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Report on the technical review of the third biennial report of Croatia

Developed country Parties were requested by decision 2/CP.17 to submit their third biennial report to the secretariat by 1 January 2018. This report presents the results of the technical review of the third biennial report of Croatia, conducted by an expert review team in accordance with the "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".

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Contents

Abbreviations and acronyms

AEA	annual emission allocation
Annex II Party	Party included in Annex II to the Convention
AR4	Fourth Assessment Report of the Intergovernmental Panel on Climate Change
BR	biennial report
CH_4	methane
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
CTF	common tabular format
ERT	expert review team
ESD	effort-sharing decision
EU	European Union
EU ETS	European Union Emissions Trading System
F-gas	fluorinated gas
GDP	gross domestic product
GHG	greenhouse gas
HFC	hydrofluorocarbon
IPCC	Intergovernmental Panel on Climate Change
IPPU	industrial processes and product use
LULUCF	land use, land-use change and forestry
NA	not applicable
NC	national communication
NE	not estimated
NF_3	nitrogen trifluoride
NO	not occurring
non-ETS sectors	sectors not covered by the EU ETS
N_2O	nitrous oxide
PaMs	policies and measures
PFC	perfluorocarbon
SF_6	sulfur hexafluoride
UNFCCC reporting guidelines on BRs	"UNFCCC biennial reporting guidelines for developed country Parties"
UNFCCC reporting guidelines on NCs	"Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part II: UNFCCC reporting guidelines on national communications"
WAM	'with additional measures'
WEM	'with measures'
WOM	'without measures'

I. Introduction and summary

A. Introduction

1. This is a report on the centralized technical review of the BR3[1] of Croatia. The review was organized by the secretariat in accordance with the "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", particularly "Part IV: UNFCCC guidelines for the technical review of biennial reports from Parties included in Annex I to the Convention" (annex to decision 13/CP.20).

2. In accordance with the same decision, a draft version of this report was transmitted to the Government of Croatia, which provided comments that were considered and incorporated, as appropriate, into this final version of the report.

3. The review was conducted from 21 to 26 May 2018 in Bonn by the following team of nominated experts from the UNFCCC roster of experts: Ms. Amrita Narayan Achanta (India), Ms. Damla Dogan (Turkey), Mr. Christopher John Dore (United Kingdom of Great Britain and Northern Ireland), Mr. Sangay Dorji (Bhutan), Mr. A. Ricardo J. Esparta (Brazil), Mr. Sandro Federici (San Marino), Mr. Ross Alexander Hunter (United Kingdom), Mr. Naoki Matsuo (Japan), Ms. Roisin Moriarty (Ireland), Mr. Rostislav Neveceral (Czechia), Ms. Agnieszka Maria Patoka-Janowska (Poland) and Ms. Verica Taseska Gjorgievska (the former Yugoslav Republic of Macedonia). Mr. Dorji, Mr. Federici, Mr. Matsuo and Ms. Patoka-Janowska were the lead reviewers. The review was coordinated by Ms. Sevdalina Todorova, Mr. Davor Vesligaj and Ms. Marion Vieweg (UNFCCC secretariat).

B. Summary

4. The ERT conducted a technical review of the information reported in the BR3 of Croatia in accordance with the UNFCCC reporting guidelines on BRs (annex I to decision 2/CP.17).

1. Timeliness

5. The BR3 was submitted on 2 May 2018, after the deadline of 1 January 2018 mandated by decision 2/CP.17. The CTF tables were submitted on 2 May 2018.

6. Croatia informed the secretariat on 22 November 2017 about its difficulties with making a timely submission in accordance with decision 13/CP.20 and decision 22/CMP.1. The ERT noted with great concern the delay in the submission, and recommends that Croatia make its next submission on time.

2. Completeness, transparency of reporting and adherence to the reporting guidelines

7. Issues and gaps identified by the ERT related to the reported information are presented in table 1. The information reported by Croatia in its BR3 is mostly complete and adheres to the UNFCCC reporting guidelines on BRs.

[1] The BR submission comprises the text of the report and the CTF tables, which are both subject to the technical review.

Table 1
Summary of completeness and transparency of mandatory information reported by Croatia in its third biennial report

Section of BR	*Completeness*	*Transparency*	*Reference to description of recommendations*
GHG emissions and trends	Mostly complete	Transparent	Issue 1 in table 3
Assumptions, conditions and methodologies related to the attainment of the quantified economy-wide emission reduction target	Complete	Transparent	
Progress in achievement of targets	Partially complete	Mostly transparent	Issues 1 and 2 in table 5 and issues 3, 5, 7 and 12 in table 10
Provision of support to developing country Parties[a]	NA	NA	NA

Note: A list of recommendations pertaining to the completeness and transparency issues identified in this table is included in chapter III below.

[a] Croatia is not an Annex II Party and is therefore not obliged to adopt measures and fulfil obligations defined in Article 4, paragraphs 3, 4 and 5, of the Convention.

II. Technical review of the information reported in the third biennial report

A. Information on greenhouse gas emissions and removals related to the quantified economy-wide emission reduction target

1. Technical assessment of the reported information

8. Croatia provided a summary of information on GHG emission trends for the period 1990–2015 in its BR3. This summary information is consistent with the 2017 national GHG inventory submission. Summary tables, including trend tables for emissions (in kt CO_2 eq), are provided in the BR3. During the review, the ERT took note of the recently submitted 2018 annual submission in which the GHG emissions for 2016 were presented. The data from the 2018 annual submission were used for this section of the report and a comparison with the inventory data provided in the BR3 and 2017 annual submission is presented in paragraph 11 below. The ERT notes that the summary information provided in the BR3 on GHG emissions is not consistent with the information reported in the 2018 annual submission because there have been numerous recalculations in the 2018 annual submission; the ERT notes that these recalculations have been documented in the 2018 annual submission.

9. Total GHG emissions[2] excluding emissions and removals from LULUCF decreased by 23.8 per cent between 1990 and 2016, whereas total GHG emissions including net emissions or removals from LULUCF decreased by 23.4 per cent over the same period. Table 2 illustrates the emission trends by sector and by gas for Croatia.

Table 2
Greenhouse gas emissions by sector and by gas for Croatia for the period 1990–2016

	GHG emissions (kt CO_2 eq)					*Change (%)*		*Share (%)*	
	1990	*2000*	*2010*	*2015*	*2016*	*1990–2016*	*2015–2016*	*1990*	*2016*
Sector									
1. Energy	21 831.84	18 350.77	19 903.93	16 728.04	17 074.45	–21.8	–2.0	68.5	70.3
A1. Energy industries	7 094.31	5 839.41	5 951.08	4 795.41	4 917.32	–30.7	–2.5	22.2	20.2

[2] In this report, the term "total GHG emissions" refers to the aggregated national GHG emissions expressed in terms of CO_2 eq excluding LULUCF, unless otherwise specified. Values in this paragraph are calculated based on the 2018 annual submission, version 1.

	GHG emissions (kt CO_2 eq)					*Change (%)*		*Share (%)*	
	1990	*2000*	*2010*	*2015*	*2016*	*1990–2016*	*2015–2016*	*1990*	*2016*
A2. Manufacturing industries and construction	5 529.04	3 115.63	3 030.11	2 232.02	2 215.33	–59.9	0.8	17.3	9.1
A3. Transport	3 881.11	4 499.39	5 952.34	5 951.83	6 173.38	59.1	–3.6	12.2	25.4
A4. and A5. Other	4 217.93	3 865.11	4 024.35	3 219.51	3 276.83	–22.3	–1.7	13.2	13.5
B. Fugitive emissions from fuels	1 109.45	1 031.23	946.04	529.27	491.60	–55.7	7.7	3.5	2.0
C. CO_2 transport and storage	NO	NO	NO	NO	NO	NO	NO	NO	NO
2. IPPU	4 680.65	3 154.12	3 356.61	2 769.73	2 460.19	–47.4	12.6	14.7	10.1
3. Agriculture	4 398.33	3 131.40	3 029.76	2 875.27	2 931.82	–33.3	–1.9	13.8	12.1
4. LULUCF	–6 644.18	–7 441.87	–7 149.98	–4 833.87	–4 965.18	–25.3	–2.6	NA	NA
5. Waste	983.41	1 194.86	1 695.42	1 815.65	1 838.58	87.0	–1.2	3.1	7.6
6. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO
Gas [a]									
CO_2	23 441.97	19 815.74	21 245.08	17 996.57	18 221.47	–22.3	–1.2	73.5	75.0
CH_4	4 354.49	3 377.01	3 972.75	3 949.20	3 950.92	–9.3	0.0	13.7	16.3
N_2O	2 847.09	2 478.87	2 380.02	1 817.77	1 706.58	–40.1	6.5	8.9	7.0
HFCs	NO	147.90	378.87	419.90	419.67	NO	–0.1	NO	1.7
PFCs	1 240.24	NO	0.03	0.03	NO	NO	NO	3.9	NO
SF_6	10.45	11.62	8.95	5.22	6.39	–38.8	–18.4	0.0	0.0
NF_3	NO	NO	NO	NO	NO	NO, NA	NO, NA	NO, NA	NO, NA
Total GHG emissions without LULUCF	**31 894.24**	**25 831.14**	**27 985.72**	**24 188.69**	**24 305.03**	**–23.8**	**–0.5**	**100**	**100**
Total GHG emissions with LULUCF	**25 250.05**	**18 389.28**	**20 835.74**	**19 354.81**	**19 339.85**	**–23.4**	**0.1**	**NA**	**NA**

Source: GHG emission data: Croatia's 2018 annual submission, version 1.

[a] Emissions by gas without LULUCF and without indirect CO_2.

10. The overall decrease in total emissions from 1990 to 2016 was driven by a combination of factors. Emissions decreased between 1990 and 1994 as a result of the war in Croatia and the consequent decline in economic activity and energy consumption during that time. The increase between 1997 and 2007 was mainly caused by the revival of economic activities in the energy, IPPU and waste sectors. The global economic downturn in 2008 led to a significant slowdown of economic activity and a decrease in industrial production, a consequent decrease in fuel consumption and a decrease in industrial processes for the period afterwards. Emissions increased again between 2015 and 2016 which is mainly the result of economic growth accompanied by a larger fraction of goods and services being exported, and a small share of the increase in GHG emissions was driven by the increase in activity in the energy sector.

11. The summary information provided on GHG emissions in the BR3 was consistent with the information reported in the 2017 annual submission.

12. In brief, Croatia's national inventory arrangements were established in accordance with the Regulation on the Monitoring of Greenhouse Gas Emissions, Policies and Mitigations Measures in the Republic of Croatia (chapter II, "National system for estimation and reporting of anthropogenic greenhouse gas emissions by sources and removals by sinks"). There is one change in the arrangements since the BR2, which is that in 2016 the Ministry of Environmental and Nature Protection changed its name to Ministry of Environment and Energy. The Party reported a summary of national inventory arrangements,

including institutional, legal and procedural arrangements made for estimating emission sources and removals by sinks of all GHGs not controlled by the Montreal Protocol, and for reporting and archiving inventory information. The ERT noted that the Party provided additional information elaborating on national inventory arrangements and changes to these arrangements during the review.

2. Assessment of adherence to the reporting guidelines

13. The ERT assessed the information reported in the BR3 of Croatia and identified an issue relating to completeness and adherence to the UNFCCC reporting guidelines on BRs. The finding is described in table 3.

Table 3
Findings on greenhouse gas emissions and trends from the review of the third biennial report of Croatia

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation or encouragement*
1	Reporting requirement specified in paragraph 3 Issue type completeness Assessment recommendation	The Party did not report a complete summary of national inventory arrangements, including all institutional, legal and procedural arrangements made for estimating emissions by sources and removals by sinks of all GHGs not controlled by the Montreal Protocol, and for reporting and archiving inventory information. The summary does not include information on (1) the name and contact information for the national entity and its designated representative for the national inventory; (2) a description of the process for collecting activity data, for selecting emission factors and methods, and for the development of emission estimates; and (3) a description of the quality assurance and quality control plan, its implementation and the quality objectives established, and information on internal and external evaluation and review processes and their results. There is also no mention of changes to these national inventory arrangements since the last BR. During the review the Party provided additional information elaborating on national inventory arrangements and changes to these arrangements. The ERT welcomes the efforts of the Party and recommends that Croatia provide a summary of national inventory arrangements and a statement of changes to these national inventory arrangements since the last BR.

Note: Paragraph number listed under reporting requirement refers to the relevant paragraph of the UNFCCC reporting guidelines on BRs. The reporting on the requirements not included in this table is considered to be complete, transparent and adhering to the UNFCCC reporting guidelines on BRs.

B. Assumptions, conditions and methodologies related to the attainment of the quantified economy-wide emission reduction target

1. Technical assessment of the reported information

14. For Croatia the Convention entered into force on 7 July 1996. Under the Convention Croatia committed to contributing to the achievement of the joint EU economy-wide emission reduction target of 20 per cent below the 1990 level by 2020. The EU offered to move to a 30 per cent reduction target on the condition that other developed countries commit to a comparable target and developing countries contribute according to their responsibilities and respective capabilities under a new global climate change agreement.

15. The target for the EU and its member States is formalized in the EU 2020 climate and energy package. The legislative package regulates emissions of CO_2, CH_4, N_2O, HFCs, PFCs and SF_6 using global warming potential values from the AR4 to aggregate the GHG emissions of the EU until 2020. Emissions and removals from the LULUCF sector are not included in the quantified economy-wide emission reduction target under the Convention. The EU generally allows its member States to use units from the Kyoto Protocol mechanisms as well as new market mechanisms for compliance purposes, subject to a number of restrictions in terms of origin and type of project and up to an established limit. Companies can make use of such units to fulfil their requirements under the EU ETS.

16. The EU 2020 climate and energy package includes the EU ETS and the ESD. The EU ETS covers mainly point emissions sources in the energy, industry and aviation sectors. An EU-wide emissions cap has been put in place for the period 2013–2020 with the goal of reducing emissions by 21 per cent below the 2005 level by 2020. Emissions from non-ETS sectors are regulated through member State specific targets that add up to a reduction at the EU level of 10 per cent below the 2005 level by 2020.

17. Under the ESD, Croatia has a target of limiting its emission growth to 11 per cent above the 2005 level by 2020 for non-ETS sectors. National emission targets for non-ETS sectors for 2020 have been translated into binding quantified AEAs for the period 2013–2020. Croatia's AEAs change following a linear path from 19,613.81 kt CO_2 eq in 2013 to 19,317.94 kt CO_2 eq in 2020.[3] In the National Action Plan for Renewable Energy Sources by 2020, Croatia set targets for 2020 for the shares of renewable energy sources in final energy consumption (20 per cent), in electricity generation (35 per cent), in transport (10 per cent) and in heating and cooling (20 per cent). According to the National Action Plan for Energy Efficiency for the Period 2017–2019 the energy savings target was set at 22.76 PJ in final energy consumption in 2020. The final energy consumption is expected to be 291.30 PJ in 2020.

2. Assessment of adherence to the reporting guidelines

18. The ERT assessed the information reported in the BR3 of Croatia and recognized that the reporting is complete and transparent and adhering to the UNFCCC reporting guidelines on BRs. No issues relating to the topics discussed in this chapter of the review report were raised during the review.

C. Progress made towards the achievement of the quantified economy-wide emission reduction target

1. Mitigation actions and their effects

(a) Technical assessment of the reported information

19. Croatia provided information on its package of PaMs implemented, adopted and planned, by sector and by gas, in order to fulfil its commitments under the Convention and its Kyoto Protocol. Croatia reported on its policy context and legal and institutional arrangements put in place to implement its commitments and monitor and evaluate the effectiveness of its PaMs.

20. Croatia provided information on a set of PaMs similar to those previously reported with some exceptions. Energy and agriculture are the sectors where most of the differences occur. Croatia did not provide information on changes made since the previous submission to its institutional, legal, administrative and procedural arrangements used for domestic compliance, monitoring, reporting, archiving of information and evaluation of the progress made towards its target. During the review the Party provided information about its domestic institutional arrangements; however, it did not provide information about the changes since the previous BR.

21. Croatia did not report on its self-assessment of compliance with its emission reduction target and did not report on national rules for taking action against non-compliance (see issue 3 in table 5). According to current emission trend development Croatia expects to reach the target without using market-based mechanisms and without including emissions from LULUCF.

22. The key overarching related cross-sectoral policy in the EU is the 2020 climate and energy package, adopted in 2009, which includes the revised EU ETS and the ESD. The package is supplemented by renewable energy and energy efficiency legislation and legislative proposals on the 2020 targets for CO_2 emissions from cars and vans, the carbon

[3] European Commission decision 2017/1471 of 10 August 2017 amending decision 2013/162/EU of 26 March 2013 to revise member States' AEAs for the period from 2017 to 2020.

capture and storage directive, and the general programmes for environmental conservation, namely the 7th Environment Action Programme and the clean air policy package.

23. In operation since 2005, the EU ETS is a cap-and-trade system that covers all significant energy-intensive installations (mainly large point emissions sources such as power plants and industrial facilities), which produce 40–45 per cent of the GHG emissions of the EU. It is expected that the EU ETS will guarantee that the 2020 target (a 21 per cent emission reduction below the 2005 level) will be achieved for sectors under the scheme. The third phase of the EU ETS started in 2013 and the system now includes aircraft operations (since 2012) as well as N_2O emissions from chemical industries, PFC emissions from aluminium production and CO_2 emissions from industrial processes (since 2013).

24. The ESD became operational in 2013 and covers sectors outside the EU ETS, including transport (excluding domestic and international aviation, and international maritime transport), residential and commercial buildings, agriculture and waste, together accounting for 55–60 per cent of the GHG emissions of the EU. The aim of the ESD is to decrease GHG emissions in the EU by 10 per cent below the 2005 level by 2020 and includes binding annual targets for each member State for 2013–2020. The ESD target for Croatia is to limit emission growth to 11 per cent above the 2005 level by 2020. In 2015, 66.3 per cent of emissions were from non-ETS (ESD) sectors.

25. Croatia introduced national-level policies to achieve its targets under the ESD and domestic emission reduction targets. The key policies reported are the EU ETS, the programme for energy renovation of the apartment buildings, feed-in tariffs and a premium system for the support of the use of renewable energy sources in electricity generation and for efficient cogeneration, financial incentives for the purchase of plug-in hybrid and electric vehicles, regulations related to the handling of substances that deplete the ozone layer and F-gases, and measures to prevent the generation and reduce the amount of municipal waste. The mitigation effect of feed-in tariffs and the premium system for the support of the use of renewable energy sources in electricity generation and for efficient cogeneration is the most significant (524.00 and 1,573.00 kt CO_2 eq in 2020 and 2030 respectively).

26. Other policies that have delivered significant emission reductions are financial incentives for the purchase of plug-in hybrid and electric vehicles (221.00 and 662.00 kt CO_2 eq in 2020 and 2030), regulations on the handling of substances that deplete the ozone layer and F-gases (242.00 and 268.00 kt CO_2 eq in 2020 and 2030), and preventing the generation and reducing the amount of municipal waste (405.00 and 1,283.00 kt CO_2 eq in 2020 and 2030).

27. Croatia has also included information on planned PaMs such as change in the diet of cattle and pigs and animal feed quality (17.80 kt CO_2 eq in 2030), improvement of mineral fertilizer application methods (68,70 kt CO_2 eq in 2030) and the planned introduction of an Energy Efficiency Obligation Scheme (mitigation effect is not estimated). Among the mitigation actions that provide a foundation for significant additional actions, the following actions are critical for Croatia to attain its 2020 emission reduction target: improvement of mineral fertilizer application methods; prevention of leaching of nutrients (hydromeliorative interventions) and systems of protection against natural disasters; and change in diet of cattle and pigs and animal feed quality. Table 4 provides a summary of the reported information on the PaMs of Croatia.

Table 4
Summary of information on policies and measures reported by Croatia

Sector	*Key PaMs*	*Estimate of mitigation impact by 2020 (kt CO_2 eq)*	*Estimate of mitigation impact by 2030 (kt CO_2 eq)*
Policy framework and cross-sectoral measures	EU ETS	NE	NE
Energy			

Sector	*Key PaMs*	*Estimate of mitigation impact by 2020 (kt CO_2 eq)*	*Estimate of mitigation impact by 2030 (kt CO_2 eq)*
Transport	Financial incentives for the purchase of plug-in hybrid and electric vehicles	221.00	662.00
Renewable energy	Increase of the use of renewable energy sources and energy efficiency in industry sector	98.00	293.00
	Feed-in tariffs and premium system for the support of the use of renewable energy sources in electricity generation and for efficient cogeneration	524.00	1 573.00
Energy efficiency	Programme for energy renovation of apartment buildings	254.00	763.00
IPPU	Handling of substances that deplete the ozone layer and F-gases	242.00	268.00
Agriculture	Improvement of mineral fertilizer application methods	NE	69.00
LULUCF		NE	NE
Waste	Preventing the generation and reducing the amount of municipal waste	405.00	1 283.00

Note: The estimates of mitigation impact are estimates of emissions of CO_2 or CO_2 eq avoided in a given year as a result of the implementation of mitigation actions.

28. The Croatian Agency for the Environment and Nature is responsible for updating the "Report on the implementation of policies and measures to reducing emissions of greenhouse gases" and the "Report on projections of greenhouse gas emissions" according to Regulation (EU) No. 525/2013. In accordance with the Croatian Air Protection Act (OG 130/11, 47/14, 61/17) the Commission for Inter-sectoral Coordination of Policies and Measures for Mitigation and Adaptation to Climate Change is responsible for the monitoring, evaluation and implementation of PaMs for mitigation and adaptation to climate change. Commission members, appointed by the Government, include representatives of relevant governmental bodies and non-governmental organizations.

(b) Policies and measures in the energy sector

29. **Energy supply**. The basic document in the energy sector is the Energy Strategy. The main measure for GHG reduction in the energy supply sector (for combustion in power plants above 20 MW) is the EU ETS. The goal for facilities included in the EU ETS is quantified in such a way that, from 2013, the total number of AEAs decreases linearly at an annual rate of 1.74 per cent. Another important measure is the CO_2 emission tax, which imposes a tax to all non-ETS stationary sources emitting more than 30 t CO_2 per year. The reconstruction and renovation of the heating and steam network, which is financed through the Operational Programme Competitiveness and Cohesion of the European structural and investment funds, has the goal of preventing high losses of energy during the transport of heat.

30. **Renewable energy sources**. The National Action Plan for Renewable Energy Sources was prepared by the Ministry of Economy in 2013 and sets objectives and policy supporting renewable energy. The share of renewables in final energy consumption shall increase to 20 per cent in 2020, including increases to 35 per cent in electricity generation, 10 per cent in transport and 20 per cent in heating and cooling energy. To achieve this, the Act on Renewable Energy Sources and Efficient Cogeneration was adopted in 2015; it modifies the existing system of feed-in tariffs and introduces the premium system. The measure on feed-in tariffs and the premium system for the support of the use of renewable energy sources in electricity generation and for efficient cogeneration is expected to decrease GHG emissions by 524.00 kt CO_2 eq in 2020 and by 1,573.00 kt CO_2 eq in 2030.

31. **Energy efficiency**. Regarding energy efficiency, Croatia refers to the 4th National Energy Efficiency Action Plan for the Period 2017–2019 under the EU energy services

directive (2006/32/EC). The Program for the Energy Efficiency in Public Lighting intends to reduce energy consumption by 30 GWh per year. The Croatian Bank for Reconstruction and Development provides loan programmes for projects in environmental protection, energy efficiency and renewable energy. There is also a wide range of measures, including energy audits in industry, the promotion of equipment for measuring energy consumption and billing, the labelling of household appliances and the eco-design of energy-using products. Further important measures for increasing energy efficiency are included in residential and commercial sectors.

32. **Residential and commercial sectors**. A number of programmes related to energy efficiency target households and commercial organizations. The Long-Term Strategy for the National Building Stock Renovation Investment is a strategic document regarding investments in the renovation of buildings. Currently in Croatia there are many programmes in the residential and commercial sectors supporting the renovation of buildings and energy saving; for example, the National Plan for the Increase of the Number of Nearly-Zero Energy Buildings, the programme for energy renovation of apartment buildings and the programme for the increase of energy efficiency and use of renewable energy sources in commercial non-residential buildings.

33. **Transport sector**. There are currently many measures focusing on reducing the use of fossil fuels in transportation. The most effective are expected to be the financial incentives for the purchase of plug-in hybrid and electric vehicles with a high emission saving potential (221.00 kt CO_2 eq in 2020). The aim of the measure is to increase the share of electric and hybrid vehicles. Croatia also introduced a system of taxes and fees to divert from fossil-fuelled cars towards more environmentally friendly transportation (e.g. public transport or hybrid vehicles). Also, development of infrastructure for alternative fuels, support of biofuels and promotion of intelligent transport systems are important measures in the transport sector.

34. **Industrial sector**. The Industrial Strategy of the Republic of Croatia 2014–2020 defines objectives of industrial development and key indicators of Croatian industry in the period 2014–2020. The EU ETS is the main PaM for mineral oil refining and the production of pig iron and steel, cement clinker, lime, glass, ceramic products, paper and nitric acid. There are also PaMs for energy audits, energy services for the implementation of energy-efficiency projects, use of refuse-derived fuel in the cement industry and funds for environmental, energy-efficiency and renewable-energy projects.

(c) Policies and measures in other sectors

35. **Industrial processes**. Croatia reported PaMs targeted to reduce F-gases in industrial processes, namely a ban and reduction of the consumption of ozone-depleting substances and F-gases; technical and organizational measures for collecting, recycling and recovering ozone-depleting substances and F-gases; and preventive measures for uncontrolled leaking of F-gases.

36. **Agriculture**. The implementation of measures in the agriculture sector is predominantly reflected in the reduction of CH_4 and N_2O emissions. Most of the PaMs are planned and one measure is adopted with implementation expected to start in 2018 or 2020. The most effective measure is the improvement of mineral fertilizer application methods, with an estimated mitigation effect of 68.70 kt CO_2 eq in 2030. A reduction in the amount of fertilizer used and slower release of nitrogen will reduce N_2O emissions. Other PaMs include improving animal waste management, reduction of leaching and run-off (hydromeliorative interventions) and the introduction of new cultivars.

37. **LULUCF**. Croatia has prepared the Action Plan for LULUCF under decision 29/2013/EU and has delivered the first report on the implementation of measures under this plan. Croatia also reported an ongoing cost–benefit analysis of reforestation on new areas to justify the introduction of possible incentive measures. Additionally, Croatia is making efforts to improve its reporting on the LULUCF sector. Currently there are no PaMs in place to promote concrete actions for reducing emissions or increasing carbon storage in the LULUCF sector.

38. **Waste management**. Croatia reported five PaMs related to waste management. Preventing the generation and reducing the amount of municipal waste is the measure with

the highest mitigation effect (405.00 kt CO_2 eq in 2020). This PaM supports cleaner production, incentives, regulations and investment in up-to-date technologies. Further measures include increasing the separating and recycling of municipal waste, CH_4 flaring on landfills and reducing the disposal of biodegradable waste on landfills.

(d) Response measures

39. Croatia reported on the assessment of the economic and social consequences of response measures. Croatia presented several initiatives aimed at minimizing adverse impacts. Croatia strives to minimize economic and social consequences of response measures. For the development of new policies, an impact assessment system has been established in which all proposals are examined before a final legislative act is proposed. The assessment is based on an integrated approach which analyses benefits and costs, and addresses all significant economic, social and environmental impacts of the new legislation. The continuing liberalization of the energy market is in line with EU policies and directives. No significant market distortions have been identified. Consumption taxes for electricity and fossil fuels have been harmonized recently. The subsidies associated with the use of environmentally unsound and unsafe technologies have been removed.

(e) Assessment of adherence to the reporting guidelines

40. The ERT assessed the information reported in the BR3 of Croatia and identified issues relating to completeness, transparency and adherence to the UNFCCC reporting guidelines on BRs. The findings are described in table 5.

Table 5
Findings on the mitigation actions and their effects from the review of the third biennial report of Croatia

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation or encouragement*
1	Reporting requirement specified in paragraph 6 Issue type: transparency Assessment: recommendation	The Party provided information on its mitigation actions; however, the ERT noted that for many measures the mitigation effect was not estimated and reported in CTF table 3. During the review, Croatia explained that some measures do not have direct mitigation impact, such as the cross-sectoral coordination committee. For some measures the effect is included in other measures; for example, the programme for energy renovation of apartment buildings includes the GHG emission reduction potential for the renovation of all types of buildings. Further, there is some uncertainty for some measures currently active, but where duration and scope after 2020 are unclear; for example, the EU regulatory framework for climate and energy. The ERT recommends that Croatia assess and report on the mitigation effects of its individual PaMs or provide an explanation of why this is not possible owing to its national circumstances.
2	Reporting requirement specified in paragraph 7 Issue type: completeness Assessment: recommendation	Croatia reported information on its domestic institutional arrangements; however, it did not provide information on changes in its domestic institutional arrangements used for domestic compliance, monitoring, reporting, archiving of information and evaluation of the progress towards its economy-wide emission reduction target. During the review, Croatia further clarified its domestic institutional arrangements, but did not explain the changes in institutional arrangements since the last BR. The ERT reiterates the recommendation made in the previous review report that Croatia report in its next BR on the changes in its domestic institutional arrangements compared with the previous BR.
3	Reporting requirement specified in Paragraph 24 Issue type: completeness	Croatia provided information about its emission reduction target, but did not report on its self-assessment of compliance with the target. During the review, Croatia provided references to figure 5-6 in chapter 5 of the NC7. This figure shows the effect of PaMs for the WOM, WEM and WAM scenarios and the compliance with the target.

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation or encouragement*
	Assessment: encouragement	The ERT reiterates the encouragement made in the previous review report that the Party report on its self-assessment of compliance with the target.
4	Reporting requirement specified in Paragraph 24 Issue type: completeness Assessment: encouragement	The ERT noted that Croatia did not report on national rules for taking action against non-compliance with the emission reduction target. During the review, Croatia explained that compliance with the emission limits is under the control of various state administration authorities responsible for, among others, environmental protection, construction, energy industry, agriculture, forestry, tourism and transport. The ERT reiterates the encouragement made in the previous review report that the Party report on national rules for taking action against non-compliance with the target.

Note: Paragraph number listed under reporting requirement refers to the relevant paragraph of the UNFCCC reporting guidelines on BRs. The reporting on the requirements not included in this table is considered to be complete, transparent and adhering to the UNFCCC reporting guidelines on BRs.

2. Estimates of emission reductions and removals and the use of units from market-based mechanisms and land use, land-use change and forestry

(a) Technical assessment of the reported information

41. For 2014 Croatia reported in CTF table 4 annual total GHG emissions excluding LULUCF of 23,049.00 kt CO_2 eq, which is 26.0 per cent below the 1990 level. In 2014 emissions from non-ETS sectors relating to the target under the ESD amounted to 14,663.20 kt CO_2 eq.

42. For 2015 Croatia reported in CTF table 4 annual total GHG emissions excluding LULUCF of 23,502.15 kt CO_2 eq, which is 24.6 per cent below the 1990 level. In 2015 emissions from non-ETS sectors relating to the target under the ESD amounted to 15,565.30. kt CO_2 eq.

43. On its use of units from LULUCF activities, Croatia reported in CTF tables 4 and 4(a) that in 2014 and 2015 it did not use any units to offset its total GHG emissions. Croatia reported that it does not intend to use units from market-based mechanisms under the Kyoto Protocol. Moreover, it reported in CTF tables 4 and 4(b) that it did not use units from market-based mechanisms in 2015 and 2016 towards the achievement of its 2020 target. Table 6 illustrates Croatia's total GHG emissions, the contribution of LULUCF and the use of units from market-based mechanisms to achieve its target.

Table 6
Summary of information on the use of units from market-based mechanisms and land use, land-use change and forestry by Croatia to achieve its target

Year	*Emissions excluding LULUCF (kt CO_2 eq)*	*Contribution of LULUCF (kt CO_2 eq)*[a]	*Emissions including contribution of LULUCF (kt CO_2 eq)*	*Use of units from market-based mechanisms (kt CO_2 eq)*
1990	31 153.70	NA	NA	NA
2010	27 329.01	NA	NA	NA
2011	26 928.66	NA	NA	NA
2012	25 121.94	NA	NA	NA
2013	23 922.55	NA	NA	NA
2014	23 049.00	NA	NA	NA
2015	23 502.15	NA	NA	NA

Sources: Croatia's BR3 and CTF tables 1, 4, 4(a)I, 4(a)II and 4(b).

[a] The EU's unconditional commitment to reduce GHG emissions by 20 per cent below the 1990 level by 2020 does not include emissions/removals from LULUCF.

44. In assessing the progress towards the achievement of the 2020 target, the ERT noted that Croatia's emission reduction target under the Convention is 20 per cent below the 1990 level (see para. 14 above). As discussed above, in 2015 Croatia's annual total GHG emissions excluding LULUCF were 24.6 per cent (7,651.55 kt CO_2 eq) below the base-year level. In addition, the ERT noted that in 2015 there was no contribution of LULUCF and there was no contribution of the use of market-based mechanisms.

45. The ERT noted that Croatia is making progress towards its emission reduction target by implementing mitigation actions that are delivering significant emission reductions. On the basis of the results of the projections (see para. 60 below), the ERT also noted that the Party is making progress towards achieving its target under the Convention.

(b) Assessment of adherence to the reporting guidelines

46. The ERT assessed the information reported in the BR3 of Croatia and recognized that the reporting is complete, transparent and adhering to the UNFCCC reporting guidelines on BRs. No issues relating to the topics discussed in this chapter of the review report were raised during the review.

3. Projections

(a) Technical assessment of the reported information

47. Croatia reported updated projections for 2020 and 2030 relative to actual inventory data for 2014 under the WEM scenario. The WEM scenario reported by Croatia includes implemented and adopted PaMs until 2020.

48. In addition to the WEM scenario, Croatia reported the WAM and WOM scenarios. The WAM scenario includes planned PaMs, while the WOM scenario excludes all PaMs implemented, adopted or planned after 2014. Croatia provided a definition of its scenarios. For the energy sector the WEM scenario does not include the installation of additional renewables capacity after 2020 (as documented in the National Action Plan for Renewable Energy Resources by 2020) and energy efficiency improvements are in line with existing measures as documented in the 4th National Energy Efficiency Action Plan for the Period 2017–2019, whereas the WAM scenario includes emission reductions that result from continued support to energy efficiency after 2020 and further development of its renewable energy policy after 2020.

49. In relation to transport, the WEM scenario includes a stagnation in the use of rail and inland waterways, while the WAM scenario includes emission reductions from moving 7 per cent of transport of passengers and goods to rail between 2020 and 2030 compared with the WEM scenario. For industrial processes, the WEM scenario assumes that there will be no installation of additional capacity in this sector, and the WAM scenario further includes the application of cost-effective measures to reduced GHG emissions associated with the production of cement, glass, nitric acid and the reduction of emissions of volatile organic compounds, controlled substances and F-gases. In relation to waste, under the WEM scenario it is assumed that there will be a continuous increase of waste as a result of higher living standards, while under the WAM scenario this waste will be reduced. The definitions provided by Croatia indicate that the scenarios were prepared according to the UNFCCC reporting guidelines on NCs.

50. The projections are presented on a sectoral basis, using the same sectoral categories as those used in the reporting on mitigation actions, and on a gas-by-gas basis for CO_2, CH_4, N_2O, PFCs, HFCs and SF_6 (treating PFCs and HFCs collectively in each case) for 2015–2035. The projections are also provided in an aggregated format for each sector as well as for a Party total using global warming potential values from the AR4.

51. Croatia did not report emission projections for indirect GHGs such as carbon monoxide, nitrogen oxides, non-methane volatile organic compounds or sulfur oxides. (see issue 4 in table 10).

52. Emission projections related to fuel sold to ships and aircraft engaged in international transport were not reported separately and were not included in the totals. Croatia reported on factors and activities affecting emissions for each sector.

(b) Methodology, assumptions and changes since the previous submission

53. The methodology used for the preparation of the projections is different from that used for the BR2. Croatia reported supporting information further explaining the methodologies and the changes made since the BR2. The ERT noted that, during the review, Croatia provided information on how changes in the methodology used provides greater detail and a significant improvement to the modelling of the synergies and cross-sectoral effects of the measures for the projections.

54. To prepare its projections, Croatia relied on the following key underlying assumptions: population trends, economic development indicators and energy prices. These variables and assumptions were reported in CTF table 5. The assumptions were updated on the basis of information provided by the European Commission and the data are consistent with the EU Reference Scenario.[4] The Party also provided the document "Report on projections of greenhouse gas emissions". The assumptions are outlined in CTF table 5 and include GDP growth and the EU ETS carbon price, as follows: GDP growth rate is estimated to be 1.8 per cent by 2020 decreasing to 1.3 per cent in 2030; GDP at constant prices is estimated to be EUR 48,817.00 million in 2020 increasing to EUR 55,274.00 million in 2030; gross value added of total industry is estimated to be EUR 11,326.00 million in 2020 and EUR 12,713.00 million in 2030; and the EU ETS carbon price is estimated to be EUR 15 in 2020 and EUR 33.50 in 2030.

55. Each sector is estimated using a different model. The energy sector, including energy industries and transport, is modelled using the Long-range Energy Alternatives Planning system (LEAP) which is used to track energy consumption. The industrial sector is modelled using the Industrial Processes Model, which is an Excel-based engineering simulation model. Agriculture is modelled by following the bottom-up reference-based approach from the IPCC guidelines. Waste is modelled using an Excel-based engineering simulation model.

56. Croatia provided information in CTF table 5, on assumptions, methodologies, models and approaches used and on the key variables and assumptions used in the preparation of the projection scenarios. The ERT notes that Croatia provided information to explain the changes and supporting documentation on sensitivity analyses, both in the BR3 and during the review.

57. Sensitivity analyses were conducted for a number of important assumptions, such as population trends, economic growth, the influence of temperature on heating and cooling trends, the impact of changes in weather on renewable electricity generation, hydrology and electricity imports. The ERT notes that Croatia provided detailed information on the assumptions during the review, including information on a range of GDP growth scenarios. GDP growth is assumed to increase by 2050 by a long-term annual average of 1.7 per cent across all scenarios based on the EU Reference Scenario. In the optimistic scenario, where economic growth is expected to be 2.2 per cent, emissions are expected to be 7.1 per cent higher in 2030 and 18.1 per cent higher in 2050. The pessimistic growth scenario sees an increase in GDP growth of less than 1 per cent by 2050, which results in emissions being lower than for the average scenario. However, as economic growth is low there may be an issue in financing the transition, and finding additional funding for the implementation of measures might be difficult.

(c) Results of projections

58. The projected emission levels under different scenarios and information on the Kyoto Protocol targets and the quantified economy-wide emission reduction target are presented in table 7 and the figure below.

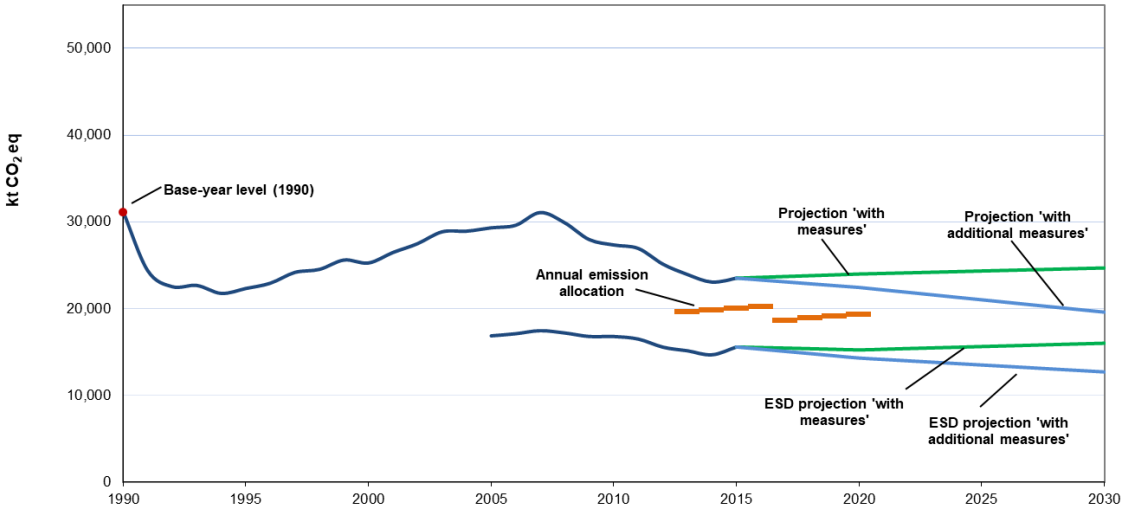
[4] See https://ec.europa.eu/energy/en/data-analysis/energy-modelling.

Table 7
Summary of greenhouse gas emission projections for Croatia

	GHG emissions (kt CO_2 eq per year)	*Changes in relation to base-year[a] level (%)*	*Changes in relation to 1990 level (%)*
Quantified economy-wide emission reduction target under the Convention[b]	NA	NA	NA
Inventory data 1990[c]	31 153.70	–0.2	NA
Inventory data 2015[c]	23 502.14	–24.7	–24.6
WOM projections for 2020[c]	25 635.96	–17.8	–17.7
WEM projections for 2020[c]	23 976.59	–23.2	–23.0
WAM projections for 2020[c]	22 429.66	–28.1	–28.0
WOM projections for 2030[c]	29 706.72	–4.8	–4.6
WEM projections for 2030[c]	24 677.30	–20.9	–20.8
WAM projections for 2030[c]	19 582.72	–37.2	–37.1

[a] "Base year" in this column refers to the base year used for the target under the Kyoto Protocol, while for the target under the Convention it refers to the base year used for that target.
[b] The quantified economy-wide emission reduction target under the Convention is a joint target of the EU and its 28 member States. The target is to reduce emissions by 20 per cent compared with the base-year (1990) level by 2020.
[c] From Croatia's BR3 CTF table 6.

Greenhouse gas emission projections reported by Croatia



[a] *Sources*: (1) data for the years 1990–2015: Croatia's CTF table 1; total GHG emissions excluding LULUCF; (2) data for the years 2015–2030: Croatia's CTF table 6; total GHG emissions excluding LULUCF; (3) European Environment Agency ESD review data (2005–2015); data for ESD projections provided by Croatia during the review; (4) EU transaction log.

59. Croatia's total GHG emissions excluding LULUCF in 2020 and 2030 are projected to be 23,976.59 and 24,677.30 kt CO_2 eq, respectively, under the WEM scenario, which represents a decrease of 23.0 and 20.8 per cent, respectively, below the 1990 level. Under the WAM scenario, emissions in 2020 and 2030 are projected to be 22,429.66 and 19,582.72 kt CO_2 eq, respectively, which represents a decrease of 28.0 and 37.1 per cent below the 1990 level. The 2020 projections suggest that Croatia will continue contributing to the achievement of the EU target under the Convention.

60. Croatia's target for non-ETS sectors is to limit its total emission growth to 11 per cent above the 2005 level by 2020 (see para. 24 above). Croatia's AEAs, which correspond to its national emission target for non-ETS sectors, change linearly from 19,613.81 kt CO_2 eq in 2013 to 19,317.94 kt CO_2 eq for 2020. According to the projections under the WEM scenario, emissions from non-ETS sectors are estimated to reach 15,228.00 kt CO_2 eq by 2020. Under

the WAM scenario, Croatia's emissions from non-ETS sectors in 2020 are projected to be 14,290.00 kt CO_2 eq. The projected level of emissions under the WEM and WAM scenarios are 21.2 and 26.0 per cent, respectively, below the AEAs for 2020. The ERT noted that this suggests that Croatia expects to meet its target under the WEM scenario (see para. 45 above).

61. Croatia presented the WEM and WAM scenarios by sector for 2020 and 2030, as summarized in table 8.

Table 8
Summary of greenhouse gas emission projections for Croatia presented by sector

	GHG emissions and removals (kt CO_2 eq)					*Change (%)*			
	1990	*2020*		*2030*		*1990–2020*		*1990–2030*	
Sector		*WEM*	*WAM*	*WEM*	*WAM*	*WEM*	*WAM*	*WEM*	*WAM*
Energy (not including transport)	17 950.74	11 169.34	10 846.61	10 966.89	8 839.77	–37.8	–39.6	–38.9	–50.8
Transport	3 881.11	5 421.69	5 421.06	5 594.87	4 827.37	39.7	39.7	44.2	24.4
Industry/industrial processes	4 628.76	3 008.86	2 447.39	3 146.54	2 546.63	–35.0	–47.1	–32.0	–45.0
Agriculture	4 039.08	2 523.06	2 266.09	2 712.66	2 395.22	–37.5	–43.9	–32.8	–40.7
LULUCF	–6 589.43	–3 098.18	NA	–2 375.06	NA	–53.0	NA	–64.0	NA
Waste	654.01	1 853.64	1 448.50	2 256.33	973.73	183.4	121.5	245.0	48.9
Other (specify)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total GHG emissions without LULUCF	**31 153.70**	**23 976.59**	**22 429.66**	**24 677.30**	**19 582.72**	**–23.0**	**–28.0**	**–20.8**	**–37.1**

Source: Croatia's BR3 CTF table 6.

62. According to the projections reported for 2020 under the WEM scenario, the most significant emission reductions are expected to occur in the energy and industry/industrial processes sectors, amounting to projected reductions of 6,781.40 kt CO_2 eq (37.8 per cent) and 1,619.90 kt CO_2 eq (35.0 per cent) between 1990 and 2020, respectively. In both the transport and waste sectors emission increases are expected. In the case of transport, projected emission increases amount to 1,540.58 kt CO_2 eq (39.7 per cent) between 1990 and 2020. In the case of waste, emission increases amount to 1,199.63 kt CO_2 eq (183.4 per cent) between 1990 and 2020. The pattern of projected emissions reported for 2030 under the same scenario remains largely the same.

63. According to the projections reported for 2030 under the WEM scenario, the most significant emission reductions are expected to occur in the energy and industry/industrial processes sectors, amounting to projected reductions of 6,983.85 kt CO_2 eq (38.9 per cent) and 1,482.22 kt CO_2 eq (32.0 per cent) between 1990 and 2030, respectively. These changes are largely as a result of energy efficiency measures and an increase in renewable electricity (in the energy sector) as well as the closure of iron, steel and ferroalloy production, the application of abatement measures and the assumption that no additional capacity will be added in the industry/industrial processes sectors between 1990 and 2030.

64. Under the WAM scenario, the patterns of emission reductions by 2020 presented by sector and by gas are largely the same.

65. Croatia presented the WEM and WAM scenarios by gas for 2020 and 2030, as summarized in table 20.

66. For 2020 the most significant reductions are projected for CO_2 and PFC emissions: 5,452.59 kt CO_2 eq (23.3 per cent) and 1,240.24 kt CO_2 eq (100.0 per cent) between 1990 and 2020, respectively.

67. For 2030 the most significant reductions are projected for CO_2 and PFC emissions: 5,399.58 kt CO_2 eq (23.1 per cent) and 1,240.24 kt CO_2 eq (100.0 per cent) between 1990 and 2030, respectively. However, CH_4 shows an increase above 1990 levels under the WEM scenario, of 504.10 kt CO_2 eq (13.5 per cent) between 1990 and 2030. Apart from increases in CH_4 under the WEM scenario there is no difference in the projection trends for both time frames.

68. According to the WAM scenario, the patterns of emission reductions for 2020 presented by gas remain largely the same. Significant changes in the projections and variations in important variables since the BR2 are as follows: (1) the methodologies used for the projections were significantly improved and allowed for more detailed modelling of the synergies and cross-sectoral effects of measures; (2) the data presented in the BR3 are mainly derived from the draft Low-Carbon Development Strategy of Croatia until 2030 with a view to 2050 while the main basis for the previous projections was the Energy Strategy; (3) bringing key parameters in line with the EU Reference Scenario 2016; and (4) changes in the expected average long-term annual GDP growth, which was around 3.5 per cent in the NC6 whereas it is expected to be around 1.7 per cent based on the input date from the EU Reference Scenario. The projections take key assumptions from the EU Reference Scenario into account.

Table 9
Summary of greenhouse gas emission projections for Croatia presented by gas

	GHG emissions and removals (kt CO_2 eq)					*Change (%)*			
	1990	*2020*		*2030*		*1990–2020*		*1990–2030*	
Gas		*WEM*	*WAM*	*WEM*	*WAM*	*WEM*	*WAM*	*WEM*	*WAM*
CO_2	23 390.08	17 937.49	17 431.88	17 990.50	14 989.61	–23.3	–25.5	–23.1	–35.9
CH_4	3 744.19	3 713.71	3 045.55	4 248.29	2 546.88	–0.8	–18.7	13.5	–32.0
N_2O	2 768.74	1 854.90	1 723.96	1 920.50	1 796.49	–33.0	–37.7	–30.6	–35.1
HFCs	NO	463.90	221.68	511.15	242.88	NO	NO	NO	NO
PFCs	1 240.24	0.00	0.00	0.00	0.00	–100.0	–100.0	–100.0	–100.0
SF_6	10.45	6.59	6.59	6.86	6.86	–36.9	–36.9	–34.4	–34.4
NF_3	NO	NO	NO	NO	NO	NO	NO	NO	NO
Total GHG emissions without LULUCF	**31 153.70**	**23 976.59**	**22 429.66**	**24 677.30**	**19 582.72**	**–15.0**	**–28.0**	**–9.2**	**–37.1**

Source: Croatia's BR3 CTF table 6.

(d) Assessment of adherence to the reporting guidelines

69. The ERT assessed the information reported in the BR3 of Croatia and identified issues relating to completeness, transparency and adherence to the UNFCCC reporting guidelines on BRs. The findings are described in table 10.

Table 10
Findings on greenhouse gas emission projections reported in the third biennial report of Croatia

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation or encouragement*
1	Reporting requirement[a] specified in paragraph 30 Issue type: completeness	The Party did not report any information on sensitivity analyses for any of the projections in its BR3. During the review the Party provided additional information by the Croatian Agency for the Environment and Nature that describes the sensitivity analyses for

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation or encouragement*
	Assessment: encouragement	the projections under the WEM and WAM scenarios (chapter 5, "Report on projections of greenhouse gas emissions"). The ERT welcomes the efforts made by the Party and reiterates the encouragement made in the previous review report (FCCC/TRR.2/HRV, para. 49) that the Party include sensitivity analyses for projections in its next BR.
2	Reporting requirement[a] specified in paragraph 32 Issue type: completeness Assessment: encouragement	The BR3 includes projection estimates for the year 2015 in tables 5-1, 5-2 and 5-3, even though inventory data for the year 2015 were available at the time of preparation of the report. Paragraph 32 of the UNFCCC reporting guidelines on NCs states that the starting point should generally be the latest year for which inventory data are available, and this also applies to the BR. During the review the Party clarified that the starting point of the projections is 2014 and therefore the 2015 values are projections. The Party also explained that the modelling of projections was carried out in 2016 when the latest available inventory data was for the year 2014. The ERT welcomes the efforts made by the Party and encourages the Party to provide in its next BR information describing projection estimates that use the latest available inventory data.
3	Reporting requirement[a] specified in paragraph 34 Issue: completeness Assessment: recommendation	In the BR3 the Party did not report information on other (cross-cutting) PaMs in the projections even though it presented projections for all other sectors (energy, transport, industrial processes, waste management, agriculture and LULUCF) in line with the sectors presented in the PaMs chapter, where the 'Other (cross-cutting) policies and measures' is included as a separate chapter. During the review the Party provided additional information clarifying that other (cross-cutting) PaMs, which affect more than one sector, are included in the projections, namely MCC-4, MCC-5 and MCC-7. The ERT welcomes the efforts made by the Party and recommends that in its next BR the Party provide sectoral projections, to the extent possible, using the same sectoral categories used in the PaMs section, including for the other (cross-sectoral) PaMs, or provide a duly substantiated explanation of why this is not possible.
4	Reporting requirement[a] specified in paragraph 35 Issue type: completeness Assessment: encouragement	The Party did not report information on projections for indirect GHGs such as carbon monoxide, nitrogen oxides and non-methane volatile organic compounds or sulfur oxides. During the review the Party provided additional information describing the national programme for the reduction of emissions of air pollutants, which had not been adopted at the time of the review owing to delays associated with changes in government and delays in the adoption of planning documents, particularly the draft Low-Carbon Development Strategy of the Republic of Croatia until 2030 with a view to 2050, which should be adopted by the end of 2018. The ERT welcomes the efforts made by the Party and encourages the Party to provide information describing projections for indirect GHGs in its next BR.
5	Reporting requirement[a] specified in paragraph 36 Issue type: completeness Assessment: recommendation	In the BR3 the Party did not provide information on emission projections related to fuel sold to ships and aircraft engaged in international transport separately and not included in the totals. During the review the Party stated that it was not yet in a position to supply this information but was willing to develop projections of the fuel sold to ships and aircraft engaged in international travel for future BRs. The ERT welcomes the efforts made by the Party and reiterates the recommendation made in the previous review report (FCCC/TRR.2/HRV, para. 46) that the Party provide information in its next BR describing the emission projections related to fuel sold to ships and aircraft engaged in international transport, to the extent possible, separately and not included in the totals.

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation or encouragement*
6	Reporting requirement[a] specified in paragraph 38	The BR3 includes a diagram of overall projections under the WOM, WEM and WAM scenarios, but it does not provide additional diagrams for each sector as was provided in previous submissions.
	Issue type: transparency	During the review the Party provided additional diagrams for projections under the WOM, WEM and WAM scenarios for each of the sectors.
	Assessment: encouragement	The ERT welcomes the efforts made by the Party and encourages the Party to provide additional diagrams of projection estimates in its next BR.
7	Reporting requirement[a] specified in paragraph 40	The Party did not report an estimate of GHG emissions avoided, by gas, based on the total effect of PaMs for projections under the WEM scenario compared with a situation without such PaMs.
	Issue type: completeness	During the review the Party provided a table showing an estimate of GHG emissions avoided, by gas (on a CO_2 eq basis), based on the total effect of PaMs for projections under the WEM scenario compared with a situation without such PaMs (i.e. the WOM scenario), for the years 2015–2035 in five-year time steps.
	Assessment: recommendation	The ERT welcomes the efforts made by the Party and recommends that the Party provide in its next BR an estimate of GHG emissions avoided, by gas (on a CO_2 eq basis), based on the total effect of PaMs for the projections under the WEM scenario compared with a situation without such PaMs.
8	Reporting requirement[a] specified in paragraph 43	The Party did not report the necessary description of each model or approach used, as required by the UNFCCC reporting guidelines on NCs, applicable also to BRs, particularly in relation to paragraph 43(d) to provide a summary of the strengths and weaknesses of the model approach used and paragraph 43(e) to provide an explanation of how the model or approach used accounts for any overlap of synergies that may exist between different PaMs. The ERT noted that it could also be useful to provide more information on paragraph 43(a)–(c), namely an explanation of which gases and/or sectors the model or approach was used for; a description of the type of model or approach used and its characteristics (e.g. top-down, bottom-up and accounting models or expert judgment); and a description of the original purpose of the model or approach and what it was designed for and, if applicable, how it has been modified for climate change purposes.
	Issue type: transparency	
	Assessment: encouragement	During the review the Party provided complete and comprehensive additional information describing all elements required by paragraph 43(a)–(e) of the UNFCCC reporting guidelines on NCs.
		The ERT welcomes the efforts made by the Party and encourages the Party to provide in its next BR the descriptions of each model or approach used, in line with the requirements of paragraph 43(a)–(e) of the UNFCCC reporting guidelines on NCs.
9	Reporting requirement[a] specified in paragraph 44	The Party did not report references for the description of each model or approach used in relation to the information reported under paragraph 43 of the UNFCCC reporting guidelines on NCs.
	Issue type: transparency	During the review the Party provided the necessary references, which are included in the annex to this report.
	Assessment: encouragement	The ERT welcomes the efforts made by the Party and encourages the Party to provide in its next BR the references for the descriptions of each model or approach used in relation to paragraph 43 of the UNFCCC reporting guidelines on NCs.
10	Reporting requirement[a] specified in paragraph 45	The Party did not report information on the main differences in the assumptions, methodologies, models and approaches employed, and results between projections in the current BR and those in earlier BRs.
	Issue type: transparency	During the review, the Party provided additional information describing the main differences compared with the projections provided in the BR2.

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation or encouragement*
	Assessment: encouragement	The ERT welcomes the efforts made by the Party and reiterates the encouragement made in the previous review report (FCCC/TRR.2/HRV, para. 48) that the Party provide information in its next BR information describing the main differences in the assumptions, methodologies, models and approaches employed, and results between projections in the current BR and those in earlier BRs.
11	Reporting requirement[a] specified in paragraph 46 Issue type: transparency Assessment: encouragement	The Party did not report qualitative or quantitative information related to the sensitivity of projections to underlying assumptions. During the review the Party provided complete and comprehensive additional information by the Croatian Agency for the Environment and Nature that describes the sensitivity analyses for the projections under the WEM and WAM scenarios (chapter 5, "Report on projections of greenhouse gas emissions"). The ERT welcomes the efforts made by the Party and encourages the Party to provide in its next BR qualitative and quantitative information related to the sensitivity of projections to underlying assumptions.
12	Reporting requirement[b] specified in paragraph 12 Issue type: completeness Assessment: recommendation	The Party did not report information on changes in models or methodologies used for the preparation of projections or supporting documentation since the most recent BR. During the review the Party provided additional information describing how the methodologies used for the projections were significantly improved in order to provide the more detailed modelling of the synergies and cross-sectoral effects among PaMs. The ERT welcomes the efforts of the Party and reiterates the recommendation made in the previous review report (FCCC/TRR.2/HRV, para. 48) that the Party provide in its next BR information describing the changes in models or methodologies used for the preparation of projections that have occurred since its most recent BR and provide supporting documentation for this information.

Note: The reporting on the requirements not included in this table is considered to be complete, transparent and adhering to the UNFCCC reporting guidelines on NCs and on BRs.

[a] Paragraph number listed under reporting requirement refers to the relevant paragraph of the UNFCCC reporting guidelines on NCs.

[b] Paragraph number listed under reporting requirement refers to the relevant paragraph of the UNFCCC reporting guidelines on BRs.

D. Provision of financial, technological and capacity-building support to developing country Parties

70. Croatia is not an Annex II Party and is therefore not obliged to adopt measures and fulfil obligations defined in Article 4, paragraphs 3, 4 and 5, of the Convention. However, Croatia reported that the Law on Air Protection stipulates the use of revenues from GHG emissions auctioning, including the financing of mitigation measures for climate change and adaptation in other countries; and Croatia also mentions that the use of these revenues is planned based on the adopted plan for the use of financial resources obtained from the sale of auctioning revenues in the Republic of Croatia by 2020. In the BR3 (CTF table 7(a)), Croatia reported provision of EUR 33,018.00 in 2015 and EUR 37,442.00 in 2016 to specialized agencies of the United Nations. The ERT commends Croatia for reporting this information and suggests that it continue to do so in future BRs, including reporting on progress on the adoption of the plans to use revenues from GHG emissions auctioning to support mitigation and adaptation programmes in other countries.

III. Conclusions and recommendations

71. The ERT conducted a technical review of the information reported in the BR3 and CTF tables of Croatia in accordance with the UNFCCC reporting guidelines on BRs. The ERT concludes that the reported information is mostly complete and adheres to the UNFCCC reporting guidelines on BRs and provides an overview of emissions and removals related to

the Party's quantified economy-wide emission reduction target; assumptions, conditions and methodologies related to the attainment of the target; progress made by Croatia in achieving its target; and the Party's provision of support to developing country Parties.

72. Croatia's total GHG emissions excluding LULUCF covered by its quantified economy-wide emission reduction target were estimated to be 23.8 per cent below its 1990 level, whereas total GHG emissions including LULUCF were 23.4 per cent below its 1990 level in 2016. Emissions were driven mainly by national circumstances economic forces (decreases and increases depending on fluctuations in the economy) and the continued reliance on fossil fuels for primary energy supply. Those factors outweighed improvements in the efficiency of energy supply and improvements in the abatement of emissions in industrial processes.

73. Under the Convention, Croatia committed to contributing to the achievement of the joint EU quantified economy-wide emission reduction target of a 20 per cent reduction in emissions below the 1990 level by 2020. The target covers all sectors and CO_2, CH_4, N_2O, HFCs, PFCs and SF_6, expressed using global warming potential values from the AR4. Emissions and removals from the LULUCF sector are not included. The EU generally allows its member States to use units from the Kyoto Protocol mechanisms and new market mechanisms for compliance purposes up to an established limit and subject to a number of restrictions on the origin and the type of project. Companies can make use of such units to fulfil their requirements under the EU ETS.

74. Under the ESD, Croatia has a target limiting its emission growth to 11.0 per cent above the 2005 level by 2020. The 2015–2020 linear progression in Croatia's AEAs (its national emission target for non-ETS sectors) is following a linear path from 19,613.81 kt CO_2 eq in 2013 to 19,317.94 kt CO_2 eq in 2020.

75. For 2015 Croatia reported in CTF table 4 total GHG emissions excluding LULUCF of 23,502.15 kt CO_2 eq. Croatia reported that it does not intend to use units from market-based mechanisms under the Kyoto Protocol and that it did not use units from market-based mechanisms in 2015 and 2016 towards the achievement of its 2020 target.

76. The GHG emission projections provided by Croatia in the BR3 correspond to the WOM, WEM and WAM scenarios. Under these scenarios, emissions are projected to be 17.7, 23.0 and 28.0 per cent below the 1990 level by 2020, respectively. On the basis of the reported information, the ERT concludes that Croatia expects to meet its 2020 target under the WEM and WAM scenarios. According to the projections under the WEM scenario, emissions from non-ETS sectors are estimated to reach 15,228.00 kt CO_2 eq by 2020. Under the WAM scenario, Croatia's emissions from non-ETS sectors in 2020 are projected to be 14,290.00 kt CO_2 eq. On the basis of the reported information, the ERT concludes that Croatia expects to meet its target for non-ETS sectors.

77. The ERT noted that Croatia is making progress towards its emission reduction target by implementing mitigation actions that deliver significant emission reductions.

78. On the basis of the results of the projections for 2020 under the WEM and WAM scenarios, the ERT noted that Croatia may achieve or overachieve its emission reduction target by 2020. In this regard, Croatia indicated in the BR3 that it does not plan to use units from market-based mechanisms in order to achieve its emission reduction target.

79. Croatia is not an Annex II Party and is therefore not obliged to adopt measures and fulfil obligations defined in Article 4, paragraphs 3, 4 and 5, of the Convention. However, Croatia provided information in the BR3 on its provision of support to developing country Parties.

80. In the course of the review, the ERT formulated the following recommendations for Croatia to improve its adherence to the UNFCCC reporting guidelines on BRs in its next BR:[5]

(a) To improve the completeness of its reporting by:

[5] The recommendations are given in full in the relevant chapters of this report.

(i) Providing a summary of national inventory arrangements and a statement of changes to these national inventory arrangements since the last BR (see issue 1, table 3);

(ii) Providing information on the changes in its domestic institutional arrangements comparing with the previous BR (see issue 2, table 5);

(iii) Providing sectoral projections, to the extent possible, using the same sectoral categories used in the PaMs section, including for the other (cross-sectoral) PaMs or a duly substantiated explanation of why this is not possible (see issue 3, table 10);

(iv) Providing the emission projections related to fuel sold to ships and aircraft engaged in international transport, to the extent possible, separately and not included in the totals (see issue 5, table 10);

(v) Providing an estimate of GHG emissions avoided, by gas (on a CO_2 equivalent basis), based on the total effect of PaMs for the projections under the WEM scenario compared with a situation without such PaMs (see issue 7, table 10);

(vi) Providing information describing the changes in models or methodologies used for the preparation of projections that have occurred since its most recent BR and provide supporting documentation for this information (see issue 12, table 10);

(b) To improve the transparency of its reporting by reporting on the mitigation effects of its individual PaMs or to provide an explanation on why this is not possible owing to its national circumstances (see issue 1, table 5);

(c) To improve the timeliness of its reporting by submitting its next BR on time (see para. 6 above).

1.

Annex

Documents and information used during the review

A. Reference documents

2017 GHG inventory submission of Croatia. Available at https://unfccc.int/process/transparency-and-reporting/reporting-and-review-under-the-convention/greenhouse-gas-inventories-annex-i-parties/submissions/national-inventory-submissions-2017.

2018 GHG inventory submission of Croatia. Available at https://unfccc.int/process-and-meetings/transparency-and-reporting/reporting-and-review-under-the-convention/greenhouse-gas-inventories-annex-i-parties/national-inventory-submissions-2018.

BR3 of Croatia. Available at https://unfccc.int/process-and-meetings/transparency-and-reporting/reporting-and-review-under-the-convention/national-communications-and-biennial-reports-annex-i-parties/third-biennial-reports-annex-i.

BR3 CTF tables of Croatia. Available at https://unfccc.int/process-and-meetings/transparency-and-reporting/reporting-and-review-under-the-convention/national-communications-and-biennial-reports-annex-i-parties/third-biennial-reports-annex-i.

"Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part II: UNFCCC reporting guidelines on national communications". FCCC/CP/1999/7. Available at http://unfccc.int/resource/docs/cop5/07.pdf.

"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". Annex to decision 13/CP.20. Available at http://unfccc.int/resource/docs/2014/cop20/eng/10a03.pdf.

NC7 of Croatia. Available at https://unfccc.int/process-and-meetings/transparency-and-reporting/reporting-and-review-under-the-convention/national-communications-and-biennial-reports-annex-i-parties/seventh-national-communications-annex-i.

Report on the individual review of the annual submission of Croatia submitted in 2016. FCCC/ARR/2016/HRV. Available at https://unfccc.int/process/transparency-and-reporting/reporting-and-review-under-the-convention/greenhouse-gas-inventories/greenhouse-gas-inventory-review-reports-2016.

Report of the technical review of the second biennial report of Croatia. FCCC/TRR.2/HRV. Available at https://unfccc.int/process/transparency-and-reporting/reporting-and-review-under-the-convention/national-communications-and-biennial-reports--annex-i-parties/international-assessment-and-review/review-reports.

"UNFCCC biennial reporting guidelines for developed country Parties". Annex I to decision 2/CP.17. Available at http://unfccc.int/resource/docs/2011/cop17/eng/09a01.pdf.

B. Additional information provided by the Party

Responses to questions during the review were received from Ms. Jasenka Nećak (Ministry of Environment and Energy), including additional material. The following documents[1] were provided by Croatia:

Air Protection Act: Official Gazette 130/11, 47/14.

[1] Reproduced as received from the Party.

Boza-Kiss, B., Bertoldi, P., Economidou, M. 2017. *Energy Service Companies in the EU*. Available at http://publications.jrc.ec.europa.eu/repository/bitstream/JRC106624/kjna28716enn.pdf.

CBS. 2017 *Statistical Yearbook of the Republic of Croatia*. Available at https://www.dzs.hr/default_e.htm.

Croatian Agency for the Environment and Nature. 2017. *Report on implementation of policies and measures that reduce greenhouse gas emissions by sources or enhance removals by sinks*. Available at http://www.haop.hr/sites/default/files/uploads/dokumenti/012_klima/dostava_podataka/Izvjesca/PaM_2017.pdf.

Croatian Agency for the Environment and Nature. 2017. *Report on projections of greenhouse gas emissions*. Available at http://www.haop.hr/sites/default/files/uploads/dokumenti/012_klima/dostava_podataka/Izvjesca/RoP_2017.pdf.

Croatian Bureau of Statistics: *2017 Statistical Yearbook of the Republic of Croatia*. Available at https://www.dzs.hr/default_e.htm.

Information and examples on advanced implementation models in public lighting. Available at http://www.streetlight-epc.eu/fileadmin/redakteure/Streetlight-EPC/Project_outputs/WP2/Advanced_LED-EPC_models.pdf and https://www.eceee.org/library/conference_proceedings/eceee_Summer_Studies/2017/3-local-action/financing-models-for-energy-efficient-street-lighting/2017/3-355-17_Novikova.pdf/.

Information on the EU actions for reduction of GHG emission from the shipping sector. Available at https://ec.europa.eu/clima/policies/transport/shipping_en.

IPCC. 2006. *Guidelines for National Greenhouse Gas Inventories – Agriculture sector*. Available at http://www.ipcc-nggip.iges.or.jp/public/2006gl/.

IPCC. 2006. *Guidelines for National Greenhouse Gas Inventories - LULUCF sector*. Available at http://www.ipcc-nggip.iges.or.jp/public/gl/invs6c.html.

Irsag, B., Pukšec, T., Duić, N., *Long term energy demand projection and potential for energy savings of Croatian tourism–catering trade sector*, Energy, Volume 48, Issue 1, December 2012, Pages 398–405

EnergyPLAN. Available at http://www.energyplan.eu/getstarted/.

EnergyManagement Information System - EMIS. Description. Available at https://www.isge.hr/cc/hr/login/EMIS.PDF.

EnergyManagement Information System - EMIS. Link to system. Available at https://www.isge.hr/login.xhtml.

Ordinance of the Government of Croatia. 2009. *Energy Strategy OG 130/09*

EU Reference Scenario. Available at https://ec.europa.eu/energy/en/data-analysis/energy-modelling.

Forest Law. Available at https://www.ecolex.org/details/legislation/forest-law-lex-faoc071624/.

Law on the System of Strategic Planning and Management of the Development of the Republic of Croatia (OG 123/17). Available at http://www.hrvatska2030.hr/plan-izrade/.

LEAP software model description. Available at https://www.energycommunity.org/default.asp?action=introduction.

Ministry of Environment and Energy. 2017. *Draft Low-Carbon Development Strategy of Croatia until 2030 with a view to 2050*. Available at http://www.mzoip.hr/hr/klima/strategije-planovi-i-programi.html.

Ministry for Protection of the Environment and Energy. 2017. *Forth National Energy Efficiency Action Plan for the Period from 2017 to 2019*. Available at https://ec.europa.eu/energy/sites/ener/files/hr_neeap_2017_en.pdf.

Ministry of Construction and Physical Planning. *Plans for the energy renovation of public buildings*. Available at http://www.mgipu.hr/default.aspx?id=15086.

National Registry, public website. Available at http://www.haop.hr/hr/tematska-podrucja/zrak-klima-tlo/klimatske-promjene (in Croatian); https://ets-registry.webgate.ec.europa.eu/euregistry/HR/index.xhtml (in Croatian and English).

Pukšec, T., Vad Mathiesen B., Duić, N. 2013. *Potentials for energy savings and long term energy demand of Croatian household sector,* Applied Energy, Volume 101, January 2013, Pages 15–25.

Pukšec, T., Krajačić, G., Lulić, Z., Vad Mathiesen B., Duić, N. 2013. *Forecasting long-term energy demand of Croatian transport sector,* Energy, Volume 57, 1 August 2013, Pages 169–176.