United Nations

Framework Convention on
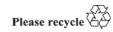Climate Change

FCCC/ARR/2022/HRV

Distr.: General
15 March 2023

English only

Report on the individual review of the annual submission of Croatia submitted in 2022*

Note by the expert review team

Summary

  Each Party included in Annex I to the Convention must submit an annual inventory of emissions and removals of greenhouse gases for all years from the base year (or period) to two years before the inventory due date (decision 24/CP.19). Parties included in Annex I to the Convention that are Parties to the Kyoto Protocol are also required to report supplementary information under Article 7, paragraph 1, of the Kyoto Protocol with the inventory submission due under the Convention. This report presents the results of the individual review of the 2022 annual submission of Croatia, conducted by an expert review team in accordance with the "Guidelines for review under Article 8 of the Kyoto Protocol". The review took place from 10 to 15 October 2022 in Bonn.

---

  * In the symbol for this document, 2022 refers to the year in which the inventory was submitted, not to the year of publication.

Please recycle

Contents

Abbreviations and acronyms

2006 IPCC Guidelines	*2006 IPCC Guidelines for National Greenhouse Gas Inventories*
AAU	assigned amount unit
AD	activity data
Annex A source	source category included in Annex A to the Kyoto Protocol
Annex I Party	Party included in Annex I to the Convention
AR	afforestation and reforestation
Article 8 review guidelines	"Guidelines for review under Article 8 of the Kyoto Protocol"
BEF	biomass expansion factor
B_o	maximum methane-producing capacity
C	carbon
CaO	calcium oxide
CER	certified emission reduction
CH_4	methane
CM	cropland management
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
Convention reporting adherence	adherence to the "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"
CORINE	Coordination of Information on the Environment
CPR	commitment period reserve
CRF	common reporting format
CRONFI	Croatian National Forest Inventory
CSC	carbon stock change
DOC	degradable organic carbon
EF	emission factor
ERT	expert review team
ERU	emission reduction unit
ESD	European Union effort-sharing decision
EU	European Union
EU ETS	European Union Emissions Trading System
FM	forest management
FMRL	forest management reference level
$Frac_{GasMS}$	fraction of managed livestock manure nitrogen that volatilizes as ammonia and nitrogen oxides for each livestock species or category
$Frac_{LeachMS}$	fraction of nitrogen input to managed soils that is lost through leaching and run-off
$Frac_{LossMS}$	fraction of total nitrogen loss from manure managed in each manure management system for each livestock species or category
GHG	greenhouse gas
GM	grazing land management
HFC	hydrofluorocarbon
HWP	harvested wood products
IE	included elsewhere
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
IPPU	industrial processes and product use

KP reporting adherence	adherence to the reporting guidelines under Article 7, paragraph 1, of the Kyoto Protocol
KP-LULUCF	activities under Article 3, paragraphs 3–4, of the Kyoto Protocol
Kyoto Protocol Supplement	2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol
LULUCF	land use, land-use change and forestry
MCF	methane conversion factor
MgO	magnesium oxide
MMS	manure management system(s)
MSW	municipal solid waste
N	nitrogen
N_2O	nitrous oxide
NA	not applicable
NCV	net calorific value
NE	not estimated
Nex	nitrogen excretion
NF_3	nitrogen trifluoride
NH_3	ammonia
NIR	national inventory report
NO	not occurring
NO_X	nitrogen oxides
PFC	perfluorocarbon
QA/QC	quality assurance/quality control
RMU	removal unit
RV	revegetation
SEF	standard electronic format
SF_6	sulfur hexafluoride
SIAR	standard independent assessment report
SWDS	solid waste disposal site(s)
UNFCCC Annex I inventory 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 greenhouse gas inventories"
UNFCCC review guidelines	"Guidelines for the technical review of information reported under the Convention related to greenhouse gas inventories, biennial reports and national communications by Parties included in Annex I to the Convention"
VS	volatile solid(s)
WDR	wetland drainage and rewetting
Wetlands Supplement	*2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands*

I. Introduction

1.   This report covers the review of the 2022 annual submission of Croatia, organized by the secretariat in accordance with the Article 8 review guidelines (adopted by decision 22/CMP.1 and revised by decision 4/CMP.11). In accordance with the Article 8 review guidelines, this review process also encompasses the review under the Convention as described in the UNFCCC review guidelines, particularly in part III thereof, namely the "UNFCCC guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention" (annex to decision 13/CP.20). The review took place from 10 to 15 October 2022 in Bonn, and was coordinated by Nalin Srivastava, Sohel Pasha and Claudia do Valle (secretariat). Table 1 provides information on the composition of the ERT that conducted the review for Croatia.

Table 1
Composition of the expert review team that conducted the review for Croatia

Area of expertise	Name	Party
Generalist	Mark Hunstone	Australia
	Mayra Rocha	Brazil
Energy	Maya Fukuda	Japan
	Haakon Marold	Australia
	Victoria Novikova	Belarus
	David O'Toole	Australia
IPPU	Valentina Idrissova	Canada
	Thapelo Clifford Mohale Letete	South Africa
	Takuji Terakawa	Japan
Agriculture	Michael Anderl	Austria
	Britta Maria Hoem	Norway
	Giovanna Lunkmoss de Christo	Brazil
LULUCF and KP-LULUCF	Andrea Brandon	New Zealand
	Oksana Butrym	Ukraine
	Iordanis Tzamtzis	Greece
Waste	Takefumi Oda	Japan
	Sirinthornthep Towprayoon	Thailand
Lead reviewers	Mark Hunstone	
	Mayra Rocha	

2.   The basis of the findings in this report is the assessment by the ERT of the Party's 2022 annual submission in accordance with the UNFCCC review guidelines and the Article 8 review guidelines.

3.   The ERT has made recommendations that Croatia resolve identified findings, including issues[1] designated as problems.[2] Other findings, and, if applicable, the encouragements of the ERT to Croatia to resolve related issues, are also included in this report.

4.   A draft version of this report was communicated to the Government of Croatia, which provided comments that were considered and incorporated, as appropriate, into this final version of the report.

---

[1]   Issues are defined in decision 13/CP.20, annex, para. 81.
[2]   Problems are defined in decision 22/CMP.1, annex, paras. 68–69, as revised by decision 4/CMP.11.

5. Annex I presents the annual GHG emissions of Croatia, including totals excluding and including LULUCF, indirect CO_2 emissions, and emissions by gas and by sector, and contains background data on emissions and removals from KP-LULUCF, if elected by the Party, by gas, sector and activity.

6. Information to be included in the compilation and accounting database can be found in annex II.

II. Summary and general assessment of the Party's 2022 annual submission

7. Table 2 provides the assessment by the ERT of the Party's 2022 annual submission with respect to the tasks undertaken during the review. Further information on the issues identified, as well as additional findings, may be found in tables 3 and 5.

Table 2
Summary of review results and general assessment of the 2022 annual submission of Croatia

Assessment			Issue/problem ID#(s) in table 3 or 5[a]
Date(s) of submission	Original submission: NIR, 26 May 2022; CRF tables (version 2), 26 May 2022; SEF tables, 12 April 2022		
	Revised submission: CRF tables (version 3), 14 October 2022		
	Unless otherwise specified, values from the most recent submission are included in this report		
Review format	Centralized		
Application of the requirements of the UNFCCC Annex I inventory reporting guidelines and the Wetlands Supplement (if applicable)	Have any issues been identified in the following areas:		
	(a) Identification of key categories?	No	
	(b) Selection and use of methodologies and assumptions?	Yes	G.1, G.2, E.1, E.5, I.4, I.6, I.7, I.8, I.28, A.3, A.5, A.9, L.22, KL.11
	(c) Development and selection of EFs?	Yes	E.3, E.7, E.8, E.9, L.11
	(d) Collection and selection of AD?	Yes	E.5, I.10, I.18, I.35, A.20, A.23, W.6, W.8, W.14
	(e) Reporting of recalculations?	No	
	(f) Reporting of a consistent time series?	No	
	(g) Reporting of uncertainties, including methodologies?	Yes	G.7, G.8, G.9, A.19, L.7, L.8, KL.2
	(h) QA/QC?		QA/QC procedures were assessed in the context of the national system (see supplementary information under the Kyoto Protocol below)
	(i) Missing categories, or completeness?[b]	No	
	(j) Application of corrections to the inventory?	No	
Significance threshold	For categories reported as insignificant, has the Party provided sufficient information showing that the likely level of emissions meets the criteria in paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines?	NA	The Party did not report any insignificant categories as "NE"
Description of trends	Did the ERT conclude that the description in the NIR of the trends for the different gases and sectors is reasonable?	Yes	
Supplementary information under	Have any issues been identified related to the following aspects of the national system:		

Assessment			Issue/problem ID#(s) in table 3 or 5[a]
the Kyoto Protocol	(a) Overall organization of the national system, including the effectiveness and reliability of the institutional, procedural and legal arrangements?	No	
	(b) Performance of the national system functions?	No	
	Have any issues been identified related to the national registry:		
	(a) Overall functioning of the national registry?	No	
	(b) Performance of the functions of the national registry and the adherence to technical standards for data exchange?	No	
	Have any issues been identified related to the reporting of information on AAUs, CERs, ERUs and RMUs and on discrepancies in accordance with decision 15/CMP.1, annex, chapter I.E, in conjunction with decision 3/CMP.11, taking into consideration any findings or recommendations contained in the SIAR?	No	
	Have any issues been identified in matters related to Article 3, paragraph 14, of the Kyoto Protocol, specifically problems related to the transparency, completeness or timeliness of the reporting on the Party's activities related to the priority actions listed in decision 15/CMP.1, annex, paragraph 24, in conjunction with decision 3/CMP.11, including any changes since the previous annual submission?	No	
	Have any issues been identified related to the following reporting requirements for KP-LULUCF:		
	(a) Reporting requirements of decision 2/CMP.8, annex II, paragraphs 1–5?	Yes	KL.11
	(b) Demonstration of methodological consistency between the reference level and reporting on FM in accordance with decision 2/CMP.7, annex, paragraph 14?	No	
	(c) Reporting requirements of decision 6/CMP.9?	Yes	KL.8
	(d) Country-specific information to support provisions for natural disturbances in accordance with decision 2/CMP.7, annex, paragraphs 33–34?	No	
CPR	Was the CPR reported in accordance with decision 18/CP.7, annex; decision 11/CMP.1, annex; and decision 1/CMP.8, paragraph 18?	Yes	
Adjustments	Has the ERT applied any adjustments under Article 5, paragraph 2, of the Kyoto Protocol?	No	
	Has the Party submitted a revised estimate to replace a previously applied adjustment?	NA	Croatia does not have a previously applied adjustment
Response from the Party during the review	Has the Party provided the ERT with responses to the questions raised, including the data and information necessary for assessing conformity with the UNFCCC Annex I inventory reporting guidelines and any further guidance adopted by the Conference of the Parties?	Partly	
Recommendation for an exceptional in-country review	On the basis of the issues identified, does the ERT recommend that the next review be conducted as an in-country review?	No	
Questions of implementation	Did the ERT list any questions of implementation?	No	

[a] Further information on the issues identified, as well as additional findings, may be found in tables 3 and 5.
[b] Missing categories for which methods are provided in the 2006 IPCC Guidelines may affect completeness and are listed in annex III.

III.   Status of implementation of recommendations included in the previous review report

8.   Table 3 compiles the recommendations from previous review reports that were included in the most recent previous review report, published on 21 June 2021,[3] and had not been resolved by the time of publication of the report on the review of the Party's 2020 annual submission. The ERT has specified whether it believes the Party had resolved, was addressing or had not resolved each issue or problem by the time of publication of this review report and has provided the rationale for its determination, which takes into consideration the publication date of the most recent previous review report and national circumstances.

Table 3
Status of implementation of recommendations included in the previous review report for Croatia

ID#	Issue/problem classification[a, b]	Recommendation from previous review report	ERT assessment and rationale
General			
G.1	National system (G.1, 2020) (G.4, 2018) KP reporting adherence	Prioritize efforts and resources to implement projects on the use of higher-tier methods included in the annual improvement plans, starting with the implementation of projects to use higher tiers for key categories, and report on the implementation of these projects or their progress in the NIR, together with specific information on the related projects included in the annual improvement plans.	Addressing. As noted by the previous ERT, the Party has made some progress in implementing higher-tier methods for key categories; for example, a tier 2 method is now used to estimate CO_2 emissions from fuel combustion for some subcategories of energy industries. However, Croatia continued to use tier 1 methods for some key categories, for example for CO_2 emissions for category 1.A.2 (fuel combustion – manufacturing industries and construction (solid, liquid, gaseous and other fuels)) under the energy sector, and for CH_4 emissions for category 3.A (enteric fermentation) for all livestock categories, including cattle, which is identified as a key category under the agriculture sector (see ID# A.3 below). In addition, for some categories the Party set out in the NIR a clear summary of sector-specific improvement goals, for example category-specific planned improvements for CH_4 emissions from enteric fermentation of domestic livestock (category 3.A) (NIR section 5.2.6, p.186). Croatia did not describe in the NIR its efforts and resources to implement projects on the use of higher-tier methods included in the improvement plan and long-term plans (section 10.4, table 10.4-1, pp.369–382, and table 10.4-3, pp.389–394). During the review, the Party explained that an improvement plan is not included in the NIR because it is confidential, and a detailed plan will be submitted to the ERT at a future review.
G.2	National system (G.2, 2020) (G.5, 2018) KP reporting adherence	Prioritize efforts and resources to obtain all the AD and EFs needed for implementing higher-tier methods included in the annual improvement plans, starting with the implementation of projects to obtain AD and EFs for key categories, and report on the implementation of this work or its progress	Addressing. Croatia reported the improvement plan and long-term plans in response to the review process in its NIR (section 10.4, table 10.4-1, pp.369–382, and table 10.4-3, pp.389–394), which contain some minor improvements compared with those in the previous submission. However, the Party did not include clear information on efforts to obtain the AD and EFs for key categories or the plan for implementing higher-tier methods. During the review, Croatia reported that its improvement plan is not included in the NIR because it is confidential and that the improvements planned, and long-term

---

[3] FCCC/ARR/2020/HRV. The ERT notes that the report on the individual inventory review of Croatia's 2021 annual submission has not been published yet owing to insufficient funding for the review process. As a result, the latest previously published annual review report reflects the findings of the review of the Party's 2020 annual submission.

ID#	Issue/problem classification[a, b]	Recommendation from previous review report	ERT assessment and rationale
		in the NIR, together with specific information on the related projects included in the annual improvement plans.	plans, are already provided in the NIR (section 10.4, table 10.4-1, pp.369–382, and table 10.4-3, pp.389–394).
G.3	NIR (G.3, 2020) (G.6, 2018) Transparency	Improve the documentation on methodologies and assumptions in the NIR for all subcategories for which documentation is missing, not complete or not to the necessary level of detail (e.g. (a) PFCs from aluminium production, (b) CSCs from forest land, (c) cropland (mineral soils), (d) land converted to cropland, (e) land converted to grassland, (f) CH$_4$ from solid waste disposal and (g) CSCs from afforestation and deforestation), prioritizing key categories.	Addressing. Croatia made several improvements to the quality and detail of the documentation of methodologies and assumptions in the NIR, as recommended in the 2018 annual review report, namely for (a) PFCs from aluminium production, (b) CSCs from forest land, (c) cropland (mineral soils), (d) land converted to cropland, (e) land converted to grassland and (g) CSCs from afforestation and deforestation. However, for category 5.A ((f) CH$_4$ emissions from solid waste disposal), the Party explained during the review that detailed documentation on methodologies and assumptions will be included in the next annual submission, as the Ministry of Economy and Sustainable Development is currently implementing a comprehensive research project regarding AD and parameters for category 5.A for the entire time series as part of comprehensive research regarding system improvements and the development of historical databases for the calculation and reporting of GHG emissions from the waste sector (categories 5.A– 5.C). The Party plans to include the results of the project in its next annual submission.
G.4	QA/QC and verification (G.5, 2020) (G.1, 2018) Convention reporting adherence	Compile complete documentation on QA activities undertaken and the results thereof, in particular on sectoral QA activities, and report on these activities in annual submissions.	Not resolved. The Party did not include any information on QA/QC activities reported in the NIR (section 1.2.3, pp.42–44) that was additional to that included in the previous submission, in particular regarding the sectoral QA activities. During the review, Croatia clarified that this recommendation will be implemented in its next annual submission.
G.5	QA/QC and verification (G.6, 2020) (G.2, 2018) Convention reporting adherence	Document in the NIR, at least for key categories or categories where significant methodological changes and data revisions occurred, the QC activities conducted and their outcomes, and improve the documentation on the process and data management for estimating emissions.	Resolved. The Party implemented improvements in the information reported in the NIR regarding the QC activities conducted and their outcomes for key categories or categories for which significant methodological changes occurred, as compared with the information reported in the 2020 NIR. During the review, Croatia explained that it is continually working on improving the conduct of QC activities and their outcomes, and that general checks were also carried out by the EU (NIR annex 3.3, pp.91–92).
G.6	Recalculations (G.11, 2020) Transparency	Report recalculations following paragraphs 43–44 of the UNFCCC Annex I inventory reporting guidelines; describe differences in emissions resulting from the recalculations carried out and provide a brief explanation of the reasons for the recalculations. (For example, for the recalculations reported in section 3.3.2.5 of the 2020 NIR, explain why oil transport data from the Croatian Bureau of Statistics, which resulted in a recalculation, were used.)	Resolved. The Party has described in its NIR differences in emissions resulting from the recalculations carried out (e.g. in section 3.3.2.5, p.110) and provided a brief explanation of the reasons for the recalculations following paragraphs 43–44 of the UNFCCC Annex I inventory reporting guidelines.

ID#	Issue/problem classification[a, b]	Recommendation from previous review report	ERT assessment and rationale
G.7	Uncertainty analysis (G.7, 2020) (G.3, 2018) Convention reporting adherence	Update the uncertainty estimates for the LULUCF sector for those categories where improvements have been implemented since 2013 and report on the results of these actions in the next annual submission.	Not resolved. The Party did not update the uncertainty estimates for the LULUCF sector for those categories where improvements have been implemented since 2013. During the review, Croatia explained that this will be implemented in its next annual submission.
G.8	Uncertainty analysis (G.8, 2020) (G.3, 2018) Convention reporting adherence	Provide in the NIR information on underlying assumptions and methods, including documentation on the experts' uncertainty estimates in the IPPU and waste sectors.	Addressing. Croatia made some improvements in the information reported on underlying assumptions and methods, including documentation on the experts' uncertainty estimates in the IPPU sector. However, the Party did not include all the necessary improvements on uncertainty estimates for the waste sector. Croatia explained during the review that, following the 2018 in-country review, all uncertainty estimates in the IPPU sector were revised. As a result, changes were implemented in each subsequent NIR and presented in the corresponding chapters for each category. Most of the categories in the IPPU sector use recommended values from the 2006 IPCC Guidelines. In NIR sections 4.3.1.3 (p.134) and 4.3.2.3 (p.137), the Party explains that uncertainty estimates based on expert judgment are used for categories 2.B.1 (chemical industry – ammonia production) and 2.B.2 (chemical industry – nitric acid production), for which experts from the operator (the operator is the same for both categories) base their estimates on plant-specific conditions. For categories 2.F (product uses as substitutes for ozone-depleting substances) and 2.G (other product manufacture and use), uncertainty estimates are determined by experts from the Croatian Refrigeration Air-conditioning and Heat Pumps Association and the Faculty of Mechanical Engineering and Naval Architecture on the basis of national circumstances and recommendations in the 2006 IPCC Guidelines. The Party explained that, for the waste sector (categories 5.A–5.C), the Ministry of Economy and Sustainable Development is conducting research on system improvements and the development of historical databases for the calculation and reporting of GHG emissions. One of the research activities focuses on improving uncertainty estimation for the waste sector. Croatia plans to include the results of the research in its next annual submission.
G.9	Uncertainty analysis (G.12, 2020) Convention reporting adherence	Review and revise the uncertainties associated with the AD and EFs used for all categories that have moved to using a higher-tier method for estimating emissions since the previous submission, and update the approach 1 and approach 2 uncertainty analyses accordingly.	Not resolved. Croatia did not revise the uncertainties associated with the AD and EFs used for all categories that have moved to using a higher-tier method for estimating emissions since the previous submission. During the review, the Party explained that this will be implemented in its next annual submission.
Energy			
E.1	1.A Fuel combustion – sectoral approach – gaseous, liquid and solid fuels – CO_2	Implement as a priority the improvement projects for the energy sector that are included in the improvement plan for the Party's GHG inventory, addressing the methodological approach used for emission	Addressing. The ERT noted that the Party has identified and planned projects to address the methodological approach used for emission estimates for key categories in accordance with the 2006 IPCC Guidelines. For example, Croatia reported in its NIR (section 3.2.4.1, pp.84–85) that CO_2 emissions for categories 1.A.1.a.i (electricity generation) and 1.A.1.a.ii (combined heat and power generation) are calculated using

ID#	Issue/problem classification[a, b]	Recommendation from previous review report	ERT assessment and rationale
	(E.1, 2020) (E.10, 2018) Accuracy	estimates for key categories in accordance with the 2006 IPCC Guidelines.	country-specific EFs for natural gas and hard coal. During the review, the Party confirmed that the results of a project analysing the energy balance for category 1.A.2 (manufacturing industries and construction) for 1990–2003 had been incorporated into the 2021 submission. However, the Party reported in its NIR that the majority of projects identified by the Party are yet to be completed, including those aiming to determine country-specific CO_2 EFs and carbon content values for categories 1.A.1.b (petroleum refining) (p.86), 1.A.2 (manufacturing industries and construction) (p.89), 1.A.4 (other sectors) (p.99) and 1.B.2 (oil and natural gas) (p.110).
E.2	1.A Fuel combustion – sectoral approach – gaseous, liquid and solid fuels – CO_2 (E.1, 2020) (E.10, 2018) Transparency	If the Party is not able to fully implement a given project to address, for example, recommendations contained in ID#s E.2, E.3 and E.4 in the 2018 annual review report, document in the NIR the progress made in implementing the project, including any delays.	Addressing. Where the Party was unable to implement a project identified in ID# E.10 of the 2018 annual review report, it documented in its NIR (table 10.4, pp.369–382) the progress and indicative time frame for the projects for each sector. During the review, Croatia confirmed that a project analysing the energy balance for category 1.A.2 (manufacturing industries and construction) for 1990–2003 had been implemented and its results included in the 2021 submission, and that the project for determining country-specific CO_2 EFs for subcategory 1.A.1.b (petroleum refining) has not yet been launched. The ERT considers that the recommendation has not yet been fully addressed, as the Party has not provided an explanation for the delay in implementing the projects.
E.3	1.A Fuel combustion – sectoral approach – gaseous fuels – CO_2 (E.2, 2020) (E.11, 2018) Accuracy	Check the CO_2 EFs for natural gas from the countries of origin for this imported natural gas, and on that basis estimate a weighted average country-specific EF and use it for emission estimates of CO_2 from natural gas consumption.	Not resolved. The Party reported in its NIR (section 3.2.4.1, p.85) that CO_2 emissions for natural gas combusted for categories 1.A.1.a.i (electricity generation) and 1.A.1.a.ii (combined heat and power generation) are calculated using country-specific EFs. However, during the review Croatia confirmed that it had not provided the information on the CO_2 EFs for imported natural gas in the NIR and that these improvements were considered to be part of its long-term plan. The ERT noted that the continued use of default EFs for CO_2 emissions from natural gas for fuel combustion categories other than for categories 1.A.1.a.i (electricity generation) and 1.A.1.a.ii (combined heat and power generation) is likely to be a slight overestimation rather than an underestimation.
E.4	1.A.2 Manufacturing industries and construction – gaseous, liquid and solid fuels – CO_2, CH_4 and N_2O (E.5, 2020) (E.4, 2018) (E.16, 2016) (E.16, 2015) Comparability	Distribute fuel consumption and emissions from the generation of electricity and heat in manufacturing industries and construction for 1990–2000 in accordance with the detailed industrial split for stationary combustion provided in the 2006 IPCC Guidelines.	Resolved. The Party reported recalculated emissions for category 1.A.2 (manufacturing industries and construction) for 1990–2000 to reflect the redistribution of fuel consumption and emissions from the generation of electricity and heat in that sector.
E.5	1.A.2.a Iron and steel – gaseous fuels – CO_2 (E.6, 2020) (E.12, 2018) Accuracy	Remove the amount of natural gas used as a feedstock for steel production from the subcategory 1.A.2.a (iron and steel) and correspondingly revise its CO_2 emission estimates for iron and steel production by ensuring that no double counting of	Not resolved. The Party continued to include the amount of natural gas used as a feedstock for steel production in subcategory 1.A.2.a (iron and steel), which is not in accordance with the approach indicated in the 2006 IPCC Guidelines (vol. 3, chap. 1, box 1.1), namely that CO_2 and CH_4 emissions from iron and steel production, including sinter production, are considered industrial process emissions and should be reported as such. The Party reported in NIR section 3.1.1 (p.61) that determining total emissions in

ID#	Issue/problem classification[a, b]	Recommendation from previous review report	ERT assessment and rationale
		emissions from natural gas consumption occurs for the entire time series, in accordance with the 2006 IPCC Guidelines.	categories 2.A.1 (mineral industry – cement production), 2.C.1 (iron and steel production) and 2.B.8 (chemical industry – petrochemical and carbon black production) is a complex task, since the energy balance, emission reporting, emissions trading and statistics from associations differ widely in terms of their underlying methods. During the review, the Party confirmed that this issue has not yet been addressed. The ERT therefore considers that the recommendation has not yet been resolved, as although the Party has addressed the issue of double counting, as CO_2 emissions from the use of natural gas as feedstock was removed from category 2.C.1 (iron and steel production) in the recalculations made in the 2019 submission, it has not done so in accordance with the 2006 IPCC Guidelines (vol. 3, chap. 1, box 1.1).
E.6	1.A.2.g Other (manufacturing industries and construction) – gaseous fuels – gaseous, liquid and solid fuels, other fossil fuels and biomass – CO_2, CH_4 and N_2O (E.7, 2020) (E.13, 2018) Comparability	Report emissions from cement production under subcategory 1.A.2.f (non-metallic minerals), not under 1.A.2.g.v (construction).	Resolved. The Party reported fuel combustion from cement production under subcategory 1.A.2.f (non-metallic minerals) rather than under 1.A.2.g.v (construction) and recalculated the emissions for the whole time series.
E.7	1.A.3.b Road transportation – gaseous and liquid fuels – CO_2 (E.13, 2020) Accuracy	Develop country-specific EFs for CO_2 emissions from fuels combusted in road transportation, thereby allowing the use of a tier 2 method for estimating these emissions, given that CO_2 emissions from road transportation is a key category and that the 2006 IPCC Guidelines (vol. 2, figure 3.2.2) suggest it is good practice to apply a tier 2 method.	Not resolved. The Party reported in its NIR (section 3.2.6.2, p.92) that emissions of CO_2 from liquid and gaseous fuels are calculated on the basis of the amount and type of fuel combusted using a tier 1 (top-down) approach, which is in line with the 2006 IPCC Guidelines. Amounts of all types of liquid and gaseous fuels consumed for 1990–2020 were extracted from national energy balances and EFs used for calculating CO_2 emissions from liquid and gaseous fuels were taken from the 2006 IPCC Guidelines (vol. 2, chap. 3, table 3.2.1). During the review, the Party clarified that the recommendation to develop country-specific EFs for CO_2 emissions from fuels combusted in road transportation, thereby allowing Croatia to use a tier 2 method for estimating these emissions, has not yet been resolved and is considered to be part of the Party's long-term plan.
E.8	1.B.2.b Natural gas – gaseous fuels – CO_2 (E.11, 2020) (E.16, 2018) Accuracy	Strive to develop a country-specific CO_2 EF for 1.B.2.b.3 (natural gas – processing) (considering that CO_2 emissions from 1.B.2.b (natural gas) is a key category), taking into account data on CO_2 scrubbing provided by gas field and plant operators and, if this is not possible, use the IPCC CO_2 EF default values, avoiding the double counting of emissions from scrubbing under	Addressing. The Party reported in its NIR (section 3.3.2.2, pp.108–109) that it had estimated emissions from natural gas processing using a tier 1 approach based on the total amount of natural gas produced and a default EF from the 2006 IPCC Guidelines (vol. 2, chap. 4, table 4.2.4) that excluded additional CO_2 emissions from scrubbing. During the review, Croatia confirmed that CO_2 emissions from scrubbing that have been determined from CO_2 balance data obtained directly from the plant operator were included under category 1.B.2.b.2 (natural gas – production) in the NIR. Further, during the review, the Party stated that implementation of the recommendation does not affect CO_2 emissions and is specified as a long-term goal. However, although Croatia has

ID#	Issue/problem classification[a, b]	Recommendation from previous review report	ERT assessment and rationale
		natural gas processing for the entire time series, and report the revised estimates of CO_2 emissions from 1.B.2.b.3 (natural gas – processing).	addressed issues of double counting of CO_2 emissions from scrubbing, the ERT considers that implementation of the recommendation has not yet been fully addressed, as the Party has not developed a country-specific CO_2 EF or applied tier 2 or tier 3 approaches from the 2006 IPCC Guidelines (vol. 2, chap. 4.2.2.2), as required for key categories, or correctly allocated emissions to category 1.B.2.b.3 (natural gas – processing).
E.9	Fuel combustion – reference approach – liquid fuels – CO_2, CH_4 and N_2O (E.12, 2020) Accuracy	Undertake additional research to determine the NCVs of bitumen and lubricants and use those values when calculating emissions from fuel combustion in order to avoid possible underestimation of emissions.	Not resolved. The Party continued to report in CRF table 1.A(b) the NCV used for both bitumen and lubricants as 33.5 TJ/kt. During the review, Croatia stated its view that additional research will not lead to different results because it is not possible to increase the value of 33.5 TJ/kt for lubricants, as such a correction would lead to a disturbed ratio of input and output energy in refineries in certain years (see ID# I.16 below). The ERT noted that the emission estimate for the category is lower than what would be the case if the default NCV (40.2 TJ/kt) was used instead of 33.5 TJ/kt. However, the potential underestimation of emissions is below the significance threshold for the application of an adjustment as per paragraph 37(b) of the annex to decision 24/CP.19 (11.88 kt CO_2 eq).
IPPU			
I.1	2. General (IPPU) – SF_6 (I.3, 2020) (I.10, 2018) Convention reporting adherence	Correct the error in NIR table ES.3.2-6, ensuring that emissions reported in this table are consistent with the SF_6 emissions reported in CRF table summary 2 and sectoral CRF tables and within the NIR.	Resolved. Croatia reported in its NIR (section ES.3.2.4, p.32, and table ES.3.2-6) SF_6 emissions consistent with CRF table summary 2 and sectoral CRF tables.
I.2	2. General (IPPU) – CO_2 and N_2O (I.4, 2020) (I.11, 2018) Transparency	Provide in the NIR explanations of the inconsistencies between emission data reported in the CRF tables and those reported in the EU ETS reports, for each category, owing to different classifications of emission categories.	Resolved. Croatia reported in its NIR (section 4.3.1.2, pp.133–134, and section 4.4.1.2, pp.145), for each category for which data from the EU ETS are used, information on how the data are obtained and how the emissions are allocated among sectors. The Party also reported in its NIR (sections 4.2.4, 4.3.1 and 4.4.1) for each category the reason for the differences between the emissions reported under the EU ETS and those reported in the CRF tables.
I.3	2.A.1 Cement production – CO_2 (I.6, 2020) (I.13, 2018) Transparency	Provide information in the NIR on carbonate and non-carbonate sources of CaO used for cement production.	Resolved. Croatia reported transparent information on carbonate and non-carbonate sources of CaO used for cement production in its NIR (section 4.2.1.2, pp.114–116).
I.4	2.A.1 Cement production – CO_2 (I.6, 2020) (I.13, 2018) Accuracy	Confirm that all sources of CaO are correctly included in the estimation of emissions in accordance with the 2006 IPCC Guidelines.	Addressing. Croatia reported in its NIR (section 4.2.1.2, p.115) that non-carbonate sources of CaO and MgO are still only partially included in EFs. During the review, Croatia clarified that a project, which included additional investigation and collection of all available consistent AD for non-carbonate sources of CaO and MgO for the whole time series, has been completed. Croatia also clarified that the results, including information on the AD, EFs, methodologies and assumptions used to estimate emissions for this project, will be included in its next annual submission. The ERT noted that there is no underestimation of emissions before 2000 because the emissions for the years

ID#	Issue/problem classification[a, b]	Recommendation from previous review report	ERT assessment and rationale
			before 2000 were estimated on the basis of the arithmetic mean (average) of the EFs used for the estimations for the years after 2000, which were determined accurately.
I.5	2.A.2 Lime production – CO_2 (I.10, 2020) (I.17, 2018) Accuracy	Revise the calculation of EFs for lime production taking into account working plants only and the mass of lime produced by each plant, and revise the CO_2 estimates for category 2.A.2 (lime production) for 1990–2011 using the correct EFs.	Resolved. The CO_2 EFs and emissions were revised in the 2019 submission. Croatia reported AD and EFs for lime production and information on how they were derived in its NIR (section 4.2.2.2, pp.120–122). The ERT noted that more detailed data were subject to confidentiality restrictions and confirmed, on the basis of the information provided in the NIR (section 4.2.2.2, pp.120–122) on EFs, IEF and AD, that the Party did not underestimate emissions from lime production.
I.6	2.B.8 Petrochemical and carbon black production – CO_2 (I.20, 2020) (I.4, 2018) (I.9, 2016) (I.9, 2015) Accuracy	Move from a tier 1 method to a higher-tier method for estimating CO_2 emissions from petrochemical and carbon black production, in accordance with the corresponding decision trees in the 2006 IPCC Guidelines.	Addressing. Croatia reported in its NIR (section 4.3.8.2, p.139) CO_2 emissions from carbon black production using a tier 2 method in accordance with the 2006 IPCC Guidelines (vol. 3, chap. 3.9.2.1, pp.3.66–3.68) and described the method. However, for other subcategories of 2.B.8 (petrochemical and carbon black production), the Party continued to use tier 1 methods for estimating CO_2 emissions. During the review, Croatia clarified that the issue is included in its long-term improvement plan and, subject to resources, will be investigated further. While welcoming the inclusion of this issue in Croatia's long-term improvement plan, the ERT considers that the recommendation has not yet been fully addressed because Croatia has not moved to higher-tier methods for subcategories of 2.B.8 other than carbon black production.
I.7	2.B.8 Petrochemical and carbon black production – CO_2 and CH_4 (I.47, 2020) Accuracy	Collect input data for methanol production from individual producers to allow the use of a tier 2 method for estimating emissions from methanol production or, if this information is not available, continue to apply a tier 1 method, reporting all emissions for category 2.B.8 (petrochemical and carbon black production), including from natural gas use, under the IPPU sector, not under the energy sector.	Not resolved. Croatia reported in its NIR (section 4.3.8.2, p.138) that emissions from this subcategory were reported as "IE" in this submission and are considered to be included in the energy sector. During the review, the Party clarified that the issue has not yet been resolved. The ERT considers that the recommendation has not yet been fully addressed because the Party does not report all emissions from fuels and other input materials under the IPPU sector and therefore the Party's approach is not in accordance with the 2006 IPCC Guidelines (vol. 3, chap. 1, box 1.1), which recommend reporting such emissions under the IPPU sector.
I.8	2.B.8 Petrochemical and carbon black production – CO_2, CH_4 and N_2O (I.48, 2020) Accuracy	Further investigate the types of feedstock and their quantities used for ethylene production; if fuels are used as feedstock, investigate why they are not included in the energy balance, and if emissions from ethylene production are also reported under the energy sector, subtract these emissions from the energy sector to avoid double counting.	Not resolved. Croatia reported in its NIR (section 4.3.8.2, p.139) that data on the type of feedstock and processes used for the production of ethylene dichloride in the country are currently not available. During the review, the Party clarified that this issue has not yet been resolved and so is included in the long-term improvement plan. The ERT considers that the recommendation has not yet been fully addressed because the Party's approach is not in accordance with the 2006 IPCC Guidelines (vol. 3, chap. 1, box 1.1), which recommend reporting all emissions from fuels and other input materials under the IPPU sector, and notes that the approach may result in double counting of emissions.
I.9	2.C.1 Iron and steel production – CO_2	Estimate CO_2 emissions from pig iron production for 1990–1993 using the tier 2	Resolved. Croatia reported in CRF table 2(I).A-Hs2 the CO_2 emissions from pig iron production for 1990–1991, as the production of pig iron was discontinued thereafter.

ID#	Issue/problem classification[a, b]	Recommendation from previous review report	ERT assessment and rationale
	(I.22, 2020) (I.28, 2018) Comparability	method of the 2006 IPCC Guidelines, based on available data on coke and coal consumption for pig iron production, and report these emissions under category 2.C.1 (iron and steel production) in the IPPU sector, and ensure that CO_2 emissions are not double counted under the energy and IPPU sectors.	Croatia reported in its NIR (section 4.4.1.2, p.145) that CO_2 emissions for category 2.C.1.b (iron and steel production – pig iron production) were calculated using a tier 3 method, in accordance with the 2006 IPCC Guidelines (vol. 3, chap. 4.2.2.2), and described the method used. The Party reported for this category only the emissions corresponding to the limestone and dolomite inputs to the plant, while emissions corresponding to the coal and coke inputs were still reported under the energy sector. During the review, Croatia noted that, since all quantities of coal and coke are included in the energy balance, and therefore already included in the energy sector, they need to be subtracted from this category within the IPPU sector in order to avoid double counting. The ERT confirmed that all emissions from reducing agent consumption have been allocated without double counting or omissions.
I.10	2.C.1 Iron and steel production – CO_2 (I.23, 2020) (I.29, 2018) Accuracy	(a) Specify all sources of ferrous materials for steel production used in the country and provide this information in the NIR; (b) Revise the Party's CO_2 emission estimates from steel production if the ferrous charge materials were not accurately taken into account in the calculations.	(a) Not resolved. Croatia reported in its NIR (section 4.4.1.2, p.144) that emissions of CO_2 from electric arc furnaces for 1990–2012 were calculated using the tier 2 method from the 2006 IPCC Guidelines (mass balance approach and material-specific carbon contents) (vol. 3, chap. 4.2.2.2, pp.4.22–4.23). However, the ERT noted that the Party did not indicate the input material used as AD in the NIR. Emissions for the period since 2013 are taken from the annual emissions report submitted under the EU ETS, which are adjusted for the fuel materials included in the energy sector in order to avoid double counting. During the review, Croatia clarified that the types of input materials used, their quantities and their carbon content vary from year to year and it did not include detailed information on input materials in its NIR for reasons of confidentiality. The ERT could not fully verify the accuracy of the estimates owing to the limited information provided in the NIR due to the confidentiality constraints. However, based on its preliminary assessment, the ERT concluded that there is no underestimation of emissions. The ERT acknowledged that reporting of information by a Party as confidential is consistent with the UNFCCC Annex I inventory reporting guidelines and noted that Croatia offered to provide, on a confidential basis in response to a request made by the ERT, the confidential data or information needed to consider the emission estimates reported by the Party. (b) Addressing. All input data were investigated to the extent it was possible and recalculations were applied for submissions made since 2019. The ERT noted that no further recalculations were applied for the category.
I.11	2.C.1 Iron and steel production – CO_2 (I.25, 2020) (I.31, 2018) Comparability	Correctly allocate the estimates of CO_2 emissions from natural gas consumption for steel production emissions only to the IPPU sector in accordance with the 2006 IPCC Guidelines, and improve coordination among the IPPU and energy experts preparing the inventory.	Not resolved. Croatia did not correctly allocate CO_2 emissions from natural gas consumption for steel production only to the IPPU sector, although it allocated all emissions from reducing agent consumption without double counting or omissions. During the review, the Party explained that, since all quantities of natural gas are included in the energy sector, they need to be subtracted from category 2.C.1 (iron and steel production) within the IPPU sector in order to avoid double counting.

ID#	Issue/problem classification[a, b]	Recommendation from previous review report	ERT assessment and rationale
I.12	2.C.1 Iron and steel production – CO_2 (I.26, 2020) (I.32, 2018) Transparency	Include in the NIR correct data, including units, for the NCV of natural gas used in the emission calculations for steel production.	Not resolved. Croatia did not report in its NIR the NCV of natural gas used in the emission calculations for steel production. During the review, the Party explained that CO_2 emissions corresponding to natural gas input to steel production were reported under the energy sector (see ID# I.11 above).
I.13	2.C.2 Ferroalloys production – CO_2 (I.29, 2020) (I.6, 2018) (I.10, 2016) (I.10, 2015) Accuracy	Estimate CO_2 emissions from ferroalloys production using a higher-tier method, in accordance with the corresponding decision trees in the 2006 IPCC Guidelines and pursuant to decision 24/CP.19, annex I, paragraph 11.	Resolved. Croatia reported in its NIR (section 4.4.2.2, pp.148–150) CO_2 emissions from ferroalloys production using the tier 1 approach and explained the calculations and the rationale for using that approach. During the review, the Party clarified that if additional data become available in the future it would consider applying higher-tier methods. In the light of the explanation provided by the Party for using the tier 1 method for the category, the ERT considers the issue resolved.
I.14	2.D.1 Lubricant use – CO_2 (I.32, 2020) (I.36, 2018) Consistency	Revise the AD of lubricant use in the country for 1990–1998 using the splicing techniques provided in the 2006 IPCC Guidelines (vol. 1, chap. 5) and ensure the consistency of the AD time series and corresponding CO_2 emissions.	Resolved. Croatia reported in its NIR (section 4.5.1.2, p.154) the AD of lubricant use in the country for 1990–1998, which were revised using the splicing techniques as part of a project for improving emission calculations.
I.15	2.D.1 Lubricant use – CO_2 (I.32, 2020) (I.36, 2018) Transparency	Explain transparently in the NIR the reasons for the significant change in AD of lubricant use in 2003–2004 and, if appropriate, in other years.	Not resolved. The Party did not explain transparently in its NIR the reasons for the significant change in AD in 2003–2004. During the review, Croatia clarified that there are no detailed data available on the quantities consumed by type of lubricant use.
I.16	2.D.1 Lubricant use – CO_2 (I.33, 2020) (I.38, 2018) Accuracy	Include in the NIR information on NCVs and data sources for the NCVs used for estimating CO_2 emissions from lubricants and paraffin waxes, and also justify the application of a lower NCV for lubricants and paraffin waxes (33.5 TJ/Gg) compared with the default NCV value provided in the 2006 IPCC Guidelines (40.2 TJ/Gg for lubricants and paraffin waxes). If the Party cannot justify the current NCV used, apply the default NCVs from table 1.2 of the 2006 IPCC Guidelines (vol. 2) and revise the emission estimates accordingly.	Resolved. Croatia reported in its NIR (section 4.5.1.2, p.154) that the analysis of operations at the two Croatian refineries concluded that it is not possible to increase the NCVs for lubricants because such a correction would lead to a disturbed ratio of input and output energy in refineries in some years. During the review, the Party shared with the ERT a detailed report on the study and the associated model and demonstrated improvements in its energy balance table, including a verification of NCVs for some fuel types, including lubricants. The ERT noted that the NCV for lubricants in Croatia is the same as the lower limit provided in the 2006 IPCC Guidelines (33.5 TJ/kt for lubricants and paraffin waxes) (vol. 2, chap. 1, table 1.2). The ERT considers that Croatia justified its use of the value used for its lubricant NCV (33.5 TJ/kt).
I.17	2.D.1 Lubricant use – CO_2 (I.34, 2020) (I.39, 2018) Comparability	Separately estimate emissions from lubricant use for two-stroke engines and report those emissions under the energy sector, in accordance with the 2006 IPCC Guidelines.	Resolved. Croatia reported emissions from lubricant use for two-stroke engines in the current CRF table 2(I).A-Hs2 and explained in its NIR (section 4.5.1.1, p.153) that emissions from two-stroke engines were extracted from emissions from lubricant use and included in the energy sector.
I.18	2.D.1 Lubricant use – CO_2	Confirm the balance of lubricants used in Croatia, as shown to the ERT during the	Not resolved. Croatia did not include in the NIR the confirmed results of the balance of lubricants used in the country, including in waste incineration. During the review, the

ID#	Issue/problem classification[a, b]	Recommendation from previous review report	ERT assessment and rationale
	(I.35, 2020) (I.40, 2018) Accuracy	review (50 per cent of lubricant is lost during the primary use), and report corresponding emissions from all lubricants oxidized during the primary use under the IPPU sector, from lubricants combusted for energy purposes under the energy sector and from the incineration of lubricants under the waste sector.	Party clarified that distribution of the total amount of non-energy derivatives to appropriate subcategories was corrected under a project to improve emission calculation. However, during the review, Croatia also clarified that the fraction of lubricants oxidized during primary use and disposal, including incineration, is not taken into consideration, as the data required for the emission estimate are not available. The ERT considers that the recommendation has not yet been fully addressed because the project has not covered an investigation of the full balance of lubricants used in Croatia, including the fraction of lubricants oxidized during primary use and the fraction of lubricants disposed of, which includes the incineration of lubricants under the waste sector. However, the ERT noted that the approach followed by the Party does not lead to an underestimation of emissions because Croatia does not deduct lubricant consumption in the waste sector and in estimates using the default method provided in the 2006 IPCC Guidelines (vol. 3, chap. 5.2.2.1).
I.19	2.D.2 Paraffin wax use – CO_2 (I.49, 2018) Accuracy	Undertake additional research to determine the NCV of paraffin wax through analysis of the product, and use that value when calculating emissions for this category; or, if further research is not possible, use the default EF to calculate emissions for this category.	Resolved. Croatia estimated the CO_2 emissions from paraffin wax using a country-specific NCV of 40.2 TJ/Gg, determined by Energy Institute Hrvoje Požar, instead of the previously used NCV of 33.5 TJ/Gg (NIR section 4.5.2.2, p.155). The value is the same as the default value provided in the 2006 IPCC Guidelines (vol. 2, chap. 1, table 1.2).
I.20	2.D.3 Other (non-energy products from fuels and solvent use) – CO_2 (I.36, 2020) (I.41, 2018) Convention reporting adherence	When estimating indirect CO_2 emissions from solvent use, road paving with asphalt and asphalt roofing in accordance with paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines, report these emissions in CRF table 6 (removing them from CRF table 2(I).A-H and using the notation key "IE" in this table) and separately in CRF table summary 1.A, table summary 2, table 8 and table 10, and include and exclude these indirect CO_2 emissions in the national totals in CRF table summary 2 and table 10, and include in the corresponding section of the NIR (e.g. in chap. 9) information on which indirect emissions are reported in Croatia's GHG inventory as required by paragraph 29 of the UNFCCC Annex I inventory reporting guidelines.	Not resolved. Croatia reported CO_2 emissions from solvent use, road paving with asphalt and asphalt roofing in CRF table 2(I).A-H, while reporting indirect CO_2 emissions from the IPPU sector as "NA" in CRF table 6. During the review, Croatia clarified that it has not yet resolved this issue.

ID#	Issue/problem classification[a, b]	Recommendation from previous review report	ERT assessment and rationale
I.21	2.F.1 Refrigeration and air conditioning – HFCs and PFCs (I.37, 2020) (I.7, 2018) (I.5, 2016) (I.5, 2015) (41, 2014) (41, 2013) Transparency	Continue to conduct surveys on the status of disposal of refrigeration and air-conditioning equipment and include the results in the NIR.	Not resolved. Croatia reported in its NIR (section 4.7.1.5, p.167) that an improvement project led by the Ministry of Economy and Sustainable Development was carried out for category 2.F (product uses as substitutes for ozone-depleting substances). The ERT welcomed the Party's extensive survey to improve AD in category 2.F. However, the ERT noted that the NIR does not include detailed results from this study on the status of the disposal of refrigeration and air-conditioning equipment. During the review, Croatia provided a detailed report on this study to the ERT. The ERT considers that all information on AD, EFs, methods and assumptions used for estimating HFC emissions from the disposal of equipment containing HFCs in this report should be included in the Party's next NIR.
I.22	2.F.1 Refrigeration and air conditioning – HFCs (I.38, 2020) (I.42, 2018) Completeness	Investigate and report in the NIR whether HFC emissions occur in the country from (1) manufacturing of equipment containing HFCs (e.g. at companies such as MD Frigo, Frigo Plus and Dolmacia Clima), (2) disposal of equipment containing HFCs (e.g. at special service centres for collection, recovery and destruction of HFCs) and (3) use of containers for the import of HFCs; and, if these emissions occur, collect relevant AD, estimate HFC emissions from manufacturing, disposal and recovery, and report these emissions under category 2.F.1 (refrigeration and air conditioning) for the whole time series.	Resolved. The Party addressed the recommendations from previous reviews as follows: (1) Croatia reported in CRF table 2(II)B-Hs2 HFC emissions from the manufacturing of equipment containing HFCs under category 2.F.1 (refrigeration and air conditioning) for the whole time series. In addition, the Party continued to report HFC emissions from the manufacturing of domestic refrigeration and mobile air conditioning as "NO" and clarified in its NIR (section 4.7.1.1, pp.161–162) that all household refrigerators and vehicles in the country are imported. (2) Croatia reported in CRF table 2(II)B-Hs2 HFC emissions from the disposal of all equipment containing HFCs under category 2.F.1 (refrigeration and air conditioning) for the whole time series. The Party reported in its NIR (section 4.7.1.2, pp.162–166) relevant information, such as the use of tier 2a methods, sources of AD, lifetimes and EFs. (3) Croatia reported in CRF table 2(II)B-Hs2 revised HFC emissions under category 2.F.1 (refrigeration and air conditioning) for the whole time series. The Party explained to the ERT that an improvement project for category 2.F (product uses as substitutes for ozone-depleting substances) was carried out, leading to improvements related to the use of containers for the import of HFCs.
I.23	2.F.1 Refrigeration and air conditioning – HFCs and PFCs (I.39, 2020) (I.43, 2018) Accuracy	Collect accurate and reliable AD on HFCs used in Croatia for the remaining years of the time series (1995–2012) and for 2013 and 2015–2016, for which AD may still not be fully reliable, for each use or application under the category 2.F.1 (refrigeration and air conditioning) (i.e. commercial refrigeration, domestic refrigeration, industrial refrigeration, transport refrigeration, mobile air conditioning and stationary air conditioning). For the years in which AD are not reliable, estimate AD using the splicing techniques provided in the	Resolved. Croatia reported in its NIR (section 4.7.1.5, p.167) that an improvement project led by the Ministry of Economy and Sustainable Development was carried out for category 2.F (product uses as substitutes for ozone-depleting substances) and the results of this project include revised emission estimates for all subcategories of category 2.F for the whole time series. The Party explained that national statistics and submissions from service technicians were used to obtain AD for the following periods: 2003 onwards for commercial refrigeration, 2003 onwards for domestic refrigeration, for the entire time series for industrial refrigeration, 2007 onwards for transport refrigeration, 1996 onwards for mobile air conditioning, for the entire time series for stationary air conditioning (stationary equipment and devices filled with 3 kg or more of gas), and for 2005–2008 for stationary air conditioning (with less than 3 kg of gas). Croatia also explained that the AD for other periods were estimated using the splicing techniques provided in the 2006

ID#	Issue/problem classification[a, b]	Recommendation from previous review report	ERT assessment and rationale
		2006 IPCC Guidelines and revise the HFC estimates for this category accordingly by applying the tier 2a method, ensuring the consistency of the time series.	IPCC Guidelines (vol. 1, chap. 5.3.3, pp.5.8–5.14). The ERT welcomed Croatia's extensive survey to improve AD for category 2.F.
I.24	2.F.1 Refrigeration and air conditioning – HFCs and PFCs (I.39, 2020) (I.43, 2018) Transparency	Document in detail the sources of actual AD used in the calculations of HFC emissions, the splicing techniques used for estimating missing AD and how the consistency of the time series was ensured, as well as document up-to-date information indicating that PFC emissions are not occurring in Croatia under category 2.F.1. If the latter is not possible, continue reporting PFC emissions under category 2.F.1 in accordance with paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines.	Addressing. Croatia reported in its NIR (section 4.7.1.5, p.167) information on the AD, EFs, methodologies and assumptions used to estimate emissions for category 2.F (product uses as substitutes for ozone-depleting substances) for the whole time series on the basis of the results of an improvement project led by the Ministry of Economy and Sustainable Development (see ID# I.23 above). The Party also reported PFC emissions under category 2.F.1 as "NO" in CRF table 2(I)s2. However, the ERT noted that Croatia did not include detailed information in the NIR indicating that PFC emissions do not occur in the country under category 2.F.1 (refrigeration and air conditioning). During the review, Croatia clarified that PFCs have never been used in the refrigeration and air-conditioning sector in Croatia.
I.25	2.F.2 Foam blowing agents – HFCs (I.40, 2020) (I.8, 2018) (I.13, 2016) (I.13, 2015) Accuracy	Estimate HFC-152a emissions in accordance with the type of foam (open cell or closed cell) where HFC-152a is used, consistent with the methodology prescribed in the 2006 IPCC Guidelines (vol. 3, chap. 7.4.2), and report such emissions under the appropriate subcategory.	Resolved. Croatia reported in CRF table 2(II)B-Hs2 and its NIR (section 4.7.2.2, p.168) HFC-152a emissions from the manufacturing of open cells on the basis of the 2006 IPCC Guidelines tier 1a methodology (vol. 3, chap. 7.4.2.1, p.7.34) using data on imports and exports of HFC-152a used for the production of flexible foams for 2006–2010.
I.26	2.F.2 Foam blowing agents – HFCs (I.41, 2020) (I.44, 2018) Completeness	Investigate whether closed-cell foams are imported and used in the country, noting that a list of subapplications for consideration is provided in the 2006 IPCC Guidelines (vol. 3, table 7.4). If closed-cell foams are used, estimate and report HFC emissions from the use and commissioning of closed-cell foams in the CRF tables.	Resolved. Croatia reported in CRF table 2(II)B-Hs2 HFC emissions from the use and commissioning of closed-cell foams from 2003 onwards.
I.27	2.F.2 Foam blowing agents – HFCs (I.41, 2020) (I.44, 2018) Transparency	Provide relevant information on estimation and reporting of HFC emissions from the use and commissioning of closed-cell foams, if estimated and reported in the NIR.	Resolved. Croatia reported in its NIR (section 4.7.2.2, pp.168–171) relevant information on the estimation and reporting of HFC emissions from the use and commissioning of closed-cell foams, including country-specific methodologies, AD data sources and EFs.
I.28	2.F.3 Fire protection – HFCs (I.42, 2020) (I.45, 2018) Accuracy	Estimate emissions in accordance with the chosen tier 2a method of the 2006 IPCC Guidelines for all HFCs used in category 2.F.3 (fire protection) (HFC-125, HFC-	Not resolved. Croatia reported in its NIR (section 4.7.2.2, p.168) the emissions for category 2.F.3 (fire protection) using tier 1 (fixed systems) and tier 2 (portable systems) approaches from the 2006 IPCC Guidelines (vol. 3, chap. 7, equation 7.17). During the review, the Party clarified that an improvement project was carried out for category 2.F,

ID#	Issue/problem classification[a, b]	Recommendation from previous review report	ERT assessment and rationale
		227ea and HFC-236fa) and apply the correct EF for stationary fire protection systems for all years of the time series.	which included extensive research and the collection of revised AD. The ERT welcomed Croatia's extensive survey to improve the AD used for category 2.F. The ERT confirmed, on the basis of a report provided by Croatia during the review, that EFs based on a tier 2a methodology were used to estimate HFC-227ea and HFC-236fa emissions. However, Croatia reported in its NIR (section 4.7.2.2, p.169) that stock EFs of HFC-125 for fixed systems are estimated to be 4 per cent, but the product life factor is 40 per cent in CRF table2(II)B-Hs2. The ERT noted that although the EFs used to estimate emissions from HFC-125 stocks are inaccurate, they lead to an overestimation of emissions. The ERT considers that the recommendation has not yet been addressed because the Party has not yet fully estimated emissions in accordance with the chosen tier 2a method of the 2006 IPCC Guidelines for all HFCs used in category 2.F.3.
I.29	2.F.3 Fire protection – HFCs (I.43, 2020) (I.46, 2018) Completeness	Estimate HFC emissions associated with the production, use and disposal of portable fire extinguishers (e.g. HFC-236fa) and report these emissions in the CRF tables under category 2.F.3 (fire protection).	Resolved. Croatia reported in CRF table 2(II)B-Hs2 HFC emissions associated with the production, use and disposal of portable fire extinguishers (e.g. HFC-236fa).
I.30	2.F.3 Fire protection – HFCs (I.43, 2020) (I.46, 2018) Transparency	Provide relevant information in the NIR on estimation and reporting of HFC emissions associated with the production, use and disposal of portable fire extinguishers (e.g. HFC-236fa).	Resolved. Croatia reported in its NIR (section 4.7.2.2, pp.168–171) relevant information on the estimation and reporting of HFC emissions associated with the production, use and disposal of portable fire extinguishers (e.g. HFC-236fa), including tier 2 methodologies, AD data sources and EFs.
I.31	2.F.4 Aerosols – HFCs (I.44, 2020) (I.47, 2018) Transparency	Include information in the NIR on the AD, EFs, methods and assumptions used for estimating HFC emissions for category 2.F.4 (aerosols) in accordance with paragraph 50(a) of the UNFCCC Annex I inventory reporting guidelines.	Resolved. Croatia reported in its NIR (section 4.7.2.2, pp.168–171) relevant information on the AD, EFs, methods and assumptions used for estimating HFC emissions for category 2.F.4 (aerosols).
I.32	2.G.1 Electrical equipment – SF$_6$ (I.45, 2020) (I.48, 2018) Accuracy	Use consistent EFs for estimating SF$_6$ emissions for category 2.G.1 (electrical equipment), using available information from questionnaires of companies that use electrical equipment filled with SF$_6$, revise estimates of SF$_6$ emissions and report a consistent time series of SF$_6$ emissions.	Resolved. Croatia recalculated SF$_6$ emissions from the disposal of electrical equipment for the entire time series and reported a consistent time series of emissions from the category. The Party reported in its NIR (section 4.8.1.2, pp.172–174) relevant information on the AD, EFs and methods used for estimating SF$_6$ emissions for category 2.G.1 (electrical equipment). During the review, Croatia clarified that an improvement project was carried out for category 2.G (other product manufacture and use), which included extensive research and the collection of revised AD, and the results of this project include revised emission estimates for the whole time series. The ERT noted that SF$_6$ emissions for category 2.G.1 (disposal of electrical equipment) were only reported for 2012, 2013 and 2015–2017. During the review, Croatia further clarified that equipment with SF$_6$ was used for the first time in Croatia in 1982 and the lifetime of the

ID#	Issue/problem classification[a, b]	Recommendation from previous review report	ERT assessment and rationale
			equipment was about 30 years, so after 30 years of use (therefore between 2012 and 2017), the old equipment was sent for disposal and new equipment was installed.
I.33	2.G.1 Electrical equipment – SF$_6$ (I.50, 2020) Accuracy	Prioritize the collection of AD for calculating SF$_6$ emissions from electrical equipment and, if necessary, use provisional data for the most recent years and correctly apply the methods described in the 2006 IPCC Guidelines (vol. 1, chap. 5).	Resolved. Croatia reported in its NIR (section 4.8.1.2, pp.173–174) AD for the whole time series collected from users and operators of SF$_6$ gas-filled electrical equipment and recalculated the emission estimates for the category using the revised AD, thus correcting the error in the extrapolated estimates for 2017 and 2018 noted during the 2020 review.
I.34	2.G.1 Electrical equipment – SF$_6$ (I.51, 2020) Completeness	Collect the AD required to allow estimates of emissions from SF$_6$ filled into new electrical equipment and SF$_6$ emissions from the decommissioning of electrical equipment to be made, and report these emissions.	Resolved. Croatia reported in CRF table 2(II)B-Hs2 SF$_6$ emissions from SF$_6$ filled into new electrical equipment and from the decommissioning of electrical equipment in addition to SF$_6$ emissions from leakage and maintenance losses in existing equipment stocks.
I.35	2.G.3 N$_2$O from product uses – N$_2$O (I.46, 2020) (I.49, 2018) Accuracy	Implement the planned improvement regarding gathering accurate and consistent data on N$_2$O product uses to ensure the accuracy of AD and N$_2$O emission estimates for N$_2$O used in anaesthesia and aerosol cans under category 2.G.3 (N$_2$O from product uses), report a consistent time series of emissions in the CRF tables.	Addressing. Croatia reported in CRF table 2(I).A-Hs2 revised N$_2$O emissions under category 2.G (other product manufacture and use) for the whole time series based on an improvement project led by the Ministry of Economy and Sustainable Development. The ERT noted that while the AD for activities for medical purposes had been revised for the whole time series, those for activities of N$_2$O consumption for food purposes had not.
I.36	2.G.3 N$_2$O from product uses – N$_2$O (I.46, 2020) (I.49, 2018) Transparency	Provide relevant information in the NIR on emission estimates for N$_2$O used in anaesthesia and aerosol cans.	Resolved. Croatia reported in its NIR (section 4.8.3.2, p.175) relevant information on revised emission estimates of all subcategories within category 2.G (other product manufacture and use) for the whole time series based on an improvement project led by the Ministry of Economy and Sustainable Development.

Agriculture

ID#	Issue/problem classification[a, b]	Recommendation from previous review report	ERT assessment and rationale
A.1	3. General (agriculture) – CH$_4$ (A.2, 2020) (A.9, 2018) Convention reporting adherence	Justify in the NIR the use of the notation key "NO" or otherwise use the notation key "NE" for reporting CH$_4$ emissions from enteric fermentation of poultry under category 3.A.4 (other livestock).	Resolved. The Party reported in its NIR (section 5.2.2, p.182, and section 5.5, p.192) that CH$_4$ emissions from enteric fermentation of poultry were not estimated because the 2006 IPCC Guidelines do not provide default estimation methods. Croatia thus reported "NE" for CH$_4$ emissions from enteric fermentation for poultry in CRF table 3.As1.
A.2	3. General (agriculture) – CH$_4$ (A.3, 2020) (A.12, 2018) Transparency	Cite references in the agriculture chapter of the NIR to the sources of data used to estimate emissions in the agriculture sector, including, when possible, the web address of the source, and make specific references to years or other relevant information to make the source easy to identify.	Not resolved. The Party updated its references in the NIR by removing unused data sources from its reference list (references, pp.471–472), but the agriculture chapter still does not provide clear references, for example regarding the development of country-specific data by experts from the Faculty of Agriculture, University of Zagreb. No documentation associated with the expert judgment (such as basic assumptions or data sources) is included in the reference list.

ID#	Issue/problem classification[a, b]	Recommendation from previous review report	ERT assessment and rationale
A.3	3.A Enteric fermentation – CH_4 (A.23, 2020) Accuracy	Prioritize efforts and resources to apply a higher-tier methodology for estimating emissions from enteric fermentation, and report the estimates obtained from using that methodology, as well as a description of country-specific parameters (i.e. gross energy and CH_4 conversion rate), at least for cattle, which represent 81 per cent of CH_4 emissions from enteric fermentation, in line with the decision tree for CH_4 emissions from enteric fermentation in the 2006 IPCC Guidelines.	Addressing. Croatia used the tier 1 methodology from the 2006 IPCC Guidelines (vol. 4, chap. 10.3.1, pp.10.24–10.26) for the calculation of CH_4 emissions from enteric fermentation for the whole time series for all livestock categories other than cattle and for cattle for 1990–2015 (except 2005). As noted in the annual review report for 2020, the tier 2 methodology provided in the 2006 IPCC Guidelines (vol. 4, chap. 10.3.1, pp.10.24–10.26) was used to calculate emissions for cattle for 2005 and 2016–2020 because of technical corrections applied on the basis of the ESD comprehensive review of 2020. However, the Party did not include a description of country-specific parameters (i.e. gross energy and the CH_4 conversion rate) used for applying the tier 2 methodology for estimating the CH_4 emissions from the category for cattle. The Party stated in the NIR (section 5.2.6, p.186) under short-term goals (under one year) that it will improve AD and develop tier 2 or tier 3 methodologies for relevant animal categories and that the necessary financial funds have been pledged by the Ministry of Economy and Sustainable Development. During the review, the Party informed the ERT that the project for the development of updated country-specific parameters and appropriate values for enteric fermentation and manure management is in progress. Results from this project and subsequent reimplementation of higher-tier methodologies are expected for the next annual submission.
A.4	3.A.1 Cattle – CH_4 (A.5, 2020) (A.15, 2018) Transparency	Report in the NIR the correct maintenance coefficients from the 2006 IPCC Guidelines (vol. 4, table 10.4) that were used to estimate CH_4 emissions from enteric fermentation of cattle.	Not resolved. Croatia did not report the maintenance coefficients from the 2006 IPCC Guidelines used to estimate CH_4 emissions from enteric fermentation of cattle. The Party used the tier 1 methodology from the 2006 IPCC Guidelines (vol. 4, chap. 10.3.1, pp.10.24–10.26) for the calculation of CH_4 emissions from enteric fermentation. As explained by the Party during the review, for cattle, for 2005 and 2016–2020, the Party implemented the technical corrections suggested by the ESD comprehensive review of 2020 for EU member States. The technical corrections were calculated on the basis of 2017 IEFs of mature dairy cattle, other mature cattle and growing cattle obtained from Croatia's 2019 submission that applied the tier 2 approach and default maintenance factors provided in the 2006 IPCC Guidelines (vol. 4, chap. 10, table 10.4). However, the Party did not include information on these default maintenance coefficients in the NIR. Croatia states in its NIR (section 5.2.6, p.186) under short-term goals (under one year) that it will improve AD and develop tier 2 or tier 3 methodologies for relevant animal categories, and that the necessary financial funds have been pledged by the Ministry of Economy and Sustainable Development. During the review, the Party informed the ERT that the project for the development of updated country-specific parameters and appropriate values for enteric fermentation and manure management is in progress (see ID# A.3 above).
A.5	3.A.1 Cattle – CH_4 (A.6, 2020) (A.16, 2018) Accuracy	Estimate CH_4 emissions from enteric fermentation and manure management consistently using, if appropriate, representative livestock subcategories from table 10.1 of the 2006 IPCC Guidelines (vol.	Not resolved. The Party estimated the CH_4 emissions for the category using subcategories of cattle, swine and poultry provided by the Croatian Bureau of Statistics. The subcategories used for estimating the emissions from cattle have changed across the time series, with 8 subcategories used for the period 1990–1999 and 11 subcategories for 2000–2020. The Party reported in its NIR (section 5.2.2, p.184) that the improved

ID#	Issue/problem classification[a, b]	Recommendation from previous review report	ERT assessment and rationale
		4, p.10.11) and report the results in the annual submission. (Assumptions and documented expert judgment can be used where data gaps are observed (e.g. the population of other cows for 1990–1999 can be derived from the structure of the herd in 2000–2017 and it can be assumed that other cows mostly comprise beef cows)).	segregation and classification of cattle is part of the planned upgrade to national tier 2 and 3 methodologies. As described in the NIR (section 5.2.6, p.186), the improvement and verification of AD parameters for relevant animal categories are planned as a short-term goal (under one year). During the review, the Party explained that the project for the development of updated country-specific parameters and appropriate values for enteric fermentation and manure management is in progress (see ID# A.3 above).
A.6	3.A.1 Cattle – CH_4 (A.7, 2020) (A.17, 2018) Transparency	Report the feeding situation for cattle in CRF table 3.A (e.g. stall, pasture) instead of reporting activity coefficients, and include in the NIR a description of the approach used to derive activity coefficients for estimating net energy for each activity, based on equation 10.4 of the 2006 IPCC Guidelines (vol. 4), for mature dairy and non-dairy cattle.	Not resolved. Croatia did not correct the reporting of the feeding situation for cattle in CRF table 3.A and still reported activity coefficients instead of describing the feeding situation in accordance with the 2006 IPCC Guidelines (vol. 4, chap. 10, table 10.5). During the review, the Party clarified that activity coefficients are not used in the current tier 1 calculation of emissions from enteric fermentation and that the values in the additional information CRF table 3.As2 are old values that remained from previous submissions and will be replaced with new national values expected from the results of the project for developing updated country-specific parameters (see ID# A.3 above). However, the ERT noted that Croatia reported CH_4 emissions from enteric fermentation for cattle categories for 2005 and 2016–2020 using the tier 2 methodology from the 2006 IPCC Guidelines, but it did not report information on the feeding situation in CRF table 3.A for those years.
A.7	3.B Manure management – CH_4 (A.24, 2020) Transparency	Report in CRF table 3.B(a)s2 appropriate MCF data for animal categories allocated to MMS in the cool climate region: mature dairy cattle – anaerobic lagoon; other mature cattle – anaerobic lagoon; market swine – solid storage and dry lot; and horses – solid storage, dry lot, and pasture, range and paddock.	Resolved. The Party reported in CRF table 3.B(a)s2 the applied MCF data for animal categories allocated to MMS for the cool climate region.
A.8	3.B Manure management – CH_4 (A.25, 2020) Transparency	Include in the NIR a detailed rationale for using MCFs of 22 per cent for both liquid systems and anaerobic lagoons or revise the estimates of CH_4 emissions from these MMS using the default MCF values from the 2006 IPCC Guidelines (i.e. 17–25 per cent for liquid systems without crust cover and 66–73 per cent for anaerobic lagoons).	Addressing. For anaerobic lagoons, Croatia uses the MCF value applicable for liquid systems (22 per cent). As noted in the annual review report for 2020, this was proposed by the EU during its review of member States' GHG inventories. The Party justified the MCF value on the basis of the cool temperature conditions of Croatia and available scientific information. This MCF value for liquid systems is also used by the other EU member States for anaerobic digesters. The ERT therefore considers the use of an MCF of 22 per cent for anaerobic lagoon MMS to be reasonable. However, the Party should include a detailed rationale for using this value in its NIR (e.g. how often the lagoons are emptied). During the review, Croatia clarified that the values and appropriate use of default values for the category in the 2006 IPCC Guidelines (vol. 4, chap. 10, table 10.17) are currently being reviewed as part of a project for developing country-specific values (see ID# A.3 above).

ID#	Issue/problem classification[a, b]	Recommendation from previous review report	ERT assessment and rationale
A.9	3.B.1 Cattle – CH_4 (A.10, 2020) (A.21, 2018) Accuracy	Follow the guidance in the decision tree in the 2006 IPCC Guidelines (vol. 4, chap. 10, p.10.36, figure 10.3) for estimating CH_4 emissions from manure management of cattle, including the use of currently available data on gross energy and feed digestibility for estimating country-specific VS values, and report the results in the next annual submission.	Not resolved. Croatia did not follow the decision tree regarding the choice of methodology in the 2006 IPCC Guidelines (vol. 4, chap. 10, figure 10.3) and calculated CH_4 emissions from manure management of mature dairy cattle and other mature cattle using the tier 2 method from the 2006 IPCC Guidelines (vol. 4, chap. 10.4.1, pp.10.41–10.47). The Party used default VS and B_o rates for Western European countries from the 2006 IPCC Guidelines (vol. 4, chap. 10, tables 10A-1–10A-9). For growing cattle, Croatia chose the default VS and B_o rates for Eastern Europe as country-specific values. The NIR provides no information explaining the choice of values for Eastern Europe for growing cattle. Factors are provided in the NIR (table 5.3-1, p.188) but some of them were incorrectly entered and were clarified during the review. During the review, the Party explained that the project for developing updated country-specific parameters and appropriate values for enteric fermentation and manure management is in progress (see ID# A.3 above).
A.10	3.B.1 Cattle – CH_4 (A.27, 2020) Convention reporting adherence	Revise and report in the CRF tables the correct percentages of growing cattle allocated to each MMS for the cool climate region, ensuring that the allocation totals 100 per cent.	Resolved. The Party reported revised percentages of growing cattle allocated to each MMS in CRF table 3.B(a)s2, which total 100 per cent.
A.11	3.B Manure management – N_2O (A.9, 2020) (A.19, 2018) Transparency	Include in the NIR a description of the method, data and assumptions used to estimate country-specific Nex values for cattle, as well as weight data and the assumptions used to derive default Nex values for other livestock categories, with supporting references, and also report Nex rates in CRF table 3.B(b) disaggregated by other mature cattle and growing cattle subcategories, as required when reporting under Option B, instead of using a single aggregated Nex rate for both above-mentioned animal subcategories.	Addressing. Croatia used the tier 1 methodology from the 2006 IPCC Guidelines (vol. 4, chap. 10.5.1, pp.10.53–10.56) together with the default values from the same Guidelines (vol. 4, chap. 10.19) for the Nex rate for all livestock categories. The Party reported in the NIR (table 5.3-1, p.188) the country-specific values of typical animal mass for mature dairy cattle, other mature cattle and growing cattle and default values provided in the 2006 IPCC Guidelines (vol. 4, chap. 10, tables 10A-4–10A-9) used to calculate the Nex values for other livestock categories. However, the Party did not transparently describe the underlying assumptions used for the derivation of Nex values for cattle. Nex rates were reported in CRF table 3.B(b) disaggregated by subcategory (e.g. mature cattle and growing cattle), as required when reporting under option B. During the review, the Party explained that the project for developing updated country-specific parameters and appropriate values for enteric fermentation and manure management is in progress (see ID# A.3 above).
A.12	3.B Manure management – N_2O (A.26, 2020) Accuracy	Apply a tier 2 method with collected data to develop and revise the Nex rates and country-specific EFs for typical animal mass and a country-specific MMS distribution, and report in the NIR a description of the country-specific parameters used, especially for cattle and poultry, which represent 52.8 and 28.7 per cent of direct N_2O emissions from manure management, respectively, in	Not resolved. Croatia still uses the tier 1 methodology and default Nex rates for all animal categories from the 2006 IPCC Guidelines (vol. 4, chap. 10, table 10.19). Croatia stated in its NIR (section 5.3.2.6, p.192) under short-term goals (under one year) that it will improve AD and develop tier 2 emission calculations for relevant animal categories and MMS, and that the necessary financial funds have been pledged by the Ministry of Economy and Sustainable Development. The implementation of national parameters developed as part of this project into the inventory is planned as a mid- or long-term goal. During the review, the Party informed the ERT that the project for developing

ID#	Issue/problem classification[a, b]	Recommendation from previous review report	ERT assessment and rationale
		line with the decision tree for N$_2$O emissions from manure management in the 2006 IPCC Guidelines.	updated country-specific parameters and appropriate values for enteric fermentation and manure management is in progress (see ID# A.3 above).
A.13	3.B.2 Sheep – N$_2$O (A.28, 2020) Completeness	Report revised direct N$_2$O emissions from manure management that include the direct N$_2$O emissions from solid storage MMS of sheep, and ensure that all direct N$_2$O emissions from manure management of all livestock categories are included in the total amount in order to avoid a potential underestimation of emissions.	Resolved. The inclusion of direct N$_2$O emissions from solid storage MMS of sheep was implemented, as mentioned in the current NIR (table 10-4-1, p.374), thereby ensuring that all direct emissions from manure management of all livestock categories are reported in CRF table 3.B(b).
A.14	3.B.4 Other livestock – CH$_4$ and N$_2$O (A.13, 2020) (A.20, 2018) Completeness	Estimate CH$_4$ and N$_2$O emissions from manure management of rabbits under category 3.B.4 (other livestock) using default EFs and parameters from tables 10.16 and 10.A.9 (vol. 4, chap. 10, pp.10.41 and 10.83, respectively) and Nex value from table 10.19 (vol. 4, chap. 10, p.10.59) of the 2006 IPCC Guidelines, or ensure that the related cells in CRF tables 3, 3.A, 3.B(a) and 3.B(b) are filled in with the corresponding notation keys.	Resolved. The Party included estimates for CH$_4$ and N$_2$O emissions from manure management of rabbits in its inventory for all reporting years, which were calculated using default tier 1 EFs, and parameters from the 2006 IPCC Guidelines (vol. 4, chap. 10, table 10.16, and vol. 4, chap. 10, table 10.A-9, respectively), which were reported in the relevant CRF tables.
A.15	3.B.5 Indirect N$_2$O emissions – N$_2$O (A.29, 2020) Accuracy	Correct the estimation of total N volatilized as NH$_3$ and NO$_X$ by including the amount of N volatilized as NH$_3$ and NO$_X$ from the solid storage MMS of sheep, and by revising the conversion of N$_2$O-N emissions to N$_2$O emissions.	Resolved. The Party included the amount of N volatilized as NH$_3$ and NO$_X$ from the solid storage MMS of sheep and revised the conversion of N$_2$O-N emissions to N$_2$O emissions, as referenced in the current NIR (section 10.4, table 10-4-1, p.375).
A.16	3.D Direct and indirect N$_2$O emissions from agricultural soils – N$_2$O (A.15, 2020) (A.4, 2018) (A.7, 2016) (A.7, 2015) (59, 2014) Accuracy	Correct the error concerning the N content of dry matter used to estimate emissions and improve QA/QC for the data received from the Croatian Environment Agency.	Resolved. Croatia reported in its NIR (section 5.5.1.4, p.205) that it consulted countries with similar climate and soil conditions regarding values of N content of dry matter fraction. The ERT noted that Croatia now uses a realistic value of 3.89 per cent N in dry matter mass (NIR section 5.5.1.2, table 5.5-3, p.197).
A.17	3.D Direct and indirect N$_2$O emissions from agricultural soils – N$_2$O	Increase the accuracy of the estimated direct N$_2$O emissions from animal manure applied to soils by applying Frac$_{GasMS}$ and Frac$_{LossMS}$ in accordance with the 2006 IPCC	Resolved. The Party used values of Frac$_{GasMS}$ and Frac$_{LossMS}$ in accordance with the 2006 IPCC Guidelines (vol. 4, chap. 11, table 11.3) in the current submission (CRF table 3.D) for each animal category in each MMS used in the country.

ID#	Issue/problem classification[a, b]	Recommendation from previous review report	ERT assessment and rationale
	(A.30, 2020) Accuracy	Guidelines (vol. 4, tables 10.22 and 10.23) for each animal category in each MMS used in the country.	
A.18	3.D Direct and indirect N$_2$O emissions from agricultural soils – N$_2$O (A.30, 2020) Accuracy	Revise indirect N$_2$O emissions from animal manure applied to soils due to changes in N input from manure applied to soils that directly affect indirect N$_2$O emissions from atmospheric deposition and N leaching and run-off.	Resolved. The Party revised indirect N$_2$O emissions from animal manure applied to soils owing to changes in N input from manure applied to soils (2021 NIR section 5.5.2.5, p.202).
A.19	3.D.a Direct N$_2$O emissions from managed soils – N$_2$O (A.16, 2020) (A.24, 2018) Convention reporting adherence	Justify in the NIR the assumptions used to derive the uncertainty value of ±30 per cent for the EF1 for mineral fertilizers, N-fixing crops and crop residues and ±50 per cent for animal manure, or use the appropriate uncertainty range for the default EF1 from table 11.1 of the 2006 IPCC Guidelines (0.003–0.03 kg N$_2$O-N/kg N) in the Monte Carlo uncertainty analysis.	Addressing. Croatia used the uncertainty range for the default EF1 in the 2006 IPCC Guidelines (vol. 4, chap. 11, table 11.1) (0.003–0.03 kg N$_2$O-N/kg N, or –70 to +200 per cent) for mineral fertilizers, N-fixing crops and crop residues (NIR section 5.5.1.3, p.204). During the review, the Party explained that, although it implemented this recommendation in its inventory, the NIR (annex 2, table A2:3-1, column F, pp.54–62) could not be updated with the new information. Croatia also shared with the ERT a screenshot of its uncertainty model, including the corrected uncertainty values used for EF1 in line with the 2006 IPCC Guidelines (vol. 4, chap. 11, table 11.1). However, for urine and dung deposited by grazing animals, the uncertainty range of –50 to +150 per cent has not been updated and therefore the ERT considers that the issue has not been resolved.
A.20	3.D.a Direct N$_2$O emissions from managed soils – N$_2$O (A.17, 2020) (A.25, 2018) Accuracy	Investigate the reasons for the substantial discrepancies observed between data from producing companies and statistical data on the consumption of inorganic N fertilizers in the country for 2006–2016 (e.g. by analysing production, export and import data), including relevant data from the Food and Agriculture Organization of the United Nations in the comparison analysis, and revise the estimates for the consumption of inorganic N fertilizers for 2006–2016 on the basis of the investigation and using the most reliable source of data, if appropriate, while ensuring time-series consistency.	Addressing. The Party has improved the time-series consistency of AD used for the consumption of inorganic N fertilizers. The mineral N fertilizer consumption of Croatia is consistent with the data reported on the website of the Croatian Bureau of Statistics, and as at the 2020 submission the 2006–2016 emissions were recalculated. During the review, the Party said that providing an explanation for the similarities and differences in the time series between two data sources, namely fertilizer producers and the Croatian Bureau of Statistics, was a long-term goal.
A.21	3.D.a Direct N$_2$O emissions from managed soils – N$_2$O (A.17, 2020) (A.25,	Report the results of the investigation into the reasons for the substantial discrepancies observed between data from producing companies and statistical data on the consumption of inorganic N fertilizers in the	Addressing. Croatia did not report the results of the requested investigation in the NIR. The Party listed in the NIR (section 5.5.1.6, p.205) as a long-term goal the investigation of AD for a more detailed explanation of its trends and verification of data sources. During the review, the Party confirmed that providing an explanation in the NIR for the

ID#	Issue/problem classification[a, b]	Recommendation from previous review report	ERT assessment and rationale
	2018) Transparency	country for 2006–2016 in the next annual submission.	similarities and differences in the time series between two data sources, namely fertilizer producers and the Croatian Bureau of Statistics, was a long-term goal.
A.22	3.D.a Direct N_2O emissions from managed soils – N_2O (A.31, 2020) Convention reporting adherence	Apply the appropriate uncertainty range for the default EF1 from the 2006 IPCC Guidelines (0.003–0.03 kg N_2O-N/kg N) and report the results.	Resolved. The Party applied the appropriate uncertainty range for the default EF1 from the 2006 IPCC Guidelines (vol. 4, chap. 11, table 11.1) for all inputs, including a range of –70 to +200 per cent for organic N fertilizers and mineralization/immobilization associated with loss/gain of soil organic matter, and included this information in the NIR (section 5.5.1.3, pp.204–205, and table 10.4-1, pp.369–382).
A.23	3.D.a.2.b Sewage sludge applied to soils – N_2O (A.19, 2020) (A.26, 2018) Completeness	Considering the increasing trend in the amount of sludge applied during 2005–2016, make all the necessary efforts to obtain reliable data on sludge applied during 1990–2008. If this is not possible, extrapolate the values for 2009–2016 or use another, more appropriate splicing technique recommended by the 2006 IPCC Guidelines to derive the amount of sludge applied to soils for 2005–2008 and report the resulting N_2O emissions for subcategory 3.D.a.2.b (sewage sludge applied to soils). Also investigate and confirm whether sludge application occurred in earlier years of the time series (1990–2004) and, if so, use the same splicing technique to expand the period and report N_2O emissions for subcategory 3.D.a.2.b for the complete time series.	Not resolved. Croatia did not report a complete time series of emissions for 1990–2004 but used instead the notation key "NA". In its 2021 inventory submission, Croatia improved the time-series consistency for 2005–2008 by revising the average N content of sewage sludge from 11.0 per cent to 3.89 per cent in order to ensure consistency with the other reported years (NIR table 5.5-3, p.197). The ERT noted that the Party included the verification of the amount of sludge applied to soils for 2005–2008, and the investigation and confirmation of whether sludge application occurred in earlier years of the time series (1990–2004), in its improvement plan (NIR section 5.5.1.6, p.205). According to the NIR, this improvement is planned to be implemented in the short term (one year). However, during the review, the Party explained that this improvement is identified as a long-term goal.

LULUCF

ID#	Issue/problem classification[a, b]	Recommendation from previous review report	ERT assessment and rationale
L.1	4. General (LULUCF) – CO_2, CH_4 and N_2O (L.1, 2020) (L.3, 2018) (L.12, 2016) (L.12, 2015) Convention reporting adherence	Determine which carbon pools and subcategories are significant in each key category based on the guidance provided in the 2006 IPCC Guidelines, and provide detailed information on the results of such determination in the NIR.	Addressing. Croatia did not determine which carbon pools and subcategories are significant in each key category based on the guidance provided in the 2006 IPCC Guidelines (vol. 1, chap. 4, table 4.1), and did not provide detailed information on the results of such determination in the NIR. The Party reported in its NIR (table 6.1-1, p.212) and CRF table NIR 3 a summary of its key category analysis for the LULUCF sector, which included information on which subcategories are significant in terms of both level and trend assessment based on the assessments presented in more detail in annex 1 to the NIR. The analysis did not, however, include details on the carbon pools that have a significant impact on total national emissions and removals, and their trend or uncertainty for land-use categories other than forest land remaining forest land, for which above-ground biomass and soil were considered significant pools. The ERT noted that some information on significant carbon pools for KP-LULUCF is presented in the NIR

ID#	Issue/problem classification[a, b]	Recommendation from previous review report	ERT assessment and rationale
			(section 11.6.1, p.469) but that this information is missing for key categories in the LULUCF sector for Convention reporting. During the review, the Party confirmed that above-ground biomass and soil are significant pools in the category of forest land remaining forest land. Croatia explained that further analysis to determine which carbon pools and subcategories are significant in other land-use categories will be carried out for the next annual submission.
L.2	4. General (LULUCF) – CO_2, CH_4 and N_2O (L.2, 2020) (L.20, 2018) Transparency	Provide in the NIR a clear, documented and complete description of the methodologies used, in particular for forest land, cropland (mineral soils), land converted to cropland, and grassland, including the identification of all equations, references and sources of information used in the specific IPCC methodologies, and provide a clear indication of which parameters used are default or country-specific for all categories.	Resolved. Croatia improved the description of the methodologies for forest land, cropland (mineral soils), land converted to cropland and grassland (NIR section 6.4.2, pp.240–250, section 6.5.2, pp.256–264, and section 6.6.2, pp.268–269) used for determining CSC, including where nationally determined EFs and default EFs are applied. During the review, the Party provided more information on the scientific projects carried out to determine national EFs.
L.3	4. General (LULUCF) – CO_2, CH_4 and N_2O (L.3, 2020) (L.21, 2018) Comparability	Use "NA" for reporting a specific carbon pool for which an IPCC default method is applied that assumes that no net CSCs occur, accompanied by an explanation in the information box of the corresponding CRF table stating that "NA" indicates a tier 1 estimate.	Addressing. The Party changed the notation key "NO" to "NA" for the category of forest land remaining forest land. However, for all other land-use categories for which it assumes that no net CSCs occur, it continued to report "NO" without including any information in documentation boxes. During the review, Croatia resubmitted its CRF tables but in the resubmitted file net CSCs in dead organic matter were still reported as "NO". During the review, the Party noted the urgent need to improve the QA/QC plan for the LULUCF sector.
L.4	4. General (LULUCF) – CO_2, CH_4 and N_2O (L.4, 2020) (L.22, 2018) Convention reporting adherence	(a) Include in NIR table 6.4-5 a column with data on the annual carbon stock in litter; (b) Report CSCs in soil organic carbon in mineral soils instead of annual CSCs (p.258 of the NIR); (c) Report total carbon stocks in above-ground biomass in perennial cropland instead of annual stock changes (p.267 of the NIR); (d) Correct the indication that existing carbon pools are not occurring (section 6.8 of the NIR); (e) Improve and fully implement QC activities in the LULUCF sector to avoid such types of error in the NIR.	(a) Resolved. Croatia inserted additional columns in NIR table 6.4-5 (pp.249–250) to report CSCs in litter and deadwood. (b) and (c) Not resolved. The relevant descriptions included in the NIR have not been changed. (d) Not resolved. The indication that existing carbon pools are not occurring has been retained. The CSCs were reported as "NE" in section 6.8 (pp.275–283) of the NIR, but in the relevant CRF tables they were reported as "NO" without explanation (see ID# L.3 above). (e) Not resolved. QC activities do not seem to have been improved or fully implemented, as several sections of the NIR contain text that does not correspond to the current version of the inventory (see ID#s L.5, L.11, L.19 and L.21 below). The ERT noted that there are also various inconsistencies between the NIR and the CRF tables, for example between the AD and the CSCs reported for almost all land-use sectors. During the review, the Party clarified that it recognizes the urgency of upgrading and improving its QA/QC plan for the LULUCF sector, noting that the first steps will be taken for the 2023 submission

ID#	Issue/problem classification[a, b]	Recommendation from previous review report	ERT assessment and rationale
			and subsequent improvements will be made over the following three years. The short- and midterm improvements will be described fully in the Party's next annual submission.
L.5	4. General (LULUCF) – CO_2, CH_4 and N_2O (L.5, 2020) (L.4, 2018) (L.13, 2016) (L.13, 2015) Convention reporting adherence	Correct all the inconsistencies identified in the NIR and between the NIR and the CRF tables, and further improve the QA/QC system's effectiveness by enhancing related QA/QC procedures such as internal audits, and corrective and preventive activities following the national QA/QC plan, in order to be able to identify and correct such inconsistencies during the inventory preparation process in the future.	Not resolved. There are various inconsistencies between the NIR and the CRF tables. For example, there is inconsistency in the AD and the CSCs reported for almost all land-use sectors (e.g. between NIR table 6.1-3, pp.215–217, and CRF tables 4.A–4.F). During the review, the Party clarified that it recognizes the urgent need to improve its QA/QC plan for the LULUCF sector. These improvements will be initiated for the next annual submission and subsequent improvements will be made over the following three years. Short- and midterm improvements will be described the next annual submission.
L.6	4. General (LULUCF) – CO_2, CH_4 and N_2O (L.21, 2020) Transparency	Transparently explain in the NIR which data have been used to construct the land-use change matrices.	Resolved. Croatia described in its NIR (section 6.3.2, pp.231–232) the process for calculating areas used for the construction of land-use matrices. The Party also states in the NIR that it has begun a new Croatian Land Information System project, due to be completed in 2024, for obtaining more comprehensive coverage of data on land areas. During the review, the Party further clarified the main details of the method used to prepare the land database.
L.7	Land representation – CO_2, CH_4 and N_2O (L.6, 2020) (L.23, 2018) Convention reporting adherence	Review the uncertainty estimations in forest land remaining forest land, land converted to forest land, grassland and land-use changes to and from cropland and, if the uncertainty ranges are confirmed, undertake improvements to the approaches used to reduce the uncertainty of the estimates, taking into account and focusing on the identified significant sources of uncertainties associated with the use of approaches 1, 2 and 3 for land representation, as well as those related to the use of the tier 1 parameters from the 2006 IPCC Guidelines. In the case that uncertainties are lower than the current estimated uncertainty ranges, focus efforts on improving the quality of the approach used for tracking land-use changes to and from grassland and land-use changes to and from cropland and the related parameters used in the estimates.	Addressing. The Party reported in its NIR (section 6.4.3, p.250) information regarding an ongoing research project initiated by the Ministry of Economy and Sustainable Development on uncertainties in the LULUCF sector and shared results from the project with the ERT (the full text of the research project is only available in Croatian). However, the Party did not report in its NIR (section 6.4.3, table 6.4-6, pp.250–252) updated information or uncertainty values for the parameters based on the results of the research project. The ERT considers that the recommendation has not yet been fully addressed because, although the Party has an ongoing research project to improve uncertainties in the LULUCF sector, the available revised uncertainty values for some parameters were not updated in the NIR.
L.8	Land representation – CO_2, CH_4 and N_2O	Report in the NIR a detailed description of the method implemented to estimate	Addressing. The Party did not include a detailed description of the method used to estimate uncertainties that stated the assumptions and expert judgment used for

ID#	Issue/problem classification[a, b]	Recommendation from previous review report	ERT assessment and rationale
	(L.7, 2020) (L.23, 2018) Convention reporting adherence	uncertainties in AD, in particular regarding the assumptions and expert judgment used.	LULUCF sector assessments. The NIR (annex 2) includes a description of a Monte Carlo simulation method. However, there are discrepancies between the numerical values mentioned in that section and those reported in the CRF tables. During the review, Croatia stated that it will improve the QA/QC procedures in its next annual submission (see issue ID# L.7 above).
L.9	Land representation – CO_2, CH_4 and N_2O (L.22, 2020) Consistency	Improve the consistency of the land-transition matrices, for instance by adjusting the time series for not only cropland converted to grassland but also grassland converted to cropland to reflect the net change between both categories according to the most reliable information available for that purpose (which, according to Croatia, as reported in its 2020 NIR, is currently the CORINE land-cover inventory data).	Resolved. The Party corrected the inter-annual inconsistencies in land-transition matrices (CRF table 4.1). The final area from the previous year for each land-use category is reported as the initial area for the following year in the land-transition matrices (CRF table 4.1). The land-transition matrices allow tracking of all land transitions occurring between two successive years, in accordance with the 2006 IPCC Guidelines (vol. 4, chap. 3).
L.10	Land representation – CO_2, CH_4 and N_2O (L.23, 2020) Transparency	Transparently report in the NIR the data used and assumptions made in estimating the gross fluxes of land-use change between cropland and grassland.	Not resolved. The Party did not transparently report in its NIR the data used and the assumptions made for estimating the gross fluxes of land-use change between cropland and grassland, especially that the area of cropland converted to grassland as a variable was used to match the inter-annual variability in the total cropland area reported in the Croatian Bureau of Statistics cropland statistics, while the conversion of grassland to cropland was assumed to occur at a constant rate within each of the periods covered by the CORINE land-cover data, as noted in the previous review. Croatia began a project in 2020 (the Croatian Land Information System) to improve its reporting on this land-use change to complement the data held in its Land Parcel Identification System by providing the necessary data on agricultural land use in order to improve the report.
L.11	4.A Forest land – CO_2 (L.10, 2020) (L.25, 2018) Accuracy	Develop country-specific BEFs and ratios of below-ground biomass to above-ground biomass to fully implement the tier 2 method for this key category, in line with the 2006 IPCC Guidelines.	Not resolved. Croatia used the tier 1 values of BEFs and ratios of below-ground biomass to above-ground biomass for the calculation of the CSCs in forest land, as for its previous submission. Croatia currently uses BEF values from the *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (chap. 3, annex 3A.1, table 3A.1.10). The Party reported in its NIR (section 6.4.2.1, p.242) that country-specific BEFs will be developed as part of a new project, thereby improving the transparency and accuracy of future reporting. The Party explained in its NIR (section 10.4, table 10.4-1, p.377) and during the review that a separate project is required to estimate national values of BEF, which will be considered when planning future activities in the LULUCF sector.
L.12	4.A Forest land – CO_2 (L.10, 2020) (L.25, 2018) Transparency	Report on country-specific BEFs and ratios of below-ground biomass to above-ground biomass to fully implement the tier 2 method	Not resolved. See issue ID# L.11 above.

ID#	Issue/problem classification[a, b]	Recommendation from previous review report	ERT assessment and rationale
		for this key category in the next annual submission.	
L.13	4.A.1 Forest land remaining forest land – CO_2 (L.11, 2020) (L.9, 2018) (L.15, 2016) (L.15, 2015) Accuracy	Collect data in order to estimate and report carbon stock losses from the living biomass pool in 'out of yield' forest land remaining forest land.	Resolved. The CSCs in the biomass pool for forest land remaining forest land have been estimated and reported for all forest types, including 'out of yield' forests, in CRF table 4.A.
L.14	4.A.1 Forest land remaining forest land – CO_2, CH_4 and N_2O (L.24, 2020) Consistency	Ensure time-series consistency of the AD used to estimate the forest land sink.	Resolved. Croatia recalculated the AD used and reported a consistent time series for areas by forest type. The Party reported in its NIR (section 11.3.1.7, pp.457–458) and in CRF table 4.A revised data on forest areas for each forest type, comparing them with previously submitted values (NIR table 11.3-10, p.457).
L.15	4.A.2 Land converted to forest land – CO_2 (L.13, 2020) (L.10, 2018) (L.16, 2016) (L.16, 2015) Transparency	Provide detailed information on the analysis of the data from CRONFI to check their usefulness for the GHG inventory, and clarify whether the CRONFI data cover both the deadwood and the litter pools.	Addressing. Croatia described the calculation process for assessments of CSC for all forest carbon pools, including information on CRONFI data. The Party reported in its NIR (section 11.1, p.395) that data on above-ground biomass and deadwood pools were collected through CRONFI, whereas the data relevant to the estimation of CSCs in other pools (below-ground biomass, litter, soil and HWP) were not part of this process. The NIR does not, however, include a clear indication that CRONFI data cannot be used to update estimates for the litter pool.
L.16	4.B.1 Cropland remaining cropland – CO_2 (L.14, 2020) (L.11, 2018) (L.5, 2016) (L.5, 2015) (69, 2014) (72, 2013) Accuracy	Implement the tier 2 approach for perennial cropland remaining perennial cropland as soon as possible.	Resolved. Croatia implemented the tier 2 approach for calculating CSC in living biomass on perennial cropland remaining perennial cropland, as reported in the NIR (section 6.5.5, p.264). However, instead of the calculated values of biomass gains, "NO" was entered by mistake into CRF table 4.B. The Party reported in its NIR (section 6.5.2.1, p.257, and section 6.5.5, p.264) that a country-specific value of above-ground biomass carbon stock at harvest of 17.8 t C/ha and a conservative approach assuming that biomass stocks in perennial cropland are in balance (p.257) have been used to calculate CSCs. During the review, the Party confirmed this information and explained that the use of "NO" in CRF table 4.B was an error. Croatia therefore resubmitted its CRF tables, replacing the notation keys entered in error with calculated values.
L.17	4.B.2 Land converted to cropland – CO_2 (L.15, 2020) (L.12, 2018) (L.6, 2016) (L.6, 2015) Accuracy	Improve the cropland biomass estimates to enable implementation of a tier 2 method for estimating cropland biomass in this category as soon as possible.	Resolved. Croatia implemented results from a project conducted in 2021 ("LULUCF 3") in order to improve cropland biomass estimation (NIR section 6.5.5, p.264). As a result of the project, Croatia uses nationally determined values for biomass carbon stock in perennial cropland.
L.18	4.C.2 Land converted to grassland – CO_2 (L.17, 2020) (L.15, 2018)	Improve the cropland biomass estimates to enable implementation of a tier 2 method for estimating cropland biomass under the land	Resolved. Croatia implemented the tier 2 methodology from the 2006 IPCC Guidelines (vol. 4, chap. 6) for calculating CSC in living biomass in cropland converted to grassland. The Party reported in its NIR (section 6.6.2.2.2, p.269) that the average

ID#	Issue/problem classification[a, b]	Recommendation from previous review report	ERT assessment and rationale
	(L.8, 2016) (72, 2015) Accuracy	converted to grassland category as soon as possible.	annual carbon stock in perennial cropland in Croatia is derived from the LULUCF 3 project, which has already been implemented. It is assumed that the final stocks are lost at the end of the rotation period of perennial crops.
L.19	4.E.2.2 Cropland converted to settlements – CO_2 (L.18, 2020) (L.17, 2018) (L.10, 2016) (73, 2014) Accuracy	Improve the cropland biomass estimates to enable implementation of the tier 2 approach for estimating cropland biomass estimates under the cropland converted to settlements category as soon as possible.	Resolved. Croatia implemented the tier 2 methodology from the 2006 IPCC Guidelines (vol. 4, chap. 8) for calculating CSC in living biomass on cropland converted to settlements. The Party reported in its NIR (section 6.8.2.1.2, p.281) the values of annual net change due to loss of cropland biomass and increase of biomass in settlements. CRF table 4.E indicates the gains and losses of biomass for cropland converted to settlements, which are divided into the subcategories of perennial cropland converted to settlements and annual cropland converted to settlements. During the review, the Party clarified that the LULUCF 3 project has been completed and so national values can now be used for determining the content of carbon stocks in cropland biomass in the forest land category, as well as in the cropland and grassland categories.
L.20	4.G HWP – CO_2 (L.25, 2020) Convention reporting adherence	Verify and report the correct amount of gains and losses of HWP in t C as required in CRF table 4.Gs1.	Addressing. The Party reported in CRF table 4.Gs1 gains and losses of HWP in kt C but, according to the table legend, these values should be reported in t C. During the review, the Party noted that it had used the wrong units and explained that it intends to improve QA/QC procedures to minimize such errors in the future.
L.21	4.G HWP – CO_2 (L.26, 2020) Accuracy	Either implement methodologies from the 2006 IPCC Guidelines to determine inputs to HWP pools for reporting under the Convention or, if an equation from the Kyoto Protocol Supplement is used for this purpose, explain why this equation is considered to better reflect national circumstances than an equation from the 2006 IPCC Guidelines.	Resolved. Croatia reported in the NIR (section 6.10.2, pp.289–291) that the fractions of domestically produced wood pulp used as feedstock for paper and paperboard production were determined nationally by implementing the Kyoto Protocol Supplement methods to determine inputs to the HWP pool. The Party also reported in the NIR (section 11.3.1.5, pp.455–456) the algorithm used to determine the components for carbon stock assessments for the HWP pool, showing that nationally available data on wood pulp production were collected and the share of domestic production determined for each year.
L.22	4.G HWP – CO_2 (L.26, 2020) Transparency	If the import and export of roundwood continues to be reported as input to HWP on the basis of equations 2.8.1 and 2.8.4 of the Kyoto Protocol Supplement, apply equation 2.8.4 correctly by taking into account the import–export balance of wood pulp for the paper and paperboard pool.	Addressing. The Party reported in its NIR (section 11.3.1.5, pp.455–456) information on the algorithm used to determine the components of the HWP pool carbon stocks, which implemented the methodology provided in the Kyoto Protocol Supplement to determine inputs to the HWP pool. The Party mentioned in the NIR that the share of industrial roundwood from its domestic harvest was determined by using equation 2.8.1 from the Kyoto Protocol Supplement. During the review, the Party shared with the ERT information on the amounts of imports and exports of industrial roundwood used for the estimation of CSC in the HWP pool. The ERT noted that the description of the algorithm for the determination of CSC in the HWP pool needs to be supplemented with information on the results of the new project initiated by the Ministry of Economy and Sustainable Development in 2022 relating to AD on HWP, which was mentioned in the NIR (section 6.10.5, p.292) as one of the planned improvements.

ID#	Issue/problem classification[a, b]	Recommendation from previous review report	ERT assessment and rationale
L.23	4(IV) Indirect N_2O emissions from managed soils – N_2O (L.19, 2020) (L.18, 2018) (L.18, 2016) (L.18, 2015) Completeness	Estimate indirect N_2O emissions associated with the loss of soil organic matter resulting from a change in land use or management of mineral soils and report these emissions in CRF table 4(IV), following the guidance in footnotes 2 and 4 of that table as well as in the 2006 IPCC Guidelines.	Resolved. The Party reported in the agriculture sector (CRF table 3.D) indirect N_2O emissions from leaching and run-offs associated with the loss of soil organic matter and reported the corresponding emissions as "IE" in CRF table 4(IV). The Party added comments to cells in CRF table 4(IV) to indicate that the corresponding emissions are reported under the agriculture sector in CRF table 3.D.

Waste

ID#	Issue/problem classification[a, b]	Recommendation from previous review report	ERT assessment and rationale
W.1	5.A Solid waste disposal on land – CH_4 (W.1, 2020) (W.1, 2018) (W.1, 2016) (W.1, 2015) (77, 2014) (76, 2013) Transparency	Provide information on the type of waste disposed of in SWDS and ensure that all types of solid waste, including industrial waste, sludge, and construction and demolition waste, disposed of in SWDS are included in the emission estimates.	Resolved. Croatia provided information in its NIR (section 7.2.2.1, pp.319–322) on the types of waste disposed of in SWDS, including industrial waste, sludge, and construction and demolition waste, and ensured that all types of solid waste are included in the emission estimates. The Party reported in its NIR (section 7.2.2.2, p.320) that the largest contributions to landfilled industrial waste are from the construction and waste treatment sectors, and that it calculates the DOC of industrial waste by using DOC data from construction and demolition waste. See issue ID# W.7 below.
W.2	5.A Solid waste disposal on land – CH_4 (W.2, 2020) (W.8, 2018) Transparency	Provide comprehensive information on solid waste management practices in the NIR, if possible in tabular format, covering the number of active and closed SWDS (including unofficial ones), the type of SWDS and management practices used at all landfills in the country (including unofficial ones), including the type of waste and amounts disposed of.	Resolved. Croatia reported in its NIR (section 7.2.1, p.305) information on the number of active and closed SWDS, the management practices applied at each SWDS and the amount disposed of for each waste type disposed of (MSW, industrial waste and sludge) since the 2020 submission. However, data for unofficial sites at which waste is improperly discarded into the environment are not included because the data for such sites are not available (NIR section 7.2.1, p.305). During the review, Croatia explained that, as an initiative to improve data availability, including for unofficial sites, since 2020, it has introduced an electronic application for registering the locations of discarded waste sites operated by municipalities (NIR section 10.4, p.378). See issue ID# W.8 below.
W.3	5.A Solid waste disposal on land – CH_4 (W.3, 2020) (W.9, 2018) Accuracy	Continue the efforts to obtain accurate country-specific historical AD and parameters, in particular on population, waste generation per capita and the percentage of waste disposed of at SWDS for different periods of time from 1955 to 1990, with the aim of estimating CH_4 emissions for the entire time series for category 5.A (solid waste disposal).	Resolved. Croatia is planning to carry out comprehensive research regarding AD and parameters, in particular on population, waste generation per capita and the percentage of waste disposed of in SWDS that is included in the inventory, for the entire time series (NIR section 10.4, p.379). The ERT considers this issue resolved, as Croatia intends to continue its efforts to obtain accurate country-specific historical AD.
W.4	5.A Solid waste disposal on land – CH_4 (W.3, 2020) (W.9, 2018) Transparency	Document the efforts to obtain accurate country-specific historical AD and parameters on waste disposed of at SWDS comprehensively in the NIR, including a	Resolved. Croatia provided a detailed description in its NIR (section 7.2.2.1, pp.308–315) as to how it has obtained historical data (1955–1999) for SWDS since its 2020 submission, including improvements made to the assumptions. The Party also

ID#	Issue/problem classification[a, b]	Recommendation from previous review report	ERT assessment and rationale
		description of improvements made to the assumptions, in particular by referring to the annual increases in population, waste generation per capita and the percentage of waste disposed of at SWDS for different periods of time from 1955 to 1990.	documented its plans for further improvement in AD collection in the NIR (section 7.2.6, p.327).
W.5	5.A Solid waste disposal on land – CH_4 (W.11, 2020) Transparency	Provide in the NIR the DOC values not only for MSW but also for industrial waste and sludge.	Resolved. The Party reported in its NIR (section 7.2.2.2, p.322) the values of DOC for industrial waste (0.017) and for sewage sludge (0.05).
W.6	5.A Solid waste disposal on land – CH_4 (W.12, 2020) Accuracy	Revise estimates of CH_4 emissions from industrial waste by using the amount of each waste type (e.g. paper/cardboard, textiles, food waste, wood) rather than the total amount of industrial waste disposed of.	Addressing. Croatia has reported in its NIR (section 7.2.2.2, p.320) an estimation of DOC for industrial waste by using country-specific data by waste type, such as mining waste (group 01), construction and demolition waste (group 17) and waste from waste management facilities and wastewater treatment plants (group 19). The ERT noted that DOC values for group 19 indicated in table 7.2-12 in the NIR (p.322) are an average value for several waste types. During the review, Croatia provided a spreadsheet that estimated the oxygen content for industrial waste by using DOC values from segregated waste types. The ERT noted that the average DOC value Croatia used does not lead to an underestimation of CH_4 emission from aggregated industrial waste. The ERT commends Croatia's effort to enhance accuracy in this category but notes that the Party still estimates CH_4 emissions from industrial waste by using the aggregated amount of industrial waste and its average DOC value.
W.7	5.A Solid waste disposal on land – CH_4 (W.13, 2020) Transparency	Clearly report in the NIR that construction and demolition waste is included in industrial waste as AD for this category.	Resolved. Croatia reported in its NIR (section 7.2.2.2, p.320) that the largest contribution to landfilled industrial waste comes from the construction and waste treatment sectors. The Party calculates the DOC of industrial waste by using DOC data for construction and demolition waste. On the basis of this information, the ERT concludes that the Party's AD of industrial waste include those for construction and demolition waste used for CH_4 emission estimations for this category.
W.8	5.A Solid waste disposal on land – CH_4 (W.14, 2020) Accuracy	Investigate the amount of waste disposed of at unofficial sites and include the emissions from those sites in the estimates for the category	Addressing. Data for unofficial sites at which waste is improperly discarded into the environment are not included in the inventory, as the data for such sites are not yet available (NIR section 7.2.1, p.305). During the review, Croatia stated that, as an initiative to improve data availability, including for unofficial sites, since 2020, it has introduced an electronic application for registering the locations of discarded waste sites operated by municipalities (NIR section 7.2.1, p.305). The ERT noted that the AD on solid waste disposal in such unofficial sites are typically small. As such, given that there is no way to reasonably estimate the amount of waste clandestinely disposed of, except by continuous investigation, the ERT believes that this cannot be considered an underestimation of emissions.

ID#	Issue/problem classification[a, b]	Recommendation from previous review report	ERT assessment and rationale
W.9	5.B Biological treatment of solid waste – CH_4 and N_2O (W.4, 2020) (W.10, 2018) Transparency	Provide in the NIR information on the official source of AD for composting and anaerobic digestion and the period for which AD are available, including information on when these activities started in the country.	Resolved. The Party reported in its NIR (section 7.3.1, p.328) two publications as the data sources of AD for composting and anaerobic digestion (Ekonerg, 2021, 2022). Croatia states in its NIR (section 7.3.2.1, p.328, and section 7.3.2.2, p.331) that composting activity started in 1994 and that anaerobic digestion at biogas facilities has been used in the country since 2009.
W.10	5.B.1 Composting – CH_4 and N_2O (W.15, 2020) Convention reporting adherence	Correctly report AD for composting on a dry weight basis.	Resolved. CRF table 5.B correctly reported AD for composting on a dry weight basis.
W.11	5.C.1 Waste incineration – CO_2 (W.5, 2020) (W.7, 2018) (W.6, 2016) (W.6, 2015) (table 3 and 82, 2014) Completeness	Extrapolate back in order to estimate CO_2 emissions from the incineration of plastic waste between 1990 and 2006 to improve the consistency of the time series and transparency.	Resolved. Croatia continued to report CO_2 emissions from the incineration of aggregated industrial waste, which includes hazardous waste and plastics (NIR section 7.4.2.1, p.338) for the entire time series. However, the ERT noted that this source is not a key category and using aggregated AD is sufficient when using a 2006 IPCC Guidelines tier 1 estimation methodology (vol. 5, chap. 5.2.1.1, pp.5.7–5.8). The ERT considers the estimates to be complete and therefore considers this issue resolved.
W.12	5.C.1 Waste incineration – CO_2, CH_4 and N_2O (W.6, 2020) (W.11, 2018) Transparency	Provide information in the NIR on the systems and amounts of plastic waste disposed of and/or incinerated for the entire time series, including information on plastic waste that is not collected and recycled and total AD for plastic waste that is generated in the country.	Not resolved. Croatia did not provide in the NIR the information related to waste plastic management because there is no information available on the handling of plastic waste that includes systems and amounts of plastic waste disposed of and/or incinerated for the entire time series. The Party is currently preparing to investigate this issue as a part of a comprehensive research project conducted by the Ministry of Economy and Sustainable Development regarding system improvements and the development of historical databases for the calculation and reporting of GHG emissions from the waste sector (NIR section 7.4.6, p.345). During the review, Croatia confirmed this plan.
W.13	5.C.1 Waste incineration – N_2O (W.16, 2020) Transparency	Report in the NIR the value of the default N_2O EF for industrial waste used for estimating N_2O emissions from waste incineration, that is, 100 g N_2O/t waste.	Resolved. The Party stated in its NIR (section 7.4.2.1, p.337) that it uses the default N_2O EF of 100 g N_2O/t waste for industrial waste.
W.14	5.D.1 Domestic wastewater – CH_4 (W.7, 2020) (W.12, 2018) Accuracy	Collect more detailed and complete information on domestic wastewater treated in various systems in the country, in particular individual wastewater treatment systems, and use this information to estimate and improve the accuracy of the CH_4 emissions from domestic wastewater.	Addressing. In its 2020 submission (section 7.5.2.1, p.327) Croatia had estimated CH_4 emissions from individual wastewater treatment systems under category 5.D.1 (domestic wastewater), assuming that all systems are septic tanks, and subtracting degradable carbon in sludge removed. Croatia has estimated these emissions without subtracting degradable carbon in sludge removed, as the applied MCF for septic systems in the 2006 IPCC Guidelines (vol. 5, chap. 6, table 6.3) already accounts for removed sludge, and estimated CH_4 emissions from direct discharge of untreated wastewater. The ERT noted that the assumption and methodology applied by Croatia is conservative and thus does not lead to an overestimation of emissions. The ERT commends Croatia's effort to enhance completeness of this category. However, Croatia

ID#	Issue/problem classification[a, b]	Recommendation from previous review report	ERT assessment and rationale
			did not estimate CH_4 emissions by using detailed and complete information on individual wastewater treatment in various systems, and currently plans to carry out comprehensive research on domestic wastewater treatment in various systems in the country (NIR section 7.5.6, p.360). During the review, Croatia confirmed its plan to address the issue.
W.15	5.D.1 Domestic wastewater –CH_4 (W.8, 2020) (W.13, 2018) Transparency	Provide in the NIR transparent descriptions and accurate data for the whole time series (1990–2016) related to the occurrence in the country of (1) anaerobic domestic wastewater installations, (2) anaerobic industrial wastewater installations, (3) aerobic domestic wastewater installations and (4) aerobic industrial wastewater installations.	Not resolved. The Party did not report in its NIR sufficient information related to the occurrence of wastewater installations in the country. Croatia plans to conduct comprehensive research on domestic and industrial wastewater treatment in various systems in the country (NIR section 7.5.6, p.360). During the review, Croatia confirmed its plan to resolve this issue.
W.16	5.D.2 Industrial wastewater –CH_4 and N_2O (W.10, 2020) (W.14, 2018) Transparency	Provide in the NIR a transparent description of the industrial wastewater treatment systems used in the country and the amounts of industrial wastewater treated aerobically and anaerobically.	Not resolved. The Party did not report in its NIR sufficient information on industrial wastewater treatment systems, including amounts of industrial wastewater treated aerobically and anaerobically. The Party plans comprehensive research on industrial wastewater treatment in various systems in the country (NIR section 7.5.6, p.360). During the review, Croatia confirmed its plan to resolve this issue.
KP-LULUCF			
KL.1	General (KP-LULUCF) – CO_2, CH_4 and N_2O (KL.2, 2020) (KL.12, 2018) Transparency	Ensure that a clear, documented and complete description of the methodologies used in the emission estimates is provided in the NIR, including the identification of equations, references and sources of information used in the specific IPCC methodologies and a clear indication of which parameters used are default or country-specific, in particular regarding methodologies used to estimate CSCs in biomass in afforestation and deforestation.	Addressing. Although the Party has made some improvements to the description of methodologies used in the emission estimates provided in the NIR (section 11.3.1.1, pp.428–429), the description is still not sufficiently clear, documented or complete. The Party reported in its NIR (section 11.3.1.1, pp.422–429) a description of the methodologies and the underlying assumptions used for KP-LULUCF and by carbon pools. However, only the sections on afforestation, reforestation and deforestation activities relating to litter and soils include formulas with a description of their components. The KP-LULUCF section for biomass for afforestation, reforestation and deforestation (section 11.3.1.1, pp.423–426) includes a link to a section in the LULUCF chapter (section 6.4.2.2, pp.243–244), which itself does not provide transparent information on the formulas used but contains a reference to the corresponding KP-LULUCF section. In a similar way, the section on FM activity (section 11.3.1.1, pp.428–429) includes a link to section 6.4.2 (pp.240–249) in the LULUCF chapter, which contains a formula for the calculation of carbon stock for living biomass but does not describe all components. During the review, Croatia explained that the references to the equations used are provided in the relevant sections of the KP-LULUCF chapter. However, the ERT did not find them in that chapter. The ERT concludes that this potential problem of a mandatory nature does not influence the Party's ability to fulfil its commitments for the second commitment period of the Kyoto

ID#	Issue/problem classification[a, b]	Recommendation from previous review report	ERT assessment and rationale
			Protocol and therefore this issue was not included in the list of potential problems and further questions raised.
KL.2	General (KP-LULUCF) – CO_2 (KL.3, 2020) (KL.13, 2018) KP reporting adherence	Reassess the uncertainty analysis using appropriate uncertainty values for AD and parameters used and revise the assumptions made and, if the resulting uncertainty values are high and confirmed, use this information to set priorities in the planned improvements to the estimates of KP-LULUCF, in particular improvements related to the parameters used in the estimates. In the case that uncertainties are lower than the current estimated uncertainty ranges, focus efforts on improving the quality of the estimates for AR and deforestation and the related parameters used in the estimates.	Addressing. Croatia assessed the uncertainty analysis in the LULUCF sector under a project conducted in 2022. However, by mistake, this project was not specified in the list of implemented and planned projects in the LULUCF sector in the annex to the NIR (annex 3.2, table A3.2-1, pp.89–90). During the review, Croatia explained that it recognizes the need for improvement in the QA/QC plan for the LULUCF and KP-LULUCF sectors and relevant activities will be initiated for its next annual submission (see issue ID# L.7 above). The ERT concludes that this potential problem of a mandatory nature does not influence the Party's ability to fulfil its commitments for the second commitment period of the Kyoto Protocol and therefore this issue was not included in the list of potential problems and further questions raised.
KL.3	General (KP-LULUCF) – CO_2 (KL.3, 2020) (KL.13, 2018) Transparency	Report in the NIR a detailed description of the method implemented to estimate uncertainties for KP-LULUCF, in particular regarding the assumptions and expert judgment used.	Not resolved. The Party did not report in the NIR a detailed description of the method, assumptions and expert judgment used to estimate uncertainties for KP-LULUCF. The NIR (annex 2) includes a description of a Monte Carlo simulation method. However, there are discrepancies between the numerical values mentioned in that section and those reported in the CRF tables. During the review, the Party provided further explanation (see issue ID# KL.2 above). The ERT concludes that this potential problem of a mandatory nature does not influence the Party's ability to fulfil its commitments for the second commitment period of the Kyoto Protocol and therefore this issue was not included in the list of potential problems and further questions raised.
KL.4	General (KP-LULUCF) – CO_2, CH_4 and N_2O (KL.11, 2020) KP reporting adherence	Further develop QC procedures for KP-LULUCF reporting in accordance with the annex to decision 19/CMP.1.	Addressing. The Party has not fully implemented the QC procedures for KP-LULUCF in accordance with paragraph 7 of the annex to decision 19/CMP.1, which states that national systems should be operated to ensure the quality of the inventory, including by implementing QC procedures and carrying out procedures for the verification of the inventory data at the national level. During the review, Croatia explained that it recognizes the importance of upgrading and improving its QA/QC plan for the LULUCF and KP-LULUCF sectors; the improvements will be initiated for its next annual submission and subsequent improvements will be made over the following three years. Short- and midterm improvements will be addressed in the next NIR. However, the ERT concludes that this potential problem of a mandatory nature does not influence the Party's ability to fulfil its commitments for the second commitment period of the Kyoto Protocol and therefore this issue was not included in the list of potential problems and further questions raised.
KL.5	Deforestation – CO_2 (KL.6, 2020) (KL.16,	Report in CRF table 4(KP-I)A.2 the corresponding carbon stock losses by	Resolved. Croatia reported the corresponding carbon stock losses by deforestation in 'out of yield' forests for the above-ground and underground biomass pool in its NIR

ID#	Issue/problem classification[a, b]	Recommendation from previous review report	ERT assessment and rationale
	2018) Completeness	deforestation in 'out of yield' forests for the above-ground biomass pool and confirm the completeness and correctness of the estimates made for the below-ground biomass pool.	(section 11.4, p.464) and in CRF table 4(KP-I)A.2. During the review, the Party clarified that the estimation of CSCs in the litter and soil carbon pools had been performed using a single value of carbon stocks for all forest types in Croatia, which was determined through a specific project conducted in 2017. Because the samples are taken from all forest types for both pools, Croatia considers that there is no underestimation of emissions from deforestation for these two pools and the ERT agrees with this assessment.
KL.6	FM – CO_2 (KL.7, 2020) (KL.9, 2018) (KL.6, 2016) (KL.6, 2015) Transparency	Collect data in order to estimate and report carbon stock losses from the living biomass pool in 'out of yield' forests under the activity FM.	Resolved. Croatia reported carbon stock losses in living biomass from forest fires in 'out of yield' forests under FM for the first time in the 2019 NIR and in the previous review the ERT considered that the remaining issue was that of transparency. The Party reported in its NIR (section 11.3.1.1, pp.428–429) a detailed description of protection from illegal logging for 'out of yield' forests. The Party explained in the NIR and during the review that, on the basis of data available from the monitoring of forest health conditions mandated by the national legislative framework, there has not been a significant pest attack in 'out of yield' forests or significant damage from wildlife or natural disturbances other than forest fires. Thus, biomass carbon losses occur only due to forest fires.
KL.7	FM – CO_2 (KL.8, 2020) (KL.17, 2018) Completeness	Report CSCs in the deadwood and litter pools under FM or provide in the NIR verifiable information that demonstrates that these pools were not a net source of GHG emissions in accordance with decision 2/CMP.8, annex II, paragraph 2(e). (If Croatia does not report these carbon pools, it should use the correct notation key "NE" in CRF table 4(KP-I)B.1 (instead of "NO")).	Resolved. Croatia reported the stock changes in the deadwood and litter pools under FM in CRF table 4(KP-I)B.1 using "NA" instead of "NE". The Party reported in its NIR (section 11.3.1.2, pp.429–446) information from reliable sources showing that the pools are not net sources. The information included graphs showing increasing forest species areas, together with an expanded description of the age–class structure of forest species and logging regimes and links to the NIRs of neighbouring Annex I Parties with similar environmental conditions that had estimated CSCs in the deadwood pool using accurate data. During the review, the Party clarified that it intends to conduct additional research to determine CSC in soil and litter pools. Croatia also resubmitted its CRF tables, in which it used the correct notation key "NE" for CSC in litter, deadwood and mineral soil pools.
KL.8	FM – CO_2 (KL.9, 2020) (KL.18, 2018) Transparency	Report in the CRF table on accounting for KP-LULUCF the correct value of the FM cap as 8,737.30 kt CO_2 eq, which is fixed in accordance with paragraph 12 of decision 6/CMP.9 for the second commitment period of the Kyoto Protocol.	Not resolved. Croatia reported in the CRF table on accounting for KP-LULUCF the value of the FM cap as 8,737.00 kt CO_2 eq.
KL.9	FM – CO_2, CH_4 and N_2O (KL.12, 2020) KP reporting adherence	Update both the technical correction to the FMRL, in line with decision 2/CMP.7, and the calculation of the background and margin for natural disturbances to maintain consistency with the reported emissions.	Resolved. The Party reported in its NIR (section 11.3.1.9, pp.458–463, and section 11.3.1.4, pp.447–455) updated information on the technical correction of the FMRL and the background level and margin for natural disturbances. However, the ERT noted that, in submission version 2.0 of its CRF tables, the Party used "NA" to report the background level and margin in CRF table 4(KP-I)B.1.3 because it did not use the natural disturbance provision for the second commitment period of the Kyoto Protocol.

ID#	Issue/problem classification[a, b]	Recommendation from previous review report	ERT assessment and rationale
			Croatia also reported an incorrect value for the FMRL technical correction in the KP-LULUCF CRF accounting table (–841.83 kt CO_2 eq instead of 96.57 kt CO_2 eq). During the review, the Party clarified that it was aware of the error in the KP-LULUCF CRF accounting table and so resubmitted the CRF tables, providing the actual values of the background level and margin for natural disturbances in CRF table 4(KP-I)B.1.3, as well as the correct value of the technical correction in the Kyoto Protocol accounting table.
KL.10	HWP – CO_2 (KL.10, 2020) (KL.11, 2018) (KL.8, 2016) (KL.8, 2015) KP reporting adherence	Exclude from the reporting HWP originating from deforestation events on the basis of instantaneous oxidation (to 'zero' the net contribution to the national net CO_2 emissions), and exclude emissions from HWP already accounted for during the first commitment period of the Kyoto Protocol on the basis of instantaneous oxidation, in accordance with decision 2/CMP.7, annex, paragraphs 16 and 31.	Resolved. Croatia excluded emissions from HWP originating from deforestation from the reporting on the basis of instantaneous oxidation in its 2019 and 2020 submissions. The Party reported in its NIR (section 11.3.1.9, pp.458–463) that it excluded the inherited emissions from HWP already accounted for during the first commitment period of the Kyoto Protocol on the basis of instantaneous oxidation, in accordance with decision 2/CMP.7, annex, paragraphs 16 and 31, applying the technical procedure defined in the Kyoto Protocol Supplement.
KL.11	HWP – CO_2 (KL.13, 2020) Transparency	Correctly apply equations 2.8.3 and 2.8.4 from the Kyoto Protocol Supplement in the reporting of HWP for KP-LULUCF.	Addressing. The Party included in its NIR (section 11.3.1.5, pp.455–457) a description of the algorithm for the process for determining the components for CSC assessments for the HWP pool. Croatia also stated that the share of industrial roundwood from the domestic harvest was determined using equation 2.8.1 of the Kyoto Protocol Supplement. During the review, the Party further clarified the quantities of imports and exports of industrial roundwood that had been used to estimate the CSCs in the HWP pool. The ERT noted that, as mentioned in the annual review report for 2020, there is an error related to units (t C and kt C) in the values of losses of carbon stocks reported in CRF tables 4(KP-I)C and 4.Gs. The ERT noted that including information on the import and export of industrial roundwood in the description of the algorithm for the determination of carbon stocks for the HWP pool and reporting correct values of HWP losses in CRF tables, consistent with the units of tables 4(KP-I)C and 4.Gs1, would enhance the transparency of the submission. The ERT also noted that the description of the algorithm for the determination of CSC in the HWP pool needs to be supplemented with information on the results of the new project initiated by the Ministry of Economy and Sustainable Development in 2022 relating to AD on HWP, which was mentioned in the NIR (section 6.10.5, p.292), as one of the planned improvements. The ERT concludes that this potential problem of a mandatory nature does not influence the Party's ability to fulfil its commitments for the second commitment period of the Kyoto Protocol and therefore this issue was not included in the list of potential problems and further questions raised.

[a] References in parentheses are to the paragraph(s) and the year(s) of the previous review report(s) in which the issue or problem was raised. Issues are identified in accordance with paras. 80–83 of the UNFCCC review guidelines and classified as per para. 81 of the same guidelines. Problems are identified and classified as problems of transparency, accuracy, consistency, completeness or comparability in accordance with para. 69 of the Article 8 review guidelines in conjunction with decision 4/CMP.11.

[b] The report on the review of the 2021 annual submission of Croatia was not available at the time of this review. Therefore, the recommendations reflected in this table are taken from the 2020 annual review report. For the same reason, 2021, 2019 and 2017 are excluded from the list of review years in which issues could have been identified.

IV. Issues and problems identified in three or more successive reviews and not addressed by the Party

9.   In accordance with paragraph 83 of the UNFCCC review guidelines, the ERT noted that the issues and/or problems included in table 4 have been identified in three or more successive reviews, including the review of the 2022 annual submission of Croatia, and had not been addressed by the Party by the time of publication of this review report.

Table 4
Issues and/or problems identified in three or more successive reviews and not addressed by Croatia

ID#	Previous recommendation for issue	Number of successive reviews issue not addressed[a]
General		
G.1	Prioritize efforts and resources to implement projects on the use of higher-tier methods included in the annual improvement plans, starting with the implementation of projects to use higher tiers for key categories, and report on the implementation of these projects or their progress in the NIR, together with specific information on the related projects included in the annual improvement plans.	3 (2018–2022)
G.1	Prioritize efforts and resources to obtain all the AD and EFs needed for implementing higher-tier methods included in the annual improvement plans, starting with the implementation of projects to obtain AD and EFs for key categories, and report on the implementation of this work or its progress in the NIR, together with specific information on the related projects included in the annual improvement plans.	3 (2018–2022)
G.3	Improve the documentation on methodologies and assumptions in the NIR for all subcategories for which documentation is missing, not complete or not to the necessary level of detail (e.g. (a) PFCs from aluminium production, (b) CSCs from forest land, (c) cropland (mineral soils), (d) land converted to cropland, (e) land converted to grassland, (f) CH_4 from solid waste disposal and (g) CSCs from afforestation and deforestation), prioritizing key categories.	3 (2018–2022)
G.4	Compile complete documentation on QA activities undertaken and the results thereof, in particular on sectoral QA activities, and report on these activities in annual submissions.	3 (2018–2022)
G.5	Document in the NIR, at least for key categories or categories where significant methodological changes and data revisions occurred, the QC activities conducted and their outcomes, and improve the documentation on the process and data management for estimating emissions.	3 (2018–2022)
G.7	Update the uncertainty estimates for the LULUCF sector for those categories where improvements have been implemented since 2013 and report on the results of these actions in the next annual submission.	3 (2018–2022)
G.8	Provide in the NIR information on underlying assumptions and methods, including documentation on the experts' uncertainty estimates in the IPPU and waste sectors.	3 (2018–2022)

ID#	Previous recommendation for issue	Number of successive reviews issue not addressed[a]
Energy		
E.1	Implement as a priority the improvement projects for the energy sector that are included in the improvement plan for the Party's GHG inventory, addressing the methodological approach used for emission estimates for key categories in accordance with the 2006 IPCC Guidelines,	3 (2018–2022)
E.2	If the Party is not able to fully implement a given project to address, for example, recommendations contained in ID#s E.2, E.3 and E.4 in the 2018 annual review report, document in the NIR the progress made in implementing the project, including any delays.	3 (2018–2022)
E.3	Check the CO_2 EFs for natural gas from the countries of origin for this imported natural gas, and on that basis estimate a weighted average country-specific EF and use it for emission estimates of CO_2 from natural gas consumption.	3 (2018–2022)
E.5	Remove the amount of natural gas used as a feedstock for steel production from the subcategory 1.A.2.a (iron and steel) and correspondingly revise its CO_2 emission estimates for iron and steel production by ensuring that no double counting of emissions from natural gas consumption occurs for the entire time series, in accordance with the 2006 IPCC Guidelines.	3 (2018–2022)
E.8	Strive to develop a country-specific CO_2 EF for 1.B.2.b.3 (natural gas – processing) (considering that CO_2 emissions from 1.B.2.b (natural gas) is a key category), taking into account data on CO_2 scrubbing provided by gas field and plant operators and, if this is not possible, use the IPCC CO_2 EF default values, avoiding the double counting of emissions from scrubbing under natural gas processing for the entire time series, and report the revised estimates of CO_2 emissions from 1.B.2.b.3 (natural gas – processing).	3 (2018–2022)
IPPU		
I.4	Confirm that all sources of CaO are correctly included in the estimation of emissions in accordance with the 2006 IPCC Guidelines.	3 (2018–2022)
I.6	Move from a tier 1 method to a higher-tier method for estimating CO_2 emissions from petrochemical and carbon black production, in accordance with the corresponding decision trees in the 2006 IPCC Guidelines.	4 (2015/2016–2022)
I.10	Specify all sources of ferrous materials for steel production used in the country and provide this information in the NIR, and also revise the Party's CO_2 emission estimates from steel production if the ferrous charge materials were not accurately taken into account in the calculations.	3 (2018–2022)
I.11	Correctly allocate the estimates of CO_2 emissions from natural gas consumption for steel production only to the IPPU sector in accordance with the 2006 IPCC Guidelines, and improve coordination among the IPPU and energy experts preparing the inventory.	3 (2018–2022)
I.12	Include in the NIR correct data, including units, for the NCV of natural gas used in the emission calculations for steel production.	3 (2018–2022)
I.15	Explain transparently in the NIR the reasons for the significant change in AD of lubricant use in 2003–2004 and, if appropriate, in other years.	3 (2018–2022)

ID#	Previous recommendation for issue	Number of successive reviews issue not addressed[a]
I.18	Confirm the balance of lubricants used in Croatia, as shown to the ERT during the review (50 per cent of lubricant is lost during the primary use), and report corresponding emissions from all lubricants oxidized during the primary use under the IPPU sector, from lubricants combusted for energy purposes under the energy sector and from the incineration of lubricants under the waste sector.	3 (2018–2022)
I.20	When estimating indirect CO_2 emissions from solvent use, road paving with asphalt and asphalt roofing in accordance with paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines, report these emissions in CRF table 6 (removing them from CRF table 2(I).A-H and using "IE" in this table) and separately in CRF table summary 1.A, table summary 2, table 8 and table 10, and include and exclude these indirect CO_2 emissions in the national totals in CRF table summary 2 and table 10, and include in the corresponding section of the NIR (e.g. in chap. 9) information on which indirect emissions are reported in Croatia's GHG inventory as required by paragraph 29 of the UNFCCC Annex I inventory reporting guidelines.	3 (2018–2022)
I.21	Continue to conduct surveys on the status of disposal of refrigeration and air-conditioning equipment and include the results in the NIR.	6 (2013–2022)
I.24	Document in detail the sources of actual AD used in the calculations of HFC emissions, the splicing techniques used for estimating missing AD and how the consistency of the time series was ensured, as well as document up-to-date information indicating that PFC emissions are not occurring in Croatia under category 2.F.1. If the latter is not possible, continue reporting PFC emissions under category 2.F.1 in accordance with paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines.	3 (2018–2022)
I.28	Estimate emissions in accordance with the chosen tier 2a method of the 2006 IPCC Guidelines for all HFCs used in category 2.F.3 (fire protection) (HFC-125, HFC-227ea and HFC-236fa) and apply the correct EF for stationary fire protection systems for all years of the time series.	3 (2018–2022)
I.35	Implement the planned improvement regarding gathering accurate and consistent data on N_2O product uses to ensure the accuracy of AD and N_2O emission estimates for N_2O used in anaesthesia and aerosol cans under category 2.G.3 (N_2O from product uses), report a consistent time series of emissions in the CRF tables.	3 (2018–2022)
Agriculture		
A.2	Cite references in the agriculture chapter of the NIR to the sources of data used to estimate emissions in the agriculture sector, including, when possible, the web address of the source, and make specific references to years or other relevant information to make the source easy to identify.	3 (2018–2022)
A.4	Report in the NIR the correct maintenance coefficients from the 2006 IPCC Guidelines (vol. 4, table 10.4) that were used to estimate CH_4 emissions from enteric fermentation of cattle.	3 (2018–2022)
A.5	Estimate CH_4 emissions from enteric fermentation and manure management consistently using, if appropriate, representative livestock subcategories from table 10.1 of the 2006 IPCC Guidelines (vol. 4, p.10.11) and report the results in the annual submission. Assumptions and documented expert judgment can be used where data gaps are observed (e.g. the population of other cows for 1990–1999 can be derived from the structure of the herd in 2000–2017 and it can be assumed that other cows mostly comprise beef cows).	3 (2018–2022)

ID#	Previous recommendation for issue	Number of successive reviews issue not addressed[a]
A.6	Report the feeding situation for cattle in CRF table 3.A (e.g. stall, pasture) instead of reporting activity coefficients, and include in the NIR a description of the approach used to derive activity coefficients for estimating net energy for each activity, based on equation 10.4 of the 2006 IPCC Guidelines (vol. 4), for mature dairy and non-dairy cattle.	3 (2018–2022)
A.9	Follow the guidance in the decision tree in the 2006 IPCC Guidelines (vol. 4, chap. 10, p.10.36, figure 10.3) for estimating CH_4 emissions from manure management of cattle, including the use of currently available data on gross energy and feed digestibility for estimating country-specific VS values, and report the results in the next annual submission.	3 (2018–2022)
A.11	Include in the NIR a description of the method, data and assumptions used to estimate country-specific Nex values for cattle, as well as weight data and the assumptions used to derive default Nex values for other livestock categories, with supporting references, and also report Nex rates in CRF table 3.B(b) disaggregated by other mature cattle and growing cattle subcategories, as required when reporting under Option B, instead of using a single aggregated Nex rate for both above-mentioned animal subcategories.	3 (2018–2022)
A.19	Justify in the NIR the assumptions used to derive the uncertainty value of ±30 per cent for the EF1 for mineral fertilizers, N-fixing crops and crop residues and ±50 per cent for animal manure, or use the appropriate uncertainty range for the default EF1 from table 11.1 of the 2006 IPCC Guidelines (0.003–0.03 kg N_2O-N/kg N) in the Monte Carlo uncertainty analysis.	3 (2018–2022)
A.20	Investigate the reasons for the substantial discrepancies observed between data from producing companies and statistical data on the consumption of inorganic N fertilizers in the country for 2006–2016 (e.g. by analysing production, export and import data), including relevant data from the Food and Agriculture Organization of the United Nations in the comparison analysis, and revise the estimates for the consumption of inorganic N fertilizers for 2006–2016 on the basis of the investigation and using the most reliable source of data, if appropriate, while ensuring time-series consistency.	3 (2018–2022)
A.21	Report the results (of the investigation into the reasons for the substantial discrepancies observed between data from producing companies and statistical data on the consumption of inorganic N fertilizers in the country for 2006–2016) in the next annual submission.	3 (2018–2022)
A.23	Considering the increasing trend in the amount of sludge applied during 2005–2016, make all the necessary efforts to obtain reliable data on sludge applied during 1990–2008. If this is not possible, extrapolate the values for 2009–2016 or use another, more appropriate splicing technique recommended by the 2006 IPCC Guidelines to derive the amount of sludge applied to soils for 2005–2008 and report the resulting N_2O emissions for subcategory 3.D.a.2.b (sewage sludge applied to soils). Also investigate and confirm whether sludge application occurred in earlier years of the time series (1990–2004) and, if so, use the same splicing technique to expand the period and report N_2O emissions for subcategory 3.D.a.2.b for the complete time series.	3 (2018–2022)
LULUCF		
L.1	Determine which carbon pools and subcategories are significant in each key category based on the guidance provided in the 2006 IPCC Guidelines, and provide detailed information on the results of such determination in the NIR.	4 (2015/2016–2022)

ID#	Previous recommendation for issue	*Number of successive reviews issue not addressed*[a]
L.3	Use "NA" for reporting a specific carbon pool for which an IPCC default method is applied that assumes that no net CSCs occur, accompanied by an explanation in the information box of the corresponding CRF table stating that "NA" indicates a tier 1 estimate.	3 (2018–2022)
L.4	(b) Report CSCs in soil organic carbon in mineral soils instead of annual CSCs (p.258 of the NIR);	3 (2018–2022)
	(c) Report total carbon stocks in above-ground biomass in perennial cropland instead of annual stock changes (p.267 of the NIR);	
	(d) Correct the indication that existing carbon pools are not occurring (section 6.8 of the NIR);	
	(e) Improve and fully implement QC activities in the LULUCF sector to avoid such types of error in the NIR.	
L.5	Correct all the inconsistencies identified in the NIR and between the NIR and the CRF tables, and further improve the QA/QC system's effectiveness by enhancing related QA/QC procedures such as internal audits, and corrective and preventive activities following the national QA/QC plan, in order to be able to identify and correct such inconsistencies during the inventory preparation process in the future.	4 (2015/2016–2022)
L.7	Review the uncertainty estimations in forest land remaining forest land, land converted to forest land, grassland and land-use changes to and from cropland and, if the uncertainty ranges are confirmed, undertake improvements to the approaches used to reduce the uncertainty of the estimates, taking into account and focusing on the identified significant sources of uncertainties associated with the use of approaches 1, 2 and 3 for land representation, as well as those related to the use of the tier 1 parameters from the 2006 IPCC Guidelines. In the case that uncertainties are lower than the current estimated uncertainty ranges, focus efforts on improving the quality of the approach used for tracking land-use changes to and from grassland and land-use changes to and from cropland and the related parameters used in the estimates.	3 (2018–2022)
L.8	Report in the NIR a detailed description of the method implemented to estimate uncertainties in AD, in particular regarding the assumptions and expert judgment used.	3 (2018–2022)
L.11	Develop country-specific BEFs and ratios of below-ground biomass to above-ground biomass to fully implement the tier 2 method for this key category, in line with the 2006 IPCC Guidelines.	3 (2018–2022)
L.12	Report on country-specific BEFs and ratios of below-ground biomass to above-ground biomass to fully implement the tier 2 method for this key category in the next annual submission.	3 (2018–2022)
L.15	Provide detailed information on the analysis of the data from CRONFI to check their usefulness for the GHG inventory, and clarify whether the CRONFI data cover both the deadwood and the litter pools.	4 (2015/2016–2022)
Waste		
W.12	Provide information in the NIR on the systems and amounts of plastic waste disposed of and/or incinerated for the entire time series, including information on plastic waste that is not collected and recycled and total AD for plastic waste that is generated in the country.	3 (2018–2022)

ID#	Previous recommendation for issue	Number of successive reviews issue not addressed[a]
W.14	Collect more detailed and complete information on domestic wastewater treated in various systems in the country, in particular individual wastewater treatment systems, and use this information to estimate and improve the accuracy of the CH_4 emissions from domestic wastewater.	3 (2018–2022)
W.15	Provide in the NIR transparent descriptions and accurate data for the whole time series (1990–2016) related to the occurrence in the country of (1) anaerobic domestic wastewater installations, (2) anaerobic industrial wastewater installations, (3) aerobic domestic wastewater installations and (4) aerobic industrial wastewater installations.	3 (2018–2022)
W.16	Provide in the NIR a transparent description of the industrial wastewater treatment systems used in the country and the amounts of industrial wastewater treated aerobically and anaerobically.	3 (2018–2022)
KP-LULUCF		
KL.1	Ensure that a clear, documented and complete description of the methodologies used in the emission estimates is provided in the NIR, including the identification of equations, references and sources of information used in the specific IPCC methodologies and a clear indication of which parameters used are default or country-specific, in particular regarding methodologies used to estimate CSCs in biomass in afforestation and deforestation.	3 (2018–2022)
KL.2	Reassess the uncertainty analysis using appropriate uncertainty values for AD and parameters used and revise the assumptions made and, if the resulting uncertainty values are high and confirmed, use this information to set priorities in the planned improvements to the estimates of KP-LULUCF, in particular improvements related to the parameters used in the estimates. In the case that uncertainties are lower than the current estimated uncertainty ranges, focus efforts on improving the quality of the estimates for AR and deforestation and the related parameters used in the estimates. Also, report in the NIR a detailed description of the method implemented to estimate uncertainties for KP-LULUCF, in particular regarding the assumptions and expert judgment used.	3 (2018–2022)
KL.3	Report in the NIR a detailed description of the method implemented to estimate uncertainties for KP-LULUCF, in particular regarding the assumptions and expert judgment used.	3 (2018–2022)
KL.8	Report in the CRF table on accounting for KP-LULUCF the correct value of the FM cap as 8,737.30 kt CO_2 eq, which is fixed in accordance with paragraph 12 of decision 6/CMP.9 for the second commitment period of the Kyoto Protocol.	3 (2018–2022)

[a] Reports on the reviews of the 2017, 2019 and 2021 annual submissions of Croatia have not yet been published. Therefore, 2017, 2019 and 2021 were not included when counting the number of successive years for this table. In addition, as the reviews of the Party's 2015 and 2016 annual submissions were conducted together, they are not considered successive reviews and 2015/2016 is counted as one year.

V. Additional findings made during the individual review of the Party's 2022 annual submission

10. Table 5 presents findings made by the ERT during the individual review of the 2022 annual submission of Croatia that are additional to those identified in table 3.

Table 5
Additional findings made during the individual review of the 2022 annual submission of Croatia

ID#	Finding classification	Description of finding with recommendation or encouragement	Is finding an issue/problem?[a]
General		No general findings additional to those included in table 3 were made by the ERT during the review.	
Energy		No findings for the energy sector additional to those included in table 3 were made by the ERT during the review.	
IPPU		No findings for the IPPU sector additional to those included in table 3 were made by the ERT during the review.	
Agriculture			
A.24	3.A.1 Cattle – CH_4	Croatia estimated CH_4 emissions from enteric fermentation of cattle by applying a tier 1 method and default EFs from the 2006 IPCC Guidelines (vol. 4, chap. 10, table 10.11) (NIR section 5.2.2, p.182) for 1990–2015, except for 2005. As explained by the Party during the review, for cattle, for 2005 and 2016–2020, Croatia implemented the technical corrections suggested by the ESD comprehensive review of 2020 for EU member States. The technical corrections were carried out on the basis of tier 2 IEFs for mature dairy cattle, other mature cattle and growing cattle obtained from the 2019 submission. The ERT noted that the use of tier 1 EFs for 1990–2015 (not including 2005) and the use of 2017 IEFs for 2005 and 2016–2020 leads to inconsistency in the time series. According to the decision tree for CH_4 emissions from enteric fermentation in the 2006 IPCC Guidelines (vol. 4, chap. 10, figure 10.2), a higher-tier method (tier 2 or 3) should be used when an animal species is significant (a livestock species is significant if it accounts for 25−30 per cent or more of emissions from the source category). During the review in 2020, in response to a question raised by the ERT about the rationale for the change in the methodological tier (see ID# A.3 in table 3 above), the Party explained that it decided to use the tier 1 method as a temporary measure because several issues were detected during the 2018 in-country review in relation to the EFs for enteric fermentation of cattle. In its 2021 submission, the Party implemented the technical corrections from the ESD review of 2020 for 2005 and 2016–2020, leading to increased emissions for those years (2005: +1.63 per cent; 2016: +5.69 per cent; 2017: +1.07 per cent and 2018: +0.68 per cent, compared with the tier 1 estimates reported in the 2020 submission). During the review, Croatia explained that a project for the development of updated country-specific parameters and appropriate values for enteric fermentation and manure management is in progress and that results from this project and a subsequent reimplementation of higher-tier methodologies are expected for the next annual submission.	Yes. Consistency
		The ERT recommends that Croatia ensure a consistent time series of emissions from enteric fermentation of cattle by either implementing the same method for all the years (e.g. the tier 2 method) or by using relevant splicing techniques provided in the 2006 IPCC Guidelines (vol. 1, chap. 5.3.3).	
A.25	3.B Manure management – N_2O	Croatia applies the tier 1 methodology and default Nex rates from the 2006 IPCC Guidelines (vol. 4, chap. 10.5.1, pp.10.53–10.56) for all animal categories. For mature dairy cattle, Nex rates of 96.36–98.61 kg N have been used	Yes. Accuracy

		for 1990–2015. For 2016–2020, an increased value of 109.00 kg/head/year has been used owing to a technical correction from the ESD review of 2020, which was implemented in the 2021 submission. There were no recalculations applied for 1990–2015. During the review, Croatia explained that a project for the development of updated country-specific parameters and appropriate values for enteric fermentation and manure management is in progress and that results from this project and a subsequent reimplementation of higher-tier methodologies are expected for the next annual submission.	
		The ERT recommends that Croatia implement the tier 2 methodology for all significant livestock categories, ensuring a consistent time series. The ERT also recommends that Croatia describe the methodology and parameters used for estimating emissions in the NIR.	
A.26	3.B.5 Indirect N_2O emissions – N_2O	In its NIR (pp.190–191) Croatia states that it uses a $Frac_{LeachMS}$ of 1 per cent, which is the lower boundary of the typical range of 1–20 per cent, as recommended by the 2006 IPCC Guidelines (vol. 4, chap. 10.5.1, p.10.56). Furthermore, the Party explained that it uses the total amount of N excreted by livestock as a basis for the calculations. The ERT noted, however, that N excretions from pasture, range and paddock should be excluded, as estimates of indirect N_2O emissions from this source are already included in the calculations of indirect emissions from leaching and run-off from managed soils. According to the definitions in the 2006 IPCC Guidelines for equation 10.28 (vol. 4, chap. 10.5.1, p.10.56), $Frac_{LeachMS}$ only refers to the run-off and leaching during solid and liquid storage of manure. During the review, the Party confirmed that the inclusion of pasture, range and paddock leads to double counting and that this error will be rectified and the source excluded from the N leaching and run-off for its next annual submission. Regarding the specific requirements, policies and legislation that led to the selection of the 1 per cent factor, Croatia provided some additional explanations, referring to the "Action programme for water protection against pollution caused by nitrates of agricultural origin", and to the best available techniques to be applied under EU directive 2010/75/EC on industrial emissions.	Yes. Accuracy
		The ERT recommends that the Party exclude the N excretions from pasture, range and paddock from AD used for calculating the indirect N_2O emissions from leaching and run-off from manure management and include additional information and references regarding the selection of a $Frac_{LeachMS}$ of 1 per cent in its next NIR.	
A.27	3.D.a.5 Mineralization/ immobilization associated with loss/gain of soil organic matter – N_2O	Croatia explained in its NIR (section 5.5.1.2, p.204) that it estimated N_2O emissions from N mineralization due to management changes for conversion from perennial cropland to annual cropland in cropland remaining cropland. However, the ERT noted that the net carbon changes reported in CRF table 4.B (e.g. –22.63 kt C for 2020), when divided by the C/N ratio (10) and multiplied by 1,000,000, are not the same values as those reported as AD (kg N) in CRF table 3.D (2,057,275.89 kg N/year in 2020). The ERT noted that using the values provided in CRF table 4.B would lead to increased GHG emissions of about 1 kt CO_2 eq each year from 2013 onwards (2020: 0.96 kt CO_2 eq), which is below the threshold of significance according to paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines. No information on the C/N ratio used was provided in the NIR. During the review, the Party explained that it used a nationally determined C/N ratio of 11.	Yes. Transparency
		The ERT recommends that Croatia provide the C/N ratio used in the relevant methodological chapter of the NIR, including a justification for and references to the sources of this national factor.	
A.28	3.D.b.2 N leaching and run-off – N_2O	As explained in its NIR (section 5.5.2.2, p.206), Croatia calculated the indirect N_2O emissions from N leaching and run-off using a tier 1 methodology from the 2006 IPCC Guidelines, (vol. 4, chap. 11, equation 11.10) using a leaching fraction of 30 per cent for all relevant N inputs. However, the ERT noted that, according to the 2006 IPCC	Yes. Accuracy

ID#	Finding classification	Description of finding with recommendation or encouragement	*Is finding an issue/problem?[a]*
		Guidelines (vol. 4, chap. 11, table 11.3), the leaching fraction only applies to regions where the soil water-holding capacity is exceeded as a result of rainfall and/or irrigation. For other regions, the default value of that leaching fraction should be taken as zero. The approach used by Croatia using an overall leaching fraction of 30 per cent for all regions therefore might result in an overestimation of indirect N_2O emissions from leaching and run-off. During the review, the Party clarified that an improvement of emission calculations for this source will be included in the long-term improvement plan, after implementing the results of the current project to improve reporting for land use.	
		The ERT recommends that the Party revise the calculations of AD by considering the proportion of humid regions, evaporation and irrigation in line with the 2006 IPCC Guidelines (vol. 4, chap. 11, equation 11.10).	
LULUCF		No findings for the LULUCF sector additional to those included in table 3 were made by the ERT during the review.	
Waste		No findings for the waste sector additional to those included in table 3 were made by the ERT during the review.	
KP-LULUCF		No findings for KP-LULUCF additional to those included in table 3 were made by the ERT during the review.	

[a] Recommendations made by the ERT during the review are related to issues as defined in para. 81 of the UNFCCC review guidelines or problems as defined in para. 69 of the Article 8 review guidelines.

VI. Application of adjustments

11. The ERT did not identify the need to apply any adjustments for the 2022 annual submission of Croatia.

VII. Accounting quantities for activities under Article 3, paragraph 3, and, if any, activities under Article 3, paragraph 4, of the Kyoto Protocol

12. Table I.5 presents the accounting quantities for KP-LULUCF reported by Croatia and the final values agreed by the ERT. The final quantities of units to be issued and cancelled are presented in table I.6.

VIII. Questions of implementation

13. No questions of implementation were identified by the ERT during the individual review of the Party's 2022 annual submission.

Annex I

Overview of greenhouse gas emissions and removals and data and information on activities under Article 3, paragraphs 3–4, of the Kyoto Protocol, as submitted by Croatia in its 2022 annual submission

1.　Tables I.1–I.4 provide an overview of the total GHG emissions and removals as submitted by Croatia.

Table I.1
Total greenhouse gas emissions and removals for Croatia, base year–2020
(kt CO$_2$ eq)

| | Total GHG emissions excluding indirect CO$_2$ emissions | | Total GHG emissions and removals including indirect CO$_2$ emissions[a] | | Land-use change (Article 3.7 bis as contained in the Doha Amendment)[b] | KP-LULUCF (Article 3.3 of the Kyoto Protocol)[c] | KP-LULUCF (Article 3.4 of the Kyoto Protocol) | |
	Total including LULUCF	Total excluding LULUCF	Total including LULUCF	Total excluding LULUCF			CM, GM, RV, WDR	FM
FMRL								–6 289.00
Base year[d]	24 348.53	31 394.43	NA	NA	NA		NA	
1990	24 348.53	31 394.43	NA	NA				
1995	12 948.15	22 486.00	NA	NA				
2000	18 220.64	25 478.76	NA	NA				
2010	21 060.72	27 922.16	NA	NA				
2011	21 955.51	27 637.95	NA	NA				
2012	20 614.40	25 878.24	NA	NA				
2013	18 298.04	24 609.08	NA	NA		–135.24	NA	–8 131.97
2014	17 736.83	23 873.71	NA	NA		–175.60	NA	–7 767.46
2015	18 792.37	24 350.46	NA	NA		–191.81	NA	–7 319.42
2016	18 820.43	24 611.79	NA	NA		–319.78	NA	–7 030.92
2017	20 261.34	25 482.00	NA	NA		–283.56	NA	–6 201.02
2018	18 792.88	24 402.41	NA	NA		–358.46	NA	–6 665.69
2019	18 919.12	24 624.75	NA	NA		–367.32	NA	–6 838.73
2020	18 197.47	23 758.40	NA	NA		–379.73	NA	–6 730.93

Note: Emissions and removals reported in the sector other (sector 6) are not included in the total GHG emissions.

[a] The Party did not report indirect CO$_2$ emissions in CRF table 6.

[b] The value reported in this column relates to GHG emissions from conversion of forests (deforestation) in 1990 as contained in the report on the review of the Party's report to facilitate the calculation of the assigned amount for the second commitment period of the Kyoto Protocol.

[c] Activities under Article 3, para. 3, of the Kyoto Protocol, namely AR and deforestation.

[d] "Base year" refers to the base year under the Kyoto Protocol, which is 1990 for all gases except NF$_3$, for which the base year is 2000. The Party has not elected any activities under Article 3, para. 4, of the Kyoto Protocol. For activities under Article 3, para. 3, of the Kyoto Protocol and FM under Article 3, para. 4, only the inventory years of the commitment period must be reported.

Table I.2

Greenhouse gas emissions and removals by gas for Croatia, excluding land use, land-use change and forestry, 1990–2020

(kt CO$_2$ eq)

	CO$_2$[a]	CH$_4$	N$_2$O	HFCs	PFCs	Unspecified mix of HFCs and PFCs	SF$_6$	NF$_3$
1990	22 979.79	4 307.79	28 55.88	NO	1 240.24	NO	10.73	NO
1995	1 6817.67	3 362.39	2 272.02	21.85	NO	NO	12.08	NO
2000	19 662.49	3 285.82	2 465.23	52.89	NO	NO	12.34	NO
2010	21 016.28	3 870.76	2 430.14	595.15	NO	NO	9.83	NO
2011	20 649.62	3 823.78	2 490.46	663.84	NO	NO	10.26	NO
2012	19 087.40	3 777.47	2 260.98	741.43	NO	NO	10.96	NO
2013	18 432.19	3 678.59	1 676.55	814.57	NO	NO	7.18	NO
2014	17 681.57	3 642.27	1 636.73	905.47	NO	NO	7.67	NO
2015	17 824.70	3 737.07	1 775.71	1 007.40	NO	NO	5.58	NO
2016	18 109.01	3 801.91	1 543.78	1 150.49	NO	NO	6.60	NO
2017	18 744.00	3 762.97	1 663.93	1 304.09	NO	NO	7.02	NO
2018	17 724.15	3 619.32	1 613.83	1 438.84	NO	NO	6.27	NO
2019	17 857.45	3 580.52	1 617.97	1 560.96	NO	NO	7.85	NO
2020	16 870.53	3 532.83	1 656.56	1 689.72	NO	NO	8.76	NO
Percentage change 1990–2020	−26.6	−18.0	−42.0	NA	NA	NA	−18.3	NA

Note: Emissions and removals reported for the sector other (sector 6) are not included in this table.

[a] Party did not report indirect CO$_2$ emissions in CRF table 6.

Table I.3

Greenhouse gas emissions and removals by sector for Croatia, 1990–2020

(kt CO$_2$ eq)

	Energy	IPPU	Agriculture	LULUCF	Waste	Other
1990	21 439.51	4 617.63	4 353.02	−7 045.89	984.27	NO
1995	15 972.40	2 403.66	3 042.35	−9 537.85	1 067.59	NO
2000	18 217.13	3 038.00	3 018.30	−7 258.12	1 205.33	NO
2010	19 708.33	3 521.14	3 028.76	−6 861.44	1 663.93	NO
2011	19 453.04	3 405.50	3 082.21	−5 682.44	1 697.20	NO

	Energy	IPPU	Agriculture	LULUCF	Waste	Other
2012	18 035.18	3 190.68	2 959.11	−5 263.84	1 693.27	NO
2013	17 286.72	2 949.71	2 693.42	−6 311.04	1 679.24	NO
2014	16 343.96	3 190.60	2 617.91	−6 136.87	1 721.24	NO
2015	16 591.19	3 301.12	2 689.85	−5 558.09	1 768.30	NO
2016	16 998.58	3 110.05	2 702.44	−5 791.36	1 800.71	NO
2017	17 380.27	3 494.54	2 789.22	−5 220.66	1 817.97	NO
2018	16 437.31	3 474.12	2 696.62	−5 609.53	1 794.35	NO
2019	16 496.14	3 654.62	2 696.79	−5 705.63	1 777.19	NO
2020	15 516.58	3 770.25	2 692.31	−5 560.93	1 779.26	NO
Percentage change 1990–2020	−27.6	−18.4	−38.2	−21.1	80.8	NA

Notes: (1) Croatia did not report emissions or removals for the sector other (sector 6); the corresponding cells in the CRF tables were left blank; (2) Croatia did not report indirect CO_2 emissions in CRF table 6.

Table I.4

Greenhouse gas emissions and removals from activities under Article 3, paragraphs 3–4, of the Kyoto Protocol by activity, base year–2020, for Croatia
(kt CO_2 eq)

	Article 3.7 bis as contained in the Doha Amendment[a]	Activities under Article 3.3 of the Kyoto Protocol		FM and elected activities under Article 3.4 of the Kyoto Protocol				
	Land-use change	AR	Deforestation	FM	CM	GM	RV	WDR
FMRL				−6 289.00				
Technical correction				96.57				
Base year[b]	NA				NA	NA	NA	NA
2013		−173.27	38.03	−8 131.97	NA	NA	NA	NA
2014		−196.20	20.60	−7 767.46	NA	NA	NA	NA
2015		−240.94	49.13	−7 319.42	NA	NA	NA	NA
2016		−340.65	20.86	−7 030.92	NA	NA	NA	NA
2017		−298.74	15.18	−6 201.02	NA	NA	NA	NA
2018		−372.73	14.27	−6 665.69	NA	NA	NA	NA
2019		−386.95	19.62	−6 838.73	NA	NA	NA	NA
2020		−395.93	16.20	−6 730.93	NA	NA	NA	NA
Percentage change base year–2020					NA	NA	NA	NA

Note: Values in this table include emissions from land subject to natural disturbances, if applicable.

[a] The value reported in this column relates to 1990.

[b] Croatia has not elected to report on any activities under Article 3, para. 4, of the Kyoto Protocol. For activities under Article 3, para. 3, of the Kyoto Protocol and FM under Article 3, para. 4, only the inventory years of the commitment period must be reported.

2.   Table I.5 provides information on the Party's accounting quantities for reporting under Article 3, paragraphs 3–4, of the Kyoto Protocol.

Table I.5
Accounting quantities for activities under Article 3, paragraph 3, and forest management and any elected activities under Article 3, paragraph 4, of the Kyoto Protocol for Croatia

(kt CO_2 eq)

GHG source/sink activity	Base year	Net emissions/removals								Total[b]	Accounting parameters	Accounting quantities[a]
		2013	2014	2015	2016	2017	2018	2019	2020			
A.1. AR		–173.270	–196.198	–240.941	–340.646	–298.744	–372.727	–386.950	–395.933	–2 405.408		–2 405.408
Excluded emissions from natural disturbances[c]		NA	NA	NA	NA	NA	NA	NA	NA	NA		NA
Excluded subsequent removals from land subject to natural disturbances		NA	NA	NA	NA	NA	NA	NA	NA	NA		NA
A.2. Deforestation		38.031	20.596	49.128	20.862	15.181	14.269	19.625	16.203	193.895		193.896
B.1. FM										–56 686.147		–7 146.706
Net emissions/ removals		–8 131.972	–7 767.455	–7 319.423	–7 030.923	–6 201.019	–6 665.691	–6 838.735	–6 730.930	–56 686.147		
Excluded emissions from natural disturbances[c]		NA	NA	NA	NA	NA	NA	NA	NA	NA		NA
Excluded subsequent removals from land subject to natural disturbances		NA	NA	NA	NA	NA	NA	NA	NA	NA		NA
Any debits from newly established forest		NA	NA	NA	NA	NA	NA	NA	NA	NA		NA

GHG source/sink activity	Net emissions/removals										Accounting parameters	Accounting quantities[a]
	Base year	2013	2014	2015	2016	2017	2018	2019	2020	Total[b]		
FMRL[d]											−6 289.000	
Technical corrections to FMRL											96.570	
FM cap											8 737.296	−7 146.706
B.2. CM (if elected)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA
B.3. GM (if elected)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA
B.4. RV (if elected)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA
B.5. WDR (if elected)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA

[a] The accounting quantity is the total quantity of units to be issued or cancelled for a particular activity.
[b] Cumulative net emissions and removals for all years of the commitment period reported in the annual submission under review.
[c] The Party indicated that it is excluding emissions from natural disturbances annually.
[d] As inscribed in the appendix to the annex to decision 2/CMP.7 in kt CO_2 eq per year.

3.   Table I.6 provides an overview of key data from Croatia's reporting under Article 3, paragraphs 3–4, of the Kyoto Protocol.

Table I.6
Key data for Croatia under Article 3, paragraphs 3–4, of the Kyoto Protocol from its 2022 annual submission

Parameter	*Data*
Periodicity of accounting	(a) AR: commitment period accounting
	(b) Deforestation: commitment period accounting
	(c) FM: commitment period accounting
	(d) CM: not elected
	(e) GM: not elected
	(f) RV: not elected
	(g) WDR: not elected
Elected activities under Article 3, paragraph 4, of the Kyoto Protocol	None
Election of application of provisions for natural disturbances	Yes, for AR and FM[a]
3.5% of total base-year GHG emissions, excluding LULUCF	1 092.162 kt CO_2 eq (8 737.296 kt CO_2 eq for the duration of the commitment period)
Cancellation of AAUs, CERs and ERUs and/or issuance of RMUs in the national registry for:	
1. AR	Issue 2 405 408 RMUs
2. Deforestation	Cancel 193 896 RMUs
3. FM	Issue 7 146 706 RMUs

Note Values in this table reflect the accounting quantities for activities under Article 3, para. 3, and FM and any elected activities under Article 3, para. 4, of the Kyoto Protocol as reported in table I.5.

[a] The Party decided not to exclude emissions and subsequent removals from natural disturbances in its accounting for the 2022 annual submission.

Annex II

Information to be included in the compilation and accounting database

Tables II.1–II.8 include the information to be included in the compilation and accounting database for Croatia. Data shown are from the Party's annual submission, including the latest revised estimates submitted, adjustments (if applicable) and the final data to be included in the compilation and accounting database.

Table II.1
Information to be included in the compilation and accounting database for 2020, including on the commitment period reserve, for Croatia
(t CO_2 eq)

	Original submission	Revised submission	Adjustment	Final value
CPR	146 043 978	146 043 978	–	146 043 978
Annex A emissions				
CO_2	16 870 528	16 870 528	–	16 870 528
CH_4	3 538 705	3 532 833	–	3 532 833
N_2O	1 658 171	1 656 555	–	1 656 555
HFCs	1 680 185	1 689 719	–	1 689 719
PFCs	NO	NO	–	NO
Unspecified mix of HFCs and PFCs	NO	NO	–	NO
SF_6	8 763	8 763	–	8 763
NF_3	NO	NO	–	NO
Total Annex A sources[a]	**23 756 352**	**23 758 399**	**–**	**23 758 399**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	−280 553	−395 932	–	−395 932
Deforestation	20 911	16 203	–	16 203
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	−6 730 374	−6 730 929	–	−6 730 929

[a] The sum of the values for the individual gases and groups of gases may not match the total owing to rounding.

Table II.2
Information to be included in the compilation and accounting database for 2019 for Croatia
(t CO_2 eq)

	Original submission	Revised submission	Adjustment	Final value
Annex A emissions				
CO_2	17 857 446	17 857 446	–	17 857 446
CH_4	3 586 387	3 580 519	–	3 580 519
N_2O	1 619 584	1 617 969	–	1 617 969
HFCs	1 551 030	1 560 961	–	1 560 961
PFCs	NO	NO	–	NO
Unspecified mix of HFCs and PFCs	NO	NO	–	NO
SF_6	7.852	7.852	–	7.852
NF_3	NO	NO	–	NO
Total Annex A sources[a]	**24 622 299**	**24 624 748**	**–**	**24 624 748**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	−272 764	−386 950	–	−386 950
Deforestation	24 948	16 203	–	16 203
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				

	Original submission	Revised submission	Adjustment	Final value
FM	−4 163714	−6 730 929	−	−6 730 929

[a] The sum of the values for the individual gases and groups of gases may not match the total owing to rounding.

Table II.3
Information to be included in the compilation and accounting database for 2018 for Croatia
(t CO_2 eq)

	Original submission	Revised submission	Adjustment	Final value
Annex A emissions				
CO_2	17 724 152	17 724 152	−	17 724 152
CH_4	3 625 697	3 619 316	−	3 619 316
N_2O	1 615 582	1 613 827	−	1 613 827
HFCs	1 428 499	1 438 844	−	1 438 844
PFCs	NO	NO	−	NO
Unspecified mix of HFCs and PFCs	NO	NO	−	NO
SF_6	6 271	6 271	−	6 271
NF_3	NO	NO	−	NO
Total Annex A sources[a]	**24 400 201**	**24 402 410**	**−**	**24 402 410**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	−258 672	−340 646	−	−340 646
Deforestation	19 202	20 863	−	20 863
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	−6 665 691	−7 030 922	−	−7 030 922

[a] The sum of the values for the individual gases and groups of gases may not match the total owing to rounding.

Table II.4
Information to be included in the compilation and accounting database for 2017 for Croatia
(t CO_2 eq)

	Original submission	Revised submission	Adjustment	Final value
Annex A emissions				
CO_2	18 743 995	18 743 995	−	18 743 995
CH_4	3 769 103	3 762 968	−	3 762 968
N_2O	1 665 617	1 663 930	−	1 663 930
HFCs	1 293 312	1 304 089	−	1 304 089
PFCs	NO	NO	−	NO
Unspecified mix of HFCs and PFCs	NO	NO	−	NO
SF_6	7 017	7 017	−	7 017
NF_3	NO	NO	−	NO
Total Annex A sources[a]	**25 479 046**	**25 482 000**	**−**	**25 482 000**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	−185 382	−298 743	−	−298 743
Deforestation	20 293	15 182	−	15 182
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	−6 201 019	−6 201 018	−	−6 201 018

[a] The sum of the values for the individual gases and groups of gases may not match the total owing to rounding.

Table II.5
Information to be included in the compilation and accounting database for 2016 for Croatia
(t CO_2 eq)

	Original submission	Revised submission	Adjustment	Final value
Annex A emissions				

	Original submission	Revised submission	Adjustment	Final value
CO_2	18 109 014	18 109 014	–	18 109 014
CH_4	3 808 715	3 801 906	–	3 801 906
N_2O	1 545 655	1 543 782	–	1 543 782
HFCs	1 139 261	1 150 487	–	1 150 487
PFCs	NO	NO	–	NO
Unspecified mix of HFCs and PFCs	NO	NO	–	NO
SF_6	6 599	6 599	–	6 599
NF_3	NO	NO	–	NO
Total Annex A sources[a]	**24 609 245**	**24 611 788**	**–**	**24 611 788**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–234 604	–240 941	–	–240 941
Deforestation	26 212	49 128	–	49 128
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–7 030 923	–7 319 423	–	–7 319 423

[a] The sum of the values for the individual gases and groups of gases may not match the total owing to rounding.

Table II.6
Information to be included in the compilation and accounting database for 2015 for Croatia
(t CO_2 eq)

	Original submission	Revised submission	Adjustment	Final value
Annex A emissions				
CO_2	1 7824 705	1 7824 705	–	1 7824 705
CH_4	3 744 440	3 737 074	–	3 737 074
N_2O	1 777 734	1 775 708	–	1 775 708
HFCs	996 626	1 007 400	–	1 007 400
PFCs	NO	NO	–	NO
Unspecified mix of HFCs and PFCs	NO	NO	–	NO
SF_6	5 576	5 576	–	5 576
NF_3	NO	NO	–	NO
Total Annex A sources[a]	**24 349 081**	**24 350 463**	–	**24 350 463**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–146 296	–240 941	–	–240 941
Deforestation	56 136	49 128	–	49 128
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–7 319 423	–7 319 423	–	–7 319 423

[a] The sum of the values for the individual gases and groups of gases may not match the total for owing to rounding.

Table II.7
Information to be included in the compilation and accounting database for 2014 for Croatia
(t CO_2 eq)

	Original submission	Revised submission	Adjustment	Final value
Annex A emissions				
CO_2	17 681 566	17 681 566	–	17 681 566
CH_4	3 649 855	3 642 269	–	3 642 269
N_2O	1 638 813	1 636 726	–	1 636 726
HFCs	898 053	905 469	–	905 469
PFCs	NO	NO	–	NO
Unspecified mix of HFCs and PFCs	NO	NO	–	NO
SF_6	7 675	7 675	–	7 675
NF_3	NO	NO	–	NO

	Original submission	Revised submission	Adjustment	Final value
Total Annex A sources[a]	**23 875 962**	**23 873 706**	–	**23 873 706**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–103 752	–196 197	–	–196 197
Deforestation	25 319	20 597	–	20 597
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–7 767 455	–7 767 455		–7 767 455

[a] The sum of the values for the individual gases and groups of gases may not match the total owing to rounding.

Table II.8
Information to be included in the compilation and accounting database for 2013 for Croatia
(t CO_2 eq)

	Original submission	Revised submission	Adjustment	Final value
Annex A emissions				
CO_2	18 432 191	18 432 191	–	18 432 191
CH_4	3 686 155	3 678 593	–	3 678 593
N_2O	1 678 633	1 676 553	–	1 676 553
HFCs	807 760	814 567	–	814 567
PFCs	NO	NO	–	NO
Unspecified mix of HFCs and PFCs	NO	NO	–	NO
SF_6	7 178	7 178	–	7 178
NF_3	NO	NO	–	NO
Total Annex A sources[a]	**24 611 918**	**24 609 083**	–	**24 609 083**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–92 172	–173 27	–	–173 27
Deforestation	43 785	38 031	–	38 031
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–8 131 972	–8 131 971	–	–8 131 971

[a] The sum of the values for the individual gases and groups of gases may not match the total owing to rounding.

Annex III

Additional information to support findings in table 2

Missing categories that may affect completeness

No mandatory categories from the 2006 IPCC Guidelines were identified as missing.

Annex III

Annex IV

Reference documents

A.   Reports of the Intergovernmental Panel on Climate Change

IPCC. 2000. *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*. J Penman, D Kruger, I Galbally, et al. (eds.). Hayama, Japan: IPCC/Organisation for Economic Co-operation and Development/International Energy Agency/Institute for Global Environmental Strategies. Available at https://www.ipcc-nggip.iges.or.jp/public/gp/english/.

IPCC. 2006. *2006 IPCC Guidelines for National Greenhouse Gas Inventories*. S Eggleston, L Buendia, K Miwa, et al. (eds.). Hayama, Japan: Institute for Global Environmental Strategies. Available at http://www.ipcc-nggip.iges.or.jp/public/2006gl.

IPCC. 2014. *2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol*. T Hiraishi, T Krug, K Tanabe, et al. (eds.). Hayama, Japan: Institute for Global Environmental Strategies. Available at https://www.ipcc.ch/publication/2013-revised-supplementary-methods-and-good-practice-guidance-arising-from-the-kyoto-protocol/.

IPCC. 2014. *2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands*. T Hiraishi, T Krug, K Tanabe, et al. (eds.). Geneva: IPCC. Available at https://www.ipcc.ch/publication/2013-supplement-to-the-2006-ipcc-guidelines-for-national-greenhouse-gas-inventories-wetlands/.

B.   UNFCCC documents

Annual review reports

Reports on the individual reviews of the 2013, 2014, 2015, 2016, 2018 and 2020 annual submissions of Croatia, contained in documents FCCC/ARR/2013/HRV, FCCC/ARR/2014/HRV, FCCC/ARR/2015/HRV, FCCC/ARR/2016/HRV, FCCC/ARR/2018/HRV and FCCC/ARR/2020/HRV respectively.

Other

Aggregate information on greenhouse gas emissions by sources and removals by sinks for Parties included in Annex I to the Convention. Note by the secretariat. Available at https://unfccc.int/documents/510888.

Annual status report for Croatia for 2022. Available at https://unfccc.int/sites/default/files/resource/asr2022_HRV.pdf.

C.   Other documents used during the review

Responses to questions during the review were received from Tatjana Antolić (Ministry of Economy and Sustainable Development), including additional material on the methodology and assumptions used.

Ekonerg. 2021. Report on inventory improvement for sector composting.

Ekonerg. 2022. Report on inventory improvement for sector anaerobic digestion at biogas facilities.