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**COMMISSION STAFF WORKING DOCUMENT**

**Assessment of the draft updated National Energy and Climate Plan of Croatia**

*Accompanying the document*

**COMMISSION RECOMMENDATION**

**on the draft updated integrated national energy and climate plan of Croatia covering the period 2021-2030 and on the consistency of Croatia's measures with the Union's climate neutrality objective and with ensuring progress on adaptation**

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# 1 SUMMARY

## 1.1 Overview of key objectives, targets and contributions in the draft updated NECP


The European Green Deal, the fast-evolving geopolitical context and the energy crisis have led the EU and its Member States to accelerate the energy transition and to set more ambitious energy and climate objectives, with a strong focus on the diversification of energy supplies. These developments are reflected in the legislative framework adopted under both the Fit for 55 package and the REPowerEU plan.

Croatia’s draft updated national energy and climate plan (“the draft updated NECP” or “the plan”), submitted on 4 July 2023, partially takes into account this new geopolitical and legislative framework.

Table 1: Summary of key objectives, targets and contributions of Croatia’s draft updated NECP

		2020	Progress based on latest available data	2030 national targets and contributions	Assessment of 2030 ambition level
	Binding target for greenhouse gas emissions (GHG) compared to 2005 under the Effort Sharing Regulation (ESR) (%)		2021: -3.5% 2022: -6.1% <sup>1</sup>	-16.7%	NECP: -17.1%
	Binding target for net GHG removals under the Regulation on Land Use, Land Use Change and Forestry (LULUCF)		Reported net removals of -5.80 Mt CO <sub>2</sub> eq. in 2021	-593 kt CO <sub>2</sub> eq. (additional removal target) -5527 kt CO <sub>2</sub> eq. (total net removals)	Insufficient ambition, not reaching the target.
	National target/contribution for renewable energy: Share of energy from renewable sources in gross final consumption of energy (%)	31% (SHARE) (20% (target))	2021: 31.3%	42.5%	HR contribution of 42.5% is slightly below the 44% required according to the formula set out in Annex II of the Governance Regulation.
	National contribution for energy efficiency:				
	Primary energy consumption	10.7 Mtoe	8.27 Mtoe	8,140 ktoe	HR primary energy

<sup>1</sup> The ESR emissions for 2021 are based on final inventory data and for 2022 on approximated inventory data. However, the final ESR emissions for 2021 and 2022 will only be established in 2027 after a comprehensive review.

					consumption contribution is 8,140 ktoe. EED recast Annex I formula results: 6,830 ktoe
	Final energy consumption	7.0 Mtoe	6.97 Mtoe	6,550 ktoe	HR final energy consumption contribution is 6,550 ktoe. EED recast Annex I formula results: 5,866 ktoe
	Level of electricity interconnectivity (%)	52.0%	29.5%	15% <sup>2</sup>	

Source: Eurostat; Croatia's updated national energy and climate plan

## 1.2 Summary of the main observations<sup>3</sup>

Croatia's draft updated NECP refers to the revised energy and climate targets recently agreed under the **Fit for 55** package and the **REPowerEU plan** but will deliver on them only partially. The description of the scope of policies and measures is described well but it is vague on timing and their expected impacts.

Regarding the **reduction of greenhouse gas emissions under the Effort Sharing Regulation**, the plan provides emission projections to demonstrate that with the additional policies and measures put forward in the draft updated NECP, Croatia is on track to meet its national greenhouse gas target of -16.7% in 2030 compared to 2005 levels. According to Croatia's projections, they would overachieve the target by 0.4 percentage points.

On **Land Use Land Use Change and Forestry (LULUCF)**, the draft updated plan indicates that Croatia will fall short of the 2030 ambition, highlighting the need for enhanced climate action. The draft does not clearly set out a pathway to increase the land sector's contribution to the EU's overall enhanced climate target. The draft does not provide a clear implementation timeframe nor quantification of the impacts of existing policies and measures and acknowledges the need for additional measures.

On **Carbon Capture Utilisation and Storage (CCUS)**, the plan does not identify annual CO<sub>2</sub> emissions that can be captured, nor geological CO<sub>2</sub> storage capacity. No details on CO<sub>2</sub> transport are provided. Croatia plans to assess the geological CO<sub>2</sub> storage capacity and to commission a national feasibility study with an action plan to prepare projects. The

<sup>2</sup> Calculated by the European Commission based on the ETNSO-E data (Winter Outlook 2022-2023). The 2030 level represents the general interconnectivity target of 15%. The level of ambition cannot be assessed, because the actual 2030 interconnectivity levels will depend on the implementation of the planned interconnectors and changes in the generation capacity. The 2020 figure covers also interconnectors with the neighbouring countries outside the EU.

<sup>3</sup> In addition to the notified draft NECP, this assessment also considers informal bilateral exchanges, which are part of the iterative process established under the Governance Regulation.

outcomes should be made available once finalised. A pilot project will be implemented by the end of 2026 though more details about the project could be included in the plan.

The draft updated plan reflects **limited progress towards international commitments** under the Paris Agreement. Croatia seems to postpone its commitment to phase out coal by 2033. Moreover, there is no timeline for phasing out fossil fuel subsidies.

Regarding **adaptation to climate change**, the draft updated NECP does not contain adequate analysis of the relevant climate vulnerabilities and risks for the achievement of the national objectives, targets, and contributions and the policies and measures in the individual dimensions of the Energy Union. The link to the specific Energy Union objectives and policies, which adaptation policies and measures should support, is not specified and quantified. Adaptation policies and measures to support Croatia's achievement of national objectives targets and contributions under the Energy Union, are not properly described in terms of their scope, timing and expected impacts. Such policies and measures are needed, besides others, for the prevention of forest fires and the resilience of energy systems to structural or seasonal water scarcity.

For **renewable energy**, Croatia's draft updated NECP forward a contribution of 42.5% of the national final energy consumption in 2030, which is below the share of 44% resulting from the formula in Annex II of the Regulation (EU) 2018/1999 on the Governance Regulation of the Energy Union and Climate Action ("Governance Regulation"). The draft updated NECP includes indicative trajectories for renewables in the electricity, transport and heating and cooling sectors, however, with no inclusion of the renewables share in industry, buildings and renewable fuels of non-biological origin (RFNBO). At the same time, Croatia provides additional policies and measures in its draft updated NECP to achieve the increased ambition in particular related to renewable energy auctions, self-consumption and decarbonisation of heating, while it lacks details on facilitating permit-granting procedures, industrial energy use or district heating and cooling. The draft updated plan takes into account Directive (EU) 2018/2001 on the promotion of energy from renewable sources as amended by Directive (EU) 2023/2413 ("revised REDII") to some extent.

On **energy efficiency**, the Croatian draft NECP is quite comprehensive, providing a detailed level of planned policies and measures. The plan states that Croatia hardly increases the level of ambition for energy efficiency, when compared to the 2019 NECP. The draft updated NECP does not take into account the increased ambition set by the Directive (EU) 2023/1791 ("EED recast"). The reported policies and measures are presented with a sufficient level of detail in terms of how they will contribute towards Croatia's national contribution to the 2030 EU energy efficiency targets. The energy efficiency measures planned by Croatia in its draft updated NECP address the need to increase energy efficiency across the whole energy system and the economy. The largest impact in terms of delivering on the 2030 energy efficiency target is expected from the Croatian energy efficiency obligation schemes, followed by measures in buildings, and measures addressing public assets. The **energy efficiency first principle** is addressed only in relation to an outreach and information campaign contributing to building decarbonisation, but not as a mainstreamed planning tool.

On **buildings**, the draft updated NECP does not set out more ambitious targets than those included in the 2020 long-term renovation strategy (LTRS) but recalls some of its

elements. There are no new building-related measures, but some seem to have been scaled up. However, it is not clear why one of the measures included in the 2020 LTRS has a doubled estimated impact in the draft updated NECP.

On **energy security**, the draft updated NECP convincingly sets out targets and measures to increase the security of Croatia's energy supply. On **gas**, the draft updated plan notably provides detailed objectives for increased domestic extraction, renewable gas production and storage and LNG terminal capacity. These elements will help increase diversification and reduce import dependency on third countries. The draft updated NECP does not, however, describe in detail how the emergency measures adopted in the aftermath of the war in Ukraine to reduce gas demand are integrated into the mid-term planning towards 2030. On **electricity**, the Croatian authorities commit to support the deployment of energy storage, but the plan does not contain a specific target. Lastly, as regards oil, which is expected to remain a substantial part of Croatian energy mix, the adequacy of the oil infrastructure (oil stocks, refinery, ports, pipeline) is not assessed in the context of expected oil demand decline and the move toward biofuels.

**On the internal energy market**, the draft updated NECP builds on the strong electricity interconnection to cope with the increased share of renewables and foresees some expansion to foster the hydrogen and renewable gases uptake. In addition, the draft updated NECP sets out general lines of the measures on flexibility or aggregators to incentivise the market to bring the benefits of renewables and low carbon technologies to the consumers. However, clear targets for demand response and storage including concrete deadlines and milestones for their implementation are lacking.

**On energy poverty**, Croatia has not yet assessed the number of households that are in energy poverty but plans to develop a "Program for elimination of energy poverty" which will define it, assess its scope and propose measures. The description of the current situation concerning energy poverty lacks detail and does not explore synergies with measures to develop demand response, accelerate building renovation and energy savings in a targeted manner. However, there is a reference to four measures addressing energy poverty both in the energy efficiency and internal energy market dimension.

In relation to the **research, innovation, competitiveness, and skills dimension**, the Croatian draft updated NECP is mostly lacking quantitative targets to support research, innovation and investments in the manufacturing of clean energy technologies, in particular for key components and equipment, and digitalisation of the energy value chain. The draft updated NECP does not provide concrete goals, nor a breakdown of expenditure in R&I in energy for 2030 and 2050 and clear competitiveness and regional cooperation targets. On top of this, there is a lack of information on how Croatia will ensure the resilience of its supply chain in case of there is not enough domestic production of components or equipment for net zero technologies.

**Just transition** is addressed in a very limited manner in the draft updated NECP. There is no analysis of the social, employment and skills effects, or any other distributional impacts on vulnerable groups, of the energy and climate transition. Further, objectives, policies and measures to address social, employment and skills impacts are generally not included. In addition, the draft plan is inconsistent with the commitment to phase out coal by 2033 included in the adopted Territorial Just Transition Plan (TJTP) for Istria, consequently the

impact on the planned measures in the TJTP is not clear. Resources specifically devoted to supporting a just transition are not listed. Finally, the plan does not provide sufficient information for the preparation of the Social Climate Plan and on how the consistency of the two plans would be ensured.

Regarding its strategic alignment with other planning tools, the draft updated NECP is consistent with the **Recovery and Resilience plan** (“RRP”) which is mentioned extensively in the text. The amended RRP and REPowerEU Chapter were submitted to the Commission by Croatia on 31 August 2023.

The Croatian draft updated NECP is aligned with the energy related **European Semester country specific recommendations**, reflects the challenges to be addressed by the country, and partially addresses these recommendations.

Finally, the draft updated NECP includes partial information on the expected **investment** needs for implementing the planned policies and measures. Main sources of financing are outlined but their contribution is not explained. The **analytical base** of the draft updated NECP is based on With Existing Measures (“WEM”) and With Additional Measures (“WAM”) scenarios. The methodology and assumptions used in the modelling are presented in the draft updated NECP, but it is unclear how the scenarios were built. There is some lack of clarity as to the measures included in the WEM scenario and the results of the WAM scenario are not provided for primary energy consumption. While the methodology of the macro-economic assessment is clear, it is not very detailed and lacks robustness.

## **2 PREPARATION AND SUBMISSION OF THE DRAFT UPDATED NECP**

### **2.1 Process and structure**

The draft updated NECP was notified to the European Commission on 4 July 2023. It follows the structure provided in Annex I of Regulation (EU) 2018/1999 template, covering all five dimensions, and including objectives, targets or contributions for each, backed by policies and measures and underpinned by an analytical basis, including an impact assessment. The draft updated plan does not provide information whether a Strategic Environmental Assessment (SEA) has been done.

Croatia’s draft updated NECP does not elaborate much on the national context in which it was drawn up and mentions increased energy price volatility resulting from the Russian invasion of Ukraine only in the EU context. The draft updated NECP briefly mentions the need to analyse the impact of climate change on the adequacy of the energy system caused by extreme weather.

There is no ample evidence that, in line with the whole-of government approach, the relevant Ministries worked together to update the draft updated NECP but a workshop was organised with local and regional authorities in May 2023 to discuss policies and measures in the draft updated plan. As part of the LIFE NECP platform project Croatia has established a multilevel energy and climate dialogue in the format of a series of thematic workshops. Between March and June 2023, the draft updated NECP was discussed in this forum with different stakeholders, including social partners.

## 2.2 Public consultation

The consultation process outlined in the draft updated NECP does not provide evidence of early public participation in the process of updating the plan nor in the decision-making process. There is no summary of how the public's views were considered and addressed in the process included.

## 2.3 Regional consultations for preparing the draft updated NECP

The draft updated NECP does not provide information on consultations with neighbouring countries on the draft updated NECP. While Croatia identifies the need for further cross-border and regional cooperation to increase the flexibility and adequacy of the electricity system, no concrete actions appear to have been taken to consult neighbouring countries in the preparation of the plan.

# 3 ASSESSMENT OF THE AMBITION OF OBJECTIVES, TARGETS AND CONTRIBUTIONS AND ADEQUACY OF SUPPORTING POLICIES AND MEASURES

## 3.1 Decarbonisation dimension

### 3.1.1 Greenhouse gas emissions, removals and storage

The draft updated plan recognises the increased climate targets included in the ESR and the LULUCF Regulation as part of the 'Fit for 55' legislative package but only partially embeds them.

**The draft updated plan does not specify a clear goal by when Croatia will reach climate neutrality.** It includes concrete pathways up to 2030, but not up to 2050. WEM and WAM projections are done up to 2040. Projections submitted in March 2023 under Art. 18 of the Governance Regulation show net GHG emissions (i.e., including LULUCF and excluding international aviation) of 15 million tonnes of CO<sub>2</sub> equivalent (CO<sub>2</sub> eq.) by 2050 considering existing measures and of 11 million tonnes of CO<sub>2</sub> equivalent with additional measures. This is equivalent to projected reductions in 2050, compared to 1990, of 41% and 55%, respectively. In the most recent years, net GHG emissions in Croatia have declined at a pace below the EU average. The information provided in the draft updated plan does not allow for a full assessment as to whether Croatia's progress is consistent with the achievement of the EU climate-neutrality objective. However, based on all the available information, progress by Croatia towards the EU climate-neutrality objective appears largely insufficient.

The draft updated NECP reflects the required ambition under the **ESR** in the WAM scenario. The ESR sets Croatia's 2030 emissions reduction target to -16.7% by 2030, compared to 2005 levels. The draft updated NECP projects emissions from the effort sharing sectors in Croatia to be below their 2030 target with existing measures but with additional planned measures the target would be reached. In the WEM scenario, Croatia would reduce emissions by -10.3% by 2030 compared to 2005 and in the WAM scenario by -17.1%. This highlights the need to implement all the planned additional measures. The draft updated plan does not include any sectoral targets. In 2021, Croatia's ESR emissions were below the Annual Emission Allocations (AEA) by 0.33 Mt CO<sub>2</sub> eq.



Member States have flexibilities under the ESR to comply with their targets. No specific use of ESR flexibilities is mentioned by Croatia. To assess whether Member States comply, the use of saved AEAs from previous years is taken into account.

Table 2: ESR target and projections in Croatia’s draft updated NECP

<b>ESR target and projections<sup>4</sup></b>					
	<b>2030 target*</b>	<b>2021 performance (inventory data) *</b>	<b>2022 performance (approximated data) *</b>	<b>2030 WEM projection *</b>	<b>2030 WAM projection *</b>
<b>HR</b>	-16.7%	-3.5%	-6.1%	-10.3%	-17.1%
<b>EU</b>	-40%	-14.5%	-16.9%	-27%	-32%

\*Compared to the 2005 emissions as set out in Annex I of Commission Implementing Decision (EU) 2020/2126.

The draft updated NECP does not reflect the increased ambition of the **LULUCF Regulation** and, in particular, the national target to deliver additional -593 kt CO<sub>2</sub> eq. of net removals to reach a total value of -5 527 kt CO<sub>2</sub> eq. in 2030 compared to 2005 levels. According to the projections submitted, Croatia will only achieve -4 240 kt CO<sub>2</sub> eq. in 2030, falling short of its target. There is no WAM scenario identified to address this gap. This highlights the need for more ambitious climate action. The draft plan further highlights that research, analysis, and public consultations are needed to define additional measures. The draft updated NECP does not set out a clear pathway to increase the contribution of Croatia’s land sector to the EU’s overall enhanced climate target and does not quantify the mitigation potential of planned measures in terms of removals or emissions from the LULUCF sector.

In terms of improving monitoring, reporting and verification (MRV), the draft updated plan specifies that Croatia has launched a project to connect and harmonise databases and enable explicit georeferencing of land use and land conversion. Croatia will also start a project on improving wood product statistics, on production and cascade use of wood.

Overall, Croatia does not clearly present how its policies and measures for the LULUCF sector will contribute to the long-term transition to climate neutrality by 2050.

The draft updated NECP integrates **Circular Economy** practices and measures in different policy areas, such as waste, bioeconomy, construction. It also touches upon circular economy skills and announces a National Plan for circular economy, in the context of the construction sector, and includes a measure to compute the climate impact of consumption. Overall, the draft updated plan recognizes circular economy as a tool for decarbonisation but does not seem to take it into account in the GHG modelling.

The draft updated NECP contains objectives, targets, and policies and measures related to **transport decarbonisation**. The planned measures include the application of regulatory instruments, standards and taxes that will encourage the use of low-emission vehicles and increase the use of public transport and promote active mobility (cycling). Increased usage

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<sup>4</sup> The comparison between the ESR target and emission projections does not take into account the flexibilities available for Member States under the ESR to comply with their 2030 targets. The ESR emissions will be comprehensively reviewed in 2027 (for the years 2021-2025) and 2032 (for the years 2026-2030).

of clean public transport is envisaged by new alternatively powered buses and trams. The draft updated plan is not completely clear on the expected uptake of zero emission vehicles and how the provisions of the Alternative Fuels Infrastructure Regulation will be fulfilled. Despite foreseeing a comprehensive set of fiscal measures and incentives in line with the broad objective, and scenarios with steep increase of **RES-E in transport** (doubling by 2030), which appear to be in line with CO<sub>2</sub> standards for cars<sup>5</sup>, the expected share of sales of electric and plug-in hybrid vehicles is only 10% in 2030. It addresses the deployment of hydrogen refuelling stations but without a clear quantification. The draft updated NECP includes measures for the **electrification** and the introduction of zero-emission technologies and related infrastructure in rail, ports and airports. More specifically, in the maritime sector, the draft updated NECP contains measures for the construction of port infrastructure for the supply of electricity, RFNBOs or natural gas to ships. The plan foresees the provision of electricity and pre-conditioned air to stationary aircrafts in TEN-T airport; however, it does not mention development of specific measures concerning sustainable aviation fuels (SAF)

As per the draft updated NECP, **no annual emissions that could be captured by 2030** from ETS and non-ETS sources have been identified, nor any concrete estimation of geological CO<sub>2</sub> storage capacity. The draft updated plan does not foresee the deployment of any dedicated CO<sub>2</sub> transport capacities. However, Croatia plans to assess the geological CO<sub>2</sub> storage capacity and to commission a National Feasibility Study with an action plan to prepare carbon capture and storage projects. Latter will cover the different stages of CO<sub>2</sub> capture, transport, including interconnection with other EU countries, as well as storage. By end of 2026, a pilot project will be implemented that will enable the development and commercialization of the CO<sub>2</sub> capture and storage.

The draft updated NECP includes measures to mitigate **non-CO<sub>2</sub> emissions**, such as: (i) methane emissions from fugitive sources in energy (e.g. modernisation and transformation of refineries): (ii) agriculture (e.g. improving storage capacity and practices when handling manure; anaerobic decomposition of manure and biogas production; selective breeding as well as feed management and feed additives): and (iii) waste management (e.g. prevention and reduction of waste generation, including food waste; separation and recycling of waste; treatment and use of landfill gas). It also includes measures to reduce N<sub>2</sub>O emissions from agricultural soils and emissions of F-gases.

The ‘Agriculture Strategy until 2030, with a view to 2050’ is listed as a reference document with description of pathways for GHG emissions reduction. Despite this, the 2030 projections for the non-CO<sub>2</sub> emissions from the agricultural sector indicate stagnation, following a slight reduction in 2025.

Furthermore, the draft updated NECP does not address methane and **N<sub>2</sub>O emissions** from fuel combustion. Overall, there are no measures which target the measurement, reporting or verification of non-CO<sub>2</sub> emissions and no quantified projections of these emissions. Thus, it is not possible to assess whether the measures are sufficient to mitigate the rising trend of F-gases and the high rate of methane emissions in waste management. These

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<sup>5</sup> An EU-level reduction per OEM of 55% for cars and 50% for vans of CO<sub>2</sub> emission per km by 2030; 100% reduction (only Zero-Emission Vehicles - ZEV) at 2035. Measures such as corporate cars incentives and any fiscal incentive for ZEV shall be reported.

shortcomings are problematic, because non-CO<sub>2</sub> emissions accounted for 41% of all greenhouse gas emissions within the Effort Sharing sectors in 2021, and in the context that the ESR target will be just about reached even with additional measures, as outlined earlier in this section.

The **policies and measures** are generally described in sufficient details in terms of scope but their individual impact on GHG emission reduction is not quantified and their timing is vague.

The draft updated plan reflects limited progress towards **international commitments** under the Paris Agreement. It does not mention the political commitment made in 2021 in the context of the UN Climate Change Conference in Glasgow (COP26) to phase out coal by 2033 at the latest (possibly by 2030) and seems to refer to the continued use of the only coal-powered-plant until 2040 when projecting energy grid requirements and shares of coal-powered energy consumption. With regards to fossil fuel subsidies, although, Croatia has not set an end-date for fossil fuels subsidies, it plans to complete the analysis of the current system (mainly exemptions from excise duties in transport, agriculture and fisheries) by mid-2026 which will also cover economic impact on the most vulnerable groups, performance indicators and include a timetable.

On 24 June 2021, Croatia submitted to the Commission its **national long-term strategy**. The strategy does not indicate a clear goal of achieving climate-neutrality by 2050. In March 2023, Croatia reported on the status of implementation of its initial NECP, including progress towards the Union's climate-neutrality objective. However, Croatia did not indicate a target-year to achieve its climate-neutrality objective. In the draft updated NECP it is not specified by when exactly Croatia will reach climate-neutrality, but it is mentioned that greenhouse gas emission reduction will be implemented in line with the political framework adopted by the European Union.

### *3.1.2 Adaptation*

Croatia has identified some climate vulnerabilities and risks that may threaten the achievement of national objectives, targets and contributions but did not present them in detail in its draft updated NECP. There is no consideration of the water to be reserved for producing hydrogen through electrolysis and needed for cooling water for nuclear plant (Krško). The draft updated NECP merely states that a vulnerability assessment process took place for. There are various sectors that are considered highly vulnerable to climate change, such as agriculture, forestry, fisheries, energy and tourism. However, only for the agriculture sector the plan includes some policies and measures specifically focused on adaptation to climate change, while measures linked to prevention of forest fires and improving resilience of energy systems to structural or seasonal water scarcity are lacking.

More generally, the report provides only few links to the governance under the water acquis, such as the River Basin Management Plans (under the Water Framework Directive). In its initial NECP of 2019, Croatia identified adaptation goals, although they were not quantifiable. In the draft updated plan, the adaptation goals were formulated in the same way.

The planned and implemented nature-based solutions are not specifically described, although some policies and measures could be classified as nature-based solutions (e.g., afforestation and the introduction of new cultivars, varieties and crops under certain

conditions). Innovative approaches such as insurance policies and fiscal measures addressing the climate protection gap are not considered. Investment aimed at minimising environmental impacts, such as biodiversity loss, is considered when contributing to climate adaptation in the decarbonisation dimension, in terms of sustainable management of grassland and cropland.

### 3.1.3 Renewable energy

**The renewable energy contribution proposed in the draft updated NECP is for renewables to achieve a share of 42.5% of Croatia's national gross final consumption of energy in 2030.** This proposal is based on the WAM scenario, including absolute values in terms of energy. This contribution is slightly below the share of 44% resulting from the formula in Annex II of the Governance Regulation. The scenarios set out in the draft updated NECP provide yearly overall renewable energy contribution trajectories, up to 2030. The indicative trajectory to reach the 42.5% contribution in 2030 is provided, including specific reference points for 2022 (a renewables share of 32.9%), 2025 (a renewables share of 36.5%) and 2027 (a renewables share of 38.9%)<sup>6</sup>. The submitted reference point for 2022 is above the trajectory (22%) calculated in line with the EU 2030 renewable energy target of 32%, which was in force at that time. The reference points for 2025 and 2027 (30% and 35% respectively) are above the trajectory calculated in line with the increased EU 2030 renewable energy target of 42.5%<sup>7</sup>.

**Renewable electricity generation is projected to reach 73.6% of all electricity generated in Croatia in 2030,** with hydro power remaining the main source of renewable electricity (40% share and 2.4 GW of installed capacity), compared to the 2021 share of 61.6% and 2.2 GW of installed capacity. Wind generation is expected to triple and become the second main source of generation by 2030, with a share of 38%, and with an installed capacity of 2.5 GW. Bioenergy (biogas and biomass) is expected to represent 11% of electricity production and 304 MW of installed capacity in 2030. However, the updated draft NECP does not include information on the innovative target for renewable energy deployment. Neither does the draft updated NECP make a reference to the goals for offshore renewable generation that have been set for the South and East offshore grid priority corridor.

**The use of renewable energy in the heating and cooling sector is projected to reach a share of 47.1% by 2030.** The draft updated NECP indicates that Croatia intends to increase renewable energy in heating and cooling by 1.0 percentage points as an annual average between 2021 and 2030, which does not fully match the new mandatory average annual increases laid down in the revised REDII and is significantly below the indicative top up resulting in a 1.6 percentage point average increase over 2021-2030. The role of waste heat and cold and the accounting of renewable electricity in the trajectory and its broader impacts on the target setting and the achievement remains unclear. Bioenergy will remain dominant with 915.8 ktoe in 2030, although it is projected to decrease by 21%

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<sup>6</sup> Reference points of 18% by 2022, 43% by 2025 and 65% by 2027 pursuant to Article 4(a)(2) of Regulation 2018/1999

<sup>7</sup> Given that the provisionally agreed RED was not yet in force by the deadline of the submission of the draft NECPs, the value for 2022 has been compared to the trajectory values calculated on the basis of the 2030 EU renewable energy target of 32%. The reference points for 2025 and 2027 are compared to the trajectory calculated on the basis of the increased EU target of 42.5% in line with the revised RED.

compared to 2021 due to sustainability concerns, improved efficiency of heating equipment and the priority given to heat pumps in some measures. The contribution of heat pumps is expected to more than triple; up to 356 ktoe in 2030. However, neither the amount of electricity needed to run the heat pumps, nor their projected capacity were specified. The annual increase of the use of renewables in **district heating and cooling** is not clear from the draft updated NECP, but it is indicated that Croatia fails to meet the conditions under Article 24 of the revised REDII. Nevertheless, the draft updated NECP contains measures to support renewables in district heating and cooling but does not providing information on the integration between the electricity and district heating and cooling networks. The draft updated NECP also does not contain sufficient information on the role of waste heat and renewable electricity accounting for the calculation and their impacts on the target setting and achievement. The draft updated NECP does not provide the shares of renewable energy in the energy consumption of the **industry** and **buildings** sectors.

**In the transport sector, the share of renewable energy is projected to reach 21.6% in 2030** energy terms (RES-T) and Croatia has not provided the equivalence of the target in GHG reduction. For the transport sub-target, the main measures are the promotion of electric vehicles and the related recharging infrastructure and the introduction of mandatory quota for the consumption of conventional and advanced biofuels by 2030 focused on motor vehicles. Other measures aim for increased energy efficiency and an increase of renewable electricity use in public transport. The share of advanced biofuels is expected to increase as of 2027 contributing substantially towards the projected share of 21.6% renewable energy in 2030 while consumption of conventional biofuels and biofuels produced from used cooking oil is estimated to remain almost constant. Figures on RFNBOs are not included. The draft updated NECP indicates that electric and plug-in hybrid vehicles will reach a share of 10% of vehicle sales in 2030. Extensive details about measures related to electro-mobility (both relating to vehicles and to charging infrastructure) are also included in the draft updated NECP.

The draft updated NECP does not provide information on the capacity of electrolyzers in 2030 and does not set out measures for **RFNBO use** in demand sectors in transport and industry. The draft updated plan does not refer to the objectives contained in the Croatian Hydrogen Strategy, adopted in 2022 but foresees the adoption of an action plan based on that strategy. Croatia mentions that **international cooperation** is indispensable in the field of hydrogen production and consumption. Although the draft updated NECP does not provide details on intended international partnerships to facilitate imports of renewable hydrogen, it states that the projects financed with support of EU funding to equip the Croatian gas transmission system for the future possibility of transmission of hydrogen will also enable the cross-border transmission of renewable hydrogen between Croatia, Hungary, Slovenia within the EU and, to the South, Bosnia-Herzegovina, Montenegro and Albania. However, Croatia's draft updated NECP does not make clear how the country would target the use of hydrogen for difficult to decarbonise sectors as it seems that Croatia intends to blend hydrogen in the whole gas network and at later stage to use the whole gas network for the transport of up to 100% H<sub>2</sub> for an indiscriminate use. In addition, there is no reference to any evaluation report assessing more cost-efficient and energy-efficient options to heating and cooling than hydrogen blends. Moreover, it is not clear whether Croatia foresees to undertake all necessary investments required to adapt the gas network to enable the transport of 100% H<sub>2</sub>, notably whether Plinacro envisages to change all relevant valves, compressors and flanges for such purpose.

On **the policies and measures**, in the electricity sector, the objective is to accelerate the production of electricity from renewable energy through the use of reverse auctions, the promotion of self-consumption and of long-term Power Purchase Agreements. On **guarantees of origin**, Croatia extends the current system and is furthermore using the system to promote use of renewable electricity through procurements for public providers of transport. When it comes to **joint projects**, the draft updated plan only contains a general reference to possible regional cooperation, without specifying the Member States concerned.

The draft updated NECP contains measures to ensure an accelerated deployment of **self-consumption, energy sharing and energy communities**, predominantly based on solar energy, in line with the EU's Solar Energy Strategy objectives and will be promoted through the establishment of a specific regulatory framework accompanied by a set of incentives. Quantitative targets for self-consumption and for energy communities are not included in the draft plan. The draft updated NECP presents sufficient and well-described measures for promoting individual and collective self-consumption as well as renewable energy communities. Croatia does not indicate whether it has put in place a strategy on energy system integration, but the draft updated plan contains measures to define the regulatory framework for encouraging demand response through its participation in electricity markets, to increase the number of smart meters, to encourage the use of batteries by system operators and to modernise the distribution grid.

Measures for **renewable heating and cooling** set out in Croatia's draft updated NECP include: (i) the replacement of equipment in district heating systems; (ii) the prohibition of selling and installing individual systems relying on fossil fuels (although not decided yet); and (iii) the continuation of incentives financed by the auctioning of emission allowances. Only measures to promote energy efficiency the use of renewable sources in **industrial processes** to replace fossil fuels were included with additional funding compared to existing measures but without specific targets. Regarding **bioenergy**, a significant increase in the contribution of gaseous and liquid biofuels to gross final energy consumption (in ktoe) is expected by 2030 while the contribution of solid biomass is expected to decrease. The draft updated NECP provides the estimates trajectories of demand for energy from biomass, but it does not include estimated trajectories for biomass supply by feedstock and origin, differentiating between domestic production and import, nor information on the source of forest biomass used for energy and the impact on the LULUCF sink. The draft updated NECP does not include domestic supply of **forest biomass** for energy purposes in 2021-2030 and of the projected use of forest biomass for energy production under the revised LULUCF Regulation, particularly for 2026-2030, together with national measures and policies ensuring such compatibility in accordance with the revised sustainability criteria based on the revised REDII. The draft updated NECP includes measures to encourage the use of energy from biomass, such as promoting anaerobic degradation of manure and biogas production. Sustainability of biomass production and use for energy will be encouraged in the framework of the wider set of activities for the development of the bioeconomy. Sustainable biomethane is mentioned marginally under a hydrogen project with the intention to use biogas in the transport sector and inject biomethane into the gas network. Yet, related production capacities and investments are not reported.

The draft updated NECP includes measures for carrying out the mapping of areas **necessary to achieve the national contribution** to the Union's 2030 renewable energy target, accompanied by guidelines and criteria to identify areas for renewables

development in the context of spatial planning. For the streamlining of administrative procedures and time limits for granting permits, the draft updated plan refers to the adoption in 2021 of the Renewable Energy and High Efficiency Cogeneration Act and related bylaws and does not include a reference to a contact point for project promoters. The draft updated NECP does not provide information on other measures to streamline administrative procedures for other sectors or technologies and has not elaborated on the additional human resources dedicated to permitting or operating the new systems.

### 3.2 Energy efficiency (including buildings) dimension

**Energy savings** are presented as a pillar of the draft updated NECP, with Croatia targeting a reduction in energy consumption of 0.035 Mtoe per year until 2030 compared with the 2017-2019 average<sup>8</sup>. This corresponds to a corrected national contribution of 8.14 Mtoe for primary energy consumption (compared to the target of 6.83 Mtoe according to the EED recast Annex I Results) and 6.55 Mtoe for final energy consumption (compared to the target of 5.87 Mtoe according to the EED recast Annex I Results).

Croatia's reported 2030 contributions for primary and final energy consumption deviate from the theoretical results of the formula in the EED recast Annex I by 19.2% and 11.7%.<sup>9</sup> No specific justifications, reflections or details are provided explaining why Croatia hardly increased its **national contribution** to the collective Union's 2030 energy efficiency targets. It should be recalled that the EED recast includes provisions that will ensure that in the final updated NECPs, the sum of the notified national contributions for FEC will equal to the EU target for 2030.

The targets for 2030 are also set at a lower level as compared to the Croatia 2020 energy efficiency target that is -23.9% and -6.4%<sup>10</sup> for primary and for final energy consumption respectively. Information on WAM and WEM baseline scenarios is missing or unclear. It is unclear how the scenarios were built, which measures are included in each scenario and what are the **expected values for primary energy consumption** with these measures for 2030. There is some lack of clarity about the measures included in the WEM scenario. The results of the WAM scenario are not provided for PEC, while they are reported for FEC and are equal to the target. In addition, the content of the PAM template is not fully consistent with the draft updated NECP.

The **target for reducing the total final energy consumption of all public bodies** is not well described in Croatia's draft updated NECP and does not include enough information regarding the measures planned, including the information on the exclusion/inclusion of public transport or armed forces.

Croatia opted, in line with the 2014-2020 period and the 2019 NECP, for the alternative approach for implementing Article 5 EED provisions on the **exemplary role of public bodies' buildings**. It has set the target of 4.89 TJ per year in equivalent savings. With

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<sup>8</sup> The 2017-2019 average has been calculated based on the EED recast FEC definition, and the annual final energy consumption reduction has been calculated for the period 2021-2030.

<sup>9</sup> According to Article 4(4) EED recast, a Member State shall ensure that its contribution in Mtoe is not more than 2.5% above what it would have been had it resulted from the EED recast Annex I formula.

<sup>10</sup> The comparison has been done with the 2020 targets as included in the final 2019 NECPs JRC assessments (10.71 Mtoe PEC, 6.96 Mtoe FEC).

regards to obligations according to Article 5 EED (Article 6 EED recast), quantitative targets in terms of floor area to be renovated are not indicated (as Croatia chose an alternative approach), and it is unclear if the measure is sufficient to reach the target. Croatia plans to address relevant obligations in Articles 5 and 6 of the EED recast via two measures addressing **energy renovations and energy system management** in the public sector. In addition, the updated draft NECP includes a measure on green public procurement started in 2014 which aims to boost the entry into the market of innovative low-carbon products and services.

The updated draft NECP provides satisfactory information on what measures will be used to deliver the savings required post-2020 under Article 7 EED (Article 8 EED recast) on **energy savings obligation**. The policies and measures contained in the draft plan under the energy efficiency dimension are sufficiently well described, although they include only a partial estimation of energy savings. More details are needed to understand how these measures contribute to the achievement of the energy savings obligation toward 2030. In particular, the reason for the difference between the expected cumulative energy savings 2021-2030 reported in the draft NECP and those reported in the policies and measures (PAM) template should be clarified.

The total 2021-2030 **cumulative savings requirement** is calculated at 2,993.7 ktoe according to EED and 4,313.6 ktoe according to Article 8 of the EED recast. Savings are consistently expressed in final energy. The Croatian draft updated NECP adopts a mixed approach, including both an energy efficiency obligation scheme (accounting for about 70% of the savings) and alternative measures (about 30% of the savings). The expected contribution of each measure towards the target is quantified. However, due to the inconsistency between the expected contributions reported in the draft updated NECP text and those reported in the PAM template, it is not fully clear if the aggregated contribution is sufficient to meet the 2030 requirement. The sum of the cumulative contributions of the reported measures under energy savings obligation in the draft updated NECP document is equal to 4,245.96 ktoe. It equals to about 98% of the target calculated according to Article 8 EED recast. However, the estimate reported in the PAM template equals to 2,925.86 ktoe, which corresponds to about 68% of the target calculated according to Article 8 EED recast and to 97% of the target calculated according to Article 7 EED.

The alternative measures contributing to the achievement of the energy saving obligation are mainly **building renovation**, followed by measures aimed at increasing energy efficiency in manufacturing industries and water management. One measure consists of the implementation of the Programme for Combating Energy Poverty, which is expected to deliver cumulative savings of 78.86 ktoe over the period 2021-2030.

The draft updated NECP presents the planned measures to achieve the 2030 energy efficiency targets, as well as the energy savings expected from the energy efficiency obligation scheme, financing programmes targeting energy efficiency in buildings, measures addressing energy efficiency of public assets, and measures aiming at increasing the efficiency of the electricity transmission and distribution grid.

Croatia's draft updated NECP represents a continuation of the 2019 NECP framework also in terms of planned measures and envisaged **sources of funding support**, with some limited exceptions (measures addressing energy efficiency and on-site RES in the business sector and manufacturing industries). There is no indication of additional new planned measures to be adopted.



The envisaged measures address the **need to increase energy efficiency** across the whole energy system and the economy. The largest impact to deliver on the 2030 energy efficiency target are expected from the Croatian energy efficiency obligation system (652 ktoe), followed by the measures addressing energy efficiency in buildings (151.5 ktoe) and measures addressing energy efficiency of public assets (65.5 ktoe). The new measures addressing the efficiency of the energy transmission and distribution system, the heating system, and the business sector and manufacturing industries are very welcomed. However, the measures would need to be further detailed in terms of policy impacts (expected savings) and financing sources. There is in fact the potential to increase the efficiency of **heat and power generation** and distribution, as well as to optimise energy consumptions in the business sector and manufacturing industry.

The draft updated NECP does not raise the ambitions of the 2020 **long-term renovation strategy** (LTRS). The 2020 LTRS reports a gradual increase of renovation rate targets through the period 2021-2030 to 2% with a ten-year average rate of 1.6% (from 0.7% per year in 2020) and targets of 3.5% in 2040 and 4% by 2050. Indicative targets and milestones from the previous LTRS are expressed in terms of square meters of renovated buildings (total/residential/non-residential) and as renovation rate per year, although further clarity on unit measures and on how indicators are obtained is needed.

The draft updated NECP includes four **economic measures targeting building renovation** (of apartment buildings, family houses, public buildings, buildings with status of a cultural property) and one information/education measure on skills in the context of the just transition. Although those measures were already included in the NECP 2019, the estimated cumulative savings reported in the current draft updated NECP are higher, particularly for the renovation programme of family houses, whose estimated cumulative savings have almost doubled. It must be noted that the savings reported for each of these measures are indicative and will be specified in other relevant documents. The draft updated NECP lacks clear linkage to the energy poverty programme.

### 3.3 Energy security dimension

Fossil fuels still play quite an important role in the Croatian energy mix, as in 2021 they still accounted for 67% of the gross available energy<sup>11</sup>, which is slightly lower than the EU average. According to the draft updated plan, this share is expected to marginally decrease to 65% by 2030. Croatia has an overall **high energy import dependency on third countries**, which has slightly increased from 38% in 2013 to 43% in 2021<sup>12</sup>.

Energy security is notably addressed by the Energy Development Strategy, with a particular emphasis on the deployment of renewable energy sources. The draft updated plan sets four main national energy security objectives: (i) diversification of supply routes of energy and energy-generating products; (ii) increased gas and electricity storage capacities; (iii) increased flexibility (and thus resilience) of energy systems; and (iv) protection of critical infrastructure. The structural reduction of fossil fuel demand, and in particular gas demand, is not mentioned. The draft updated NECP does not report details on the strategy for the exploitation of the nuclear power reactor based in Slovenia, on

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<sup>11</sup> Eurostat data.

<sup>12</sup> Eurostat data

measures taken to diversify and address long-term supply of nuclear materials, fuel, spare parts, and services, and on possible future role of nuclear power in its energy mix.

**Gas** plays quite an important role in the Croatian energy system, accounting for 28% of the energy mix and 20% of the electricity mix, slightly above the EU27 average<sup>13</sup>. Croatian gas import dependency on third countries has increased sharply from 31% in 2013 to 74% in 2021<sup>14</sup>. In 2020, there were no direct imports from Russia, as gas was imported mainly through intra-EU trade.<sup>15</sup> Croatia is currently supplied with gas from domestic production and from imports through the Slovenian and Hungarian delivery routes, and through the Krk LNG terminal. Croatia is notably dependent on gas for its heating<sup>16</sup>. Peak demand is addressed through supply from the Okoli underground gas storage capacity.

According to the draft updated NECP, **domestic natural gas production** is expected to increase from less than 800 mcm in 2023 to more than 900 mcm in 2030, before decreasing towards 200 mcm by 2050. The draft updated NECP convincingly outlines policies and measures to improve security of gas supply, such as the increase of the Krk LNG terminal regasification capacity from 2.9 bcm to 6.1 bcm, the construction of new interconnections notably with Hungary and Slovenia, the building of new underground storage (no estimation of the capacity is provided), and the exploration for new hydrocarbons deposits to increase domestic production. The draft updated plan also mentions a 47.1% target for renewables deployment in the heating and cooling sector as well as the **phasing-out of fossil fuels** use in individual thermal systems. This is notably carried out through the development of an action plan with a timetable for the prohibition of individual heating and cooling systems using fossil fuels. All in all, the draft updated NECP quite convincingly sets out policy targets and measures to enhance Croatia's security of gas supply.

In reaction to the invasion of Ukraine, Croatia managed to reduce its gas consumption by 17% during the period between August 2022 and August 2023, compared with the average of the previous five years<sup>17</sup>, above the -15% indicative target but slightly below the EU27 average (-18%). However, the draft updated plan does not refer to measures adopted in the framework Council Regulation (EU) 2022/1369 on **coordinated demand-reduction measures** for gas, nor to how these measures are integrated into the medium-term planning towards 2030. In addition, natural gas consumption is expected to remain broadly stable towards 2040. In contrast to the description of the electricity sector, the draft updated plan does not contain details about the expected trends for the gas sector. Lastly, the draft updated plan does not provide an objective for a phase-out of Russian gas.

As regards the **electricity** sector, the draft updated NECP describes the ambition to increase gas and electricity storage capacities, protect critical infrastructure and mitigate risks related to cyber security. Croatia has a target to increase the share of renewables in the energy mix along with a number of other goals, such as support for investments in new

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<sup>13</sup> Energy mix figures from the [https://energy.ec.europa.eu/data-and-analysis/eu-energy-statistical-pocketbook-and-country-datasheets\\_en](https://energy.ec.europa.eu/data-and-analysis/eu-energy-statistical-pocketbook-and-country-datasheets_en).

<sup>14</sup> Eurostat data.

<sup>15</sup> Eurostat data.

<sup>16</sup> European Commission, [https://economy-finance.ec.europa.eu/system/files/2023-05/HR\\_SWD\\_2023\\_611\\_en.pdf](https://economy-finance.ec.europa.eu/system/files/2023-05/HR_SWD_2023_611_en.pdf)

<sup>17</sup> DG ENER Chief Economist data, based on ESTAT NRG\_CB\_GASM (sub-series IC\_CAL\_MG subtracted by TOS) in TJ (as of 29 September 2023, 11:00).

electricity generation facilities, the implementation of energy efficiency measures or construction of distributed power sources with a medium-voltage and low-voltage grid connection near the point of consumption. These goals, if effectively implemented, are expected to increase the **resilience of the electricity sector** by reducing dependency on single sources and on imports. The plan foresees financial investments of more than EUR 33 million for construction and use of storage facilities (batteries, energy and heat tanks); EUR 400 million to improve electricity system management, including through digitalisation, in order to support the integration of renewable energy; and another EUR 400 million committed to the development and maintenance of the district heating system. On power storage, however, the draft updated plan does not provide an overarching target, while the previous version did mention a target of 150 MW. According to a study on storage commissioned by the European Commission, the current operational Croatian power storage capacity is around 1 020 MW (mainly pumped hydro) while the main barrier identified was the lack of a common definition of energy storage in the regulatory framework<sup>18</sup>.

The share of **oil and petroleum products** in the primary energy mix decreased from 38% in 2015 to 34% in 2021<sup>19</sup>. Croatia produces oil and the import dependency on oil and petroleum products is stable at 79% in 2021 (main suppliers were Azerbaijan, Nigeria, Libya in 2021). Regarding oil security of supply, the country has direct access to the sea with oil terminals, a refinery, a connection by pipeline to Hungary and Serbia and is consistently well-above the EU requirements on emergency oil stocks.

The draft updated NECP plans to reduce **oil dependence** by decreasing consumption and increasing domestic oil extraction. Oil is expected to remain a substantial part of Croatia's energy mix by 2030 (24-32%<sup>20</sup> of the energy mix) and could decrease substantially by 2040 (10-24%) due to electrification and a broader use of biofuels. No detailed assessment of the adequacy of the oil infrastructure (oil stocks, refinery, ports, pipeline) is carried out within the context of expected oil demand decline and the move toward biofuels.

Croatia has also set a specific target to achieve resilience and reduce cybercrime, among other objectives. The protection of **critical infrastructure** against climate change risks is mentioned as an objective, but the draft updated plan does not refer to specific measures. This would, however, be particularly relevant with regard to hydropower output, with Croatian hydropower capacity at 2 200 MW in 2021 (producing 6.8 TWh), and the plan expecting capacity to rise to 3 800 MW by 2040<sup>21</sup>. The draft updated plan does not address the strategic autonomy in the industrial value chains for the energy transition (in particular for critical raw materials).

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<sup>18</sup> This figure is derived from the database which accompanied the ENTEC study on Storage funded by the European Commission and published in November 2022, by taking into account only the “operational” facilities: [https://op.europa.eu/en/publication-detail/-/publication/dfcaa78b-c217-11ed-8912-01aa75ed71a1/language-en?WT\\_mc\\_id=Searchresult&WT\\_ria\\_c=37085&WT\\_ria\\_f=3608&WT\\_ria\\_ev=search&WT\\_URL=https%3A//energy.ec.europa.eu/](https://op.europa.eu/en/publication-detail/-/publication/dfcaa78b-c217-11ed-8912-01aa75ed71a1/language-en?WT_mc_id=Searchresult&WT_ria_c=37085&WT_ria_f=3608&WT_ria_ev=search&WT_URL=https%3A//energy.ec.europa.eu/)

<sup>19</sup> Energy mix figures from the [EU energy statistical pocketbook and country datasheets \(europa.eu\)](#). Import sources and import dependency by Eurostat.

<sup>20</sup> Depending on whether additional measures are taken or not.

<sup>21</sup> Eurostat data.

The draft updated plan adequately describes detailed measures in the event of security of supply crisis for the gas sector, as defined in the national Emergency Plan. However, Croatia has still not submitted its updated **National Risk Assessment** which was due by 1 October 2022, as well as their updated Preventive Action Plan and Emergency Plan which were due by 1 March 2023. However, the Common Risk Assessment for the Ukraine, Caspian, Libya and Algeria risk groups were submitted and are currently being assessed by the European Commission.

### 3.4 Internal energy market dimension

Regarding **infrastructure**, the transmission system in the territory of the Republic of Croatia already reports meeting and exceeding that target related to the desired level of **electricity** interconnection of at least 15% compared to installed power of power plants by 2030 (2.4.1.i). The development of new interconnection projects will be based on technological and economic considerations and on cost-benefit analysis. The draft updated NECP also confirms that the existing interconnection capacity is adequate to the expected changes in the electricity system in view of the share of renewable energy. Further efforts are planned to maintain reliability and enhance the use of existing cross-border lines.

Croatia has already good interconnection with neighbouring power systems, but further expansion of interconnectors, in particular with Bosnia and Herzegovina are considered. Reinforcements of the internal grid are also planned to address the expected accelerated integration of renewables and energy transition.

Regarding **natural gas** the plan reflects the projects identified in the REPowerEU plan Annex II that is the expansion of the LNG terminal in Krk and the necessary reinforcements of the transmission grid towards Slovenia and Hungary. Further diversification of gas supply is to be also ensured by another project which was not included in REPowerEU plan that is the construction of the Ionian-Adriatic gas pipeline for the supply of gas from the Caspian region or the eastern Mediterranean. Export of gas are to be supported with gas interconnectors to Bosnia and Herzegovina.

The draft updated NECP indicates that the newly constructed gas transmission projects will be able to **transport hydrogen** including cross-border interconnections. However, the draft updated NECP lacks information on specific infrastructure investment to enable the penetration of hydrogen to the market, as well as planned timeline to deploy these infrastructures. The draft updated NECP projects to increase the transmission capacity of hydrogen by more than 10% for all repurposed or newly built H2 interconnections, but it does not specify how Croatia intends to ensure consistency with the maximum cross-border blending capacity under the hydrogen and decarbonised gases package, expected to be adopted by end of the year by the co-legislators with a maximum 2-3% range, without hindering the internal market. Moreover, the draft updated plan envisages a EUR 54 million project to enable, until the stage of complete transition to 100% hydrogen transport, the transport of other mixed renewable gases such as biomethane, in different percentages. Notwithstanding, the draft updated NECP does not clarify how Croatia will implement the separate pipelines system for hydrogen on the one hand and for decarbonised gases on the other, as foreseen in the hydrogen and decarbonised gas package.

In regards to the increase of the renewable energy target, and the need to enable the consumers to rapidly reap the benefits of it, Croatia's draft updated NECP provides key policies and measures needed to **incentivize demand response by providing an overview**

**of the flexibility needs**, not very detailed though. Nevertheless, in most of the cases the objectives do not set clear milestones to reach the stated objectives. Regarding storage, the plan sets a line of action to promote storage systems, in both gas and electricity sectors. Although the plan identifies amounts and funding sources, it does not set a clear deadline for having this strategy implemented, and it remains very general in relation to the measures and programmes supporting the development of storage. The draft updated NECP seems to contain few measures to engage the system operators in facilitating the penetration of **flexibility services** with several pilot projects announced to encourage aggregators, ancillary services and deployment of advanced metering devices.

Croatia has not yet assessed the number of households in **energy poverty** but plans to develop a "Program for elimination of energy poverty" (2024) which will define it, assess its scope, propose measures and indicators. The draft updated NECP refers to four measures addressing, in full or in part, energy poverty both in the energy efficiency and internal energy market dimension. The programme to address energy poverty through the renovation of residential buildings is the only measure expected to generate cumulative energy savings in vulnerable households (up to 78,9 ktoe by 2030) but it concerns less than 1000 buildings in the period 2023-2027. With regards to measures linked to the renovation of multi-apartment buildings and single-family houses, there is no indication of expected energy savings in vulnerable households, but both financing programmes seem to envisage a dedicated envelope to support the vulnerable households, specifically. Croatia has developed a system of vouchers targeting vulnerable customers financed directly from the bills of other consumers. Recently, the number of eligible beneficiaries and the voucher amount have been increased.

Furthermore, there is no reference to national objectives and a concrete timetable to develop the specific measures announced as well as the link between energy efficiency and social policies and measures. The description of the current situation concerning energy poverty is not detailed enough and does not explore synergies with measures to develop demand response, accelerate building renovation and energy savings in a targeted manner to have a direct effect on households on energy poverty and to empower vulnerable consumers.

### **3.5 Research, innovation, competitiveness and skills dimension**

#### *3.5.1 Research and innovation*

Croatia did not report a national target and spending for research and innovation (R&I) in specific clean energy technologies. It only referred to the overall target for research, development and innovation investments to reach 2.5% of GDP by 2025 and 3% by 2030. The measures proposed in the draft updated NECP are not specific to the energy sector and describe general initiatives<sup>22</sup> to R&I activities. Namely, they refer to the development of a monitoring system for R&I related to the Energy Union; the creation of preconditions for the implementation of R&I through strengthening of research capacities and substantially co-financing projects; and support for entrepreneurs in developing their business, via technology transfer offices, centres of excellence and capacity building. Concrete details on these means are missing.

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<sup>22</sup> <https://s3platform.jrc.ec.europa.eu/s3-for-sdgs-in-croatia>.

Overall, the draft updated NECP is not energy specific and a national target and spending for R&I in clean energy technologies is not clearly stated. Croatia has also not set a concrete ambition for **R&I in clean energy technologies**, nor provided any information about its pathways to 2030 and 2050 decarbonisation goals.

On top of this, there is no detailed information about the investments already implemented or foreseen in the future for the manufacturing of key components and equipment for net-zero technologies. If there is no domestic production, there is no detailed information on how Croatia will ensure the resilience of its supply chains to reach its energy and climate targets.

Croatia's draft updated NECP does not provide sufficient information to evaluate the level of **regional cooperation in R&I** in clean energy technologies. The SET plan is mentioned but mainly in relation to a workshop carried out in 2019. The plan does not elaborate on the impacts and follow up actions of the SET plan activities. Other formats of international collaboration are listed without further detail, i.e., IEA, ETIPs, EERA, Horizon Europe, Eureka, etc. Transfer of know-how with other EU Member States and stakeholders is not addressed in detail.

### *3.5.2 Competitiveness*

Croatia's draft updated NECP provides only superficial information with regards to measures intended to support research, innovation and investments in manufacturing and scaling-up of commercially available clean energy technologies, equipment and components. Although the draft updated plan mentions job potential in coastal and rural areas in the bioeconomy and circular economy sectors, it falls short of including any concrete measures. The draft updated NECP states that Croatia currently "has no defined national goals for competitiveness related to the Energy Union". The plan does not report any specific measures, targets, budgets, priority areas or useful examples for Croatian competitiveness.

Croatia did not provide information about the investments already implemented or foreseen in the near future for the manufacturing of key components for net-zero technologies and for the deployment of net-zero technologies in the different industrial ecosystems and, how it will ensure the resilience of its supply chains to reach its energy and climate targets. Similarly, the plan does not integrate the notions of recyclability and circularity and the need to reduce dependency, and effectively diversify the sourcing of imported raw materials, components required to manufacture clean energy technologies.

The draft updated NECP does not provide information on measures and investments related to the Digitalisation of the Energy System EU Action Plan in order to make their energy system more digital.

### *3.5.3 Skills*

The draft updated NECP mentions job potential in coastal and rural areas in the bioeconomy and circular economy sectors but falls short of including any measures. Overall, the plan lacks information on skills from the R&I, digitalisation of energy and competitiveness angle in terms of possible skills gaps identified, national objectives, targets, measures and investments which could boost European competitiveness in clean energy technologies, equipment and components, connecting for instance with the SET

plan revision, relevant European Year of Skills initiatives, Pact for Skills large scale partnerships, and the New Innovation Agenda.

## 4 JUST TRANSITION

Just transition aspects are addressed in the draft updated NECP in a very limited manner. The plan does not quantify social, employment and skills impacts of the energy and climate transition, including distributional effects on vulnerable groups, and lacks strategies to address these. Also, the draft updated NECP does not provide sufficient information for the preparation of the Social Climate Plan, as assessed in Chapter 7.

Furthermore, the transition away from coal and transformation of carbon intensive industries in the two regions currently benefiting from the Just Transition Fund (JTF) is not reflected in the draft updated NECP. The draft NECP does not include any information on the commitment made in the adopted Territorial Just Transition Plan (TJTP) to phase out coal use in the Plomin power plant in Istria by 2033 at the latest. On the contrary, it seems to consider continued use of the only coal power plant until 2040 (based on projections for energy grid requirements and higher shares of coal-powered energy consumption in both 2030 and 2040), which puts into question the measures planned in the TJTP.

Measures supporting access and preservation of **employment** and access to affordable and **inclusive education, training and life-long learning** are overall not included in the draft updated plan except a measure co-financed by the Recovery and Resilience Facility (RRF) which aims to develop a framework for skills in the context of green jobs required for building renovations. **Tax benefit and social protection** systems in the context of the transition are also not covered in the draft updated plan. Some measures exist to protect consumers (switching information, informative calculation, provision of individual meters to end consumers) which are part of the implementation of the Directive (EU) 2019/944 on common rules for the internal market for electricity. While the draft updated NECP aims to empower consumers through three programmes focusing on demand response, active participation of customers, and advanced metering and data management, these have not been assessed. With regards to energy poverty, there is some work ongoing but, as assessed in Chapter 3, more needs to be done. Finally, the draft updated NECP does not detail the resources specifically devoted to supporting the just transition.

## 5 REGIONAL COOPERATION

Croatia's draft updated NECP does not refer to the non-binding agreement on goals for offshore renewable generation for the South and East offshore grid priority corridor nor the upcoming offshore network development plan. The draft updated NECP also does not include a measure or initiative under some of the available **cooperation mechanisms in the area of renewables**, including in the margins of the regional fora, such as the political high-level groups. With respect to infrastructure issues and projects, the draft updated NECP does not refer to the regional cooperation in the context of the Central and South

Eastern Europe Energy Connectivity (CESEC) group, even if Croatia has been an active member and a beneficiary of this cooperation.<sup>23</sup>

Croatia has signed one solidarity arrangement for the security of gas supply with Slovenia out of the three it is required to sign (the two remaining ones are with Italy and Hungary). The draft updated NECP does not describe efforts in this field to improve the coordination from a security of supply perspective with neighbouring countries.

## **6 INTERNAL COHERENCE AND POLICY INTERACTIONS WITHIN THE DRAFT UPDATED NECP**

The draft updated plan reflects **key synergies** within and between the five dimensions of the Energy Union, including the increasing flexibility of the electricity system, penetration of renewable energy and measures on energy efficiency. Generally, the policies and measures presented in the plan are quite detailed, consistent and appear well aimed to achieve their objectives. However, the draft updated plan lacks a more thorough analysis of the consistency of policies and measures with the targets and a quantitative analysis of their impacts and interactions. In addition, a comprehensive analysis of the environmental, social and economic impacts is not included in the draft updated plan.

The draft updated NECP covers relatively well the security of supply, diversification, major infrastructure and cyber security explaining the current situation, identifying areas of improvement and providing policies and measures to address these. Information on the resilience of critical infrastructures, notably water scarcity, and the resilience of supply chains of critical raw material, especially in the face of climate impacts, is not very elaborated.

## **7 STRATEGIC ALIGNMENT WITH OTHER PLANNING INSTRUMENTS**

**Croatia formally submitted a modified RRP and REPowerEU chapter to the Commission on 31 August 2023.** The REPowerEU chapter submitted covers measures related to energy security, uptake of renewable energy sources, energy efficiency of buildings, transport and fossil-free hydrogen. Under the REPowerEU chapter and based on Article 21c of Regulation (EU) 2021/241, Croatia included 11 investments, of which three transferred from the original RRP based on Article 21c(2) of Regulation (EU) 2021/241, three scaled-up and five new, as well as five reforms, of which four scaled-up and one new. The draft updated NECP includes or refers to 27 out of the 61 climate relevant measures in the RRP (of the 61 climate relevant measures, 25 have 40% climate tracking, and 36 have 100% climate tracking), covering 39 RRP investments. Overall, 14 out of the 36 measures that have 100%-climate tracking are poorly or not at all reflected in the draft updated NECP.

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<sup>23</sup> Four high level groups have been set up by the European Commission to provide strategic steering and policy guidance on regulatory and infrastructure development and to monitor progress of projects of common interest in priority regions. They include: The North Seas Energy Cooperation (NSEC); Interconnections for South-West Europe; Baltic Energy Market Interconnection Plan (BEMIP); Central and South Eastern Europe energy connectivity (CESEC).



The draft updated NECP is partially consistent with the national **RRP**. It covers well the main reforms and investments that contribute to implementing the objectives, targets and contributions in the RRP components on energy, transport and renovation of buildings. However, the draft updated NECP for Croatia does not outline the main reforms and investments that contribute to implementing energy and climate relevant the objectives, targets and contributions, in other RRP components, such as those related to agriculture, tourism or employment.

In addition, some measures lack granularity and detail to allow for a full comparison with those in the RRP. This is the case for “Co-financing program for the purchase of new vehicles on alternative fuels and development infrastructure for alternative fuels in road traffic” and “Encouraging the development of energy-efficient maritime and inland transport navigation”, where RRP is mentioned only as one of the sources of financing, but without a specific reference to the RRP measures. Some of the measures in the draft updated NECP do not make specific reference to the RRF funds as a source of financing, namely the measure related to the development of the gas transmission system, nor do the measures related to the improvement of the electricity system management.

Some measures covered also seem to show inconsistencies with those in the RRP. This is the case for the measure establishing a platform for the collection, use and storage of CO<sub>2</sub>, which refers to CCS projects in the RRP that were removed and replaced with a set of studies on potential for geological CO<sub>2</sub> underground storage in Croatia in the modified RRP and REPowerEU chapter endorsed by the Commission on 21 November 2023.

The draft updated NECP mentions some policies and measures with impact on air quality pollutant emissions, but without any detailed assessment. The impact of planned policies and measures on the main air pollutants for which Directive 2016/2284 sets emission reduction commitments is not quantified and it is not clear how the draft updated plan is aligned with the **National Air Pollution Control Programme (NAPCP)**.

The draft updated plan is not consistent with the **Territorial Just Transition Plan (TJTP)** with regards to the coal phase-out timeline as there is no reference to the commitment made in the adopted TJTP for Istria to phase out coal in its only coal powered plant by 2033, at the latest. It also projects a higher share of coal-powered energy consumption in both 2030 and 2040 than the TJTP. On the other hand, it is more ambitious with regards to the share of renewable energy.

Croatia’s draft updated NECP does not provide an adequate analytical basis for the preparation of the **Social Climate Plan (SCP)** that will address the impacts of the new emissions trading system for fuel combustion in buildings, road transport and additional sectors (ETS2) on vulnerable households, transport users and micro enterprises. Croatia has not yet assessed the number of households in transport poverty and has not provided the methodology and indicators to identify the future recipients of the Social Climate Fund (SCF). While the draft updated plan outlines a consistent set of decarbonisation policies and measures in the buildings and road transport sectors, including some targeted at the vulnerable groups, information on the concrete reforms and policy framework for the future SCP is lacking, does not explain how the SCP will build on the NECP update nor how the consistency between the two plans will be ensured.

In the draft updated plan, Croatia does not provide the quantification of the climate impacts of measures currently included in the **CAP Strategic Plan (CSP)**, thus the plan does not explain whether the CSP is in line with the new LULUCF and ESR targets and whether additional measures are necessary.

Compared to the **National Adaptation Strategy (NAS)**, the draft updated NECP is less detailed and less ambitious on the respective actions.

In the draft updated NECP, Croatia addresses the **2022 and 2023 country-specific recommendations** to diversify its energy mix and reduce its dependency on fossil fuels by taking specific actions such as shortening and simplifying permitting procedures to accelerate the deployment of renewables and pursuing efforts on energy efficiency including on manufacturing processes and the decarbonisation of industry.

## **8 FINANCING THE ENERGY AND CLIMATE TRANSITIONS**

### **8.1 Investment needs**

The draft updated NECP includes partial information on the expected investment necessary to implement the planned policies and measures. This information is provided using a top-down approach for economic analysis that provides a breakdown of investment needs by specific sectors of the energy system for the periods 2024–2030 and 2031–2050. The draft updated NECP also includes non-energy sector information on emissions, such as agriculture.

Overall, from the information provided it is not possible to estimate the **investment gap**. The draft updated NECP is complemented by a bottom-up approach with information provided on the funds needed for most implementing policies and measures included in the draft, but it is not clear whether the policies and measures include both public and private funds. The draft updated plan provides a very detailed quantitative analysis for gas projects and a generic figure for total investment in the transmission grid and renewables but it does not provide a general quantitative overview of investment needs across the five dimensions of the Energy Union. The information is missing in particular for innovation, competitiveness and skills, the land use, land-use change and forestry sector, energy efficiency and the internal energy market. It is also missing for several measures in other policy areas as it is indicated that the investment needs are expected to be detailed at a later stage.

### **8.2 Funding sources**

The draft updated NECP outlines the main sources of financing for the vast majority of the 105 measures except for the dimension on research, innovation, competitiveness and skills. A large variety of sources are to be used including EU funding programmes (such as RRF, ERDF, JTF, CF, InvestEU, Innovation Fund, and Modernisation Fund), national, regional and municipal sources as well as development banks (EIB, EBRD and World Bank) and private sources. However, the contribution of the different sources is not explained, and descriptions remain generally qualitative in nature. An overview table gathering all the budgetary information is missing. The draft updated plan does not provide an assessment of the impact on the public budget, it is not clear how public spending would be financed,

but the need for co-financing from private funds and international sources of financing is acknowledged.

The contribution of the RRF is not fully reflected in the draft NECP as some RRP measures are missing. This should be addressed. Furthermore, it would be useful to provide a quantitative indication of the contribution of the RRF to the expected public financing needs to implement the policies and measures of the draft NECP.

## 9 ROBUSTNESS OF THE ANALYTICAL BASIS OF THE DRAFT UPDATED NECP

The draft updated NECP analyses the impact of both WEM and WAM scenarios, with detailed projections for the relevant sectors of the economy, including industry, the energy system and transport. The analysis of the energy sector is based on the LEAP tool<sup>24</sup> complemented by simulations with the energy market model PLEXOS to optimize the electricity and district heating networks. The methodology and the assumptions used in the modelling are presented in detail for the energy sector, but for the other sectors the methodology behind the projections is not explained.

The WEM scenario covers the five dimensions of the Energy Union and reports most of the required variables. Projections are presented up to 2040, occasionally up to 2050 and in some cases up to 2030. The WAM scenario assesses the impacts of planned policies and measures by comparing systematically the projections to the WEM scenario. Both WEM and WAM projections present GHG emissions according to an ETS/ESR split; however, for the WEM scenario not in Section 4, but in Section 5. The new ETS for buildings, road transport and additional sectors (ETS 2) has not been considered in projection scenarios.

The analysis is based on **macroeconomic and energy data** (incl. population, GDP, total final energy consumption, total primary energy consumption, total RES share, etc.) that are close to official EUROSTAT data. The projections are mostly based on the parameters recommended by the Commission (e.g., for international fuel prices). GDP is based on 2021 data published by the Croatian National Bank and projected real growth rates. The draft updated NECP is complemented by tables reporting details of the WEM and WAM projections (e.g., an energy balance for 2021 and 2030 in the WEM scenario and GHG trajectories in the WAM scenario). The plan states that the projection of final consumption of all forms of energy was made using a bottom-up approach, using the end-use modelling technique in LEAP. It is not clear whether a bottom-up or top-down approach was used for the other sectors.

The draft updated plan does not include a quantitative analysis of the expected impacts of targets and policies on health, air pollution, water, biodiversity or the environment in general. It contains a macro-economic assessment which provides some useful information. While the methodology is overall clear it is not very detailed and lacks robustness. The analysis only captures the impact of higher investment on GDP and employment using static input-output coefficients, but there is no discussion of the welfare costs in terms of lower consumption to achieve this transition.

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<sup>24</sup> Heaps, C.G., 2021. LEAP: The Low Emissions Analysis Platform. [Software version: 2020.1.54] Stockholm Environment Institute. Somerville, MA, USA. <https://leap.sei.org>.