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Assessment of the draft updated National Energy and Climate Plan of Denmark

Accompanying the document

COMMISSION RECOMMENDATION

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

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Contents

1 SUMMARY

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

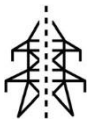
The European Green Deal, the fast-evolving geopolitical context and the energy crisis have led the EU and its Member States to accelerate the energy transition and set more ambitious energy and climate objectives. These include objectives to diversify energy supplies. These developments are reflected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

Denmark's draft updated national energy and climate plan ('the draft updated NECP' or 'the plan'), submitted on 29 June 2023, partially takes into account this new geopolitical and legislative framework.

Table 1: Summary of key objectives, targets and contributions of Denmark'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 compared to 2005 under the Effort Sharing Regulation (ESR) (%)		2021: -20.4% 2022: -20.8%[1]	-50%	NECP: -39.5%
	Binding target for net greenhouse gas removals under the Regulation on Land Use, Land Use Change and Forestry (LULUCF)		Reported net emissions of 2420 kt CO_2 eq. in 2021	-441 kt CO_2 eq. (additional removal target) 5338 kt CO_2 eq. (total net emissions)	Insufficient ambition. DK not projecting to reach the 2030 target
	National target/contribution for renewable energy: Share of energy from renewable sources in gross final consumption of energy (%)	31.7% (SHARES) 30% (target)	34.7% (2021 Eurostat SHARES) 45.6% (2022 draft NECP)	70.9%	DK contribution of 70.9% is significantly above the 60% required according to the formula set out in Annex II of the Governance Regulation.

[1] 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.

	National contribution for energy efficiency:				
	Primary energy consumption	17 500 Mtoe	16 372 ktoe	16 700.94 ktoe (no target but WEM forecast)	DK primary energy consumption projection is 16 701 ktoe. EED recast Annex I formula results: 15 524 ktoe
	Final energy consumption	15 200 ktoe	13 800 ktoe	14 198.7 ktoe (no target but WEM forecast)	DK final energy consumption projection is 14 199 ktoe. EED recast Annex I formula results: 13 730.1 ktoe
	Level of electricity interconnectivity (%)	51%	41.3%	15%[2]	

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

1.2 Summary of the main observations[3]

The draft updated plan refers to the revised energy and climate targets recently agreed under the **Fit for 55** package and the **REPowerEU plan** but does not convince on how climate these targets will be reached. Policies and measures across dimensions are not always sufficiently described in terms of their scope, timing and expected impacts while actions are lacking in some dimensions.

Regarding the **reduction of greenhouse gas emissions under the Effort Sharing Regulation** (ESR), the plan provides emission projections demonstrating that with existing policies and measures Denmark is not on track to meet its national greenhouse gas target of -50% in 2030 compared to 2005 levels. According to Denmark's projections, there is gap of 10.5 percentage points, highlighting the need for more ambitious climate action. Denmark did not provide ESR projections for the with additional policies and measures (WAM) scenario.

On **Land Use Land Use Change Forestry** (LULUCF), the draft updated projections in the plan indicate that Denmark 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

[2] Calculated by the European Commission based on the ENTSO-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 also covers interconnectors with the neighbouring countries outside the EU.

[3] 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.

provide a clear implementation timeframe nor quantification of the impacts of specific policies and measures. It also lacks information on the status and progress in ensuring higher tier levels and geographically explicit datasets needed to ensure the robustness of net removal estimates.

On **Carbon Capture Utilisation and Storage** (CCUS), the plan identifies annual CO_2 emissions that can be captured starting from 2025, however no split into ETS and non-ETS sources has been provided. The draft updated plan mentions an analysis that has identified the estimated geological CO_2 storage capacity of eight provisionally identified structures. The information on the process for assessing the volumes of CO_2 emissions to be captured and the potential storage capacity is not always very detailed. With regards to transport, it is mentioned that various modalities of transport are currently under consultation.

The draft updated plan reflects **partial progress towards international commitments under the Paris Agreement.** While Denmark confirms its objective to phase-out coal in the electricity sector by 2030, it does not address how and when fossil fuels subsidies will be phased out.

Regarding **adaptation to climate change**, the draft updated NECP does not contain adequate analysis of the relevant climate vulnerabilities and risks to the achievement of national objectives, targets, and contributions and the policies and measures in the 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 or quantified. Adaptation policies and measures to support Denmark´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. For instance, there is no reference to innovative approaches such as insurance policies and fiscal measures addressing the climate protection gap.

For **renewable energy**, the draft updated plan puts forward a contribution for a share of 70.9% of the country' gross final energy consumption by 2030, which is significantly above the share of 60% 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'). Overall, the draft plan includes specific trajectories for renewables in the electricity, transport, heating and cooling sectors but does not provide the trajectories for buildings and industry. The plan does not provide any details on renewable fuels of non-biological origin (RFNBOs). It provides a good level of detail regarding Denmark's upcoming renewable energy projects and joint cooperation with other Member States in particular. Denmark indicated that it will take into account Directive (EU) 2018/2001 on the promotion of energy from renewable sources as amended by Directive (EU) 2023/2413 ('revised REDII') in its final updated plan.

On **energy efficiency**, the draft updated NECP is a very preliminary update of the 2020 plan. Several key elements are missing such as the 2030 energy efficiency targets and the expected impact of measures in terms of energy savings. The plan reports that information on the missing key elements will be included in the final version of the NECP in 2024, following the publication of the Directive (EU) 2023/1791 on energy efficiency and amending Regulation (EU) 2023/955 ('EED recast'). Considering that this key information is missing, a comprehensive assessment of the plan, including its level of ambition and coherence, cannot be completed.

In relation to **buildings**, the draft updated NECP does not update the ambition of the 2020 long-term renovation strategy (LTRS) in relation to targets and indicators such as building renovation targets, energy savings and CO_2 emission reduction. The 2020 LTRS already lacked targets for the 2030. The draft updated NECP only lists a series of measures without quantifying their impacts in terms of energy savings. The plan refers to a roadmap that will contribute to the achievement of a decarbonised building stock by 2050 but without giving sufficient information to assess it. The draft updated plan indicates that more accurate information will be included in the final version of the updated NECP in 2024.

As for the **energy security** dimension, the draft updated plan convincingly sets out measures to enhance the security of gas, oil and electricity supply. In particular, fossil **gas** consumption will be completely replaced with biogas by 2030. The plan does not sufficiently demonstrate how emergency measures adopted in response to the unprovoked and unjustified Russian invasion of Ukraine, in particular with regard to gas demand reduction, are integrated into the medium-term planning towards 2030.

The draft updated NECP contains few details on efforts undertaken to phase out Russian **oil** and does not assess the adequacy of the oil infrastructure (refinery, oil stocks) with the expected oil demand decline and the move toward lower-carbon alternatives. The draft updated plan does not include a target for energy storage, which will become essential to ensure the reliability of the grid given the increase in intermittent energy sources in electricity generation in the near future.

On the internal market dimension, Denmark is exemplary with regards to electricity interconnection, with the current interconnectivity level already significantly exceeding the EU target for 2030. Looking ahead, Denmark sets the priority to maintain and increase interconnectivity through projects coordinated with neighbouring countries. Denmark continues to develop an integrated and competitive energy market to support the high integration of renewables, flexible resources on both the consumption and production sides, facilitation of entry for new players and technologies and sector coupling.

Energy poverty is addressed via social policies through direct income support measures and targeted social services. The draft updated NECP indicates an engagement to launch work that will tackle energy poverty in line with the recent EU legislative developments in this field.

The **research, innovation, competitiveness and skills dimension** in the draft updated NECP is well developed, containing targets, a timeline and funding as well as relevant information on regional cooperation, competitiveness and digitalisation. However, the draft updated plan did not provide a breakdown of research and innovation (R&I) funding per public and private investors. It also does not set a share of green R&I compared to the overall R&I targets and funding. The plan provides limited information on the investments needed for the manufacturing of key components and equipment for net-zero technologies and on how Denmark will ensure the resilience of its supply chains. The draft updated NECP does not include information on potential skills shortages in strategic subsectors and does not elaborate in detail on measures to address these.

Just transition is only partially addressed in the draft updated NECP. Overall, there is little analysis of the social, employment and skills impacts, including distributional impacts, of the climate and energy transition. While an overall strategy is lacking with regards to policies and measures to address these issues, the plan does describe some actions promoting education and upskilling, as well as social measures supporting the most

vulnerable groups. The plan does not detail the resources dedicated for supporting a just transition. Finally, it does not provide sufficient information for the preparation of the Social Climate Plan or on how the consistency of the two plans will be ensured.

As regards its **strategic alignment with other planning tools**, the draft updated NECP appears consistent with the **recovery and resilience plan (RRP)** with extensive references to the latter in throughout the text. The amended RRP and REPowerEU Chapter were submitted by Denmark on 31 May 2023 and will be integrated in the final NECP.

The measures in the draft updated plan address the 2023 **European Semester country specific recommendations**, in particular with regard to enhancing diversification and reducing dependence on fossil fuels by taking specific actions such as shortening and simplifying permitting procedures to accelerate the deployment of renewables and pursuing efforts in energy efficiency including in manufacturing processes and the decarbonisation of industry.

The draft updated plan does not include information on expected **investment needs** to implement the planned policies and measures. Key sources of financing are mentioned but not at the level of each planned policy and measure. For the **analytical base,** details on projections of the scenario with existing measures (WEM) are reported, but the impacts of additional measures adopted until 1 January 2024 are still missing and will be included in an upcoming analysis of impacts expected by April 2024. The draft updated NECP contains a macro-economic assessment, but it is not sufficiently developed or robust.

2 PREPARATION AND SUBMISSION OF THE DRAFT UPDATED NECP

2.1 Process and structure

The draft updated plan, including its annexes, was notified to the Commission on 29 June 2023. The draft updated plan is generally well developed and overall follows the structure provided by the Annex I template, covering all five dimensions, and including policies and measures. Some important elements are missing in the plan, however, including 'with additional measures' (WAM) projections for ESR and LULUCF targets, contributions for renewable energy and energy efficiency and information on additional measures to fulfil Denmark's 2030 targets. The plan explains that no Strategic Environmental Assessment (SEA) has been carried out, because the plan contains previously approved objectives and measures. As no new targets or policies are introduced by the plan, Denmark does not consider a SEA to be required.

The draft updated NECP describes the national context within which the draft updated plan was developed, with attention to increased energy price volatility resulting from the Russian invasion of Ukraine and the need to better protect the country from extreme weather events, notably floods.

The draft updated plan also provides evidence that, in line with the whole-of -government approach, all relevant authorities were involved to update the draft plan, taking into account synergies and trade-offs across different portfolios.

There is little evidence of a proper multilevel energy and climate dialogue during the process of updating the NECP. While the role of regions and municipalities is mentioned

in relation to the implementation of a number of policies and measures, their role in defining these seems limited to their participation via online public consultations.

2.2 Public consultation

The public participation procedure outlined in the draft updated plan raises doubts whether sufficient early public participation in the decision-making process was ensured. Denmark organised public consultations via dedicated webpages between 16 May 2023 and 6 June 2023 during which only 12 responses were submitted from NGOs, interest and trade organisations, but no members of the public. Given the low number of replies it is considered that the mechanisms to notify and reach the public in the NECP update process were insufficient.

The draft updated plan does however mention that a longer period for consultations will be ensured on the final updated plan. The draft updated NECP contains all the 12 answers to the public consultation as well as the Ministry of Climate, Energy and Utilities replies to them.

2.3 Regional consultations for preparing the draft updated NECP

There have been consultations for the preparation of the draft updated plan with neighbouring countries such as Germany, Sweden, Finland, Norway and Iceland, which took place in ad-hoc working groups. The main outcome explaining its scope and procedural aspects has not been summarised in the draft updated NECP. Denmark engaged in regional cooperation to prepare this plan with the high level group[4] North Sea Energy cooperation (NSEC) but did not specify any details on the cooperation. Denmark further reported on regional cooperation with other entities, such as the Baltic Energy Market Interconnection Plan (BEMIP), Nordic council of Ministers and Nordic Climate cooperation, but did not specify whether this cooperation was used to prepare the plan. The collaboration focused mainly on the following topics: renewable energy (in particular offshore wind), security of supply, the electricity market and CCS.

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 does not embed them.

[4] 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).

Based on the information provided in the draft updated plan, Denmark's new government intends to bring forward the climate-neutrality objective from 2050 to 2045. In the draft updated plan WEM projections are done up to 2040; there are no WAM projections. 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 23 million tonnes of CO_2 equivalent (CO_2 eq.) by 2050 based on existing measures.[5] This is equivalent to a projected reduction in 2050 of 71%, compared to 1990. In the most recent years, net GHG emissions in Denmark have declined at a pace below the EU average, mainly due to an increase in LULUCF net emissions. Despite the commitment to achieve climate neutrality by 2050, and possibly even by 2045, the information provided in the draft updated plan does not allow for a full assessment as to whether Denmark's progress is consistent with the achievement of the EU climate-neutrality objective. However, based on all the available information, progress by Denmark is likely to be consistent with the achievement of the EU climate-neutrality objective. Denmark plans to update the WEM_projections with additional measures adopted until 1 January 2024 in the final updated NECP.

The draft updated plan does not reflect the required ambition under the **Effort Sharing Regulation** (ESR), as the policies and measures in the plan do not collectively suffice to reach the effort sharing sector obligations. The ESR sets Denmark's 2030 emissions reduction target at -50% compared to 2005 levels. In the 'with existing measures' (WEM) scenario, Denmark would reduce its ESR emissions by -39.5% compared to 2005 by 2030, which is well below its ESR target. Denmark has not provided a scenario 'with additional measures' which is problematic given that Denmark is not on track to achieve its ESR target. In 2021, Denmark's ESR emissions are marginally above their Annual Emission Allocations (AEAs).

Member States have flexibilities under the ESR to comply with their targets. To assess whether Member States comply, the use of saved AEAs from previous years and the ETS flexibility if needed are taken into account. Denmark explicitly mentions in the draft updated plan that additional measures, especially in the agricultural and transport sectors, are necessary and that it considers using ESR flexibility mechanisms (excluding the purchase of emissions rights from other countries) to meet its obligations.

[5] In March 2023, Denmark did not submit GHG emission projections under the additional measure scenario.

Table 2: ESR target and projections in Denmark's draft updated NECP

ESR target and projections[6]					
	2030 target*	**2021 performance (inventory data) ***	**2022 performance (approximated data) ***	**2030 WEM projection***	**2030 WAM projection***
Denmark	-50%	-20.4%	-20.8%	-39.5%	-
EU	-40%	-14.5%	-16.9%	-27%	-32%

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

The draft updated plan does not reflect the increased ambition of the revised **LULUCF Regulation**, in particular, the 2030 national target requiring Denmark to deliver an enhancement of – 441 kt CO_2 eq. net removals. The draft plan acknowledges that existing policies and measures are insufficient in reaching the more ambitious 2030 target. According to the projections submitted, for the 2026-2030 period, Denmark will experience an accumulated reduction gap of 9.7 Mt., highlighting the need for ambitious climate action The draft plan refers to an ambitious forest plan with a target of 250,000 hectares of new forest in Denmark, however it is unclear to what extent this will contribute to achieving the LULUCF target.

It recognises the need to address agricultural emissions and introduces a binding national reduction target in the agriculture and forestry sector of 55-65% in 2030 compared to 1990 levels which equals a reduction of approximately 6 to 8 million tons CO_2 eq. However, the draft updated plan shows only a slight decrease in agricultural emissions by 2030 (25 pct. compared 1990-levels) and 29 pct. reduction by 2040 compared to 1990-level. Although some measures have been identified (e.g., introducing a carbon tax, supporting technological development, better utilisation of manure as fertiliser, rewetting of 100,000 hectares of carbon rich peat soils), it is unclear if these will be sufficient to reach the national target and no projections of their mitigation impact appear to have been included. In addition, the national reduction target covers both agriculture and forestry and does not provide any information on how these reductions will be allocated between the two sectors. As such, the draft updated plan does not set out a clear pathway to increase the contribution of the land sector to the EU's overall enhanced climate target.

The draft updated plan does not provide information on the status nor the progress to be made in ensuring higher tier levels and geographically explicit datasets, in line with the provisions under Regulation (EU) 2018/1999 for monitoring, reporting and verification (MRV).

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

[6] 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).

2050.The draft updated plan contains objectives, targets, policies and measures related to **transport decarbonisation**. There is a particular focus on launching initiatives in those sub-sectors that are deemed more likely to undergo a transformation such as: aviation, maritime and heavy road transport. Electrification and renewable fuels could eventually be a solution for some air routes, and parts of domestic maritime traffic could also be electrified. The draft updated plan also includes policies and measures for improved access to zero- and low-emission mobility, transport and vehicles. The Green Road Transport Agreement (2020) includes funding and concrete actions, which are estimated to raise the number of zero- and low-emission cars to 775,000 by 2030. The agreement provides for a reform of the car tax system to give users a greater incentive to opt for electric cars. Thus, the plan looks aligned with the provisions of the **Alternative Fuels Infrastructure Regulation**. Furthermore, the NECP refers to existing measures to support the purchase of zero-emission buses and vehicles for demand responsive transport, a passenger tax on air travel to finance domestic green aviation routes, ferry subsidy scheme to support the green conversion of domestic ferries and tolls from 2025 onwards for heavy duty vehicles varying based on CO_2 emissions.

There are measures to promote active mobility (cycling) through an investment programme for cycling infrastructure along the state road network and an advice centre on using electric bikes for the transport of goods and other commercial distribution by operators.

Furthermore, the draft updated plan briefly addresses measures for the electrification and the introduction of zero-emission technologies and related infrastructure in rail, ports and airports. In the ferry and port areas, funding will be provided to support the green transition of domestic ferries and onshore power supply, power supply for stationary aircraft at the main airports and further electrification of rail.

As regards aviation, Denmark plans to have one green domestic air route by 2025 and will ensure that all domestic flights are green by 2030. The Danish government has also reached an agreement that aims to promote green hydrogen and green Power-to-X (PtX) products (including for aviation) which includes an ambitious objective of 4-6 GW of electrolyser capacity in Denmark by 2030. This capacity will, as far as possible, be developed on market conditions and should take into account implications for security of supply. The agreement also includes several initiatives, including a PtX tender to support the industrialisation and scaling up of PtX production in Denmark up to a total value of DKK 1,25 billion.[7]

These measures support the production and deployment of **sustainable aviation fuels** (SAF) to contribute to the ReFuelEU Aviation Regulation setting harmonised Union requirements, progressively increasing over the time their use from 2% of aviation fuel in 2025, 6% in 2030 and up to 70% by 2050, and within that SAF share, a dedicated minimum share of synthetic aviation fuels starting with 1.2% in 2030 and reaching 35% in 2050. Denmark does not include specific roadmaps for the production and deployment of sustainable maritime fuels but does however plan a ferry subsidy scheme to support the green conversion of domestic ferries and onshore power supply.

The draft updated plan does not include any target on **carbon capture utilisation and storage** (CCUS). It identifies the annual CO_2 emissions that can be captured in 2025, 2030

[7] The European Commission approved the tender model on 15 February 2023 which was published on 19 April 2023.

and 2040 for the following sectors: waste incineration, heat and electricity, industry and biogas upgrade. In terms of projections of potential CO_2 capture volumes, the draft updated plan indicates that 8.9 to 17.9 Mt CO_2 will be captured annually by 2025, with CO_2 captured from biogenic sources amounting to 6.3-12.5 Mt annually. Furthermore, it is mentioned that estimates made for 2030 and 2040 are uncertain: starting 2030, the estimated capture volume is 6.9 to 13.7 Mt of CO_2 annually, out of which CO_2 captured from biogenic sources amounts to 5.1-10.1 Mt annually; starting 2040, the plan puts forward an estimation of 5.4 to 10.8 Mt of CO_2 to be captured annually, with 3.9-7.7 Mtpa of CO_2 being captured annually from biogenic sources.

No split into ETS and non-ETS sources has been provided. Bioenergy with carbon capture and storage (BECCS) and Direct Air Carbon Capture (DAC) have been addressed also in the context of funding initiatives. The draft updated plan foresees the deployment of different modes of transport for captured CO_2, including pipelines, maritime transport and truck transport, linking emitters to storage sites. It is mentioned that decisions on a national CO_2 transport network are ongoing.

The draft updated plan mentions an analysis that has identified an estimated geological **CO_2 storage** capacity of eight provisionally identified structures, amounting to 12,000 Mt in saline aquifers and at least 10,000 Mt or more in other identified structures. This excludes the potential capacity that would result after the cessation of hydrocarbon activity. Additionally, in terms of projected annual storage capacity, it refers to two offshore projects under development with a total capacity of more than 11 million tonnes per year by 2030. The draft updated NECP also mentions two onshore projects with an annual capacity of more than 10 Mt by 2030. The operation of mentioned projects is planned to start even earlier than 2030, however, with no clear estimations of the total capacity of these projects or of their lifecycle. Based on the capture and storage projects described, at least for 2025, captured volumes will exceed available internal storage capacity.

Denmark pays attention to mitigating **non-CO_2 emissions** in different sectors, such as methane emissions in energy (e.g. tax on methane from natural gas fired power plants, introduced in 2011), agriculture (e.g. Agreement on a Green Transition of the Agricultural Sector; reporting of annual mandated leak detection and repair in biogas plants; biogas subsidy), and waste management (e.g. subsidy programme for bio-covers on landfills), N_2O emissions in agriculture (e.g. separate nitrogen standards for humus soils; adjustment of simplification requirements for livestock slurry and manure; eco schemes on organic farming), and emissions of F-gases in industry and households (e.g. increased tax on HFCs, PFCs and SF6).

Although the plan refers to **circular economy** as a key area of research and innovation in the context of achieving climate change mitigation targets, overall it lacks clear recognition of circular economy practices and measures as tools for decarbonisation.

The draft updated plan does not include a detailed assessment of the impact of **individual policies and measures** on the achievement of the GHG mitigation targets. The draft updated plan only includes an assessment of the overall impact of the majority of existing policies and measures (some measures in the agriculture and transport sector have not been considered).

The draft updated plan reflects partial progress towards **international commitments** under the Paris Agreement. It mentions that almost all coal-fired power plants have been converted and now use biomass fuels, and the agreement to phase-out coal in the electricity

sector by 2030. However, the draft updated plan completely disregards the need to phase-out fossil fuel subsidies by stating that no such subsidies exist. Based on available information, there are still active fossil fuel schemes in Denmark.

On 20 December 2019, Denmark submitted to the Commission its **national long-term strategy**. The strategy includes the goal of achieving climate neutrality by 2050. The goal is enshrined into law. In March 2023, Denmark reported on the status of implementation of its initial NECP, where the target year to achieve the climate-neutrality objective was confirmed. In the draft updated plan Denmark states that the new Government plans to bring this objective forward to 2045.

3.1.2 Adaptation

Denmark has in its draft updated NECP identified climate vulnerabilities that may threaten the achievement of national objectives, targets, contributions and risks, but only for the energy security dimension. Yet, Denmark did not specify whether any of the listed policies and measures are relevant for climate change adaptation. The draft updated plan lacks analysis of relevant climate vulnerabilities and risks regarding the achievement of national objectives, targets and contributions, and the policies and measures put in place. The adaptation goals are not outlined in detail and lack quantification where possible. It is also not specified how these goals link to the Energy Union objectives and policies. Additional domestic and more ambitious measures to attain adaptation goals in Denmark are missing.

As regards nature-based solutions, Denmark mentions two measures on phosphorous and nitrate wetlands, and lowland project wetlands. In addition, afforestation measures are included in the list of policies and measures, which may be, under certain conditions, considered a nature-based solutions. These measures would require more detail. Investments aimed at minimising environmental impacts, such as biodiversity loss, have been mentioned, however, information is missing on how they have been contributing to climate adaptation.

Denmark had not identified adaptation goals in its initial NECP of 2019 and has not added any such goals in its draft updated NECP. Denmark is currently updating its national adaptation strategy and national adaptation plan.

3.1.3 Renewable energy

Denmark provides indicative projections of the evolution of the renewable energy share based on WEM scenario for 2030 expecting to reach a renewables' share of 71% of the national gross final consumption of energy in 2030 (up from a renewable share of 46% in 2022), including absolute values. This contribution is significantly above the share of 60% resulting from the formula in Annex II of the Governance Regulation. Denmark provides indicative projections for the Danish contribution from 2022 onwards up to 2030. The indicative trajectory to reach the renewable share of 71% in 2030 is provided, including specific reference points for 2022 (renewables share of approx. 46%), 2025 (approx. 53%) and 2027 (approx. 59%).[8] The submitted reference point for 2022 (approx. 46%) is above the trajectory (of 33%) calculated in line with the EU 2030

[8] Reference points of 18% by 2022, 43% by 2025 and 65% by 2027 pursuant to Article 4(a)(2) of Regulation 2018/1999.

renewable energy target of 32%, which was in force at that time. The reference points for 2025 and 2027 are also above the trajectory (43% and 50% respectively) calculated in line with the increased EU 2030 renewable energy target of 42.5%.[9]

Denmark provides projections for the estimated overall renewable energy share by technology. **The renewable electricity share is projected to reach 117% in 2030 compared to 84% in 2022** (and to exceed 120% in 2031 and to decline towards a share around 110% in 2040 as of the draft updated NECP). As a result, Denmark is expected to become a net exporter of electricity around 2030. Wind is the main source of renewable electricity (the share of offshore wind is expected to increase from 23.6% in 2022 to 65.2% in 2031) and the share of solar is expected to increase from 5.5% in 2022 to 46.2% in 2040[10]. The share of bioenergy is expected to decrease from 24.5% in 2022 to 3.2% in 2040. The updated draft plan clarifies the effort made by Denmark on giving clear national targets for offshore wind. The plan does not provide a specific target to promote the deployment of **innovative renewable energy technologies**, but it provides information on measures to encourage innovative projects in the field of energy (Denmark has three main funding programmes – EUDP, ELFORSK and Innovation Fund).

For the heating and cooling sector, the share of renewable energy is expected to increase to 77% in 2030. The plan indicates that this corresponds to an increase of 2% per year, which is higher than the new mandatory average annual increase laid down in Article 23(1) of the revised REDII. However, the period considered does not exactly correspond to the two periods defined under the revised REDII; moreover, the plan mentions two inconsistent numbers for 2021 (41%) and 2022 (61%) which does not allow to assess the annual increase. If Denmark's share of renewable energy in the heating and cooling sector is above 60%, it may count such share as fulfilling the new mandatory average annual increase. However, the figures provided by Denmark are indicative and do not constitute a sectoral target. These figures include only renewable energy and contributions from waste heat are not included.

For the district heating sector, the share of renewable energy is expected to increase from 75% in 2022 to 84.5% in 2030. This corresponds to an average increase over the period 2022-2030 of 1.19% per year. While this does not match the period and level of the indicative target of Article 24 of the revised Renewable Directive, the share is above the 60% threshold which will allow Denmark to count such share as fulfilling the required annual average increase. The increase in the share of renewable energy in district heating comes to a large extent from new heat pumps, rising from 3% in 2022 to 28.8% in 2030, while the share of bioenergy falls from 58.7% in 2022 to 43.7% in 2030. These figures include only renewable energy and contributions from waste heat are not included. The share of renewable energy in district heating is not expected to be 100% in 2030 due to

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[9] 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.

[10] This is partly due to two new offshore wind farms with a minimum capacity of 1,800 MW. The first park will have a capacity of 1 GW. The park has been put up for tender, the area has been allocated and is expected to be completed in 2027. The tendering process for the second park is expected to be completed in 2024 and the park is expected to be completed in 2029 with a minimum capacity of 800 MW. In addition, 6 GW of sea wind is planned to be completed by the end of 2030. As they have only been finalised by the end of 2030, they are only included in 2030 to a limited extent.

non-biodegradable waste. The share of renewable energy in the **industry sector** is expected to increase from 29% in 2022 to 70% in 2030. Denmark has not provided a renewable share in **buildings** for 2030.

In the transport sector, the share of renewable energy is projected to increase from 11% in 2021 to 41% in 2030 based on the method laid down in REDII increasing significantly beyond 2030. Danish legislation requires that the emission intensity of energy consumption in transport is reduced by 7% from 2030 onwards. The estimate is still based on the methodology set out in Directive (EU) 98/70 Fuel Quality Directive. The increase over the period is mainly due to increased electricity consumption of electric vehicles, combined with a higher share of electricity from renewables in the grid. The increase in the electrification of rail transport from 2027 is mainly due to new electric trains and electrification of a specific line, which is expected to become operational by the end of 2026.

Denmark promotes renewable fuels via a requirement on fuel suppliers to reduce the emission intensity of energy consumption. A credit mechanism for electricity has been put in place, whereby compliance with the obligation on fuels suppliers to reduce the emission intensity of transport energy consumption can be partially achieved by counting electricity delivered through publicly accessible recharging points. Denmark plans to meet the RED II requirements for the use of advanced biofuels in 2025 by setting a cap on the consumption of food and feed-based biofuels in the target fulfilment of the Danish CO_2 displacement requirement. The role of RFNBOs in transport is not particularly highlighted in the draft NECP, however.

Regarding **policies and measures,** the draft updated NECP indicates that there are no unjustified barriers to the conclusion of Power Purchasing Agreements (PPAs) in Denmark and it is considered that parties wishing to enter into PPAs have the possibility to do so. In relation to the associated Guarantees of Origin, Denmark has not proposed additional measures to facilitate conclusion of power purchase agreements or improve consumer information. The plan indicates however that PPAs should not prevail over other mechanisms that provide long-term price signals, such as the established forward markets.

When it comes to **joint projects**, Denmark and Germany have concluded an agreement to develop the Bornholm energy island as a joint renewable energy project under Article 9 of REDII. Moreover, Denmark overachieved the separate national target for Member States' renewable energy shares in 2020 and is expected to meet the milestones by 2030 as laid down in the Governance Regulation. On this basis, Denmark has previously concluded agreements on statistical transfers of excess renewable energy shares and expects to continue doing so.

The draft updated plan indicates that to reflect the EU's solar energy strategy, the Government had reached an agreement with a broad majority in the Danish Parliament to ensure framework conditions that will allow a fourfold increase in total solar and land-based-electricity production by 2030. The draft updated NECP provides some information on measures to ensure an accelerated deployment of solar energy in line with the EU Solar Energy Strategy objectives and to simplify and accelerate permit-granting procedures for solar energy. However, this information is not very detailed.

Denmark promotes individual and collective **self-consumption of renewable energy as well as renewable energy communities (RECs)**. Self-consumers are currently accounted for on the basis of the electricity that is consumed at the same time as it is produced via so-

called ‘instantaneous settlement’. Quantitative targets for self-consumption and for energy communities are not included in the draft updated plan. The plan presents some measures for promoting individual and collective self-consumption, such as the roll-out of smart metres for all consumers (completed) or tariff rules from 2022 to 2025. Denmark has put in place an opportunity to seek funding for local energy initiatives, which include renewable energy communities.

Denmark has not implemented any new measures aimed at ensuring a renewable energy community in all municipalities with a population of more than 10,000 citizens. Denmark has not indicated in its draft updated plan whether it has put in place a strategy on energy system integration, but the plan contains information on facilitating energy system integration, in particular, through the development of non-publicly accessible smart charging infrastructure.

Regarding **heating and cooling,** the draft updated plan provides information on measures to be implemented from those listed in Article 23(4) of REDII. If Denmark’s share of renewable energy in the heating and cooling sector is above 60% as per Article 23(2)(b) it fulfils the new average annual increase of Article 23(1) of the revised REDII without need for further action. Denmark has implemented two or more measures-pursuant to Article 23 (4) of the Directive. Under Article 23(4)(b), for example, Denmark has a 95% efficient supply of district heating and cooling.

In addition, as part of the ‘Climate Agreement on Green Electricity and Heating’, the Danish government has set a political ambition that from 2035 there should no longer be homes in Denmark that were heated by gas or oil, and that all gas in Denmark should be green by 2030. In 2026, the Danish government will present possible initiatives and the financing needed to achieve the ambition of phasing out gas boilers in 2035 and 100% of green gas by 2030. This measure is also supported by the RePowerEU chapter of the Danish recovery and resilience plan.

In terms of **district heating and cooling**, the draft updated NECP explains new emergency measures expected to enter into force in February 2024[11]. The plan also describes support tools that provide subsidies for heat pumps both in district heating production and for the roll-out of district heating and heat pumps in individual heating and in companies.

The draft updated NECP does not provide details on the expected use of **renewable hydrogen** for industrial purposes. When it comes to **international cooperation** Denmark participates in an Important Project of Common European Interest (IPCEI) for hydrogen and has allocated a total of DKK 850 million to Denmark’s participation. The Danish Business Authority has selected two projects to participate in the pan-European project and receive funding. The two projects will build significant electrolyser capacity, between 4-GW, and produce alternative fuels as well as decarbonise industrial processes.

Bioenergy will remain dominant and is expected to increase from 2022 until 2025, after which its use is expected to gradually decrease. The new calculation methodology for bioenergy introduced by REDII resulted in a significant statistical drop in the share of

[11] A new emergency legislation in the area of district heating and cooling is being prepared, which is expected to be put forward in February 2024. In concrete terms, preparedness requirements for companies in the sector will be imposed. Emergency response shall ensure that establishments and facilities critical to supply are protected and that there are plans for rapid restoration of supply in case of disruption.

renewable energy in 2021. Between 2022 and 2040, the increase in the share of renewable energy in the heating and cooling sector should come predominantly from ambient heat (heat pumps). In the draft updated NECP, Denmark provides the estimated projections for the estimated bioenergy share in the RES-E, RES-T, and RES-H&C sectors and the estimated biomass supply projections per fuel type.

Denmark uses imported and domestically produced biomass fuels and feedstocks has included a table breaking down the origin of such feedstock used for the production of bioenergy. On sustainability, Denmark informs that it has implemented the relevant RED II articles in national legislation along with stricter requirements for woody biomass, and also included reduced plant limits for heating and cogeneration. Denmark also reports that there are currently no concrete measures to promote the production of electricity from new biomass fired plants after 2020. The draft updated NECP does not include domestic supply of **forest biomass** for energy purposes in 2021-2030 nor the projected use of forest biomass for energy production under the revised LULUCF Regulation, particularly for 2026-2030. The plan does it report national measures or policies ensuring such compatibility in accordance with the revised sustainability criteria based on the revised REDII.

Biogas is produced primarily from biomass consisting of agricultural, industrial and household residues. Biogas used in heating installations does not pay methane tax when used as a fuel in boiler plants according to the Danish Tax Agency's guidelines on biogas. In the draft updated NECP, Denmark announces its policy target of 100% green gas in the Danish gas system in 2030. There are support schemes for the production and use of biogas, which are expected to deliver approximately 1,4 billion m³ of biogas in 2030. In addition, a tender has been decided for biogas and other green gases in the gas system, which is expected to supply about 0,4 bcm of **biomethane** by 2030. The plan specifies that the measures are sufficient to achieve the target, with *Klimastatus – og fremskrivning 2023 (KF23)*, a frozen-policy scenario, indicating that Denmark will produce sufficient green gas to satisfy total national gas demand in 2030.

The draft updated NECP includes general references to the **mapping of specific renewable energy areas,** such as the launch of an initiative to improve data for municipal planning and developers' design of renewable energy installations, the need to identify major state-designated areas for onshore renewable energy projects and reference to agreement reached to update Denmark's maritime spatial plan with an attachment of approximately 31,000 km² to renewable energy and energy islands, which corresponds to approximately 30% of Denmark's marine space. The draft updated plan however does not contain references to specific objectives to set up renewable acceleration areas with faster permitting for specific technologies in the context of the revised REDII.

For the streamlining of **administrative procedures** and time limits for granting permits, the draft updated plan includes a reference to a single contact point for project promoters and a manual of procedures provided online. In addition, an overall time limit has been introduced for processing applications for permits covered by the permit granting process.

To speed up and simplify permitting procedures in order to accelerate the green transition, the Government has established the **National Energy Crisis Taskforce (NEKST),** a group of various actors from authorities, municipalities and other stakeholders, which will recommend solutions to accelerate administrative procedure for the expansion of district heating, the electrical grid and the deployment of renewable energy. NEKST is currently set up for 2023 and 2024.The Danish Energy Agency is the one-stop shop for

administrative procedures for offshore wind farms. The draft updated NECP explains that efforts are being made in Denmark to streamline the environmental permitting process so that environmental impacts can be identified and managed as early as possible and in connection with the environmental impact assessment of the specific project. Funds have been allocated to ease land restrictions. Resources are also allocated to strengthened guidance on environmental assessments and the Nature Directives.

3.2 Energy efficiency (including buildings) dimension

Denmark has not reported revised energy efficiency targets arguing that the EED recast has not entered into force. According to the draft updated NECP, new targets will instead be included in the final updated NECP. For the purpose of this assessment, considering that Denmark did not report any energy consumption target for 2030, the provided 2030 projections of energy consumption for Primary Energy Consumption (PEC) and Final Energy Consumption (FEC) are considered below.

According to the data presented in the draft updated NECP, Denmark is estimated to reduce final energy consumption by 0.03 Mtoe/year until 2030 compared to the 2017-2019 average[12]. This would correspond to a theoretical national contribution of 16.7 Mtoe primary energy consumption (compared to the target of 15.5 Mtoe according to the EED recast Annex I results) and 14.2 Mtoe final energy consumption (compared to the target of 13.7 Mtoe according to the EED recast Annex I formula results). Denmark's reported projections for primary and final energy consumption deviate from the theoretical results stemming from the formula in the EED recast Annex I by 7.6% and 3.4% respectively. The provided 2030 consumption projection is lower than the Danish 2020 energy efficiency target (-4.6% and –6.6% for primary and final energy consumption respectively).[13]

The target on reducing total final energy consumption of all public bodies is not addressed in the draft updated NECP and there is not enough information provided regarding the measures planned, including the information on the inclusion of public transport or armed forces. Historically, Denmark has used an alternative approach by implementing energy efficiency measures in public buildings to comply with the provisions of the public building renovation obligation in Article 5 EED (Article 6 of the EED recast).

The draft updated NECP provides little information on what measures will be used to deliver the savings required post-2020 under **Article 7 EED (Article 8 of the EED recast)**. The policies and measures contained in the draft plan under the energy efficiency dimension are not sufficiently well described and do not include an estimation of energy savings. Insufficient details are provided to understand which measures contribute to the achievement of the 2030 energy efficiency contributions. Denmark expects to report on the cumulative amount of end-use energy savings to be achieved in the period 2021-2030 arising from the EED recast in the final update of the NECP in June 2024. The draft plan does not include measures reflecting the 'energy efficiency first principle'.

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[12] The 2017-2019 average has been calculated based on the EED recast FEC definition, and the savings per year have been calculated for the period 2021-2030.

[13] The comparison has been done with the 2020 targets as included in the final NECPs 2020 JRC assessments (17.5 Mtoe PEC, 15.2 Mtoe FEC)

The draft updated NECP does not present any planned measures to achieve the 2030 energy efficiency targets, as well as their expected savings. Although a list of measures has been reported for several dimension, the energy savings contribution is not reported for nearly any of the measures. The new measures adopted after 2020 and the new planned measures to reach the higher 2030 target[14] are not sufficiently well described in the draft updated NECP. On supply-side efficiency, Denmark does not expect higher use of cogeneration in its energy system. There is a significant potential of district cooling.

The draft updated NECP does not provide updated indicative milestones (for 2030, 2040, 2050) related to the 2020 **long-term renovation strategy (LTRS)** but only recalls some of its main elements. Denmark indicates that the drafting of new building renovation plan is pending the adoption of the recast EPBD. The 2020 LTRS included only two indicative milestones related to the residential sector: the reduction of net actual heat consumption per m² and the reduction in calculated heat loss per m² compared to 2018. The first milestone provided a target only for 2030. The second milestone provided targets for 2030, 2040 and 2050. The 2020 LTRS neither set targets for building energy consumption nor for GHG emissions for 2030, 2040 and 2050. The draft updated NECP described some economic, regulatory, and educational measures related to buildings such as subsidy scheme for energy renovations in public buildings, green renovations of social housing sector and grants for green housing improvements. However, their estimated impact in terms of energy savings is not reported.

Furthermore, the draft updated NECP only provides general information about a roadmap that will contribute to the achievement of a decarbonised building stock by 2050 set by the Danish Climate Law targeting 70% reduction in greenhouse gas emissions by 2030. The roadmap includes a number of measures to improve the energy efficiency of existing buildings but more specific information missing in the draft updated NECP. In relation to heating, in 2022, the Danish government adopted a Climate Agreement on Green Electricity and Heating in 2022. This agreement sets up the ambition to phase out all oil and gas boilers for heating by 2035. Furthermore, the draft updated NECP reports a plan to phase out fossil heating in municipal, regional and state buildings and of a model for stopping the roll-out of new oil and gas boilers in residential buildings.

3.3 Energy security dimension

Fossil fuels comprise the majority of the Danish energy mix, accounting for 57% of the gross available energy in 2021[15]. According to the draft updated plan, this share is expected to decrease to 49% by 2030. Denmark's energy **import dependency on third countries** has decreased from 36% in 2013 to 32% in 2021[16]. Denmark does not have national targets to reduce the energy import dependency on third countries, as they are already limited due to the already high diversification and the domestic production of oil and gas.

Natural gas plays a relatively marginal role in the Danish energy mix, accounting for only 12% in 2021 (and 5% of its electricity mix)[17]. The share is also on a downward trend,

[14] The new measures are not specifically presented as measures to reach the targets.
[15] Eurostat data.
[16] Eurostat data.
[17] https://energy.ec.europa.eu/data-and-analysis/eu-energy-statistical-pocketbook-and-country-datasheets_en.

having decreased from a share of more than 20% of the energy mix in 2010. While not directly dependent on Russian gas imports, Denmark was indirectly exposed through transits via Germany. The draft updated NECP does not contain a target for a complete phase-out from Russian gas. It does, however, set out national objectives to replace fossil gas by 100% of gas of biogenic origin by 2030, and to phase out gas heating in households by 2035, notably thanks to electrification via deployment of heat pumps and electric boilers. This is coupled with other investments, namely the deployment of renewable energy, in particular offshore and solar.

Security of gas supply will be further enhanced by the completion of maintenance and consequent reopening of the Tyra field in winter 2023-2024. With an expected net production between 2.5 and 3 bcm, the draft updated plan expects the Tyra field to return Denmark to a position of net gas exporter. At the same time Baltic Pipe, a gas pipeline and interconnection between Denmark and Poland, was completed in September 2022, providing other Member States better access to Danish and Norwegian gas fields. The investment enables the transport of up to 10 bcm of Norwegian gas to Poland through Danish gas infrastructure. The Baltic Pipe project has the status of a Project of Common Interest (PCI).

In response to the gas crisis following the Russian war of aggression against Ukraine, Denmark managed to cut its natural gas consumption by 44% in the period between August 2022 and August 2023 compared to the average of the five previous years, well beyond both the indicative -15% target and the EU average (-18%).[18] The draft plan does not demonstrate how the emergency measures adopted in response to the invasion of Ukraine, in particular with regard to gas demand reduction, are integrated into the medium-term planning towards 2030. Overall, however, the draft plan convincingly outlines policy targets and measures to ensure its security of gas supply.

The security of **electricity** supply in Denmark is challenged by a number of trends related to the green transition. These include the electrification of energy consumption in heating and transport, the installation of major demand facilities such as Power-to-X and data centres, as well as the phase-out of a number of thermal power plants over the next ten years which are replaced by solar and wind power. While this development reduces dependence on energy imports from third countries, it also makes the electricity system dependent on fluctuating electricity generation. Furthermore, several of Denmark's neighbouring countries, on which Denmark relies for electricity imports during periods of low wind and solar electricity production, are also transforming their energy system towards intermittent renewables. These parallel developments may further increase the risk of imbalances in the electricity grid.

To address these security of electricity supply challenges, Denmark is working on different solutions that are outlined in the NECP. On 25 June 2022, the Climate Agreement on Green Electricity and Heating was concluded, which aims to ensure framework conditions to enable a four-fold increase in total solar and land-based electricity production by 2030 and to enable the supply of at least 4 GW of offshore wind by 2030. The plan also reads that Denmark is working on the appropriate regulatory framework for an increased uptake of flexibility solutions. Digitalisation is also needed to support further electrification and the

[18] DG ENER Chief Economist Team based on ESTAT NRG_CB_GASM (sub-series IC_CAL_MG subtracted by TOS) in TJ (as of 29 September 2023, 11:00).

use of flexibility. The Danish Energy Agency is therefore actively working on the digitalisation agenda for the supply sector.

Denmark already has a large capacity of **international electricity connections** which contribute significantly to security of electricity supply. Maintaining these links and developing new connections is important to maintain a high level of security of electricity supply and therefore remains a priority according to the draft updated plan. Furthermore, Denmark aims to establish two energy islands – one in the North Sea and one at the island of Bornholm. The electricity produced and planned interconnections can contribute to security of electricity supply in Denmark and to the neighbouring countries associated with the energy islands.

While the draft updated NECP acknowledges that more **storage capacity** also is a way to ensure security of electricity supply, Denmark sets no measurable targets (except 4-6 GW of electrolyser capacity) and does not appear to have a dedicated strategy. According to a study on storage commissioned by the European Commission, the current operational Danish power storage capacity is around 3,9 MW (mainly chemical and electrochemical)[19]. By ensuring the right price signals in the market, Danish authorities expect storage solutions to be introduced where they are cost-effective. In the short term, Denmark has postponed the closure of three power plants until 2024. This should ensure that there is flexible capacity in both East and West Denmark to ensure security of supply in case of low wind production and high consumption.

Oil and petroleum products still represent 36% of the Danish energy mix in 2021. 60% of oil and petroleum products are used in transport followed by industry and households. The import dependency on oil increased from 5% in 2015 to 31% in 2021 due the declining domestic oil production.[20] Oil imports came mostly from the USA, Norway and the Russian Federation in 2021.

The draft updated NECP expects oil imports to fall by securing existing oil domestic production in the North Sea until 2050; the electrification of heating and transport by 2035; as well as by further decarbonising electricity production. Risks on global oil markets have been identified in the draft updated plan, with import diversification having increased since 2015. However, the plan does not describe efforts undertaken to phase-out Russian oil since 2022. In addition, the plan does not assess the adequacy of the oil infrastructure (refinery, oil stocks) with the expected oil demand decline and the move toward lower-carbon alternatives.

With regard to the **resilience of critical infrastructure and cybersecurity**, Denmark intends to put in place new emergency legislation in the area of district heating and cooling in February 2024. This planned legislation aims at imposing preparedness requirements for companies in the sector. The legislation will ensure that establishments and facilities

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[19] 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/.

[20] Eurostat data.

critical to energy supply are protected in case of an emergency and ensure that these facilities have plans for rapid restoration of supply in case of disruption.

The draft updated plan adequately factors in **climate change impacts on the energy system**, and it notably expects electricity prices to be driven downwards by the higher hydropower outputs (due to raining patterns change) and by reduced heating needs (due to higher temperatures) in Sweden and Norway.

Denmark has submitted the National Risk Assessment, most of the Common Risk Assessments at risk group level (in particular for the Denmark risk group for which it was coordinator, as well as for Ukraine, Belarus, Baltic Sea and Norway risk groups) and its Emergency and Preventive Action Plans required under the Regulation (EU) 2017/1938 on gas security of supply, which are currently being evaluated. However, the common risk assessment for the North Eastern group has still not been submitted despite being due by 1 October 2022, and no country has volunteered to coordinate the group.

3.4 Internal energy market dimension

The current draft updated plan does note set specific **targets for interconnectivity** in 2030 given that Denmark's current level of interconnectivity already exceeds the EU target for 2030. The plan is generally ambitious in terms of development of key electricity and gas transmission infrastructure projects to enable integration of renewable energy sources, the reduction of bottlenecks, the proper functioning of the energy market as well as security of supply.

The objective of establishing energy islands represents concrete initiatives to create more interconnectors that contribute positively to Danish security of electricity supply. In 2022, Denmark experienced lower imports due to the context of supply/demand of gas, low water stocks in Norway, heat waves leading to higher fuel prices for coal, lower output of French nuclear power plants, as well as maintenance of Swedish nuclear power plants. In spite of Demark being highly reliant on imports from neighbouring countries in the past, it is expected that import dependency will decrease by 2040, thanks to the return of operation of the Tyra gas field, the implementation of energy efficiency measures, and the deployment of three large wind farms. Hence, Denmark has not taken any new decisions to install new generation capacity after 2030 to address the expected increase in energy consumption.

Denmark is very well interconnected to the EU market and plans to further strengthen the interconnection capacity. To this end, Denmark has proposed 7 projects in the context of the 6th Union list of Project of Commin Inetersest (PCI) process. Denmark works together with the countries of the North Sea region across different fora to analyse how to best exploit the high potential of renewable energy in the region and how to remove barriers to investments in the sector.

With regards of the increase of the renewable energy target, and the need to enable the consumers to rapidly reap the benefits of it, the plan provides key policies and measures to incentivise **the uptake of flexibility services**, aggregators and demand response. Indeed, the Danish Energy Agency has carried out a report on new "Market model 3.0" to develop flexible markets with concrete recommendations and fields of actions. The work is supported by a needs assessment, and further work is ongoing to enhance the price signals and the enabling regulatory framework. In addition, the development of a

"Flexibility Forum" gathering market players and stakeholders is foreseen to significantly contribute to these changes of the energy system.

However, the plan does not indicate clearly which measures of the above-mentioned report of the Danish Agency have already been implemented, and neither how the system operators will engage in facilitating the penetration of flexibility services. Finally, the draft updated NECP does not quantify flexibility needs yet or set clear targets and objectives for demand response, storage or flexibility.

Regarding **energy poverty**, the draft updated plan does not identify the number of households in energy poverty, and therefore, does not analyse whether this number is considered significant. In general, there are no specific national objectives to reduce energy poverty as part of energy policies and legislation, since Denmark considers this issue to be part of social policies addressed through direct income support measures and targeted social services.

For example, pensioners and early pensioners may receive a heating supplement to pay for heating and hot water. In addition, persons that qualify for certain types of social benefits and that have high housing costs or high dependency costs may receive special support for their housing costs, including expenditure on utilities. Also, under some conditions people impacted by e.g., illness or unemployment may also receive financial assistance that can include payments for high energy bills.

There is however an engagement to launch work that will assess the implementation of energy poverty in the Danish context tacking into account the revised Energy Efficiency Directive, as well as of the existing and upcoming rules in the Electricity Market Directive, the Gas Directive, the EPBD and the Social Climate Fund. The outcome of this work is expected to be included in the final update of the NECP.

At the same time Denmark has promoted diverse measures to support access to renewables for final consumers within the process of decarbonising the heating system, although it is not specified in detail how these measures are designed to specifically address energy poor and vulnerable consumers. Furthermore, instruments and legislation are mentioned in the draft updated plan addressing green renovations of social housing (Green Housing Agreement 2020) and phasing out of oil and gas boilers via subsidies for conversion to green. Increased funds for phasing out oil and gas boilers until 2025 have been ensured.

A number of temporary measures have also been implemented due to high energy prices in recent years, for example a scheme for a one-off payment for low-income households was in place in 2022. Additionally, a temporary and voluntary scheme was established through which households and businesses could have part of their energy bill frozen for deferred payment.

In 2030, it is expected that the Danish electricity system will be largely based on renewable energy and that also vulnerable and vulnerable households will have access to renewable energy, and notably measures for the uptake of renewable energy communities and citizen energy communities. Overall, the description of the current situation concerning energy poverty does not explain in detail potential synergies between addressing energy poverty and measures to develop demand response, accelerate building renovation and energy savings.

3.5 Research, innovation, competitiveness and skills dimension

3.5.1 Research and innovation

Denmark reported on the spending for research and innovation (R&I) in specific clean energy technologies to support green ambitions, providing a basis for growth, exports and jobs. A total of DKK 2.4 billion has been earmarked for green research in 2023 and there is a political agreement to maintain this funding level in 2024 and 2025. As reference point, as part of the 2018 Energy Agreement, Denmark undertook to use a minimum of DKK 580 million in 2020 for research and development (R&D) and demonstration of energy technology, and to gradually increase public resources to a minimum of DKK 1 billion in 2024. The R&I spending target almost quadrupled between 2020 and 2023. The draft updated NECP does not clarify the split between public and private funds for the R&I spending targets nor indicate the green research share of the overall R&I spendings. Denmark did not provide information on its R&I-related pathways towards 2030 and 2050 decarbonisation goals.

The draft updated NECP reported that Denmark's Green Research Strategy has been translated into 4 mission driven R&I partnerships: CCS/CCUS; Green fuels (PTX, including H2); Climate and environmental-friendly agriculture and food production; and Circular economy (focused on plastics and textiles). Denmark focuses most of its R&I funding, DDK 1.3 billion between 2021-2023, towards achieving the above four missions, with a significant contribution to CCS R&I.

The draft updated NECP did not report on Denmark's involvement in the SET Plan actions or their translation to measures at national level.

There is already a good regional cooperation taking place between Denmark and the Nordic countries, although there is not much detail on regional cooperation in areas such as carbon capture, usage and storage (CCS/CCUS) technology R&I and offshore wind cooperation in the North Sea with the North Sea Energy Cooperation countries (Belgium, Denmark, France, Germany, Ireland, Luxembourg, the Netherlands, Norway and Sweden with the participation of the European Commission).

3.5.2 Competitiveness

The draft updated plan did not report national objectives in relation to competitiveness. However, Denmark's objective and ambition in terms of export and accelerated climate neutrality, maintaining its leadership as an innovator, are linked with competitiveness. The main elements for competitiveness are included under chapter 1.4 Regional cooperation, especially under the support group 4 activities, the Implementation of 2050: Long-term network and infrastructure planning.

This includes coordinated actions and input for the North Sea Offshore Network Development, PtX technologies, especially green hydrogen development in the region as well as anticipating and addressing supply chain bottlenecks (e.g., development and availability of ports) in the deployment and acceleration of the delivery of the North Sea energy system. This is closely linked to the importance of safeguarding the safety of critical offshore and underwater infrastructure and the supply of critical raw materials through innovation and increased circularity.

The draft updated plan reports that Denmark has put in place measures/investments to support manufacturing and scaling-up of clean energy technologies, namely in CCS/CCUS and PtX technologies (including green hydrogen). However, there are generally few details on the investments needed for the manufacturing of key components and equipment for net-zero technologies.

Denmark provided information on measures and investments related to the Digitalisation of Energy System EU Action Plan in order to make its energy system more digital. Measures include improving energy efficiency in buildings through digitalisation, supporting electrification and flexibility of supply, protecting and providing better information to consumers, cybersecurity aspects as well as R&I support to digitalisation. Under ELFORSK DKK 25 million is earmarked annually to support the electrification and green transition of the Danish energy system, including digitalisation and sector coupling.

3.5.3 Skills

The draft updated plan acknowledges the importance of addressing skill shortages for the development of strategic sectors. The plan includes information on the National Strategy for Green Research and Development which, amongst others, supports partnerships with universities, knowledge and innovation institutions, and businesses linked to carbon capture and storage or use, and sustainable fuels. However, there is no information on investment needs linked to green skills and upskilling or on potential measures to boost European competitiveness in clean energy technologies, equipment and components, linking it for instance with relevant European Year of Skills initiatives, the Pact for Skills large scale partnerships, and the New European Innovation Agenda.

4 JUST TRANSITION

Overall, the draft updated plan only partially addresses just transition aspects. There is some information on green jobs but overall little detail or quantification of the social impacts or the impact on employment and skills of the climate and energy, including distributional impacts on vulnerable groups. In addition, the draft updated plan does not provide sufficient information for the preparation of the Social Climate Plans, as assessed in Chapter 7.

Measures supporting access and preservation of **employment** during the transition are not addressed in detail. Access to **quality, affordable and inclusive education**, training and life-long learning is mentioned in the context of the construction sector, the National Strategy for Green Research and Development and linked to three climate related vocational education and adult learning schools. An overall strategy is lacking, however.

The plan describes that a National Energy Crisis Taskforce (NEKST), a multi-stakeholder working group, has been established to propose solutions to the challenges of the green transition, including addressing skills shortages. However, it does not provide details on concrete actions and proposals resulting from the work of this group. On the other hand, as assessed in Chapter 3, the plan does include a range of **social measures** to support the most vulnerable groups and mentions future work linked to energy poverty. Nevertheless, it does not elaborate on the role of a fair tax-benefit systems.

While the plan refers to the different measures supported through the Just Transition Fund (JTF) in the two eligible regions (North and South Jutland) and to the agreement establishing a Green Fund, which reserves DKK 53.5 billion for investments in the green transition until 2040, there are few details on the type of measures and actions that will be financed, and how they will be targeted to the most impacted by the transition, including vulnerable households. Overall, the draft updated plan does not detail the resources specifically devoted to the just transition.

5 REGIONAL COOPERATION

Denmark cooperates in several Risk Groups established in the Regulation (EU) 2017/1938 on the security of gas. Within these mechanisms, Member States cooperate on the exchange of information related to gas market, and on the elaboration of risk scenarios affecting the shortage of supply and other relevant risks, which are translated into National Risk Plans, Preventive and Emergency Plans, which are currently being submitted for consultation with the relevant Risk Groups.

The Baltic Energy Market Interconnection Plan (BEMIP) encompassing Denmark, Finland, Sweden, Estonia, Latvia, Lithuania, Poland and Germany (Norway as an observer) works together to create an open and integrated regional electricity and gas market between Member States, and to develop sea wind and the electricity grid in the Baltic Sea region.[21]

The draft updated plan explains the importance of interconnectors for Danish energy security and the ongoing assessment and cooperation with other Member States for potential new hybrid interconnector projects, including seven Projects of Common Interest or candidate projects as well as new potential hybrid interconnection solutions.

On 18 May 2022, Denmark and Germany signed a Letter of Intent for cooperation on Power-to-X. Subsequently, the Danish Ministry of Climate, Energy and Utilities and German Federal Ministry of Economic Affairs and Energy (BMWK) concluded a bilateral declaration on cooperation on cross-border infrastructure that can support the export of Danish-produced green hydrogen to Germany. In the area of renewables, the plan includes strategic partnerships on joint projects such as the North Sea energy island (with Belgium) and the Bornholm energy island (with Germany). The draft updated also more generally explains the work conducted under the high-level groups of the North Seas Energy Cooperation (NSEC) on offshore wind energy.

It is positively noted that Denmark has signed two solidarity arrangements with its neighbours, Germany and Sweden, out of the three it was supposed to sign (the remaining one should be with Poland).

[21] 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).

6 INTERNAL COHERENCE AND POLICY INTERACTIONS WITHIN THE DRAFT UPDATED NECP

The draft updated plan does not provide detailed synergies within and between the 5 dimensions of the Energy Union. The only way it addresses synergies is in terms of how existing policies and measures address more than one dimension. For example, policies and measures addressing the promotion of renewable energy sources (decarbonisation dimension) are also described as enhancing energy security. The draft updated plan did not provide analysis of consistency of policies and measures in each dimension nor a quantitative analysis of interactions of certain objectives.

However, the draft updated plan has provided solid elements on how to enhance security of supply and diversification. The promotion of renewable energy sources is a major tool to achieve these targets and supports decarbonisation at the same time. The high level of electricity interconnectivity in Denmark also enhances security of supply. The resilience of the critical infrastructures is reported as a key focus of Denmark with a strategy for cyber and information security in the electricity, gas and district heating and industry launched in 2022. The plan does not address the supply of critical raw materials.

7 STRATEGIC ALIGNMENT WITH OTHER PLANNING INSTRUMENTS

Denmark formally submitted **its REPowerEU chapter** on 31 May 2023 and it was formally adopted by the Council on 9 November 2023. It covers five measures (one reform and four investments, two of which are scale-ups of the original RRP). The reform consists of the establishment of a National Energy Crisis Taskforce (NEKST) that will provide recommendations aimed at simplifying and expediting administrative and permitting procedures for the roll-out of green heating solutions and the deployment of solar and onshore wind energy projects. The first investment measure contribute to the overall objective of supporting the deployment of wind energy. The measure consists of three sub-investments for i) the preparation of offshore wind auctions; ii) the commissioning of experimental wind turbines and iii) the screening of offshore wind capacity. The third is an investment measure related to green upskilling. The fourth and fifth measures upscale existing measures: a new Fund for negative emissions using CCUS from biogenic sources and an increase replacement target of 11 100 for oil burners and gas furnaces with heat pumps or district heating solutions.

The draft updated NECP includes or refers to 41 out of the 77 climate relevant measures in the RRP (i.e., those with 40% - 38 measures - or 100% - 39 measures - climate tagging), covering 27 RRP investments.

In terms of coherence of the draft updated NECP with the modified RRP, including the REPowerEU chapter, Denmark states that it will ensure integration in the final version of the NECP as, when drafting the updated NECP, the modified RRP and the new REPowerEU chapter were not yet adopted.

The draft updated plan generally does not explain how it is aligned with the **National Air Pollution Control Programs and projections** (NACPSC). It is missing information on the interaction with clean air policies, apart from some references to air pollutants, including ammonia. Air pollutant projections are provided (as submitted under Directive 2016/2284 on the reduction of national emissions of certain atmospheric pollutants), but

without explaining whether these and climate and energy projections were developed in an integrated manner.

The draft updated plan is consistent with the **Territorial Just Transition Plan (TJTP)** covering North and South Jutland. It includes more recent information on decarbonisation targets than the TJTPs due to the recent more ambitious political agreement reached by the new government.

The plan does not provide 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. The draft contains several measures which could, in principle, be eligible under the Social Climate Fund (SCF), such as green guarantees for social housing, or direct income support measures to support heating costs. However, this falls short of a broader and more comprehensive approach. The plan does not provide an assessment of 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), taking into account the distributional effects arising from the future ETS2. The draft updated plan does not outline reforms nor a policy framework for the future SCP. Thus, the current draft 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, Denmark 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 plan is less detailed and less ambitious on the respective actions. The consistency with relevant sectorial plans and policies is hardly discussed.

The draft updated NECP addresses the 2022 and 2023 **country-specific-recommendations** to enhance diversification and reduce their 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 decarbonisation of industry.

8 FINANCING THE ENERGY AND CLIMATE TRANSITIONS

8.1 Investment needs

The draft updated plan does not include information on the expected investment needs to implement the planned policies and measures. It only includes information on past and planned public funding. Furthermore, the draft updated plan does neither provide an assessment of total investment needs to achieve the targets nor a breakdown of these investment needs between public (EU and national) and private nor by energy segment (e.g., RE, EE R&I, grids, energy and heat storage, etc.). Also, since funding needs are not included for all actions, it is not possible to assess the investment gap.

8.2 Funding sources

The draft updated plan mentions key sources of financing but does not present this at the level of each policy and measure, including information on the public and private part, the lifetime of the measure, the share coming from the EU budget, nor explicitly specifying the RRF contribution. No overview table gathering all the budgetary information of the different policies and measures has been provided.

However, the plan does give a relatively good picture of the measures in place and required financial envelopes. Denmark relies mainly on national funding, such as the Danish Innovation Fund, the Energy Technology Development and Demonstration Programme (EUDP) and ELFORSK. Some EU funding (such as the RRF, Structural Funds and CEF) is mentioned but not described in detail.

9 ROBUSTNESS OF THE ANALYTICAL BASIS OF THE DRAFT UPDATED NECP

Details on projections with existing measures (WEM) scenario are reported using the voluntary templates to report on quantitative projection parameters and results. The WEM scenario includes policies and measures adopted before 1 January 2023. According to the draft updated plan, the impacts of additional measures adopted until 1 January 2024 will be included in an upcoming analysis of impacts expected by April 2024 (in the form of an updated WEM scenario). The result of a partial assessment of the CO_2 increase initiative in the transport sector is provided in the draft updated plan. The new ETS for buildings, road transport and additional sectors (ETS 2) has been considered in the plan but not in the scenario projections. The WEM projections cover the five dimensions of the Energy Union and provide an ETS/ESR split. Most variables have been reported, but some information on related to various assumptions such as the number of passenger-kilometres or heating and cooling degree days is missing. References to sources of the key parameters and to the tools used for the modelling are positively noted.

For the base year 2020, key parameters and variables are aligned with EUROSTAT figures with the exception of the share of renewable energy over gross energy consumption. The plan does not follow fuel and emission (ETS) price assumptions for its projections as suggested by the Commission. The Gross Domestic Product (GDP) growth assumptions used in the Danish forecast appear slightly lower than those in the 2021 Ageing Report projections.

The draft updated plan does not contain a WAM scenario. As mentioned earlier, the impact assessment of planned policies and measures is described as preliminary and Denmark indicates that it will be updated in view of the final NECP update in the form of an updated WEM projection. The assessment of macroeconomic but also health, environmental, employment and education, skills and social impacts is not developed enough and lacks robustness. The methodology is unclear and not very detailed. While some elements of the impact assessment are included in the draft and the results presented in a transparent way, the draft updated NECP lacks a consolidated quantitative macroeconomic assessment of planned policies and measures on GDP and the main demand components over time.

Furthermore. there is no assessment of the impact on the public budget and it is not clear how public spending would be financed.