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## **Report on the technical review of the fourth biennial report of Croatia**

Developed country Parties were requested by decision 2/CP.17 to submit their fourth biennial report to the secretariat by 1 January 2020. This report presents the results of the technical review of the fourth 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”. The review took place from 25 to 29 January 2021 remotely.



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## Abbreviations and acronyms

AEA	annual emission allocation
Annex II Party	Party included in Annex II to the Convention
AR	Assessment Report of the Intergovernmental Panel on Climate Change
BR	biennial report
CH <sub>4</sub>	methane
CORINE	Coordination of Information on the Environment (programme)
CO <sub>2</sub>	carbon dioxide
CO <sub>2</sub> eq	carbon dioxide equivalent
CTF	common tabular format
ERT	expert review team
ESD	European Union effort-sharing decision
ESR	European Union effort-sharing regulation
EU	European Union
EU ETS	European Union Emissions Trading System
F-gas	fluorinated gas
GDP	gross domestic product
GHG	greenhouse gas
GWP	global warming potential
HFC	hydrofluorocarbon
IE	included elsewhere
IPPU	industrial processes and product use
LEAP	Long-range Energy Alternatives Planning
LULUCF	land use, land-use change and forestry
NA	not applicable
NC	national communication
NE	not estimated
NECP	National Energy and Climate Plan
NF <sub>3</sub>	nitrogen trifluoride
NO	not occurring
N <sub>2</sub> O	nitrous oxide
PaMs	policies and measures
PFC	perfluorocarbon
SF <sub>6</sub>	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 BR4<sup>1</sup> 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 into this final version of the report.

3. The review was conducted together with the review of four other Parties included in Annex I to the Convention from 25 to 29 January 2021 remotely<sup>2</sup> by the following team of nominated experts from the UNFCCC roster of experts: Cathy Conzemius (United Kingdom of Great Britain and Northern Ireland), Agita Gancone (Latvia), Hadeel Ikhmais (State of Palestine), Traute Koether (Austria), Natalya Parasyuk (Ukraine) and Yasna Rojas Ponce (Chile). Ms. Parasyuk and Ms. Rojas Ponce were the lead reviewers. The review was coordinated by Marion Vieweg-Mersmann and Veronica Colerio (secretariat).

### B. Summary

4. The ERT conducted a technical review of the information reported in the BR4 of Croatia in accordance with the UNFCCC reporting guidelines on BRs (annex I to decision 2/CP.17).

#### 1. Timeliness

5. The BR4 was submitted on 31 December 2019, before the deadline of 1 January 2020 mandated by decision 2/CP.17. The BR4 CTF tables were submitted on 3 January 2020. The CTF tables were resubmitted on 11 February 2021 to address issues raised during the review. The resubmission included changes to the data in CTF tables 6(a) and 6(c) and additions to CTF tables 3 and 4, including notation keys for reporting estimates of mitigation impact and contribution of LULUCF and use of units from market-based mechanisms. Unless otherwise specified, the information and values from the latest submission are used in this report.

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

6. Issues and gaps identified by the ERT related to the reported information are presented in table 1. The information reported by Croatia in its BR4 mostly adheres to the UNFCCC reporting guidelines on BRs.

Table 1

**Summary of completeness and transparency of mandatory information reported by Croatia in its fourth biennial report**

<i>Section of BR</i>	<i>Completeness</i>	<i>Transparency</i>	<i>Reference to description of recommendation(s)</i>
GHG emissions and removals	Complete	Transparent	–

<sup>1</sup> The BR submission comprises the text of the report and the CTF tables, which are both subject to the technical review.

<sup>2</sup> Owing to the circumstances related to the coronavirus disease 2019, the technical review of the BR submitted by Croatia had to be conducted remotely.

<i>Section of BR</i>	<i>Completeness</i>	<i>Transparency</i>	<i>Reference to description of recommendation(s)</i>
Quantified economy-wide emission reduction target and related assumptions, conditions and methodologies	Complete	Transparent	–
Progress in achievement of targets	Mostly complete	Mostly transparent	Issues 1–2 in table 4 Issue 4 in table 9
Provision of support to developing country Parties <sup>a</sup>	NA	NA	NA

*Note:* A list of recommendations pertaining to the completeness and transparency issues identified in this table is included in chap. III below. The assessment of completeness and transparency by the ERT in this table is based only on the “shall” reporting requirements.

<sup>a</sup> Croatia is not an Annex II Party and is therefore not obliged to adopt measures and fulfil obligations defined in Article 4, paras. 3–5, of the Convention.

## II. Technical review of the information reported in the fourth 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

7. Total GHG emissions<sup>3</sup> excluding emissions and removals from LULUCF decreased by 25.4 per cent between 1990 and 2018, whereas total GHG emissions including net emissions or removals from LULUCF decreased by 26.5 per cent over the same period. Emissions peaked in 2007 and decreased thereafter. The changes in total emissions were driven mainly by factors such as changes in economic activity and energy consumption as a consequence of the war in Croatia and the subsequent recovery of the economy. Emissions decreased between 1991 and 1994 because the war affected the economic activity of industries and contributed to reducing energy use. Between 1995 and 2008, emissions increased continuously because of the process of economic recovery, with increases in activity in the energy, IPPU and waste sectors. Emissions decreased between 2008 and 2014 because of the 2008 global financial crisis, which had an impact on economic growth in Croatia, directly affecting industrial production and, consequently, leading to a decrease in fuel consumption. Emissions increased from 2015 to 2018 in line with the recovery of the economy, with more activity in industrial production and participation in foreign trade.

8. Table 2 illustrates the emission trends by sector and by gas for Croatia. Note that information in this paragraph and table 2 is based on Croatia’s 2020 annual submission, version 1, which was subject to review in November 2020 but the review report has not yet been published. All emission data in subsequent chapters are based on Croatia’s BR4 CTF tables unless otherwise noted. The emissions reported in the 2020 annual submission differ from the data reported in CTF table 1 in that the latter is based on the 2019 annual submission. In the 2020 annual submission estimated emissions were 1.4 per cent (289.04 kt CO<sub>2</sub> eq including LULUCF) above those reported in the 2019 annual submission for 2017. The increase in estimated emissions occurred mainly in the LULUCF sector, because of changes in activity data, particularly for category 4.B (cropland), for which the CORINE land-cover database was used for the first time.

<sup>3</sup> In this report, the term “total GHG emissions” refers to the aggregated national GHG emissions expressed in terms of CO<sub>2</sub> eq excluding LULUCF, unless otherwise specified.

Table 2

**Greenhouse gas emissions by sector and by gas for Croatia for 1990–2018**

Sector	GHG emissions (kt CO <sub>2</sub> eq)					Change (%)		Share (%)	
	1990	2000	2010	2017	2018	1990–2018	2017–2018	1990	2018
1. Energy	21 731.26	18 194.81	19 749.48	17 388.08	16 443.04	–24.3	–5.4	68.2	69.1
A1. Energy industries	7 071.49	5 805.92	5 903.40	4 493.22	3 937.87	–44.3	–12.4	22.2	16.6
A2. Manufacturing industries and construction	5 529.04	3 115.63	3 030.11	2 439.39	2 421.30	–56.2	–0.7	17.3	10.2
A3. Transport	3 882.81	4 443.27	5 954.67	6 662.20	6 428.25	65.6	–3.5	12.2	27.0
A4. and A5. Other	4 217.93	3 865.11	4 024.35	3 296.57	3 205.35	–24.0	–2.8	13.2	13.5
B. Fugitive emissions from fuels	1 029.98	964.89	836.96	496.69	450.27	–56.3	–9.3	3.2	1.9
C. CO <sub>2</sub> transport and storage	NO	NO	NO	NO	NO	NO	NO	NO	NO
2. IPPU	4 669.70	3 132.26	3 317.09	2 738.02	2 590.90	–44.5	–5.4	14.6	10.9
3. Agriculture	4 423.45	3 042.36	3 056.27	2 805.05	2 720.30	–38.5	–3.0	13.9	11.4
4. LULUCF	–6 421.45	–6 950.36	–6 926.00	–4 489.61	–5 094.23	–20.7	13.5	NA	NA
5. Waste	1 051.44	1 339.39	1 910.88	2 100.93	2 038.55	93.9	–3.0	3.3	8.6
6. Other <sup>a</sup>	NO	NO	NO	NO	NO	NO	NO	NO	NO
<i>Gas<sup>b</sup></i>									
CO <sub>2</sub>	23 329.25	19 694.45	21 050.86	18 737.69	17 718.65	–24.0	–5.4	73.2	74.5
CH <sub>4</sub>	4 382.44	3 425.73	4 145.18	4 069.11	3 888.72	–11.3	–4.4	13.7	16.3
N <sub>2</sub> O	2 913.47	2 429.11	2 449.83	1 730.57	1 685.85	–42.1	–2.6	9.1	7.1
HFCs	NO	147.90	378.87	489.00	494.05	NO	1.0	NO	2.1
PFCs	1 240.24	NO	0.03	NO	NO	NO	NO	3.9	NO
SF <sub>6</sub>	10.45	11.62	8.95	5.71	5.53	–47.1	–3.3	0.0	0.0
NF <sub>3</sub>	NO	NO	NO	NO	NO	NO	NO	NO	NO
<b>Total GHG emissions excluding LULUCF</b>	<b>31 875.85</b>	<b>25 708.82</b>	<b>28 033.73</b>	<b>25 032.08</b>	<b>23 792.80</b>	<b>–25.4</b>	<b>–5.0</b>	<b>100.0</b>	<b>100.0</b>
<b>Total GHG emissions including LULUCF</b>	<b>25 454.40</b>	<b>18 758.46</b>	<b>21 107.73</b>	<b>20 542.48</b>	<b>18 698.57</b>	<b>–26.5</b>	<b>–9.0</b>	<b>–</b>	<b>–</b>

Source: GHG emission data: Croatia's 2020 annual submission, version 1.

<sup>a</sup> Emissions and removals reported under the sector other (sector 6) are not included in the total GHG emissions.

<sup>b</sup> Emissions by gas without LULUCF. The Party did not report indirect CO<sub>2</sub> emissions.

9. In brief, Croatia's national inventory arrangements were established in accordance with its Regulation on the Monitoring of Greenhouse Gas Emissions, Policies and Mitigation Measures (chap. II). There has been a change in these arrangements since the BR3; namely, the Croatian Agency for the Environment and Nature merged with the Ministry of Environment and Energy on 1 January 2019. The Ministry of Environment and Energy assumed all tasks, legal rights and obligations of the Croatian Agency for the Environment and Nature.

## 2. Assessment of adherence to the reporting guidelines

10. The ERT assessed the information reported in the BR4 of Croatia and recognized that the reporting is complete, transparent and thus 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.

## **B. Quantified economy-wide emission reduction target and related assumptions, conditions and methodologies**

### **1. Technical assessment of the reported information**

11. 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.

12. 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<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, HFCs, PFCs and SF<sub>6</sub> using GWP 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 for compliance purposes, subject to a number of restrictions in terms of origin and type of project and up to an established limit. Operators and airline operators can use such units to fulfil their requirements under the EU ETS, and member States can use such units for their national ESD targets, within specific limitations.

13. The EU 2020 climate and energy package includes the EU ETS and the ESD (see paras. 24–25 below). The EU ETS covers mainly point emissions sources in the energy, industry and aviation sectors. An EU-wide emission cap has been put in place for 2013–2020 with the goal of reducing emissions by 21 per cent below the 2005 level by 2020. For 2030, a reduction target of 43 per cent below the 2005 level has been set for emissions covered by the EU ETS. Emissions from ESD 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. The ESR, successor to the ESD, was adopted in 2018 with a target of reducing covered emissions by 30 per cent below the 2005 level by 2030.

14. The European Commission set out its vision for a climate-neutral EU in November 2018, and in December 2019 presented the European Green Deal as a road map with actions for making the EU economy sustainable. The European Council endorsed in December 2019 the objective of making the EU climate-neutral by 2050. As part of the European Green Deal, the Commission proposed in March 2020 to enshrine the 2050 climate-neutrality target into the first European Climate Law. The European Green Deal calls for increasing the ambition of the 2030 emission reduction target to at least 50 per cent below the 1990 level. Member States will set out any increased ambition in the update of their NECPs.

15. Croatia has a national target of limiting its emission growth to 11 per cent above the 2005 level by 2020 for ESD sectors. This target has been translated into binding quantified AEAs for 2013–2020. Croatia's AEAs change following a linear path from 19,613.81 kt CO<sub>2</sub> eq in 2013 to 19,317.94 kt CO<sub>2</sub> eq in 2020.<sup>4</sup> Under the ESR, Croatia has a national target of reducing emissions from the covered sectors to 7 per cent below the 2005 level by 2030.

### **2. Assessment of adherence to the reporting guidelines**

16. The ERT assessed the information reported in the BR4 of Croatia and recognized that the reporting is complete, transparent and thus 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.

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<sup>4</sup> According to the EU transaction log.

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

### **1. Mitigation actions and their effects**

#### **(a) Technical assessment of the reported information**

17. 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. Croatia reported on its policy context and legal and institutional arrangements in place for implementing its commitments and monitoring and evaluating the effectiveness of its PaMs.

18. Croatia's set of PaMs is similar to that previously reported in its BR3; however, many of the PaMs have been renamed or integrated with other PaMs. For example, the measure reported in the BR3 as "Program for the increase of energy efficiency and use of renewable energy sources in commercial non-residential buildings" is split into two PaMs in the BR4: "Charter for Cooperation for Decarbonisation of Buildings by 2050" and "Information, education and capacity building for the use of renewable energy sources".

19. Croatia estimated the impacts of its PaMs in groups under the energy, transport, industry/industrial processes and agriculture sectors. The Party explained during the review that there are various reasons why mitigation impacts are estimated for groups of PaMs and not for individual measures, including that some measures do not have a direct GHG mitigation impact; that there is still uncertainty regarding the duration and scope after 2020 of some planned and implemented measures; and that at the time the BR4 was prepared, the Low-Carbon Development Strategy until 2030 with a view to 2050 and the Energy Strategy were ready but not yet adopted. The former has been sent to the Government for adoption. Once adopted, it will be reported to the UNFCCC secretariat.

20. Croatia did not provide information in its BR4 on changes since its previous submission to its institutional, legal, administrative and procedural arrangements used for domestic compliance, monitoring, reporting, archiving of information and evaluation of progress towards its target. During the review, Croatia explained that, although the Agency for the Environment and Nature is now part of the Ministry of Environment and Energy, its functions and tasks are the same as they were before. The Party noted that only the legislative basis has changed following the adoption of the Act on Climate Change and Ozone Layer Protection. Further, two committees were established in order to enhance cross-sectoral cooperation. In 2021, relevant institutions will be legally required to resubmit appointments to the committee for cross-sectoral coordination for policies and measures for climate change mitigation and adaptation and the committee for cross-sectoral coordination for the national greenhouse gas monitoring system.

21. Croatia did not report in its BR4 on its self-assessment of compliance with its emission reduction targets and national rules for taking action against non-compliance. During the review, Croatia explained that it contributes to the EU emission reduction target. The monitoring of obligations within the EU ETS is performed through verification of reports from the installations and aircraft operators and through reports submitted by the competent authority to the European Commission, as prescribed by the Act on Climate Change and Ozone Layer Protection. In addition, the national inspection service is responsible for monitoring the performance of the installations and operators that are covered by the EU ETS. The monitoring of ESD sectors (i.e. that the total national emissions do not exceed the AEA) is the responsibility of the Ministry of Economy and Sustainable Development, and is achieved through the compliance procedure within the EU (including through the quality control of the national inventory report, during which the European Commission conducts a detailed analysis and review of the national inventory report and finally approves it).

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<sub>2</sub> emissions from cars and vans, the carbon capture and storage directive, and the general programmes for environmental conservation, namely the 7<sup>th</sup> Environment Action Programme and the clean air policy package. The 2030



climate and energy framework, adopted in 2014, includes more ambitious targets that will be updated as part of the European Green Deal.

23. The achievement of the Energy Union objectives and targets is ensured through a combination of Energy Union initiatives and national policies set out in integrated NECPs. The NECPs are periodically updated to reflect changes to EU policy, such as the implementation of the European Green Deal. Croatia's NECP specifies its key objectives and targets: a 7 per cent binding national 2030 target for ESR emissions under regulation (EU) 2018/842 on binding annual GHG emission reductions by member States from 2021 to 2030, with a 36.6 per cent planned share of energy from renewable sources in gross final energy consumption, a 36.6 per cent estimated share of energy from renewable sources in gross direct energy consumption for heating and cooling, a 63.8 per cent estimated share of energy from renewable sources in the gross direct consumption of electricity and a 14.0 per cent estimated share of energy from renewable sources in direct energy consumption in the transport sector, as well as a national contribution from energy efficiency aiming to reduce primary energy consumption to 344.39 PJ by 2030 down from 405.34 PJ in 2016.

24. 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 and 2030 targets (a 21 and 43 per cent emission reduction below the 2005 level, respectively) 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<sub>2</sub>O emissions from chemical industry, PFC emissions from aluminium production and CO<sub>2</sub> emissions from some industrial processes that were not covered in the previous phases of the EU ETS (since 2013). Auctioning is the default method for allocating allowances; however, harmonized rules for free allocations, based on benchmark values achieved by the most efficient 10 per cent of installations, are still in place as a safeguard for the international competitiveness of industrial sectors at risk of carbon leakage.

25. The ESD became operational in 2013 and covers 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 ESD includes binding annual targets for each member State for 2013–2020. The ESR sets national emission reduction targets for 2030 ranging from 0 to 40 per cent below the 2005 level, and trajectories with annual limits for 2021–2030, for all member States, and keeps many of the flexibilities of the ESD.

26. Croatia introduced national-level policies to achieve its targets under the ESD and domestic emission reduction targets. The key policies reported include the EU ETS, the Long-Term Strategy for Mobilising Investment in the Renovation of the National Building Stock, the plan for protection of air, ozone layer and climate change mitigation (2013 to 2017), the National Renewable Energy Action Plan until 2020, the 4<sup>th</sup> National Energy Efficiency Action Plan for the Period until 2019, the Program for Energy Efficiency in Heating and Cooling (2016–2030), the Integrated National Energy and Climate Plan (2021–2030), the Industrial Strategy (2014–2020) and the Waste Management Plan (2017–2022).

27. Croatia highlighted the domestic mitigation actions that are under development, such as the Low-Carbon Development Strategy until 2030 with a view to 2050, the Energy Strategy (2019–2030) and the Integrated National Energy and Climate Plan (2021–2030). According to information provided by the Party, the latter two documents have been finalized. The mitigation effects of individual PaMs are not estimated, but among the mitigation actions that provide a foundation for significant additional action are refinery modernization, legislative adjustments for cleaner transport, changes in livestock diet and feed quality, improving cattle facilities and systems of animal waste management, improving mineral fertilizer application methods and carbon accumulation in existing forest areas. For some of the planned measures implementation is still uncertain. Table 3 provides a summary of the reported information on the PaMs of Croatia.

Table 3  
**Summary of information on policies and measures reported by Croatia**

<i>Sector</i>	<i>Key PaMs</i>	<i>Estimate of mitigation impact in 2020 (kt CO<sub>2</sub> eq)</i>	<i>Estimate of mitigation impact in 2030 (kt CO<sub>2</sub> eq)</i>
Policy framework and cross-sectoral measures	EU ETS	NE	NE
Energy		0	675.95
Energy efficiency	Programme for the energy renovation of public buildings	IE	IE
	Increasing the efficiency of the heating system	IE	IE
Energy supply and renewables	Promoting the use of renewables for electricity and heat production	IE	IE
Transport		0	482.66
	Financial incentives for the purchase of energy-efficient vehicles	IE	IE
IPPU	Limiting F-gas emissions	187.63	154.62
Agriculture		72.56	161.73
	Improvement of mineral fertilizer application methods	IE	IE
	Changes in livestock diet and feed quality	IE	IE
LULUCF	Carbon accumulation in existing forest areas	NE	NE
Waste	Preventing the generation and reducing the amount of solid waste	NE	NE

*Note:* The estimates of mitigation impact are estimates of emissions of CO<sub>2</sub> eq avoided in a given year as a result of the implementation of mitigation actions.

**(b) Policies and measures in the energy sector**

28. **Energy efficiency.** In its BR4, Croatia refers to the 4<sup>th</sup> National Energy Efficiency Action Plan for the Period until 2019 and the Program for Energy Efficiency in Heating and Cooling (2016–2030). For PaMs related to energy efficiency the priorities are measures to improve processes and process units, including more rational use of energy and raw materials and changing equipment at pumping stations and refineries to reduce fugitive emissions; increasing the energy efficiency of buildings; promoting energy efficiency in households and the services sector through project activities; and increasing the efficiency of the heating system, including upgrading to high-efficiency cogeneration systems and efficient pumps and developing new heating and cooling systems. Energy efficiency PaMs targeting individual sectors are discussed below.

29. **Energy supply and renewables.** The main strategic policy for the energy sector is the Energy Strategy (2019–2030), which was in the development stage when the BR4 was prepared. During the review, Croatia explained that it had been adopted in 2020. The National Action Plan for Renewable Energy Sources by 2020 sets objectives for renewable energy. The main PaMs related to energy supply and renewables are the implementation of the EU ETS and the CO<sub>2</sub> emission tax for ESD stationary sources, which requires the payment of fees on CO<sub>2</sub> emissions by operators of all stationary sources that emit more than 450 t CO<sub>2</sub> per year. Operators that make energy efficiency investments, or introduce renewable energy sources and other measures that decrease emissions, are charged a lower fee.

30. **Residential and commercial sectors.** A large number of Croatia's PaMs are aimed at improving energy efficiency or promoting use of renewable energy in the residential and commercial sectors. Many programmes support the renovation of buildings, including the national plan for increasing the number of nearly zero energy buildings and the programme on energy renovation of apartment buildings, which includes plans to renovate approximately 520,000 m<sup>2</sup> of apartment buildings per year with the help of planned European structural and investment funds. The aim of the programme for the energy renovation of family dwellings

(to be developed as a continuation of the implementation of the energy efficiency programme for single-family homes from 2014 to 2020 with co-financing from the Environmental Protection and Energy Efficiency Fund) is to renovate 350,000 m<sup>2</sup> of single-family homes annually, while the aim of the programme for the energy renovation of public buildings is to renovate 350,000 m<sup>2</sup> of public buildings.

31. **Transport sector.** Croatia reported on several policies and strategic measures to reduce emissions from the transport sector. These include a sales tax on motor vehicles based on CO<sub>2</sub> emissions, financial incentives for purchasing energy-efficient vehicles and the development of infrastructure for alternative fuels. According to the Advanced Biofuel Market Development Plan, Croatia plans to increase the share of renewable energy sources in the transport sector by 2030, and to amend the legal framework to ensure the development of alternative fuel infrastructure to increase the share of renewable sources in the fuel mix. In its BR4 Croatia reported some new measures, such as measures to encourage the development of sustainable integrated transport at the national level, which includes planned investments to develop a sustainable integrated trans-European climate-resilient transport network. There are also plans to develop an action plan for shipping that will define appropriate emission standards for the coming period and encourage alternative fuel use in the shipping transport system, which is an important source of GHG emissions because Croatia is a maritime country.

32. **Industrial sector.** The Industrial Strategy (2014–2020) defines objectives for industrial development and key indicators. One of the main policies for limiting GHG emissions is establishing energy management systems in the services and industrial sectors, including regular energy audits. The Party further plans to develop a comprehensive analysis of the possibilities of using a tax to encourage businesses to introduce certified energy management systems and thereby ensure ongoing monitoring of energy consumption.

**(c) Policies and measures in other sectors**

33. **Industrial processes.** Croatia has regulated the market of some F-gases in line with EU regulation 517/2014: the measure includes limitation of the amount of hydrocarbons available on the EU market by 2030 to 21 per cent of the total amount sold in the reference period (2009–2012). The Party also reported PaMs related to reducing clinker content in cement production and limiting F-gas emissions from mobile air-conditioning systems.

34. **Agriculture.** Croatia identified that the largest potentials for reducing CH<sub>4</sub> and N<sub>2</sub>O emissions in agriculture relate to improving mineral fertilizer application methods, changes in livestock diet and feed quality, improving cattle facilities and systems of animal waste management, anaerobic decomposition of manure and biogas production. Most of the reported PaMs are planned and only the Rural Development Program (2014–2020) has been adopted. The focuses of other PaMs include reducing tillage, improving the breeding programme and promoting agroforestry.

35. **LULUCF.** Croatia reported only planned PaMs in this sector. It plans to develop a land management strategy by 2027 aiming to increase CO<sub>2</sub> removals and reduce GHG emissions from the LULUCF sector. To achieve this, it is necessary to implement a number of activities first, including establishing a tailor-made land information system and conducting an analysis of all LULUCF categories. Croatia plans to assess the effectiveness of the implemented measures and activities under the Rural Development Program (2014–2020) in order to develop new guidelines that include information on applying measures to mitigate and adapt to climate change in the forestry and agriculture sectors.

36. **Waste management.** Croatia has adopted sectoral legislation that is harmonized with EU legislation to implement the measures for reducing CO<sub>2</sub> and CH<sub>4</sub> emissions in the waste sector. The Sustainable Waste Management Act and the Waste Management Plan (2017–2022) define the quantitative targets and deadlines (e.g. to reduce the amount of municipal waste landfilled to 25 per cent of the total amount of municipal waste generated by 2022). Other PaMs include reducing the amount of disposed biodegradable waste; using biogas for biomethane production and electricity and heat generation; and introducing a system for treatment and use of landfill gas.

**(d) Response measures**

37. Croatia's assessment of the economic and social consequences of its response measures includes using the impact assessment system established by the European Commission based on an integrated approach, which analyses both benefits and costs, and addresses all significant economic, social and environmental impacts of possible initiatives. The Party's initiatives aimed at minimizing adverse impacts include harmonizing the consumption taxes for electricity and fossil fuels, and removing subsidies for environmentally unsound and unsafe technologies. The 4<sup>th</sup> National Energy Efficiency Action Plan for the Period until 2019 contains measures to reduce energy poverty and increase energy efficiency. During the review, the Party explained that the aim is to establish a system for monitoring socioeconomic, demographic and energy indicators for response measures.

**(e) Assessment of adherence to the reporting guidelines**

38. The ERT assessed the information reported in the BR4 of Croatia and identified issues relating to completeness, transparency and thus adherence to the UNFCCC reporting guidelines on BRs. The findings are described in table 4.

Table 4

**Findings on mitigation actions and their effects from the review of the fourth biennial report of Croatia**

No.	<i>Reporting requirement, issue type and assessment</i>	<i>Description of the finding with recommendation or encouragement</i>
1	Reporting requirement specified in paragraph 6  Issue type: transparency  Assessment: recommendation	<p>The Party reported similar PaMs to those presented in the BR3, but for some PaMs that were reported in the BR3 the names were changed in a way that was not easy for the ERT to recognize them without additional explanation, such as the feed-in tariffs and premium system providing support for the use of renewable energy sources in electricity generation and for efficient cogeneration, which had the highest estimated mitigation impact in the BR3. Additionally, some PaMs were grouped differently in the BR4 than in the BR3 and some were not reported in the BR4 but were included in the BR3 (e.g. the Rural Development Program (2014–2020) and implementation of the action plan for the LULUCF sector).</p> <p>During the review, Croatia explained that some PaMs had been renamed or integrated with other PaMs, and provided a table comparing the PaMs in the BR3 and in the BR4 for the energy and transport sectors.</p> <p>The ERT recommends that the Party increase transparency by providing explanations of any changes made to PaMs between submitted reports in the next BR.</p>
2	Reporting requirement specified in paragraph 7  Issue type: completeness  Assessment: recommendation	<p>The Party reported information on its domestic institutional arrangements in its BR4; however, there is no information on changes to domestic institutional arrangements since the previous submission.</p> <p>During the review, Croatia explained that the Agency for the Environment and Nature is now part of the Ministry of Environment and Energy, but its functions and tasks are the same as they were before. The Party noted that only the legislative basis has changed following the adoption of the Act on Climate Change and Ozone Layer Protection.</p> <p>The ERT reiterates the recommendation from the previous review report for Croatia to improve the completeness of its reporting by providing, in its next BR, information on the changes to the institutional, legal, administrative and procedural arrangements used for domestic compliance, monitoring, reporting, archiving of information and evaluation of progress towards its economy-wide emission reduction target.</p>
3	Reporting requirement specified in paragraph 24  Issue type: completeness	<p>Croatia provided information about its emission reduction target but did not report on the domestic arrangements established for the process of self-assessment of compliance with the target or on national rules for taking action against non-compliance with the emission reduction target.</p>

No.	Reporting requirement, issue type and assessment	Description of the finding with recommendation or encouragement
	Assessment: encouragement	<p>During the review, Croatia provided detailed information on the existing domestic arrangements for the process of self-assessment of compliance with the target, and explained that its compliance is monitored by the EU and that EU rules for action against non-compliance are applied (see para. 21 above).</p> <p>The ERT reiterates the encouragement from the previous review report for the Party to provide in its next BR, to the extent possible, information on domestic arrangements established for the process of self-assessment of compliance with emission reduction targets and information on national rules for taking action against non-compliance with the target. The ERT notes that such information could build on the information provided to the ERT during the review.</p>

*Note:* Item 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 thus 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

39. Croatia does not intend to use units from market-based mechanisms under the Kyoto Protocol or other market-based mechanisms under the Convention to meet its commitment under the ESD. It reported in CTF table 4 that it did not use any units from market-based mechanisms in 2017. Given that the contribution of LULUCF activities is not included in the joint EU target under the Convention, the reporting of contributions of LULUCF activities is not applicable for Croatia. Table 5 illustrates Croatia's ESD emissions and use of units from market-based mechanisms for achieving its ESD target.

Table 5

#### Summary of information on the use of units from market-based mechanisms by Croatia for achieving its target

Year	ESD emissions (kt CO <sub>2</sub> eq)	AEA (kt CO <sub>2</sub> eq)	Use of units from market-based mechanisms (kt CO <sub>2</sub> eq) <sup>a</sup>	Annual AEA surplus/deficit (kt CO <sub>2</sub> eq)	Cumulative AEA surplus/deficit (kt CO <sub>2</sub> eq)
2013	15 125.53	19 613.81	NA	4 488.28	4 488.28
2014	14 663.20	19 805.26	NA	5 142.06	9 630.34
2015	15 565.30	19 996.71	NA	4 431.40	14 061.74
2016	16 006.81	20 188.16	NA	4 181.35	18 243.09
2017	16 669.30	18 681.01	NA	2 011.71	20 254.80
2018	16 219.17	18 893.32	NA	2 674.15	20 917.24

*Sources:* Croatia's BR4 and BR4 CTF table 4(b), information provided by the Party during the review and EU transaction log (AEAs).

*Note:* For a given year, a positive number (surplus) indicates that annual or cumulative ESD emissions were lower than the corresponding AEA or cumulative AEAs, while a negative number (deficit) indicates annual or cumulative ESD emissions were higher than the AEA or cumulative AEAs.

<sup>a</sup> "NA" indicates that the Party stated in its BR4 that it does not intend to use market-based mechanisms for achieving its target.

40. In assessing the progress towards achieving the 2020 joint EU target, the ERT noted that Croatia's target for the ESD is to limit emission growth to 11 per cent above the 2005 level (see para. 15 above). In 2018, Croatia's ESD emissions were 14.2 per cent (2,674.15 kt CO<sub>2</sub> eq) below the AEA. Taking the use of market-based mechanisms into account, Croatia has a cumulative surplus of 20,917.24 kt CO<sub>2</sub> eq with respect to its AEAs between 2013 and 2018.

41. The ERT noted that Croatia is making progress towards its ESD target by implementing mitigation actions that are delivering significant emission reductions without using units from market-based mechanisms under the Convention or other mechanisms.

**(b) Assessment of adherence to the reporting guidelines**

42. The ERT assessed the information reported in the BR4 of Croatia and recognized that the reporting is complete, transparent and thus 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 overview, methodology and results****(a) Technical assessment of the reported information**

43. Croatia reported updated projections for 2020 and 2030 relative to actual inventory data for 2016 under the WEM scenario. The WEM scenario reported by Croatia includes PaMs implemented and adopted until 2016.

44. In addition to the WEM scenario, Croatia reported the WAM scenario. The WAM scenario includes planned PaMs. Owing to a lack of data the Party did not include a WOM scenario. Croatia provided a definition of its scenarios, explaining that its WEM scenario includes policies that have been implemented or adopted, such as the market improvements on energy efficiency and fuel replacement in the industrial sector, the renewal of the housing stock at a rate of 0.75 per cent per year and the market penetration of electric and hybrid vehicles in the transport sector. The WAM scenario additionally includes planned policies such as the target of renovating 1.3 per cent of buildings annually to near-zero energy consumption standards and further increasing the penetration rates of electric and hybrid vehicles. The definitions indicate that the scenarios were prepared in accordance with the UNFCCC reporting guidelines on BRs.

45. 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<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, PFCs, HFCs and SF<sub>6</sub> (treating PFCs and HFCs collectively in each case) for 2020–2035. The projections are also provided in an aggregated format for each sector and for a Party total using GWP values from the AR4. Croatia reported on factors and activities affecting emissions for each sector.

46. Croatia did not report emission projections for indirect GHGs such as carbon monoxide, nitrogen oxides and non-methane volatile organic compounds or sulfur oxides in its BR4.

47. 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.

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

48. The methodology used for the preparation of the projections is different from that used for the preparation of the emission projections for the NC7. Croatia did not provide information on the changes since the submission of its NC7 in the assumptions, methodologies, models and approaches used for the projection scenarios. During the review, Croatia clarified that the main differences between the NC7 and the BR4 were in the methodology used for the energy sector. For the NC7, the energy sector was modelled exclusively using the LEAP software package. For the BR4, the energy sector was modelled using two more-advanced software packages, Model for Analysis of Energy Demand and Model for Energy Supply Strategy Alternatives and their General Environmental Impact. The results were then integrated in the LEAP software package, which allows for more advanced modelling. The IPPU and waste sectors were modelled using Excel-based engineering simulation models, and the agriculture sector was modelled using an engineering simulation model and by following the bottom-up reference-based approach. Another difference between the NC7 and the BR4 is that, while the main basis for the NC7 was the data derived from the draft of the Low-Carbon Development Strategy alone, the data for the energy and transport sectors for the BR4 were derived from a combination of the draft of the Energy Strategy and the draft of the Low-Carbon Development Strategy. This allowed for more accurate and detailed data to be used in the BR4.

49. The Party did not report the necessary description of the strengths and weaknesses of the models or how the models are used to account for any overlap or synergies that may exist between different PaMs. During the review, the Party provided complete and comprehensive additional information describing all the elements required. A particular strength of the LEAP model is that it is an integrated model that allows for the planning of projection scenarios for other pollutants and for the harmonization of commitments under the UNFCCC. As each sector is estimated using a different model, which allows for detailed specifications, a weakness of this approach is that it needs considerable resources to produce individual scenarios. An additional weakness is that the structures of some models are very complex, which may make interpreting the modelling outputs difficult.

50. To prepare its projections, Croatia relied on key underlying assumptions relating to GDP growth rate, population, energy prices (international oil price, EU gas and coal prices, electricity price), emission unit prices and number of households. The assumptions were updated on the basis of the most recent economic developments known at the time of the preparation of the projections. The main differences in assumptions are in the updated projections of average long-term annual GDP growth and population. GDP growth rate is projected to change from 1.6 per cent in 2017 to 2.7 per cent in 2020 and reduce to 2.2 per cent in 2030. Between 2017 and 2020, the population is projected to decrease by 2.1 per cent from 4.07 million to 3.98 million, while the number of households is projected to increase by 0.4 per cent. The international oil price is projected to increase by 129.3 per cent, from USD 41 to USD 94 per barrel of oil equivalent, between 2016 and 2030, while EU gas and coal prices are projected to increase by 75.5 and 27 per cent, respectively, in the same period. From 2015 to 2020, the electricity price is projected to decrease by 1 per cent (from EUR 41 to EUR 40.6 per MWh), while from 2015 to 2030 it is projected to increase by 46.3 per cent (from EUR 41 to EUR 60 per MWh). The emission unit price is projected to increase by 232.5 per cent between 2015 and 2020 (from EUR 7.7 to EUR 25.6 per t CO<sub>2</sub> eq), and by 345.5 per cent between 2015 and 2030 (from EUR 7.7 to EUR 34.3 per t CO<sub>2</sub> eq).

51. Sensitivity analyses were conducted for a number of important assumptions, such as rates of economic development (GDP growth rate and demographic trends), the influence of temperature change on heating and cooling energy demand, and the effects of hydrology on hydroelectricity production and agricultural development. A key point is that by assuming lower GDP growth rates, as recommended by the EU, emissions could be around 1.2 per cent lower in 2030 under the WEM and WAM scenarios. However, the Party noted that GDP growth can contribute to reducing emissions if it is driven through investments in low-carbon technologies, industries and services. Sensitivity analyses for demographic trends showed that these trends have a declining impact on emissions. Additionally, uncertainty of future temperatures can have a considerable impact on emissions in the electricity sector because temperatures significantly affect production in hydropower plants. In extreme cases, such as droughts, Croatia's total emissions under the WAM scenario could increase by 4.2 per cent in 2030 compared with the WAM scenario presented in the BR4.

### (c) Results of projections

52. The projected emission levels under different scenarios and information on the quantified economy-wide emission reduction target are presented in table 6 and figure 1.

Table 6

#### Summary of greenhouse gas emission projections for Croatia

	<i>Total GHG emissions</i>		<i>Emissions under the ESD</i>	
	<i>GHG emissions (kt CO<sub>2</sub> eq/year)</i>	<i>Change in relation to 1990 level (%)</i>	<i>ESD emissions (kt CO<sub>2</sub> eq/year)</i>	<i>Difference from 2020 AEA (%)</i>
2020 AEA under the ESD <sup>a</sup>	NA	NA	19 317.94	NA
Inventory data 1990	31 858.36	NA	NA	NA
Inventory data 2017	25 019.75	-21.5	16 669.30	-13.7
WEM projections for 2020	23 354.56	-26.7	15 892.00	-17.7
WAM projections for 2020	23 094.38	-27.5	15 817.00	-18.1
WEM projections for 2030	22 649.49	-28.9	15 201.00	NA

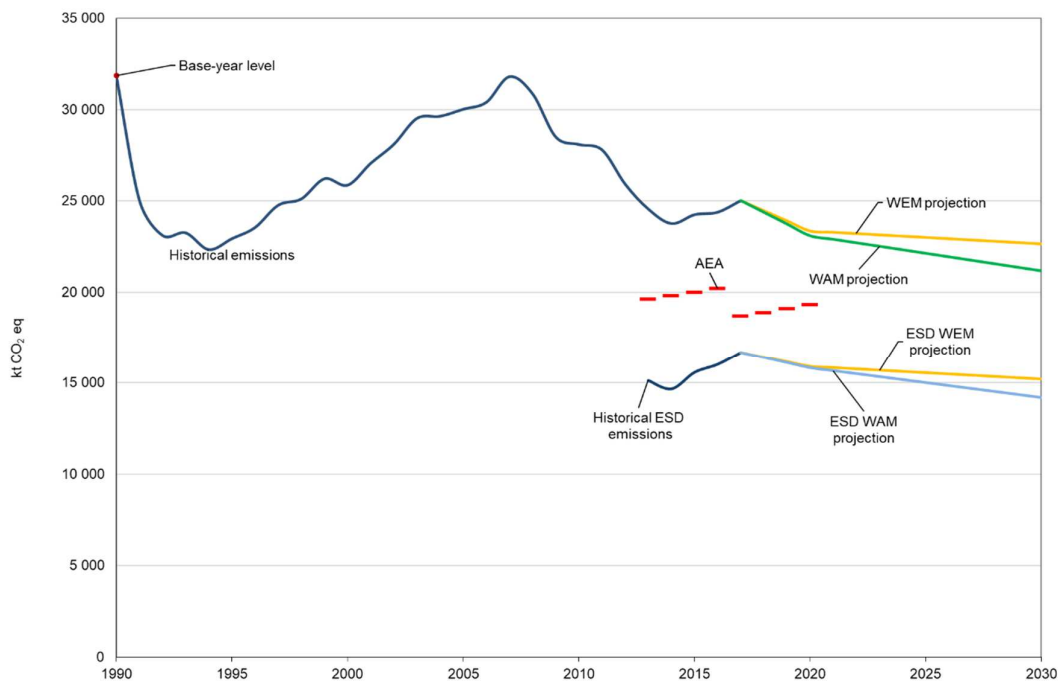
	Total GHG emissions		Emissions under the ESD	
	GHG emissions (kt CO <sub>2</sub> eq/year)	Change in relation to 1990 level (%)	ESD emissions (kt CO <sub>2</sub> eq/year)	Difference from 2020 AEA (%)
WAM projections for 2030	21 174.53	-33.5	14 183.00	NA

Sources: Croatia’s BR4 and BR4 CTF table 6, and EU transaction log (AEAs). Updated projections were provided by Croatia during the review.

Note: The projections are for GHG emissions excluding LULUCF and excluding indirect CO<sub>2</sub>.

<sup>a</sup> The quantified economy-wide emission reduction target under the Convention is a joint target of the EU and its member States. The target is to reduce emissions by 20 per cent compared with the base-year (1990) level by 2020. Croatia’s target under the ESD is 11 per cent above the 2005 level by 2020.

Figure 1  
Greenhouse gas emission projections reported by Croatia



Sources: EU transaction log (AEAs) and Croatia’s BR4 and BR4 CTF tables 1 and 6. Updated projections were provided by Croatia during the review.

53. Croatia’s total GHG emissions excluding LULUCF in 2020 and 2030 are projected under the WEM scenario to decrease by 26.7 and 28.9 per cent, respectively, below the 1990 level. Under the WAM scenario, emissions in 2020 and 2030 are projected to be lower than those in 1990 by 27.5 and 33.5 per cent, respectively. Croatia provided projections for 2020 and 2030 separately for the EU ETS and ESD sectors. The ERT noted the usefulness of reporting the projections for emissions covered by the EU ETS and from ESD sectors separately for both the WEM and WAM scenarios in the BR4.

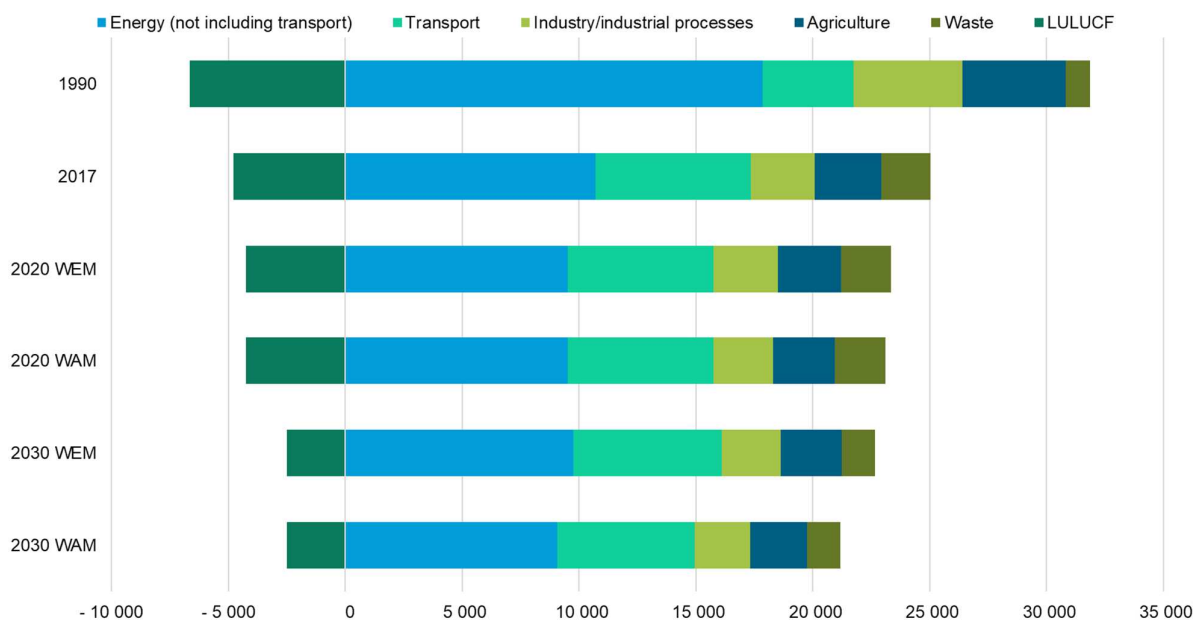
54. Croatia’s target under the ESD is to limit its ESD emission growth to 11 per cent above the 2005 level by 2020 (see para. 15 above). Croatia’s AEAs, which correspond to its national emission target for ESD sectors, change from 19,613.81 kt CO<sub>2</sub> eq in 2013 to 19,317.94 kt CO<sub>2</sub> eq for 2020. The projected level of emissions under the WEM and WAM scenarios is 17.7 and 18.1 per cent, respectively, below the AEAs for 2020. The ERT noted that the Party’s cumulative surplus of AEAs is 20,917.24 kt CO<sub>2</sub> eq, which suggests that Croatia expects to meet its target under the WEM scenario.

55. Croatia presented the WEM and WAM scenarios by sector for 2020 and 2030, as summarized in figure 2 and table 7.



Figure 2  
Greenhouse gas emission projections for Croatia presented by sector

(kt CO<sub>2</sub> eq)



Sources: Croatia's BR4 CTF table 6. Updated projections were provided by Croatia during the review.

Table 7  
Summary of greenhouse gas emission projections for Croatia presented by sector

Sector	GHG emissions and removals (kt CO <sub>2</sub> eq)					Change (%)			
	1990	2020		2030		1990–2020		1990–2030	
		WEM	WAM	WEM	WAM	WEM	WAM	WEM	WAM
Energy (not including transport)	17 848.63	9 507.2	9 507.2	9 745.08	9 069.13	-46.7	-46.7	-45.4	-49.2
Transport	3 881.11	6 241.73	6 241.73	6 358.30	5 587.68	60.8	60.8	63.8	51.4
Industry/industrial processes	4 677.54	2 751.72	2 564.1	2 521.13	2 366.51	-41.2	-45.2	-46.1	-49.4
Agriculture	4 399.65	2 702.81	2 630.25	2 605.40	2 443.67	-38.6	-40.2	-40.8	-44.5
LULUCF	-6 654.58	-4 257.27	-4 257.27	-2 487.82	-2 487.82	-36.0	-36.0	-62.6	-62.6
Waste	1 051.44	2 151.10	2 151.10	1 419.58	1 419.58	104.6	104.6	35.0	35.0
Other	NO	NO	NO	NO	NO	NO	NO	NO	NO
<b>Total GHG emissions excluding LULUCF</b>	<b>31 858.36</b>	<b>23 354.56</b>	<b>23 094.38</b>	<b>22 649.49</b>	<b>21 174.53</b>	<b>-26.7</b>	<b>-27.5</b>	<b>-28.9</b>	<b>-33.5</b>

Sources: Croatia's BR4 CTF table 6. Updated projections were provided by Croatia during the review.

56. According to the projections reported for 2020 under the WEM scenario, the most significant absolute emission reductions are expected to occur in the energy and industrial sectors, amounting to projected reductions of 46.7 and 41.2 per cent between 1990 and 2020, respectively. This is due mainly to the increased capacity of renewable energy power plants in accordance with the National Renewable Energy Action Plan until 2020 and the tariff system for renewable energy sources and efficient cogeneration, which will push new coal-fired power plants out of the market. For industry, the reduction of emissions is due to market improvements in energy efficiency and fuel replacement in the industrial sector. The pattern and drivers of projected emissions reported for 2030 under the WEM scenario remain largely the same as for 2020. The most significant absolute emission reductions are expected to occur in the energy and industry/industrial processes sectors, amounting to projected reductions of 45.4 and 46.1 per cent between 1990 and 2030, respectively.

57. If additional measures are considered (i.e. under the WAM scenario), the patterns of emission reductions by 2020 and 2030 presented by sector remain the same as in the WEM scenario, with the energy and industrial sectors accounting for the most significant absolute emission reductions. Additional measures, such as increased renovations of buildings to near-zero energy consumption standards, the gradual decrease in the share of clinker in cement production and the more intense reduction of F-gases, contribute to these reinforced emission decreases.

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

Table 8

**Summary of greenhouse gas emission projections for Croatia presented by gas**

Gas	GHG emissions and removals (kt CO <sub>2</sub> eq)					Change (%)			
	1990	2020		2030		1990–2020		1990–2030	
		WEM	WAM	WEM	WAM	WEM	WAM	WEM	WAM
CO <sub>2</sub> <sup>a</sup>	23 337.10	17 166.74	16 979.12	17 494.47	16 213.05	–26.4	–27.2	–25.0	–30.5
CH <sub>4</sub>	4 423.83	4 026.01	3 955.18	3 310.79	3 135.80	–9.0	–10.6	–25.2	–29.1
N <sub>2</sub> O	2 846.74	1 644.30	1 642.58	1 665.74	1 656.50	–42.2	–42.3	–41.5	–41.8
HFCs	NO	510.85	510.85	170.28	160.97	NO	NO	NO	NO
PFCs	1 240.24	NO	NO	NO	NO	NO	NO	NO	NO
SF <sub>6</sub>	10.45	6.66	6.66	8.21	8.21	–36.3	–36.3	–21.4	–21.4
NF <sub>3</sub>	NO	NO	NO	NO	NO	NO	NO	NO	NO
<b>Total GHG emissions without LULUCF</b>	<b>31 858.36</b>	<b>23 354.56</b>	<b>23 094.38</b>	<b>22 649.49</b>	<b>21 174.53</b>	<b>–26.7</b>	<b>–27.5</b>	<b>–28.9</b>	<b>–33.5</b>

Sources: Croatia's BR4 CTF tables 6. Updated projections were provided by Croatia during the review.

<sup>a</sup> Croatia did not include indirect CO<sub>2</sub> emissions in its projections.

59. For 2020, the most significant absolute reductions are projected for CO<sub>2</sub> and N<sub>2</sub>O emissions in the WEM scenario: 26.4 and 42.2 per cent between 1990 and 2020, respectively. The CO<sub>2</sub> reductions can be explained mainly by the decrease in emissions in the energy sector, which is the most significant source of anthropogenic CO<sub>2</sub> emissions. The reductions in N<sub>2</sub>O emissions are driven mainly by the agriculture sector, owing to decreases in livestock and the implementation of the Rural Development Program (2014–2020).

60. For 2030, the most significant absolute reductions are projected for CO<sub>2</sub> and N<sub>2</sub>O emissions in the WEM scenario: 25.0 and 41.5 per cent between 1990 and 2030, respectively, with similar drivers as those for 2020. In summary, all gases showed decreases in emissions between 1990 and 2020 or 2030.

61. If additional measures are considered (i.e. under the WAM scenario), the patterns of emission reductions by 2020 presented by gas remain the same as for the WEM scenario.

62. However, the patterns of emission reductions by 2030 differ from the WEM scenario, with CO<sub>2</sub> and CH<sub>4</sub> delivering the most significant absolute reductions: 30.5 and 29.1 per cent between 1990 and 2030, respectively. The potential reason for this difference between the WEM and WAM scenarios for 2030 is that increased efforts in agriculture under the WAM scenario result in the reduction of CH<sub>4</sub> and nitrogen compounds. Even though the waste sector is the biggest emitter of CH<sub>4</sub>, the assumptions under the WEM and WAM scenarios for this sector remain the same and can therefore not explain the observed differences in terms of the most significant GHG emission reductions.

63. Croatia reported projections for PFCs in its BR4 as “NO” instead of zero (0.00) as reported in its NC7, where PFCs were identified as one of the gases with the largest emission reductions over time. During the review, the Party explained that the production of PFCs in Croatia ceased after primary aluminium production ceased in 1991 and PFCs have been excluded from industrial refrigeration systems since 2012.

64. The Party provided inconsistent starting years for the projections in its BR4. During the review, the Party clarified that this mistake occurred during the writing process and that the base year for the projections is 2016.

**(d) Assessment of adherence to the reporting guidelines**

65. The ERT assessed the information reported in the BR4 of Croatia and identified issues relating to completeness, transparency and thus adherence to the UNFCCC reporting guidelines on BRs. The findings are described in table 9.

Table 9

**Findings on greenhouse gas emission projections reported in the fourth biennial report of Croatia**

No.	<i>Reporting requirement, issue type and assessment</i>	<i>Description of the finding with recommendation or encouragement</i>
1	Reporting requirement specified in paragraph 28  Issue type: completeness  Assessment: encouragement	In its BR4 Croatia reported the WAM scenario, but did not report the WOM scenario or provide an explanation for not reporting the scenario.  During the review, Croatia explained that it has no data for the WOM scenario and therefore did not report it in the BR4.  The ERT encourages Croatia to improve the completeness of its reporting by including WOM projections and the corresponding CTF tables in the next BR or providing an explanation for not reporting the WOM scenario.
2	Reporting requirement specified in paragraph 32  Issue type: transparency  Assessment: encouragement	Croatia reported inconsistent starting years for the projections in its BR4 and CTF tables. The introduction to the projections, on page 68 of the BR4, states that the chapter presents the historical GHG emissions for 1990–2016 and that projections of GHG emissions are for 2015–2035. Additionally, the last sentence on page 69 of the BR4 states that 2016 is the base year for the projections, whereas CTF tables 6(a) and 6(c) use 2017 as the last historical year and the base year for the projections.  During the review, Croatia explained that a mistake occurred during the writing process and confirmed that the base year for the projections is 2016.  The ERT encourages Croatia to increase the transparency of its reporting by providing consistent information about the starting point for the projections in its next BR.
3	Reporting requirement 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 in its BR4.  During the review, the Party provided additional information stating that the national programme for the reduction of emissions of air pollutants, which includes new indirect GHG emission projections, is not yet consistent and harmonized with the Energy Strategy and the Low-Carbon Development Strategy.  The ERT encourages the Party to improve the completeness of its reporting by providing projections for indirect GHG emissions in its next BR or providing a duly substantiated explanation of why this is not yet possible.
4	Reporting requirement specified in paragraph 36  Issue type: completeness  Assessment: recommendation	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 in its BR4.  During the review, the Party stated that it is not yet in a position to supply this information but is willing to develop projections of fuel sold to ships and aircraft engaged in international travel for future BRs.  The ERT reiterates the recommendation from the previous review report for the Party to improve the completeness of its reporting by including in its next BR, to the extent possible, the emission projections related to fuel sold to ships and aircraft engaged in international transport separately and not included in the totals.
5	Reporting requirement specified in paragraph 43  Issue type: completeness	The Party did not (1) describe each model or approach used, and its characteristics; (2) explain the original purpose that the model or approach was designed for and, if applicable, how it has been modified for climate change purposes; (3) summarize the strengths and weaknesses of the model or approach used; or (d) provide an

No.	<i>Reporting requirement, issue type and assessment</i>	<i>Description of the finding with recommendation or encouragement</i>
	Assessment: encouragement	<p>explanation of how the model or approach used accounts for any overlap or synergies that may exist between different PaMs.</p> <p>During the review, the Party provided complete and comprehensive additional information describing all elements required under paragraph 43(b–e) of the UNFCCC reporting guidelines on NCs.</p> <p>The ERT encourages the Party to improve the completeness of its reporting by providing in its next BR the information required under paragraph 43(b–e) of the UNFCCC reporting guidelines on NCs.</p>
6	<p>Reporting requirement specified in paragraph 44</p> <p>Issue type: completeness</p> <p>Assessment: encouragement</p>	<p>In its BR4 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.</p> <p>During the review, the Party provided the necessary references.</p> <p>The ERT reiterates the encouragement from the previous review report for the Party to improve the completeness of its reporting by providing in its next BR references for the descriptions of each model or approach used in relation to paragraph 43 of the UNFCCC reporting guidelines on NCs.</p>
7	<p>Reporting requirement specified in paragraph 45</p> <p>Issue type: completeness</p> <p>Assessment: encouragement</p>	<p>The Party did not report information on the main differences in assumptions, methods and results between the projections in the BR4 and those in the NC7 and BR3.</p> <p>During the review, the Party provided additional information describing the main differences between the projections provided in the BR4 and those in the NC7 and BR3.</p> <p>The ERT reiterates the encouragement from the previous review report for the Party to improve the completeness of its reporting by providing information, in its next BR, describing the main differences in assumptions, methodologies, models and approaches employed, and results between the projections in the BR5 and those in the BR4.</p>

*Note:* Item listed under reporting requirement refers to the relevant paragraph of the UNFCCC reporting guidelines on NCs, as per para. 11 of the UNFCCC reporting guidelines on BRs. The reporting on the requirements not included in this table is considered to be complete, transparent and thus adhering to the UNFCCC reporting guidelines on NCs and on BRs.

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

66. Croatia is not an Annex II Party and is therefore not obliged to adopt measures and fulfil obligations defined in Article 4, paragraphs 3–5, of the Convention. However, Croatia provided information in its BR4 on its provision of support to developing country Parties. The Party reported that revenue from GHG emission auctioning under the EU ETS will be used to finance projects in developing countries and contributions to the Green Climate Fund. A related assistance programme is currently being drafted. During the review, the Party explained that, as a result of the current situation with the coronavirus disease 2019, recent earthquakes in Croatia and lack of human capacity in the responsible ministry, the programme has not yet been finalized.

### **III. Conclusions and recommendations**

67. The ERT conducted a technical review of the information reported in the BR4 and BR4 CTF tables of Croatia in accordance with the UNFCCC reporting guidelines on BRs. The ERT concludes that the reported information mostly 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; and the progress of Croatia towards achieving its target.

68. Croatia's total GHG emissions excluding LULUCF covered by its quantified economy-wide emission reduction target were estimated to be 25.4 per cent below its 1990 level, whereas total GHG emissions including LULUCF were 26.5 per cent below its 1990 level, in 2018. Emissions peaked in 2007 and decreased thereafter. The changes in total emissions were driven mainly by factors such as changes in economic activity and energy consumption as a consequence of the war in the 1990s and the subsequent process of economic recovery. In recent years Croatia has been in a state of economic recovery, with more activity in industrial production and participation in foreign trade.

69. Under the Convention Croatia committed to contributing to the achievement of the joint EU quantified economy-wide target of a 20 per cent reduction in emissions below the 1990 level by 2020. The target covers all sectors and CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, HFCs, PFCs and SF<sub>6</sub>, expressed using GWP values from the AR4. Emissions and removals from the LULUCF sector are not included.

70. Under the ESD Croatia has a target of limiting its emission growth to 11 per cent above the 2005 level by 2020. The 2013–2020 progression in Croatia's AEAs (its national emission target under the ESD) is 19,613.81–19,317.94 kt CO<sub>2</sub> eq.

71. The EU's joint targets under the EU ETS and ESR are to reduce emissions by 2030 by 43 and 30 per cent, respectively, compared with the 2005 level.

72. In 2018 Croatia's ESD emissions were 14.2 per cent (2,674.15 kt CO<sub>2</sub> eq) below the AEA. In addition, the ERT noted that Croatia does not plan to use market-based mechanisms. Taking this into account, Croatia has a cumulative surplus of 20,917.24 kt CO<sub>2</sub> eq with respect to its AEAs.

73. The GHG emission projections provided by Croatia in its BR4 correspond to the WEM and WAM scenarios. Under these scenarios, emissions are projected to be 26.7 and 27.5 per cent below the 1990 level by 2020, respectively. According to the projections under the WEM scenario, ESD emissions are estimated to reach 15,892 kt CO<sub>2</sub> eq by 2020. Under the WAM scenario, Croatia's ESD emissions in 2020 are projected to be 15,817 kt CO<sub>2</sub> eq. The projected level of emissions under the WEM and WAM scenarios is 17.7 and 18.1 per cent, respectively, below the AEAs for 2020. The ERT noted that the Party's cumulative surplus of AEAs is 20,917.24 kt CO<sub>2</sub> eq for the WEM scenario, which suggests that Croatia expects to meet its target under the WEM scenario.

74. Croatia's main policy framework relating to energy and climate change is the Energy Strategy and the Integrated National Energy and Climate Plan. Key policies supporting Croatia's climate change goals include the Long-Term Strategy for Mobilising Investment in the Renovation of the National Building Stock, the plan for protection of air, ozone layer and climate change mitigation 2013 to 2017, the National Renewable Energy Action Plan until 2020, the 4<sup>th</sup> National Energy Efficiency Action Plan for the Period until 2019, and the Program for Energy Efficiency in Heating and Cooling. The mitigation actions making the most significant contributions to Croatia's 2020 target are the EU ETS, providing financial support for renewable and efficient electricity production, the CO<sub>2</sub> emission tax for ESD stationary sources and increasing the share of biofuel in the fuel mix in the transport sector.

75. Croatia is not an Annex II Party and is therefore not obliged to adopt measures and fulfil obligations defined in Article 4, paragraphs 3–5, of the Convention. However, Croatia reported that it intends to use revenue from GHG emission auctioning under the EU ETS to finance projects in developing countries and contributions to the Green Climate Fund.

76. 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:

- (a) To improve the completeness of its reporting by:
  - (i) Providing information on the changes to the institutional, legal, administrative and procedural arrangements used for domestic compliance, monitoring, reporting, archiving of information and evaluation of the progress towards its economy-wide emission reduction target (see issue 2 in table 4);

- (ii) Including in its next BR, to the extent possible, the emission projections related to fuel sold to ships and aircraft engaged in international transport separately and not included in the totals (see issue 4 in table 9);
- (b) To improve the transparency of its reporting by providing explanations of any changes made to PaMs between submitted reports (see issue 1 in table 4).

## Annex

### Documents and information used during the review

#### Reference documents

2019 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-2019>.

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NECP of Croatia. Available at [https://ec.europa.eu/energy/sites/default/files/documents/hr\\_final\\_necp\\_main\\_en.pdf](https://ec.europa.eu/energy/sites/default/files/documents/hr_final_necp_main_en.pdf).

Report on the individual review of the annual submission of Croatia submitted in 2018. FCCC/ARR/2018/HRV. Available at <https://unfccc.int/process-and-meetings/transparency-and-reporting/reporting-and-review-under-the-convention/greenhouse-gas-inventories-annex-i-parties/inventory-review-reports/inventory-review-reports-2018>.

Report on the technical review of the BR3 of Croatia. FCCC/TRR.3/HRV. Available at [https://unfccc.int/review-reports-BR3\\_and\\_NC7](https://unfccc.int/review-reports-BR3_and_NC7).

“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>.