in manufacturing agricultural fertilizers) in order to improve transparency. The ERT commends Croatia for taking the necessary steps to improve the accuracy of the calculations of natural gas used as fuel in ammonia production and recommends that the Party continue with the measures and report the data for natural gas used as fuel obtained from the industrial plant in its next annual submission.

3. Key categories

Stationary combustion: solid, liquid and gaseous fuels – CO₂, CH₄ and N₂O⁴

28. Croatia reported that GHG emissions from thermal power plants and public cogeneration plants in the period 1990–2012 were estimated using the tier 2 approach. As identified in the previous review report, the ERT noted that Croatia used the Intergovernmental Panel on Climate Change (IPCC) default EFs for the estimation of CO₂ emissions, while the implied emission factors (IEFs) for CH₄ and N₂O were based on technology type and configuration (tier 2). The ERT considers the use of default IPCC EFs under the tier 2 approach inappropriate and not in line with the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance). In response to a question raised by the ERT during the review, Croatia indicated that although it had used some default IPCC EFs, the tier 2 approach was reported because some of the fuel consumption data and IEFs are technology-specific or thermal plant-specific. As the tier 2 approach was used, the ERT recommends that Croatia take steps to obtain and use plant-specific CO₂ EFs to improve the accuracy of its emission estimates.

29. Croatia reported in its NIR that emissions from stationary combustion in agriculture, forestry and fisheries, which is a key category, were estimated using the tier 1 approach, based on default IPCC EFs and fuel consumption data from the national energy balance. Croatia also reported that, in the long term, the national inventory team plans to use country-specific carbon content values and oxidation factors for the estimation of emissions. The ERT encourages Croatia to expedite actions to implement these planned improvements.

30. Croatia used the tier 1 approach for the estimation of emissions from manufacturing industries and construction in the period 1990–2000, using aggregated fuel consumption data. Disaggregated fuel consumption data were used for the emission estimations for the

⁴ CH₄ and N₂O emissions from this category are not key. However, since all issues related to this category are discussed as a whole, the individual gases are not assessed in separate sections.

period 2001–2012. The ERT considers that the inconsistency in the time series data, if not addressed, could pose a problem in the future when Croatia moves from the tier 1 approach to higher tiers (2 and 3). To ensure consistency, the ERT encourages Croatia to consider the possibility of disaggregating the data used for the period 1990–2000.

Civil aviation: liquid fuels – CO₂

31. Croatia reported in its NIR that GHG emissions from civil aviation are estimated using the tier 1 approach and based on aviation fuel consumption, which was apportioned to domestic and international aviation based on the average passenger-kilometres travelled. The approach used to estimate fuel consumption figures for domestic and international aircraft per passenger-kilometre is not transparent and may not give accurate results for the calculated aircraft emissions. The ERT strongly recommends that Croatia improve the accuracy and transparency of its reporting in its next NIR by adopting an approach in accordance with the IPCC good practice guidance, such as using aviation fuel use surveys, sales statistics and origin–destination statistics to obtain the actual jet kerosene consumption figures for domestic and international aviation.

Road transportation: liquid and gaseous fuels – CO₂

32. Croatia used the tier 1 approach to estimate CO₂ emissions from liquid fuels based on the quantity of fuel combusted, as recommended in the previous review report, which is in line with the IPCC good practice guidance. Also as recommended in the previous review report, Croatia indicated in the CRF tables that it used the tier 1 approach to estimate CO₂ emissions from gaseous fuels. However, no information was provided in the NIR to indicate that the tier 1 methodology was used. The ERT recommends that Croatia improve the transparency of its reporting under road transportation by providing sufficient explanations in the NIR about the methodology used for estimating emissions from gaseous fuels.

Coal mining and handling: solid fuels – CH₄

33. Coal was mined in Croatia only in the period 1990–1999. Therefore, CH₄ emissions from coal were reported for the period 2000–2011 as “NO”. CH₄ emissions from coal mines within the period 1990–1999 were estimated using the tier 1 approach, based on the IPCC average EFs and data on the quantities of coal consumed obtained from the national energy balance. As recommended in the previous review report, Croatia explained the methodology used for estimating the emissions and provided the sources of EFs and oxidation factors used in the estimation. The previous review report also recommended that Croatia revise its calculations in accordance with the IPCC good practice guidance by using the amount of raw coal produced rather than the amount of saleable coal produced. However, in its 2014 NIR, Croatia continued to use saleable coal figures for estimating emissions. The ERT considers that this could lead to an underestimation of emissions for the period 1990–1999. The ERT reiterates the recommendation made in the previous review report that Croatia use the actual coal production figures for estimating emissions.

Oil and natural gas: gaseous fuels – CH₄ and CO₂

34. The documentation box of CRF table 1.B.2 indicates that the AD used to calculate CO₂ emissions from transmission is the length of pipeline in kilometres. However, the AD reported for that category in the CRF tables is the amount of gas consumed in PJ, which was reported as 101.78 TJ in 2012. Apart from the inconsistency in the reported AD used, the use of gas throughput or consumption as AD for emission estimation is not in line with the IPCC good practice guidance, which recommends the use of gas pipeline length rather than gas throughput. The ERT recommends that Croatia take steps to use the gas pipeline length as the AD for CO₂ emission calculations.

4. Non-key categories

Other (mobile): liquid fuels – CO₂, CH₄ and N₂O

35. As recommended in the previous review report, Croatia has used the notation key “IE” (included elsewhere) in the CRF tables to indicate that fuel consumption by the military has been included elsewhere. However, no indication has been given in the NIR as to where the military fuel consumption has been included. To enhance the transparency of reporting, the ERT recommends that Croatia indicate in the NIR the category under which military fuel use has been included.

C. Industrial processes and solvent and other product use

1. Sector overview

36. In 2012, emissions from the industrial processes sector amounted to 2,850.61 Gg CO₂ eq, or 10.8 per cent of total GHG emissions, and emissions from the solvent and other product use sector amounted to 155.57 Gg CO₂ eq, or 0.6 per cent of total GHG emissions. Since 1990, emissions have decreased by 24.4 per cent in the industrial processes sector, and increased by 33.0 per cent in the solvent and other product use sector. The key drivers for the fall in emissions in the industrial processes sector are: a decrease in emissions from metal production (by 99.9 per cent since the base year) owing to the cessation of pig iron and aluminium production in 1999 and of ferroalloys in 2003; a decrease in emissions from mineral products (by 10.2 per cent since the base year) owing to a decline in industrial activities caused by the war in Croatia; and a decrease in cement production (by 39.8 per cent in 2012 compared with 2008) because of reduced economic activity. In contrast, there is a trend of increasing emissions from the consumption of halocarbons and SF₆ (an increase of 4,421.0 per cent since the base year). Within the industrial processes sector, 41.5 per cent of the emissions were from chemical industry, followed by 41.1 per cent from mineral products and 17.4 per cent from consumption of halocarbons and SF₆. Metal production accounted for less than 0.1 per cent of emissions.

37. Croatia has made recalculations between the 2013 and 2014 annual submissions for the industrial processes sector. The most significant recalculations made by Croatia between the 2013 and 2014 annual submissions were in the following categories: mineral products; chemical industry; and consumption of halocarbons and SF₆. The recalculations were made as a result of obtaining new AD and using improved methodologies. The ERT noted that Croatia improved its reporting of N₂O emission estimates from nitric acid production by using more accurate AD and EFs from the two sites where nitric acid is produced and plant-specific EFs obtained from the manufacturer (a company that produces fertilizer). Applying the improved EFs resulted in a decrease in emissions from the chemical industry of 20.2 per cent. Compared with the 2013 annual submission, the recalculations for 2011 increased emissions in the industrial processes sector by 4.1 Gg CO₂ eq (0.1 per cent) and increased total national emissions by 0.02 per cent. The recalculations were adequately explained.

2. Key categories

Ammonia production – CO₂

38. The ERT noted that, in response to a recommendation made in the previous review report, Croatia provided an additional explanation in its 2014 NIR concerning the use of natural gas in ammonia production. Natural gas is used both as a feedstock and as fuel in ammonia production, but only the CO₂ emissions from natural gas used as feedstock have been calculated for this subsector and included in the industrial processes sector, while CO₂

emissions from natural gas used as fuel are calculated separately and reported under the energy sector.

39. The ERT noted that the IEF for ammonia (NH₃) production is 1.06–1.35 t CO₂/t NH₃ produced, which is lower than the IPCC default EF (1.5–1.6 t CO₂/t NH₃ produced). Croatia stated in the NIR that the composition of natural gas is the reason for the low CO₂ IEF, because natural gas is the main feedstock for ammonia production. The ERT noted the Party's explanation regarding the low IEF, and asked the Party to provide a clarification. Responding to a question raised by the ERT during the review, Croatia explained that, according to its programme for improving the inventory, the tier 2 approach will be used in the next annual submission and recalculation will be performed for the entire period 1990–2012. The ERT reiterates the strong recommendation made in the previous review report that Croatia review the emission estimation methodology it uses for this category and provide clearer justification of its IEF estimation in its next annual submission.

Ferroalloys production – CO₂

40. Croatia collected information on the quantity of reducing agent used in ferroalloy production from a statistical database (of inputs of raw material in industrial production) and used an interpolation method for the calculation of missing AD on the production of coke from coal for the periods 1994–1996 and 1999–2001. The ERT notes that, because this is a key category, interpolated data may affect the accuracy of the emissions estimate. Croatia reported that ferroalloys production fluctuated over the period 1990–2003 as a result of discontinuous operation, in turn a result of the war in Croatia. Ferroalloys production ceased in 2003 (NIR table 4.4-7), which has consequently hindered the possibility of rechecking AD. In response to a question raised by the ERT during the review, Croatia agreed with the ERT that the transparency and accuracy of the estimates could be improved by obtaining AD for ferroalloys production to replace the interpolated data. Moreover, Croatia indicated to the ERT that such improvements are planned as long-term goals, depending on statistical research, as the Party seeks a way to replace the interpolated data with real data or with data estimated on the basis of certain indicators. The ERT reiterates the recommendation made in the previous review report that Croatia provide more details on its plan to increase the transparency and accuracy of its estimates by obtaining AD for ferroalloys production to replace the interpolated data.

Consumption of halocarbons and SF₆ – HFCs, PFCs and SF₆

41. Croatia stated in the NIR that currently there are no data available on the decommissioning and disposal of refrigeration and air-conditioning equipment, which are reported as “NO” for 2012, but that presumably there are individual cases of disposal of such equipment. In response to a question raised by the ERT during the review on the Party's plans to collect data on the status of disposal of refrigeration and air-conditioning equipment to enhance the inventory report, Croatia clarified that currently the country still has installed refrigeration and air-conditioning equipment using chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs), and also equipment using HFCs. Croatia stated that, considering its current economic situation, there is no decommissioning planned for equipment using HFCs (except in some individual cases mentioned in the NIR), as the equipment is in good condition and working order, according to available information. Nevertheless, Croatia clarified that it intends to seek more information regarding decommissioning and disposal of this equipment. The ERT strongly reiterates the recommendation made in the previous review report that Croatia continue to conduct surveys on the status of disposal of refrigeration and air-conditioning equipment and include the results in its NIR.

42. Croatia stated in the NIR that the potential emissions of HFC-227ea used in fire extinguishers in 2007 and 2008 were assessed by an interpolation method between 2006

and 2010. Responding to a question raised by the ERT during the review on the Party's plans to replace interpolated data with real data, Croatia stated that all available data were reported, and the reason for data unavailability for 2007 and 2008 could be that in these years, halon installations were still permitted in Croatia and hence there was no need for HFCs. After having consulted the competent authority responsible for the collection of relevant data, Croatia considered the reported data for both years to be zero or around zero, and has therefore decided to use reported data without any interpolation in the next annual submission. The ERT commends the Party for its efforts to complete its reporting in a transparent manner and encourages Croatia to revise the interpolated data in accordance with available information.

43. Croatia stated in the NIR that potential emissions of SF₆ used in electronic equipment have been calculated for the period 2006–2012, and that it is in the process of improving AD regarding SF₆ emissions following the organization of several workshops on this topic involving competent bodies. Moreover, all data are being processed and necessary changes will be performed in the next annual submission. However, responding to a question raised by the ERT during the review, Croatia stated it has no AD for estimating potential emissions of SF₆ for the period 1990–2005. The ERT commends the Party for its efforts to complete its reporting under this category, and encourages Croatia to continue its efforts to enhance its reporting.

3. Non-key categories

Lime production – CO₂

44. Croatia stated in the NIR that information regarding the operation of a particular lime-producing factory for 2012 could not be obtained in time to incorporate it in the 2014 annual submission and consequently, data for 2011 were used in the emissions calculation. The ERT noted that CO₂ emissions from lime production were not included in the list of key categories (NIR table 4.1-1). In response to a question raised by the ERT during the review, Croatia explained that it could not provide concrete data because of confidentiality agreements, but that real data for the factory in question were not significantly different from the data used in the calculations. The Party said that approximate data would be replaced with real data in the next annual submission. The ERT strongly recommends that Croatia recalculate the CO₂ emissions from lime production for 2012 using real data, report them in the next annual submission and conduct an analysis for the key categories of the industrial processes sector.

Other production (glass) – CO₂

45. The ERT noted that CO₂ emissions from the use of carbonate materials in glass production have been reported as "IE" and included in the categories limestone and dolomite use and soda ash use. In response to a question raised by the ERT during the review, Croatia stated that it plans to report the emissions from glass production in a separate section in the next annual submission, according to the *2006 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the 2006 IPCC Guidelines). The AD required for the calculation are included in the Party's programme for data collection. Moreover, Croatia plans to collect data from all operators included in the European Union Emissions Trading System (EU ETS) from the verification reports for 2012 and 2013. The ERT commends the Party on its plans for improving reporting under this category.

D. Agriculture

1. Sector overview

46. In 2012, emissions from the agriculture sector amounted to 3,394.67 Gg CO₂ eq, or 12.8 per cent of total GHG emissions. Since 1990, emissions have decreased by 27.5 per cent. The key driver for the fall in emissions is the reduction in livestock population owing to the war in Croatia in the early 1990s and to the economic and political transition to a market economy in the country. Within the sector, 61.1 per cent of the emissions were from agricultural soils, followed by 24.5 per cent from enteric fermentation. Manure management accounted for 14.4 per cent. Rice cultivation, prescribed burning of savannahs and field burning of agricultural residues were reported as “NO” in Croatia.

47. Croatia has made recalculations between the 2013 and 2014 annual submissions for this sector. The most significant recalculations made by Croatia between the 2013 and 2014 annual submissions were in the following categories: CH₄ emissions from enteric fermentation; N₂O emissions from manure management from cattle; and agricultural soils. The recalculations were made in response to the 2013 review report and following changes in AD. Compared with the 2013 annual submission, the recalculations increased emissions in the agriculture sector by 120.94 Gg CO₂ eq (3.5 per cent), and increased total national emissions by 0.5 per cent. The recalculations were not sufficiently explained. The ERT recommends that Croatia provide detailed explanations in the NIR on the data sources and recalculations.

48. For all animals, except for cattle, Croatia applied a tier 1 method for the estimation of CH₄ emissions from enteric fermentation and used the default EFs for developing countries for the years 1990–2007 and the default EFs for developed countries for the years 2008–2012. For the estimation of CH₄ and N₂O emissions from manure management, Croatia applied a tier 1 method using default EFs for developing countries for all years for sheep, goats, horses, mules, asses and poultry. The use of these developing countries default EFs was raised during previous reviews, during which Croatia confirmed that it would use EFs for developed countries for the entire time series in the future. However, in its 2014 annual submission Croatia continued to use developing countries default values and did not implement country-specific EFs and AD for animal waste management system distribution. Following a question raised by the ERT during the review, Croatia responded that CEA had undertaken a project, with expected completion in March 2015, to develop country-specific EFs for the calculation of ammonia, CH₄ and N₂O emissions from manure management. The ERT strongly recommends that Croatia implement this short-term improvement in its next annual submission and continue its effort to develop country-specific EFs to estimate CH₄ emissions from enteric fermentation and CH₄ and N₂O emissions from manure management.

49. The agriculture sector information is relatively accurate in technical terms but the ERT encourages Croatia to improve the agricultural knowledge in the inventory team regarding the feeding and housing of animals. The ERT also considers that the agriculture situation in Croatia could be explained in more depth to improve transparency; for example, the estimated average milk production per mature dairy cattle changed from 12.05 kg/head/day in 2011 to a revised estimate of 9.03 kg/head/day, even though the number of dairy mature cattle was not changed accordingly. By multiplying the reported daily milk yield and the number of mature dairy cattle reported for the year 2011 the total national milk production reported in the 2013 annual submission was approximately 800 million litres and in the 2014 annual submission approximately 700 million litres. The ERT considers that this lower milk yield needs to be explained in the NIR, as it is the lowest among all Parties included in Annex I to the Convention (Annex I Parties). The ERT

strongly recommends that Croatia improve the agricultural information provided in the inventory and explain its national conditions more thoroughly in the NIR.

2. Key categories

Enteric fermentation – CH₄

50. Croatia used the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines) and the IPCC good practice guidance to estimate CH₄ emissions from enteric fermentation. Croatia used tier 2 method for mature dairy cattle and tier 1 method for other animals. Between the 2013 and 2014 annual submissions these emissions were recalculated because the reported number of dairy cows for 2011 changed from 183,686 (reported in the 2013 annual submission) to 206,291 (reported in the 2014 submission) and animal weights changed (see para. 51 below). Based on the revised number of dairy cows, average milk production has been revised from 12.05 litre/day to 9.03 litre/day, which is not in accordance with the revised number of dairy cows (see para. 49 above). The revised number of mature dairy cattle results from a change in data source from the Central Bureau of Statistics to the Croatian Agricultural Agency; the latter is considered by Croatia as a more accurate source. The ERT notes that the current milk production used by Croatia in the emission estimation is the lowest among Annex I Parties and is close to that reported by Croatia to Eurostat. The overall impact of this recalculation is an increase of 4.9 per cent in the CH₄ emissions from enteric fermentation from all cattle where the emissions from mature dairy cattle (+ 0.1 per cent) are almost unaltered and a small increase is coming from young cattle. The ERT commends Croatia for improving the inventory but strongly recommends that the Party improve the transparency of its recalculations and provide the references for AD for milk production.

51. By using a tier 2 method for estimating CH₄ emissions from cattle, Croatia used country-specific values for cattle live weights compared with the previous annual submission, for which default values had been used (e.g. for mature dairy cattle the average weight has been changed from 550 kg/head to 562.62 kg/head). The ERT commends Croatia for this improvement.

Manure management – CH₄ and N₂O

52. Croatia used the tier 1 approach together with IPCC default EFs to estimate CH₄ emissions from manure management for mature dairy cattle and selected the EF of 6 kg CH₄/head/year (for Eastern European conditions) from 1990 to 2005 and 14 kg CH₄/head/year (for Western European conditions) from 2006 to 2012 (Revised 1996 IPCC Guidelines, table B-3). The default EF for Eastern European conditions is based on an average annual milk production of 2,550 kg/head/year or a daily milk production of 7.0 kg/head/day (Revised 1996 IPCC Guidelines, table 4-4 and table A-1). The ERT acknowledges the current situation in Croatia regarding the lack of updated data; however, considering that manure management is a key category, the Party should have advanced to a higher tier. Croatia informed the ERT during the review that it has commenced a research project on estimating ammonia, CH₄ and N₂O emissions from manure management, including seeking data on the distribution of manure in manure management systems (MMS). During the in-country review in 2012, Croatia had informed the ERT of that review that the research project will start in 2012 and the results of the project would be implemented in the 2014 annual submission. The ERT strongly reiterates the recommendations made in previous review reports that Croatia implement the results of the research project.

53. In the 2014 annual submission, Croatia used the default methodologies from the Revised 1996 IPCC Guidelines and the IPCC good practice guidance for estimating N₂O

emissions from MMS, together with the default values for Eastern Europe for the distribution of animal manure in MMS (Revised 1996 IPCC Guidelines, table 4-21). It is assumed and reflected in the 2006 IPCC Guidelines that MMS distribution is the same when estimating CH₄ and N₂O emissions from MMS. However, the ERT noted that in the Revised 1996 IPCC Guidelines there are two tables for MMS distribution: one used for CH₄ emissions and one for N₂O emissions. In table 4-21 for N₂O emissions there is a potential error in the MMS distribution for Eastern Europe for non-dairy cattle and for pigs: it seems that these two animal categories have been switched. The results, in contradiction with normal farming practices, are that non-dairy cattle are described as “not grazing” and pigs are “grazing”. The ERT further notes that if these figures are used without checking their agronomic relevance, the N₂O emission estimates from MMS are not correctly estimated. Croatia has used table 4-21 from the Revised 1996 IPCC Guidelines in its inventory, regardless of this error. The ERT considers that the use of table 4-21 is leading to an underestimation of the N₂O emissions from MMS in Croatia. N₂O emissions from MMS is a key category and therefore Croatia should advance to tier 2 and implement country-specific data on how animal manure is handled. Doing so would have eliminated the error. The ERT therefore recommended in the list of potential problems and further questions by the ERT that Croatia resubmit new N₂O emission estimates from MMS in Croatia using country-specific data on MMS distribution for the entire time series 1990–2012.

54. In response to the list of potential problems and further questions raised by the ERT, Croatia submitted revised estimates for this category on 19 January 2015. The resubmission has increased the N₂O emissions from the manure management category in 2012 by 42.66 Gg CO₂ eq (17.2 per cent). The ERT considers that the revised estimates resolved the issue mentioned in paragraph 53 above, identified during the review.

Other (agricultural soils) – N₂O

55. Croatia used the tier 1a approach and default EFs to estimate direct N₂O emissions from agricultural soils. The annual amount of animal manure nitrogen (N) applied to soils was estimated by determining the total amount of animal manure N produced annually. As explained in paragraph 53 above, the ERT identified during the review that the distribution of animal manure in the different MMS was not representative of conditions in Croatia. Therefore, the ERT included this issue in the list of potential problems and further questions raised during the review. In response to the list of potential problems and further questions raised by the ERT, Croatia submitted revised estimates of N₂O emissions from animal manure applied to soils, calculated on the basis of the revised amounts of animal manure N applied to soils for cattle (option B) and for swine. The ERT considers that the revised estimates resolved the issue.

56. Croatia used the default method and the default EF for pasture, range and paddock manure provided in the IPCC good practice guidance to estimate N₂O emissions from pasture, range and paddock manure. The annual amount of manure N deposited directly on soils by livestock was estimated by determining the total amount of animal manure N excreted annually on pastures. As explained in paragraph 53 above, the ERT identified during the review that the distribution of the animal manure in the different MMS was not representative of conditions in Croatia, potentially leading to an underestimation of N₂O emissions from pasture, range and paddock manure. Therefore, the ERT included this issue in the list of potential problems and further questions raised during the review. In response to the list of potential problems and further questions raised by the ERT, Croatia submitted revised estimates of N₂O emissions from pasture, range and paddock manure, calculated on the basis of revised amounts of manure N excreted annually on pasture, range and paddock, under the category manure management for cattle (option B) and swine. The ERT considers that the revised estimates resolved the issue.

57. Croatia used the tier 1a approach and default EFs provided in the IPCC good practice guidance to estimate indirect N₂O emissions. The annual amount of animal manure N excreted was estimated by multiplying the annual average nitrogen excretion rate (N_{ex}) per head of species by the number of head of livestock species. As explained in paragraph 53 above, the ERT identified during the review that the selection of the distribution of the animal manure in the different MMS was not representative of conditions in Croatia, potentially leading to an underestimation of indirect N₂O emissions. Therefore, the ERT included this issue in the list of potential problems and further questions raised during the review. In response to the list of potential problems and further issues raised by the ERT, Croatia submitted revised estimates of indirect N₂O emissions, calculated on the basis of revised amounts of animal manure, under the category manure management for mature dairy cattle (option B) and swine. The ERT considers that the revised estimates resolved the issue.

58. On 19 January 2015 Croatia submitted revised values for N₂O emissions from MMS for animal manure applied to soil, pasture, range and paddock; indirect emissions from atmospheric deposition; and indirect emissions from N leaching and run-off. In total, the resubmitted estimates decreased the N₂O emissions from the category agricultural soils in 2012 by 11.85 Gg CO₂ eq (0.6 per cent). The ERT considers that the revised estimates resolved the issue.

59. Croatia reported N₂O emissions from the application of sewage sludge to agricultural land for 2005 onwards. In response to a question raised by the ERT during the review regarding the amount of sludge and its inherent N content, Croatia informed the ERT that the data on sludge applied were provided to the inventory team by CEA. Croatia used an N content of 11.0 per cent of dry matter for the period 2005–2008, based on information from one company; the ERT considers this to be an unrealistically high value. During the review, Croatia acknowledged the error, which resulted in the overestimation of the emissions, and stated that it will be corrected in the next annual submission. The ERT recommends that Croatia correct this error in the next annual submission and improve its QA/QC activity for the data received from CEA.

E. Land use, land-use change and forestry

1. Sector overview

60. In 2012, net removals from the LULUCF sector amounted to 6,544.44 Gg CO₂ eq. Since 1990, net removals have decreased by 8.9 per cent. The key driver for the fall in removals is the decrease in removals from forest land remaining forest land. Within the sector, 7,163.74 Gg CO₂ eq of net removals were from forest land, followed by 127.65 Gg CO₂ eq from grassland. Net emissions were reported from settlements (522.90 Gg CO₂ eq), cropland (208.32 Gg CO₂ eq) and wetlands (15.73 Gg CO₂ eq).

61. Croatia has made recalculations between the 2013 and 2014 annual submissions for the LULUCF sector. The two most significant recalculations made by Croatia between the 2013 and 2014 annual submissions were in the following categories: settlements and forest land. The recalculations were made following changes in AD and EFs and the correction of identified errors. Compared with the 2013 annual submission, the recalculations decreased removals in the LULUCF sector by 35.45 Gg CO₂ eq (0.5 per cent) in 2011. The recalculations were not adequately explained in the NIR, because significant changes occurred between the NIR initially submitted in 2014 and the final version of the NIR submitted on 19 January 2015 in response to the list of potential problems and further questions from the ERT formulated during the review. The recalculation explanations were not fully revised in the final version of the NIR. Recalculations were made largely as a result of the incorporation of the results from the project “Improving Croatian reporting in

the land use, land-use change and forestry sector in the first commitment period of the Kyoto Protocol” (LULUCF 1), which aimed to address many issues identified in previous review reports. The ERT recommends that Croatia adequately explain recalculations in its next annual submission to improve transparency in the sector.

62. Croatia has made significant improvements to the transparency, accuracy, comparability, consistency and completeness of the inventory for the LULUCF sector. Improvements in accuracy include: the collection of AD to enable identification of land-use change; the inclusion of below-ground biomass emission estimates following conversion of forest land to other land-use classes; reporting biomass burning emissions from wildfires on land converted to forest land; rectifying the correction factor (to 1.5 per cent from 15.0 per cent) for calculating settlement areas; and applying new root-to-shoot ratios. The ERT commends Croatia for providing estimates for all land-use categories and pools in line with the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF).

63. In response to the recommendation made in previous review reports relating to the completeness of reporting, Croatia has provided complete estimates for all mandatory land-use categories and pools and provided annual land-use change matrix tables. The ERT commends Croatia for providing complete information on land-use change.

64. The ERT notes that the transparency of the NIR and the CRF tables has been improved. Additional explanations and reference materials were provided in the NIR regarding: the forest types covered in each reported forest subdivision; the derivation of cropland areas from the Croatian Bureau of Statistics data and the CORINE Land Cover database; and the basis for expert judgements and assumptions made (e.g. that only certain types of land conversions have occurred in Croatia in the past 20 years). The transparency of the estimates of emissions and removals reported in the CRF tables have also been improved by reporting emissions from organic cropland soils separately from emissions from mineral soils for all subdivisions. The ERT commends Croatia for improving the transparency of its reporting in the NIR and the CRF tables, in particular with regard to the issues identified above. However, reporting dead organic matter (DOM) separately from living biomass for forest land converted to settlements has not been achieved, and part of the litter pool is still being reported in the soils pool. The ERT recommends that Croatia improve the transparency of the NIR and the CRF tables by reporting DOM separately in forest land converted to settlements and by separating litter from the soils pool.

2. Key categories

Forest land remaining forest land – CO₂

65. The reporting on this category is complete, as estimates are included for all forest types. Carbon stock change in maquia and scrub forests has been estimated for the first time. Emissions from wildfires that occur in maquia and scrub forests are also included for the first time. The ERT commends Croatia for reporting emissions and removals for all forest types and carbon pools for forest land remaining forest land, and for estimating emissions/removals from wildfires in maquia and shrub forests, as well as the subsequent regrowth of biomass and DOM.

66. Croatia continues to apply the tier 1 approach to the reporting of carbon stock change in the DOM and mineral soils pools in this category, assuming there is no change, and therefore uses the notation key “NO”. The ERT notes that the Croatian National Forest Inventory (CRONFI), which could potentially provide more precise data for estimating carbon stock changes in the dead wood, litter and soils pools with a higher tier and thus improve the accuracy of the inventory, is still under official consideration. The ERT

recommends that Croatia make significant efforts to use the results of CRONFI to improve the LULUCF sector inventory in its next annual submission.

Land converted to forest land – CO₂

67. Croatia has improved its AD for land converted to forest land as a result of its LULUCF 1 project. Croatia has undertaken an assessment to identify what land-use changes have occurred across all land use subcategories, determine whether the land is managed or unmanaged, as well as determining the exact year of the event of the land-use change. Croatia reports net carbon stock change estimates for land converted to forest land by applying the tier 2 approach for the living biomass and soils pools. The ERT commends Croatia for the improvements made to this category. Croatia continues to apply the tier 1 approach to the DOM pool. The ERT recommends that Croatia make significant efforts to use the results of CRONFI to improve its DOM estimates for the category land converted to forest land in its next annual submission.

68. Croatia reports “NO” for AD for the subcategory “Other land converted to forest land” but reports “NE” (not estimated) in the changes in carbon stocks columns in CRF table 5.A. The notation key for all columns should be “NO”. The ERT recommends that Croatia report the correct notation key in its CRF tables in its next annual submission.

Cropland remaining cropland – CO₂

69. Croatia applied the tier 1 approach for estimating carbon stock change in the biomass of perennial cropland remaining perennial cropland and reported no stock change occurred in the biomass of annual cropland remaining annual cropland. The ERT notes that while the majority of the area reported under cropland remaining cropland is reported under annual cropland remaining annual cropland, it is the estimate of net emissions from the subcategory perennial cropland remaining perennial cropland that make the most significant contribution to the key category status. According to the IPCC good practice guidance for LULUCF, the tier 2 approach is recommended for estimating carbon stock change in a pool which is a significant subcategory of a key category. During previous reviews, Croatia expressed its intention to identify the use of the tier 2 approach for estimating carbon stock change in the biomass pool of perennial cropland remaining perennial cropland as one of its long-term goals in relation to its LULUCF reporting. The ERT notes that the tier 2 approach has not yet been applied for perennial cropland remaining perennial cropland in the 2014 annual submission. The ERT reiterates the recommendation made in previous review reports that Croatia implement the tier 2 approach to perennial cropland remaining perennial cropland as soon as possible.

Land converted to cropland – CO₂

70. Through the application of results from the project LULUCF 1, Croatia has developed a good-quality base map for 1990 from which to assess land-use changes to cropland since 1990. Croatia reports forest land converted to cropland as well as grassland converted to cropland since 1990. This result aligns with other sources; for example, the European Environment Agency.⁵ The ERT commends Croatia for these improvements. With the exception of the cropland biomass estimates, all estimates are derived from tier 2 approaches. The ERT commends Croatia for the increased accuracy of the estimates. The ERT recommends that Croatia improve its cropland biomass estimates to enable it to implement a tier 2 method for estimating cropland biomass in this category as soon as possible.

⁵ See <<http://www.eea.europa.eu/soer/countries/hr/land-use-state-and-impacts-croatia>>.

71. The ERT notes that Croatia applies the tier 1 default method for estimating carbon stock changes in DOM in the forest land converted to cropland category and reports it as not occurring. Croatia has reported estimates for DOM in forest land converted to settlements although it is included elsewhere (in the living biomass pool estimates). The ERT recommends that Croatia work towards using a higher tier method for reporting estimates for DOM in this category.

Land converted to grassland – CO₂

72. The ERT noted that a combination of tier 1 and tier 2 methods is used to estimate emissions in this category. In particular, the biomass estimates for cropland conversions to grassland are derived from tier 1 default method. The ERT recommends that Croatia improve its cropland biomass estimates to enable it to implement a tier 2 method for estimating cropland biomass in this category as soon as possible.

Settlements – CO₂

73. Through the application of results from the project LULUCF 1, Croatia has developed a good-quality base map for 1990 from which to assess land-use changes to settlements. The ERT commends Croatia for carrying out these improvements. With the exception of the cropland converted to settlements category, all estimates are derived using tier 2 approaches. The ERT commends Croatia for the increased accuracy of the estimates. The ERT recommends that Croatia improve its cropland biomass estimates to enable it to implement the tier 2 approach for estimating cropland biomass estimates in this category as soon as possible.

F. Waste

1. Sector overview

74. In 2012, emissions from the waste sector amounted to 1,125.61 Gg CO₂ eq, or 4.3 per cent of total GHG emissions. Since 1990, emissions have increased by 84.3 per cent. The key driver for the rise in emissions is solid waste disposal on land. Within the sector, 70.5 per cent of the emissions were from solid waste disposal on land, followed by 29.5 per cent from wastewater handling. Waste incineration accounted for less than 0.1 per cent of emissions.

75. Croatia has made recalculations between the 2013 and 2014 annual submissions for this sector. The most significant recalculation made by Croatia between the 2013 and 2014 annual submissions was in the following category: wastewater handling. The recalculations were made in response to the 2013 annual review report, in order to lift applied adjustments following changes in AD and EFs and to rectify identified errors. Compared with the 2013 annual submission, the recalculations decreased emissions in the waste sector by 1.20 Gg CO₂ eq (0.1 per cent), and decreased total national emissions by 0.01 per cent. The ERT identified an inconsistency regarding recalculations in the NIR, as Croatia indicated that there are no source-specific recalculations for the subsector solid waste disposal sites, but provided an explanation for wastewater handling. The recalculations were adequately explained.

76. The inventory for the waste sector is complete. The parameters used are mainly default with some country-specific data on waste generation and municipal solid waste (MSW) composition for the estimation of emissions. The AD are mainly from CEA. There are planned improvements for the waste sector, including: the more accurate determination of waste quantities disposed to different types of solid waste disposal sites; introducing a methodology for determining country-specific MSW composition; the periodic analysis of waste for major landfills; the collection of necessary data and information on organic

industrial waste; and the establishment of an effective water information system for domestic and commercial wastewater.

2. Key categories

Solid waste disposal on land – CH₄

77. Croatia estimated CH₄ emissions from MSW disposed to solid waste disposal sites using the tier 2 first-order decay method from the IPCC good practice guidance. The parameters used are mainly IPCC default values, although some country-specific data (waste generation rate and MSW composition) are used for the emission estimation. The AD used in the emission estimation are mainly from CEA. However, information on the type of waste disposed to solid waste disposal sites is not provided. The ERT strongly reiterates the recommendation from the previous review report that Croatia provide information on the type of waste disposed to solid waste disposal sites and ensure that all types of solid waste, including industrial waste, sludge and construction and demolition waste, disposed to solid waste disposal sites are included in the emission estimates.

78. The trend in CH₄ recovered and flared is not stable from 2004 to 2012. The NIR reports that for 2004 and 2005, CH₄ recovered and flared was 0.24 and 2.72 Gg, respectively, and for 2008–2012 the values were 1.12, 1.23, 3.81, 4.40 and 4.80 Gg, respectively. Following a question raised by the ERT during the review, Croatia responded that the quantity of landfill gas collected has increased gradually since 2004. In 2010, a considerable increase in the quantity of collected landfill gas was registered compared with 2009, but Croatia did not provide sufficient reason to justify why CH₄ collection increased in the period 2004–2012. The ERT strongly recommends that Croatia increase the transparency of its explanation of the trend in CH₄ recovery and flaring or revise the estimates in order to ensure the consistency of the time series.

Wastewater handling – CH₄ and N₂O

79. Croatia estimated CH₄ emissions from domestic and commercial wastewater handling. Croatia explained in its NIR that an aerobic biological process is mostly used for wastewater and sludge treatment, and that the fraction of wastewater treated is 0.3 (30 per cent of wastewater is treated) according to expert judgement. Information regarding the number of households with individual systems of drainage is used to estimate the CH₄ emissions. During the review, a question was raised by the ERT on emissions from urban areas and the systems and processes used for treatment. Croatia indicated that it is planning to collect more information on wastewater flows and treatment systems in the future. The ERT considers that the information on wastewater treatment and discharge pathways provided in the NIR is insufficient; for example, the fraction of each wastewater type treated by a particular system is not reported. Therefore, the ERT reiterates the recommendation made in the previous review report that Croatia provide more information on wastewater flows and treatment systems, using figure 5.3 of the IPCC good practice guidance as a guide, in order to understand all potential anaerobic treatment systems and discharge pathways (e.g. uncollected and discharged into the aquatic environment without treatment) and thereby enhance transparency.

80. Croatia has reported “NE” for additional information for both the domestic and industrial categories of total wastewater and treated wastewater. In response to a question raised by the ERT during the review, Croatia stated that there is insufficient information available in the country on the total wastewater and treated wastewater for both domestic and industrial wastewater. In the previous review, the ERT recommended that Croatia provide more information on wastewater flows and treatment systems. Accordingly, Croatia included this request into the programme for annual AD collection and planned it as

long-term goal. The ERT recommends that Croatia collect AD on domestic and commercial wastewater handling.

3. Non-key categories

Waste incineration – CO₂, CH₄ and N₂O

81. The quantity of hospital waste incinerated in 2008 (without energy recovery) reported in the NIR is very high 196.64 t (= 0.20 Gg) compared with the figure for the period 2006–2012. In response to a question raised by the ERT during the review, Croatia explained that there is an error in the AD for 2009: data from one source had not been included in the emission calculation. The correct value for incinerated hospital waste without energy recovery in 2009 is 185.19 t rather than 49.19 t, which is indicated in table 8.4.1 in the NIR. The corrected figure will be included in the next annual submission, together with the recalculation of the CO₂ emissions. One operator incinerated without energy recovery a greater quantity of hospital waste compared with other operators in 2008 and 2009. The same operator used disposal processes for the entirety of its waste since 2010 onwards and is no longer incinerating waste without energy recovery. Accordingly, CO₂ emissions from waste incineration without energy recovery are reduced from 2010 onwards. The ERT recommends that Croatia make all necessary corrections in the next annual submission and perform recalculations of CO₂ emissions in order to ensure the consistency of the time series.

82. Croatia reported “NO” for CO₂ emissions from incineration of plastics waste for 2010–2012 in table 8.4.1 of the NIR, “NE” for 2006 in CRF table 6.A,C, and emission estimates for 2007–2009 in CRF table 6.A,C. In response to a question raised by the ERT during the review, Croatia explained that data for the incineration of plastics without energy recovery are not available for the period 1990–2006 (therefore “NE” was used in CRF table 6.C for 2006 as well as for the years before). Data on the incineration of plastics without energy recovery is available for the period 2007–2009 and CO₂ emissions were estimated for this period. There was no incineration of plastics without energy recovery in the period 2010–2012 (therefore “NO” was used in the CRF table for 2010–2012). The ERT recommends that Croatia extrapolate back in order to estimate CO₂ emissions since 1990 to improve consistency of the time series and transparency and report the results in its NIR.

83. Croatia reported the notation keys “NE” for N₂O emissions from hazardous waste incineration for the period 1990–2010 and “NO” for 2011–2012. Croatia explained in the NIR that it did this because information on the type of incineration technology is not available. The ERT reiterates the recommendation made in the previous review report that Croatia identify the technologies applied in the incineration of hazardous waste and estimate N₂O emissions from waste incineration in its next annual submission.

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

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

Overview

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

Table 6
Supplementary information reported under Article 3, paragraphs 3 and 4, of the Kyoto Protocol

<i>Issue</i>	<i>Expert review team assessment, if applicable</i>	<i>Findings and recommendations</i>
Assessment of the Party's reporting in accordance with the requirements in paragraphs 5–9 of the annex to decision 15/CMP.1	Sufficient	
Activities elected under Article 3, paragraph 4, of the Kyoto Protocol	Activities elected: forest management Years reported: 2008, 2009, 2010, 2011, 2012	
Period of accounting		Commitment period accounting
Party's ability to identify areas of land and areas of land-use change in accordance with paragraph 20 of the annex to decision 16/CMP.1	Sufficient	

85. Chapter G.1 includes the ERT's assessment of the 2014 annual submission against the Article 8 review guidelines and decisions 15/CMP.1 and 16/CMP.1. In accordance with decision 6/CMP.9, Parties will begin reporting of KP-LULUCF activities in the submissions due by 15 April 2015 using revised CRF tables, as contained in the annex to decision 6/CMP.9. Owing to this change in the CRF tables for KP-LULUCF activities and the change from the first commitment period to the second commitment period, paragraphs 88–99 below contain the ERT's assessment of the Party's adherence to the current reporting guidelines and do not provide specific recommendations for reporting these activities in the 2015 annual submission.

86. During the review, the ERT identified Croatia's national system as being unable to perform some of the specific functions required for the inventory preparation. The ERT advised Croatia of the problems identified during the review and included these issues in the list of potential problems and further questions raised during the review. The ERT found that Croatia's national system was not performing some of the specific functions of inventory preparation and the Party's estimates for KP-LULUCF failed to meet some of the reporting requirements in decisions 15/CMP.1 and 16/CMP.1 and some of the requirements for national systems in decision 19/CMP.1, in particular:

(a) Estimates of emissions and removals for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol were not in accordance with the methods described in the Revised 1996 IPCC Guidelines, as elaborated by the IPCC good practice guidance (decision 19/CMP.1, annex, paragraph 14(b) and decision 16/CMP.1, paragraph 3);

(b) The Party did not collect sufficient AD, process information and EFs to support the methods selected for estimating anthropogenic GHG emissions by sources and removals by sinks. The Party was unable to provide the information necessary to meet the reporting requirements defined in the guidelines under Article 7 in accordance with the relevant decisions of the COP and/or COP/MOP (decision 19/CMP.1, annex, paragraphs 14(c) and 14(f));

(c) Croatia's reporting was found to be insufficient in accordance with the requirements in paragraphs 6(a), 6(b), 6(e), 8(c), 9(a), 9(c) and 9(d) of the annex to decision 15/CMP.1. Emission and removal estimates for all activities were not reported for maquia, garigue and scrub forest areas (decision 15/CMP.1, paragraph 6(d), and decision 16/CMP.1);

(d) Croatia did not ensure that units of land were separately identifiable for afforestation, reforestation and deforestation land (decision 15/CMP.1, annex, paragraph 6(b)). Geographically explicit data based on maps of such areas exist for the state forests. For the other forest categories (private and 'other state' forests), as explained by Croatia in the previous review report, information on afforestation, reforestation and deforestation is provided from forest area maps and the Croatian forest land assessment system; however, the Party explained to the ERT that the information is not as geographically explicit as that for the state forests.

87. In response to the list of potential problems and further issues raised by the ERT, Croatia was able to correct the deficiencies identified by including the results of the LULUCF 1 project in a revised version of its NIR which was submitted along with the revised CRF and KP-LULUCF tables on 19 January 2015. Furthermore, Croatia also announced the implementation of a second project, "Upgrading the Croatian national system for the reporting of GHG emissions for the implementation of decision 29/2013/EU of the European Parliament and of the Council of 21 May 2013 on accounting rules on GHG emissions and removals resulting from activities relating to LULUCF and on information concerning actions relating to those activities" (LULUCF 2). Croatia informed the ERT that the implementation of the two projects ensures continuous and sustainable reporting of inventories. The problems identified by the ERT were resolved when Croatia resubmitted its NIR, CRF and KP-LULUCF tables.

Activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol

88. During the 2014 review, the ERT noted that Croatia did not report information in accordance with all the requirements in paragraphs 5–9 of the annex to decision 15/CMP.1, including:

(a) Information on how inventory methodologies have been applied taking into account IPCC good practice guidance for LULUCF and decision 16/CMP.1;

(b) Information on geographical location of the boundaries of areas that encompass: units of land subject to activities under Article 3, paragraph 3, of the Kyoto Protocol; units of land subject to activities under Article 3.3, which would otherwise be included in land subject to elected activities under Article 3, paragraph 4, of the Kyoto Protocol; and land subject to elected activities under Article 3.4;

(c) Information on carbon pools (above-ground / below-ground biomass, litter, dead wood and soil organic carbon) that are not accounted for;

(d) Specific information to be reported for activities under Article 3, paragraph 3, of the Kyoto Protocol, such as the emissions/removals from lands harvested during the first commitment period following afforestation and reforestation on these units of land since 1990;

(e) Specific information to be reported for activities under Article 3, paragraph 4, of the Kyoto Protocol, such as: activities under Article 3.4 that occurred since 1 January 1990 and are human induced; emissions/removals from Article 3.4 activities that are not accounted for under activities under Article 3.3; and forest management information on the extent to which removals by sinks offset the debit incurred under Article 3.3.

89. In addition, Croatia has not implemented the recommendations from previous reviews regarding the estimation of afforestation, reforestation and deforestation for all land areas and has not included all types of forest under forest management in the carbon stock change estimation (missing estimates of maquia and scrub forests). Furthermore, Croatia has estimated removals from afforestation, reforestation and forest management lands that exceeded removals from all forest land reported for all years of the first commitment period. In response to a question raised by the ERT during the review, Croatia advised that the difference was due to removals not being estimated for the conversion of other land to forest land under the Convention, because it was not known whether the land-use change was human induced, managed or unmanaged. The ERT is of the opinion that, even if the land was being reported under forest management this land would not meet the definition of forest management under the Kyoto Protocol, and that this inconsistent approach would lead to an overestimation of removals from forest management. The ERT therefore included all the aspects presented in this paragraph and in paragraph 88 above in the list of potential problems and further questions raised by the ERT during the review.

90. In response to the list of potential problems and further questions raised by the ERT, Croatia corrected the deficiencies identified by including the results of the LULUCF 1 project in a revised version of its NIR which was submitted along with the revised CRF and KP-LULUCF tables on 19 January 2015. Following the assessment of the revised submission, the ERT found that Croatia reports information in accordance with all the requirements in paragraphs 5–9 of the annex to decision 15/CMP.1. The ERT commends Croatia for implementing the required improvements in its 2014 annual submission received on 19 January 2015. In particular, Croatia has eliminated errors in the NIR allowing the ERT to verify that correct methods had been used for the calculations, and has reported sufficient information in the NIR, CRF and KP-LULUCF tables:

- (a) To ensure the identification and traceability of afforestation, deforestation and forest management activities;
- (b) To enable subsequent calculations and to enable all mandatory and elected activities to be verified;
- (c) To enable the ERT to confirm that emissions/removals have been estimated in line with the IPCC good practice guidance.

91. The ERT commends Croatia for resolving the issues with the following mandatory requirements in the revised annual submission received on 19 January 2015:

- (a) CO₂, CH₄ and N₂O emissions from the biomass burning of wildfires on afforestation and reforestation land were provided;
- (b) Emission estimates for deforestation were revised to include emissions from the dead wood and litter pools;
- (c) Emission estimates for deforestation were revised to include all biomass losses and pools;
- (d) The reporting of the use of fuel wood between the energy and LULUCF sectors was reconciled.

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

Afforestation and reforestation – CO₂

92. The ERT noted during the review that the estimates of removals from afforestation and reforestation lands provided by Croatia were not consistent with removals reported

from all forest land reported for all years of the commitment period. The ERT also noted that the area reported under afforestation and reforestation was not consistent with the area of forest land reported under the Convention. Following the assessment of the revised annual submission, received on 19 January 2015, the ERT found that both issues were resolved and the estimates of removals from afforestation and reforestation lands are consistent with removals reported from all forest land reported under the Convention for all years of the commitment period. The area reported under afforestation and reforestation is also consistent with the area of forest land reported under the Convention. The ERT noted that Croatia reports “NO” for carbon stock changes in the dead wood pool. Sufficient verifiable information was provided in the NIR to justify that this pool is not a net source. The ERT commends Croatia for providing the additional information in the NIR.

93. The ERT noted the below-ground biomass pool is reported as “IE” and is included in the above-ground biomass estimates. To increase transparency, the ERT recommends that Croatia report the below-ground biomass pool separately because the method used to calculate the below-ground biomass pool (i.e. applying a root-to-shoot ratio to the above-ground biomass pool) is a separate calculation, and is therefore able to be reported separately.

Deforestation – CO₂

94. Croatia has implemented recommendations from previous review reports and estimated deforestation for all land areas. For example, Croatia previously reported no land-use change from forest land to cropland or grassland, only to settlements. This was inconsistent with the information reported on land-use trends in Croatia by the European Environment Agency.⁶ Following the assessment of the revised annual submission, received on 19 January 2015, the ERT found that Croatia now reports deforestation for both cropland and settlement land uses.

95. In a similar manner to afforestation and reforestation, the ERT noted the below-ground biomass pool is reported as “IE” and is included in the above-ground biomass estimates. To increase transparency, the ERT recommends that Croatia report the below-ground biomass pool separately because the method used to calculate the below-ground biomass pool (i.e. applying a root-to-shoot ratio to the above-ground biomass pool) is a separate calculation, and is therefore able to be reported separately.

96. The ERT notes that the KP-LULUCF table NIR-1 reports “NE” for N₂O emissions from disturbance associated with land-use conversion to cropland, a mandatory category. However, Croatia reports N₂O emissions from disturbance associated with land use conversion to cropland in table 5(KP-II)3 and 5(KP). The ERT commends Croatia for completing the emission estimates for deforestation activities. The ERT recommends that Croatia identify that it does report these emissions by placing “R” (recorded) for this category in table NIR-1 in its next annual submission.

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

Forest management – CO₂

97. Croatia includes all types of forest under forest management in the carbon stock change estimation, as the estimation of carbon stock changes is now performed for maquia and scrub forests. Croatia’s estimates of removals from forest management lands is consistent with removals reported from all forest land reported under the Convention for all years of the commitment period. The ERT noted that the area reported under forest management land is consistent with the area of forest land reported under the Convention.

⁶ See <<http://www.eea.europa.eu/soer/countries/hr/land-use-state-and-impacts-croatia>>.

Croatia reports biomass burning from wildfires in forests under forest management activities separately from that occurring on afforestation and reforestation lands. The ERT commends Croatia for all these improvements.

98. In a similar manner to afforestation, reforestation and deforestation, the ERT noted the below-ground biomass pool is reported as “IE” and is included in the above-ground biomass estimates. To increase transparency, the ERT recommends that Croatia report the below-ground biomass pool separately because the method used to calculate the below-ground biomass pool (i.e. applying a root-to-shoot ratio to the above-ground biomass pool) is a separate calculation, and therefore able to be reported separately.

99. The ERT noted that Croatia reports “NO” for carbon stock changes in the dead wood, litter and soil pools. Sufficient verifiable information was provided in the NIR to justify that these pools are not a net source. The ERT commends Croatia for providing the additional information in the NIR.

2. Information on Kyoto Protocol units

Standard electronic format and reports from the national registry

100. 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 and recommendations included in the standard independent assessment report (SIAR) on the SEF tables and the SEF comparison report.⁷ The SIAR was forwarded to the ERT prior to the review, pursuant to decision 16/CP.10. The ERT reiterated the main findings and recommendations contained in the SIAR.

101. Information on the accounting of Kyoto Protocol units has been prepared and reported in accordance with decision 15/CMP.1, annex, chapter I.E, and reported in accordance with decision 14/CMP.1 using the SEF tables. This information is consistent with that contained in the national registry and with the records of the international transaction log (ITL) and the clean development mechanism registry and meets the requirements referred to in decision 22/CMP.1, annex, paragraph 88(a–j). 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.

Accounting of activities under Article 3, paragraph 3, of the Kyoto Protocol and any elected activities under Article 3, paragraph 4, of the Kyoto Protocol

102. Croatia has reported information on its accounting of KP-LULUCF in the accounting table, as included in the annex to decision 6/CMP.3. Information on the accounting of KP-LULUCF has been prepared and reported in accordance with decisions 16/CMP.1 and 6/CMP.3.

103. Table 7 shows the accounting quantities for KP-LULUCF as reported by the Party and the final values after the review.

⁷ The SEF comparison report is prepared by the international transaction log (ITL) administrator and provides information on the outcome of the comparison of data contained in the Party’s SEF tables with corresponding records contained in the ITL.

Table 7
Accounting quantities for activities under Article 3, paragraph 3, and, if any, activities under Article 3, paragraph 4, of the Kyoto Protocol, in t CO₂ eq

	2014 annual submission ^a		
	As reported	Revised estimates	Final accounting quantity ^b
Afforestation and reforestation			
Non-harvested land	-948 101	-553 630	-553 630
Harvested land	NO	NA, NO	NA, NO
Deforestation	1 175 388	321 791	321 791
Forest management	-5 085 620	-4 858 333	-4 858 333
Article 3.3 offset ^c	-227 287	0	0
Forest management cap ^d	-4 858 333	-4 858 333	-4 858 333
Cropland management	NA	NA	NA
Grazing land management	NA	NA	NA
Revegetation	NA	NA	NA

Abbreviations: NA = not applicable, NO = not occurring.

^a The values included under the 2014 annual submission are the cumulative accounting values for 2008, 2009, 2010, 2011 and 2012, as reported in the accounting table of the land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol common reporting format tables for the inventory year 2012.

^b The “final accounting quantity” is the quantity of Kyoto Protocol units that the Party shall issue or cancel under each activity under Article 3, paragraph 3, and paragraph 4, if relevant, based on the final accounting quantity in the 2014 annual submission.

^c “Article 3.3 offset”: for the first commitment period, a Party included in Annex I to the Convention that incurs a net source of emissions under the provisions of Article 3, paragraph 3, of the Kyoto Protocol may account for anthropogenic greenhouse gas emissions by sources and removals by sinks in areas under forest management under Article 3, paragraph 4, up to a level that is equal to the net source of emissions under the provisions of Article 3, paragraph 3, but not greater than 9.0 megatonnes of carbon times five, if the total anthropogenic greenhouse gas emissions by sources and removals by sinks in the managed forest since 1990 is equal to, or larger than, the net source of emissions incurred under Article 3, paragraph 3.

^d In accordance with decision 16/CMP.1, annex, paragraph 11, for the first commitment period only, additions to and subtractions from the assigned amount of a Party resulting from forest management under Article 3, paragraph 4, of the Kyoto Protocol after the application of decision 16/CMP.1, annex, paragraph 10, and resulting from forest management project activities undertaken under Article 6, shall not exceed the value inscribed in the appendix of the annex to decision 16/CMP.1, times five.

104. Based on the information provided in table 7 for the activity afforestation and reforestation, Croatia shall: for non-harvested land, issue 553,630 removal units (RMUs) in its national registry and for harvested land, neither issue nor cancel any units in its national registry.

105. Based on the information provided in table 7 for the activity deforestation, Croatia shall cancel 321,791 assigned amount units, emission reduction units, certified emission reductions and/or RMUs in its national registry.

106. Based on the information provided in table 7 for the activity forest management, Croatia shall issue 4,858,333 RMUs in its national registry.

Calculation of the commitment period reserve

107. Croatia has reported its commitment period reserve in its 2014 annual submission. Croatia reported that its commitment period reserve has not changed since the initial report

review (133,900,653 t CO₂ eq) as it is based on the assigned amount and not the most recently reviewed inventory. The ERT disagrees with this figure. The ERT's calculation of the commitment period reserve is 132,248,085 t CO₂ eq based on the submission of revised emission estimates by Croatia during the review of the 2014 annual submission for the most recently reviewed inventory (26,449,617 t CO₂ eq). The ERT recommends that Croatia ensure that the calculation of the commitment period reserve is in accordance with decision 11/CMP.1.

3. Changes to the national system

108. Croatia reported that there are changes in its national system since the previous annual submission. The main changes are related to legal arrangements for the new National Plan for Air Protection, Ozone Layer Protection and Climate Change Mitigation for the period 2013–2017. The plan, which was adopted in 2013 (OG 139/2013), aims to improve the performance of the national system, including the system as it relates to the preparation of the inventory for the LULUCF sector. In addition, a plan for spending auctioning revenues on research and development in the field of reporting on GHG emissions was sent to the Government of Croatia in October 2014 for adoption. The Party described the change to its legislative framework in its NIR. 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. The ERT recommends that the Party report in its annual submission any change(s) in its national system in accordance with decision 15/CMP.1, annex, chapter I.F.

4. Changes to the national registry

109. Croatia reported that there are changes in its national registry since the previous annual submission. The Party described in its NIR the changes: to its cooperation arrangements; to its national registry database so as to conform with the technical standards of its national registry; and to the URL of its national registry after migration to the EU registry. The ERT concluded that, taking into account the confirmed changes in the national registry, Croatia's national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1 and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant CMP decisions. The ERT recommends that the Party report in its annual submission any change(s) in its national registry in accordance with decision 15/CMP.1, annex, chapter I.G.

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

110. Consistent with paragraph 23 of the annex to decision 15/CMP.1, Croatia provided information relating to how it is striving, under Article 3, paragraph 14, of the Kyoto Protocol, to implement its commitments in such a way as to minimize adverse social, environmental and economic impacts on developing country Parties, particularly those identified in Article 4, paragraphs 8 and 9, of the Convention.

111. Croatia reported that considering its size, share in international trade and GHG footprint, the implemented policies and measures do not have any significant adverse economic, social and environmental impacts on developing countries and will not in the future. However, Croatia is actively assisting developing countries in the region in building their capacities to harmonize their national systems with the requirements of the Convention and its Kyoto Protocol as well as the requirements of EU regulations (all of the countries being assisted are in the process of EU accession (approximation) but with different starting points). This assistance is organized through projects financed by the European Commission under the Environment and Climate Regional Accession Network.

112. Croatia reported that while there have been no significant changes in its policies and measures implemented to minimize adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol, the section of the NIR regarding the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol was largely revised since the previous annual submission in order to provide more detailed and transparent information on actions undertaken by Croatia in mitigating climate change. The ERT concluded that, taking into account the confirmed changes in the reporting, the information provided is complete and transparent.

III. Conclusions and recommendations

A. Conclusions

113. Table 8 summarizes the ERT's conclusions on the 2014 annual submission of Croatia, in accordance with the Article 8 review guidelines.

Table 8

Expert review team's conclusions on the 2014 annual submission of Croatia

<i>Issue</i>	<i>Expert review team assessment</i>	<i>Paragraph cross-references for identified problems</i>
The ERT concludes that the inventory submission of Croatia is complete with regard to categories, gases, years and geographical boundaries and contains both an NIR and CRF tables for 1990–2012		
Annex A sources ^a	Not complete	See paragraphs 82 and 83 above
LULUCF ^a	Complete	
KP-LULUCF	Complete	
The ERT concludes that the inventory submission of Croatia has been prepared and reported in accordance with the UNFCCC reporting guidelines	No	See paragraph 26 and 27 above
The Party's inventory is in accordance with the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF	Generally	See paragraphs 28, 31, 34 and 69 above
The submission of information required under Article 7, paragraph 1, of the Kyoto Protocol has been prepared and reported in accordance with decision 15/CMP.1	Yes	
The Party has reported information on its accounting of Kyoto Protocol units in accordance with decision 15/CMP.1, annex, chapter I.E, and used the required reporting format tables as specified by decision 14/CMP.1	Yes	
The national system continues to perform its required functions as set out in the annex to decision 19/CMP.1	Yes	
The national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1 and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant CMP decisions	Yes	

<i>Issue</i>	<i>Expert review team assessment</i>	<i>Paragraph cross-references for identified problems</i>
Did the Party provide information in the NIR on changes in its reporting of the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol?	Yes	

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, CMP = Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol, CRF = common reporting format, ERT = expert review team, IPCC = Intergovernmental Panel on Climate Change, IPCC good practice guidance = IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*, IPCC good practice guidance for LULUCF = IPCC *Good Practice Guidance for 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, LULUCF = land use, land-use change and forestry, NIR = national inventory report, Revised 1996 IPCC Guidelines = *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, UNFCCC reporting guidelines = “Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories”.

^a The assessment of completeness by the ERT considers only the completeness of reporting of mandatory categories (i.e. categories for which methods and default emission factors are provided in the Revised 1996 IPCC Guidelines, the IPCC good practice guidance or the IPCC good practice guidance for LULUCF).

B. Recommendations

114. The ERT identified the issues for improvement listed in table 9. All recommendations are for the next annual submission, unless otherwise specified. The ERT notes that this review report of the 2014 annual submission was published after 15 April 2015. Where recommendations cannot be fully implemented in time for the next annual submission, the ERT recommends that the Party provide an update on progress of implementation in the NIR.

Table 9
Recommendations identified by the expert review team

<i>Sector</i>	<i>Category/cross-cutting issue</i>	<i>Recommendation</i>	<i>Reiteration of previous recommendation?</i>	<i>Paragraph cross-references</i>
Cross-cutting	Completeness, Annex A sources	Estimate and report emissions from all mandatory categories	No	Table 3
	Key category analysis	Include more information in the NIR of how the key category analysis is used to prioritize the development and improvement of the inventory	Yes	Table 4
	Follow-up to previous reviews	Improve transparency by providing in the table references (e.g. section or paragraph numbers) to indicate where such recommendations are covered in the NIR	No	16
Energy	Sector overview	Improve the transparency of reporting under feedstocks and non-energy use of fuel with regards to natural gas used as fuel in ammonia production	No	21
		Take steps to ensure the consistency of AD for fuel use in manufacturing industries and construction and in the type of AD used for the estimation of CO ₂ emissions from gas transmission pipelines	No	22

<i>Sector</i>	<i>Category/cross-cutting issue</i>	<i>Recommendation</i>	<i>Reiteration of previous recommendation?</i>	<i>Paragraph cross-references</i>
	Comparison of the reference approach with the sectoral approach and international statistics	Provide a more detailed and transparent explanation for the observed CO ₂ emission differences between the reference approach and the sectoral approach	Yes	24
		Take steps to resolve the issue regarding the allocation of natural gas used as fuel and as non-energy use in the energy balance to improve the accuracy of the reporting	No	24
	International bunker fuels	Compare the aviation bunker fuels of IEA and the CRF tables and explain any discrepancies observed	No	26
		Provide a detailed explanation of the factors contributing to decreases in bunker fuel consumption and associated CO ₂ emissions	Yes	26
	Feedstocks and non-energy use of fuels	Continue with the measures to collect data for the natural gas actually used as a fuel for the period 1990–2013 and report the data for natural gas used as fuel obtained from the industrial plant	No	27
	Stationary combustion: solid, liquid and gaseous – CO ₂ , CH ₄ and N ₂ O	Take steps to obtain and use plant-specific CO ₂ EFs to improve the accuracy of the emission estimates	No	28
	Civil aviation: liquid fuels – CO ₂	Improve the accuracy and transparency of reporting in the NIR by adopting an approach in accordance with the IPCC good practice guidance, such as using aviation fuel use surveys, sales statistics and origin–destination statistics to obtain the actual jet kerosene consumption figures for domestic and international aviation	No	31
	Road transportation: liquid and gaseous fuels – CO ₂	Improve the transparency of its reporting under road transportation by providing sufficient explanations in the NIR about the methodology used for estimating emissions from gaseous fuels	No	32
	Coal mining and handling: solid fuels – CH ₄	Use the actual coal production figures for estimating emissions	Yes	33
	Oil and natural gas: gaseous fuels – CH ₄ and CO ₂	Take steps to use the gas pipeline length as the AD for CO ₂ emission calculations	No	34
	Other (mobile): liquid fuels – CO ₂ , CH ₄ and N ₂ O	Indicate in the NIR the category under which military fuel use has been included	No	35

<i>Sector</i>	<i>Category/cross-cutting issue</i>	<i>Recommendation</i>	<i>Reiteration of previous recommendation?</i>	<i>Paragraph cross-references</i>
Industrial processes and solvent and other product use	Ammonia production – CO ₂	Review the emission estimation methodology it uses for this category and provide clearer justification of the IEF estimation	Yes	39
	Ferroalloys production – CO ₂	Provide more details on the plan to increase the transparency and accuracy of estimates by obtaining AD for ferroalloys production to replace the interpolated data	Yes	40
	Consumption of halocarbons and SF ₆ – HFCs, PFCs and SF ₆	Continue to conduct surveys on the status of disposal of refrigeration and air-conditioning equipment and include the results in the NIR	Yes	41
	Lime production – CO ₂	Recalculate the CO ₂ emissions from lime production for 2012 using real data, report them, and conduct an analysis for the key categories under the industrial processes sector	No	44
Agriculture	Sector overview	Provide detailed explanations in the NIR on the data sources and recalculations	No	47
		Continue its effort to develop country-specific EFs to estimate CH ₄ emissions from enteric fermentation and CH ₄ and N ₂ O emissions from manure management	No	48
		Improve the agricultural information provided in the inventory and explain the national conditions more thoroughly in the NIR	No	49
	Enteric fermentation – CH ₄	Improve the transparency of recalculations and provide the references for AD for milk production	No	50
	Manure management – CH ₄ and N ₂ O	Implement the results of the research project	Yes	52
	Other (agricultural soils) – N ₂ O	Correct the error in the nitrogen content of sludge and improve the QA/QC activity for the data received from CEA	No	59
LULUCF	Sector overview	Adequately explain recalculations to improve transparency in the sector	No	61
		Improve the transparency of the NIR and CRF tables by reporting DOM separately in forest land converted to settlements and by separating litter from the soils pool	No	64
	Forest land remaining forest land – CO ₂	Make significant efforts to use the results of CRONFI to improve the LULUCF sector inventory	No	66

<i>Sector</i>	<i>Category/cross-cutting issue</i>	<i>Recommendation</i>	<i>Reiteration of previous recommendation?</i>	<i>Paragraph cross-references</i>
	Land converted to forest land – CO ₂	Make significant efforts to use the results of CRONFI to improve DOM estimates for the category land converted to forest land	No	67
		Report the correct notation key in the CRF tables	No	68
	Cropland remaining cropland – CO ₂	Implement the tier 2 approach to perennial cropland remaining perennial cropland	Yes	69
	Land converted to cropland – CO ₂	Improve the cropland biomass estimates to enable it to implement a tier 2 method for estimating cropland biomass in this category	No	70
		Work towards using a higher tier method for reporting estimates for DOM in this category	No	71
	Land converted to grassland – CO ₂	Improve cropland biomass estimates to enable the implementation of a tier 2 method for estimating cropland biomass in this category	No	72
	Settlements – CO ₂	Improve cropland biomass estimates to enable the implementation of a tier 2 method for estimating cropland biomass in this category	No	73
Waste	Solid waste disposal on land – CH ₄	Provide information on the type of waste disposed to solid waste disposal sites and ensure that all types of solid waste, including industrial waste, sludge and construction and demolition waste, disposed to solid waste disposal sites are included in the emission estimates	Yes	77
		Increase the transparency of its explanation of the trend in CH ₄ recovery and flaring or revise the estimates in order to ensure consistency in the time series	No	78
	Wastewater handling – CH ₄ and N ₂ O	Provide more information on wastewater flows and treatment systems, using figure 5.3 of the IPCC good practice guidance as a guide, in order to understand all potential anaerobic treatment systems and discharge pathways and thereby enhance transparency	Yes	79
		Collect AD on domestic and commercial wastewater handling	No	80
	Waste incineration – CO ₂ , CH ₄ and N ₂ O	Make all necessary corrections and perform recalculations of CO ₂ emissions in order to ensure the consistency of the time series	No	81
		Extrapolate back in order to estimate CO ₂ emissions since 1990 to improve consistency of the time series and transparency and report the results in its NIR	No	82

<i>Sector</i>	<i>Category/cross-cutting issue</i>	<i>Recommendation</i>	<i>Reiteration of previous recommendation?</i>	<i>Paragraph cross-references</i>
		Identify the technologies applied in the incineration of hazardous waste and estimate N ₂ O emissions from waste incineration	Yes	83
KP-LULUCF	Activities under Article 3, paragraph 3, of the Kyoto Protocol	Report the below-ground biomass pool separately because the method used to calculate the below-ground biomass pool is a separate calculation, and is therefore able to be reported separately	No	93, 95
		Identify that it does report the N ₂ O emissions from disturbance associated with land-use conversion to cropland by placing “R” (recorded) for this category in table NIR-1	No	96
	Activities under Article 3, paragraph 4, of the Kyoto Protocol	Report the below-ground biomass pool separately because the method used to calculate the below-ground biomass pool is a separate calculation, and therefore able to be reported separately	No	98
Information on Kyoto Protocol units	Calculation of the commitment period reserve	Ensure that the calculation of the commitment period reserve is in accordance with decision 11/CMP.1	No	107
National system		Report any change(s) in its national system in accordance with decision 15/CMP.1, annex, chapter I.F	No	108
National registry		Report any change(s) in its national registry in accordance with decision 15/CMP.1, annex, chapter I.G	No	109

Abbreviations: AD = activity data, CEA = Croatian Environment Agency, CMP = Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol, CRF = common reporting format, CRONFI = Croatian National Forest Inventory, DOM = dead organic matter, EF = emission factor, IEA = International Energy Agency, IEF = implied emission factor, IPCC = Intergovernmental Panel on Climate Change, IPCC good practice guidance = IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, NIR = national inventory report, QA/QC = quality assurance/quality control.

IV. Questions of implementation

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

Annex I

Information to be included in the compilation and accounting database

Table 10
Information to be included in the compilation and accounting database in t CO₂ eq for 2012, including the commitment period reserve

	<i>As reported</i>	<i>Revised estimates</i>	<i>Adjustment^a</i>	<i>Final^b</i>
Commitment period reserve	133 900 653	132 248 085		132 248 085
Annex A emissions for 2012				
CO ₂	19 233 201			19 233 201
CH ₄	3 422 544			3 422 544
N ₂ O	3 267 816	3 298 628		3 298 628
HFCs	485 619			485 619
PFCs	25			25
SF ₆	9 600			9 600
Total Annex A sources^c	26 418 804	26 449 617		26 449 617
Activities under Article 3, paragraph 3, for 2012				
3.3 Afforestation and reforestation on non-harvested land for 2012	-217 464	-176 406		-176 406
3.3 Afforestation and reforestation on harvested land for 2012	NA, NO			NA, NO
3.3 Deforestation for 2012	205 780	62 160		62 160
Activities under Article 3, paragraph 4, for 2012^d				
3.4 Forest management for 2012	-7 449 402	-6 988 730		-6 988 730
3.4 Cropland management for 2012				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2012				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2012				
3.4 Revegetation for the base year				

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, NA = not applicable, NO = not occurring.

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

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

^c The values for "Total Annex A sources" in the columns "As reported", "Revised estimates" and "Final" may not equal the sum of the values for the gases in those columns owing to rounding.

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

Table 11
Information to be included in the compilation and accounting database in t CO₂ eq for 2011

	<i>As reported</i>	<i>Revised estimates</i>	<i>Adjustment^a</i>	<i>Final^b</i>
Annex A emissions for 2011				
CO ₂	20 917 997			20 917 997
CH ₄	3 626 131			3 626 131
N ₂ O	3 503 595	3 539 801		3 539 801
HFCs	484 908			484 908
PFCs	13			13
SF ₆	9 817			9 817
Total Annex A sources^c	28 542 462	28 578 668		28 578 668
Activities under Article 3, paragraph 3, for 2011				
3.3 Afforestation and reforestation on non-harvested land for 2011	-191 349	-118 919		-118 919
3.3 Afforestation and reforestation on harvested land for 2011	NA, NO			NA, NO
3.3 Deforestation for 2011	224 504	44 796		44 796
Activities under Article 3, paragraph 4, for 2011^d				
3.4 Forest management for 2011	-7 623 329	-7 432 350		-7 432 350
3.4 Cropland management for 2011				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2011				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2011				
3.4 Revegetation for the base year				

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, NA = not applicable, NO = not occurring.

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

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

^c The values for “Total Annex A sources” in the columns “As reported”, “Revised estimates” and “Final” may not equal the sum of the values for the gases in those columns owing to rounding.

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

Table 12
Information to be included in the compilation and accounting database in t CO₂ eq for 2010

	<i>As reported</i>	<i>Revised estimates</i>	<i>Adjustment^a</i>	<i>Final^b</i>
Annex A emissions for 2010				
CO ₂	21 330 405			21 330 405
CH ₄	3 686 795			3 686 795
N ₂ O	3 394 626	3 431 289		3 431 289
HFCs	472 251			472 251
PFCs	29			29
SF ₆	9 319			9 319
Total Annex A sources^c	28 893 425	28 930 088		28 930 088
Activities under Article 3, paragraph 3, for 2010				
3.3 Afforestation and reforestation on non-harvested land for 2010	-178 603	-105 419		-105 419
3.3 Afforestation and reforestation on harvested land for 2010	NA, NO			NA, NO
3.3 Deforestation for 2010	237 237	64 648		64 648
Activities under Article 3, paragraph 4, for 2010^d				
3.4 Forest management for 2010	-8 538 918	-8 523 402		-8 523 402
3.4 Cropland management for 2010				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2010				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2010				
3.4 Revegetation for the base year				

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, NA = not applicable, NO = not occurring.

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

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

^c The values for "Total Annex A sources" in the columns "As reported", "Revised estimates" and "Final" may not equal the sum of the values for the gases in those columns owing to rounding.

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

Table 13
Information to be included in the compilation and accounting database in t CO₂ eq for 2009

	<i>As reported</i>	<i>Revised estimates</i>	<i>Adjustment^a</i>	<i>Final^b</i>
Annex A emissions for 2009				
CO ₂	21 991 101			21 991 101
CH ₄	3 633 409			3 633 409
N ₂ O	3 321 702	3 360 727		3 360 727
HFCs	435 677			435 677
PFCs	204			204
SF ₆	8 393			8 393
Total Annex A sources^c	29 390 486	29 429 510		29 429 510
Activities under Article 3, paragraph 3, for 2009				
3.3 Afforestation and reforestation on non-harvested land for 2009	-182 308	-70 732		-70 732
3.3 Afforestation and reforestation on harvested land for 2009	NA, NO			NA, NO
3.3 Deforestation for 2009	248 244	71 114		71 114
Activities under Article 3, paragraph 4, for 2009^d				
3.4 Forest management for 2009	-8 732 884	-8 717 890		-8 717 890
3.4 Cropland management for 2009				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2009				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2009				
3.4 Revegetation for the base year				

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, NA = not applicable, NO = not occurring.

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

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

^c The values for "Total Annex A sources" in the columns "As reported", "Revised estimates" and "Final" may not equal the sum of the values for the gases in those columns owing to rounding.

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

Table 14
Information to be included in the compilation and accounting database in t CO₂ eq for 2008

	<i>As reported</i>	<i>Revised estimates</i>	<i>Adjustment^a</i>	<i>Final^b</i>
Annex A emissions for 2008				
CO ₂	23 770 695			23 770 695
CH ₄	3 631 170			3 631 170
N ₂ O	3 562 021	3 593 438		3 593 438
HFCs	424 416			424 416
PFCs	NA, NO			NA, NO
SF ₆	12 554			12 554
Total Annex A sources^c	31 400 857	31 432 273		31 432 273
Activities under Article 3, paragraph 3, for 2008				
3.3 Afforestation and reforestation on non-harvested land for 2008	-178 377	-82 154		-82 154
3.3 Afforestation and reforestation on harvested land for 2008	NA, NO			NA, NO
3.3 Deforestation for 2008	259 624	79 073		79 073
Activities under Article 3, paragraph 4, for 2008^d				
3.4 Forest management for 2008	-8 503 553	-8 492 403		-8 492 403
3.4 Cropland management for 2008				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2008				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2008				
3.4 Revegetation for the base year				

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, NA = not applicable, NO = not occurring.

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

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

^c The values for "Total Annex A sources" in the columns "As reported", "Revised estimates" and "Final" may not equal the sum of the values for the gases in those columns owing to rounding.

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

Annex II

Documents and information used during the review

A. Reference documents

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

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 for the estimation of anthropogenic greenhouse gas emissions by sources and removals by sinks 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 2014. Available at <http://unfccc.int/resource/docs/2014/asr/hrv.pdf>.

Synthesis and assessment report on the greenhouse gas inventories submitted in 2014. Available at <http://unfccc.int/resource/webdocs/sai/2014.pdf>.

FCCC/ARR/2013/HRV. Report of the individual review of the annual submission of Croatia submitted in 2013. Available at <http://unfccc.int/resource/docs/2014/arr/hrv.pdf>.

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

B. Additional information provided by the Party

Responses to questions during the review were received from Ms. Vlatka Palčić (Ministry of Environmental and Nature Protection), including additional material on the methodology and assumptions used. The following documents¹ were also provided by Croatia:

Agencija za Zastitu Okolisa. 2014. *Unapređenje Proračuna Emisije NH₃, CH₄ i N₂O iz Sektora Gospodarenja Stajskim Gnojem i Izrada Nacionalnih Faktora*. Zagreb: Agencija za Zastitu Okolisa.

¹ Reproduced as received from the Party.

Annex III

Acronyms and abbreviations

AD	activity data
CEA	Croatian Environment Agency
CH ₄	methane
CMP	Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol
CO ₂	carbon dioxide
CO ₂ eq	carbon dioxide equivalent
CRF	common reporting format
CRONFI	Croatian National Forest Inventory
DOM	dead organic matter
EF	emission factor
ERT	expert review team
EU	European Union
GHG	greenhouse gas; unless indicated otherwise, GHG emissions are the sum of CO ₂ , CH ₄ , N ₂ O, HFCs, PFCs and SF ₆ without GHG emissions and removals from LULUCF
HFCs	hydrofluorocarbons
IE	included elsewhere
IEA	International Energy Agency
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
ITL	international transaction log
kg	kilogram (1 kg = 1,000 grams)
KP-LULUCF	land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol
LULUCF	land use, land-use change and forestry
m ³	cubic metre
MENP	Ministry of Environmental and Nature Protection
MMS	manure management systems
MSW	municipal solid waste
N	nitrogen
N ₂ O	nitrous oxide
NA	not applicable
NCV	net calorific values
NE	not estimated
Nex	nitrogen excretion rate
NIR	national inventory report
NO	not occurring
PFCs	perfluorocarbons
PJ	petajoule (1 PJ = 10 ¹⁵ joule)
QA/QC	quality assurance/quality control
RMU	removal unit
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