SUBMISSION TO CONSULTATION ON THE TEN YEAR NETWORK DEVELOPMENT PLAN (TYNDP) 2022 DRAFT SCENARIO REPORT

Climate Action Network (CAN) Europe is Europe's leading NGO coalition fighting dangerous climate change. With over 170 member organisations from 38 European countries, representing over 1.500 NGOs and more than 47 million citizens, CAN Europe promotes sustainable climate, energy and development policies throughout Europe.

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With this submission, CAN Europe responds to the consultation on the draft scenario report for the Ten Year Network Development Plan (TYNDP) 2022. This masterplan of European energy infrastructure planning is prepared every two years by the European transmission system operators for electricity and for gas, ENTSO-E and ENTSOG.

ENTSO-E/ENTSOG consultation questions:

4. Are you satisfied with the level of stakeholder engagement during the joint ENTSO-E & ENTSOG scenario building process?

Satisfied

No opinion

X Unsatisfied

If unsatisfied, please make suggestions how we can improve for the next process:

Although CAN Europe generally welcomes the openness as well as the high level of transparency of the stakeholder engagement process, we have to highlight specific hurdles of non-profit civil society organisations such as CAN Europe in view of contributing to the process. The limited capacities within our membership make it difficult to provide detailed expertise at every step of the scenario building process. In contrast with stakeholders from the industry, CAN Europe is not dealing with the technicalities of planning electricity transmission networks and gas transmission networks on a daily base.

In order to allow for civil society organisations to engage more proactively in this debate, ENTSOs have already made important progress. We would like to reiterate our suggestions to offer introductory webinars for stakeholders that are entering the scene. It also would help to provide more regular updates about the progress of the TYNDP scenario building, for instance through the ENTSOs' newsletters. In addition, we suggest to publish clear timelines of the TYNDP process to allow for timely preparation and engagement of our member organisations. The Scenario Building Guidelines document goes into the direction of the manual that we have requested at the occasion of previous consultations.

While we understand that ENTSOs increased their direct exchange with industry groups to improve the scenario building on district heat, hydrogen and other areas, we would have seen this exercise as an opportunity to run a peer-reviewed process with independent researchers. Although the technical knowledge of industry federations is valuable, such input could have further increased the impartial character of the TYNDP scenario building process.

5. Among the different engagement options, rank them in the order of your preference. Rank from 1 (most preferred) to 3 (least preferred):

Workshops & Webinars 2

Consultations 3

Bilateral Discussions 1

6. Are you satisfied with the format and the level of explanation that was provided at the Scenario Workshop?

Yes

X Neutral

No

Please comment: -

7. Are you satisfied with the format and the level of explanation provided in the TYNDP 2022 Draft Scenario Building Report?

X Satisfied

No opinion

Unsatisfied

Please comment: -

8. Are you satisfied with the format and the level of explanation provided in the TYNDP 2022 Scenario Building Guideline?

Satisfied

No opinion

X Unsatisfied

Please comment:

The Scenario Building Guideline is a very helpful and well-designed document. A number of elements however is not covered sufficiently in view of the relevance for the scenario building. For instance, we miss detailed assumptions on the costs of carbon capture and storage (CCS) technologies, an assessment of the required storage capacities and the infrastructure costs for transporting carbon to those potential storage sites.

We also wonder whether gas and electricity demands result from a cost-optimal investment modelling or are predefined in the ambition tool, taking over TSOs' calibration. In the latter case this might have led to the high demand for gaseous energy carriers.

Given that newly built nuclear reactors play a relevant role in the Global Ambition scenario, indicators for investment costs and potential upgrading costs should have been added with the same level of detail like for other electricity generation technologies.

9. Are you satisfied with the format and the level of information provided in the Visualisation Platform/Data set?

Satisfied

No opinion

X Unsatisfied

Please comment:

We generally welcome the high level of data accessibility and the level of detail provided via the Visualisation Platform. The separate modelling for the gas and for the electricity sector however makes it difficult to directly compare indicators for specific countries and for the EU: While the modelling of the electricity side partly provides details for EU and non-EU countries, the gas side is limited to the EU27. As the previous TYNDP 2020 data featured aggregated EU28 data, understanding the evolution of the same indicators over two versions of TYNDPs becomes difficult.

It would have been helpful to integrate an option to compare the draft scenario data with previous TYNDP data and other relevant scenarios like in section 6 ('Benchmarking') of the Draft Scenario Report. The Visualisation platform does not allow to clarify which technologies supply which shares of hydrogen in the mix and which sectors in will consume it. CAN Europe generally advocates for covering all data related to EU energy infrastructure planning with an open data license to make data available for free re-use for all stakeholders.

10. Do you agree that the ENTSO-E and ENTSOG's joint scenarios should be built to be compliant with EU-27 2030 and 2050 targets as a minimum standard?

X Yes

Neutral

No

If no, please comment why: -

11. ENTSO-E and ENTSOG introduced National Trends as the central policy scenario. National Trends is aligned with national energy and climate policies and strategies as stated at the end of 2020. Do you agree that member state energy and climate policies should be used to develop National Trends?

Yes

X Neutral

No

If no, please comment why: -

12. Scenario diversity is essential when it comes to the assessment of future gas and electricity infrastructure needs. In your opinion, do the 3 scenarios cover a broad enough range of plausible pathways aiming to achieve 2050 EU-27 targets?

Yes

Neutral

X No

If no, please comment why:

Compared to the TYNDP 2020, scenarios are slightly more contrasted on the supply side. The variation of technologies and energy carriers now shows better that a broad range of solutions is already available to achieve the EU's climate and energy targets. CAN Europe would have welcomed the integration of a new TYNDP scenario that describes a fully renewable energy system, compatible with the Paris Agreement's 1.5°C objective.

By way of example, the European Resource Adequacy Assessment (ERAA) that ENTSO-E is currently preparing will consider five different scenarios. While it is true that the TYNDP and the ERAA serve different purposes, both comprise a modelling of European energy systems over the long term.

The scenarios are not very contrasted on the demand side. Energy demand in all scenarios is on a relatively high level. The mobilisation of energy savings potentials and energy efficiency gains in view of achieving the EU's climate and energy targets could have been presented in a more prominent and nuanced manner.

Recent research confirms the urgency of very swift emission reductions to keep the 1.5°C objective in reach, see Climate Analytics' 1.5°C pathways for the EU and its Member States, building on CAN Europe's Paris Agreement Compatible (PAC) scenario, October 2021, https://climateanalytics.org/publications/2021/15c-pathways-for-europe-achieving-the-highest-plausible-climate-ambition. Against this backdrop, a variation in time would have increased the pertinence of the TYNDP scenarios. One scenario should have assessed the conditions for the EU reaching net zero emissions before 2050. This forerunner role of the EU also would have underlined the equity principle in the carbon budget approach. Given that both 'COP21 compatible' scenarios in the TYNDP 2022 Draft Scenario Report exhaust the carbon budget before 2050, we regret that no alternative pathway is suggested to speed up emission reductions earlier as a reaction to the expected overshooting.

13. The COP21 Paris Agreement and IPCC Special Report 1.5°C provide evidence on the need for a carbon budget in the global effort to tackle climate change. ENTSO-E and ENTSOG compare the carbon budget resulting from the scenarios to benchmarks based on equity and population. Do you agree that these benchmarks are appropriate?

X Yes

Neutral

No

If no, please comment why: -

14. The Distributed Energy and Global Ambition scenarios aim at achieving a carbon-neutral EU-27 economy by 2050. Do you think the scenarios are helpful in identifying / assessing those challenges?

Yes

Neutral

X No

If no, please comment why:

See our answer to question 12.

15. ENTSO-E and ENTSOG use a total energy model to capture the impact of sector coupling between energy carriers. Modelling of sector coupling has been expanded in the Draft Scenario Report 2022. Do you agree that the ENTSO-E and ENTSOG's approach identifies the potential benefits and challenges of sector coupling?

Yes

Neutral

X No

If no, please make suggestions on improvements that could be addressed in the next process:

CAN Europe repeatedly asked for TYNDP scenarios to run a cross-sectoral optimisation of infrastructure needs by comparing costs and availability of all flexibility options, be it on the generation side, on the demand side or be it related to infrastructure solutions. We welcome the far-reaching improvements for integrating district heating supply, the flexibility provided by prosumers and electric vehicles as well as the new, much more realistic methodology for power-to-gas modelling. These improvements appear to fine-tune mainly the electricity demand and supply sides to reflect the increasing degree of interaction. It is not yet fully clear to what extent the integration of these flexibility solutions in the electricity sector interacts with demand and supply of methane and hydrogen. We would welcome a more in-depth presentation of the demand response potential across sectors and why it is considered to remain at a relatively low level.

Regarding the district heat supply, the potential expansion of district heat networks as well as the integration of different variable and dispatchable renewable heat technologies (solar thermal heat, geothermal heat, sustainably sourced biomass) should be assessed to better understand under which conditions fossil gas (and hydrogen) demand would further decrease. The role of thermal storage technologies in view of increased flexibility of district heat networks might deserve more attention.

Regarding the prosumer and electric vehicles modelling, we see that the methodology assesses the flexibility potential adequately. But given that market conditions and legal frameworks for prosumer and EV markets differ strongly between European countries, it might be worth considering a more granular approach than assuming unified energy delivery costs.

Regarding the power-to-gas modelling, we ask to assess the additional infrastructure costs linked to the roll-out of hydrogen for low temperature heat in buildings. Besides the costs of hydrogen supply from different sources and the costs of repurposing existing gas transmission infrastructure and building new hydrogen transmission infrastructure, the costs of the 'last mile' of hydrogen distribution into end consumers' buildings should be analysed, along with the additional costs for installing fuel cells and/or hydrogen-ready boilers. The expected utilisation rates of gas distribution networks and transmission networks should be made transparent in this context. We also miss an assessment of the potential blending of hydrogen into existing fossil gas infrastructure.

See also our comments on the ENTSOs' interlinked model, August 2020 (https://caneurope.org/content/uploads/2020/08/CAN_Europe_Feedback_interlinked_model_ENTSOs_aug20.pdf).

16. ENTSO-E and ENTSOG scenarios use external data on LULUCF (Land Use, Land Use Change, and Forestry) to provide input to the scenarios on carbon sinks. The scenarios also consider the development of net negative emission technologies. Do you agree that including external LULUCF and net-negative emission technologies within the scenario is appropriate?

Yes

Neutral

X No

If no, please explain why:

It is appropriate to integrate the net carbon sink from LULUCF into the scenarios. We however are not sure to what extent the important LULUCF potential and the strong use of bioenergy are consistent. If external data on LULUCF, BECCS and CCS are integrated instead of having them endogenous to the scenario modelling, these options might not be put in proper competition with other decarbonisation options. The net carbon sink potential from LULUCF should not be linked to the proper energy modelling if this allows for an increased use of fossil fuels on the other side. We see a need to adjust and improve the scenario building and modelling in this area.

Following CAN Europe's criticism on the relatively high contribution of potentially unsustainable biomass, the TYNDP 2020 Distributed Energy scenario saw an update with slightly lower amounts of bioenergy in view of the 2040 horizon. We are surprised to see that the total amount of bioenergy supply in the TYNDP 2022 Distributed Energy scenario apparently is significantly higher than in the previous TYNDP 2020 Distributed Energy scenario.

17. Based on feedback from the TYNDP 2022 Storyline Report, ENTSO-E and ENTSOG's scenarios consider different levels of deployment of Carbon Capture and Sequestration (CCS) for pre- and post-combustive processes. Do you agree that the CCS assumptions in the different scenarios sufficiently capture the storylines?

Yes

Neutral

X No

If no, please explain why:

Following the storyline matrix, the two scenarios correctly show the foreseen lower and higher importance of CCS technologies for the Distributed Energy scenario and for the Global Ambition scenario. In our understanding, the very strong role of post-combustion CCS in the Global Ambition scenario however is not necessarily backed by the TYNDP 2022 Storyline Report. The total CCS potential for the EU seems to be derived in a rather simplified way from the IEA Net Zero 2050 report. The importance of CCS for reaching net zero emissions and the 1.5°C objective beyond 2050 merits a more in-depth assessment of the economic viability of post-combustion and pre-combustion CCS in different sectors, together with the associated infrastructure costs for transporting carbon to potential storage sites. On top of that, the assumed capture rate of 90% (Scenario Building Guidelines, p. 10) appears to be very optimistic for a technology that is not yet introduced at large scale on European markets.

18. The Distributed Energy and Global Ambition scenarios consider different technology pathways to decarbonisation. The Distributed Energy is a scenario focusing on higher RES development and aiming at EU energy autonomy. The Global Ambition scenario focuses on the development of a global clean energy economy with low-carbon technologies and large-scale RES development. Do you agree that these scenarios are consistent with the assumptions made in the Storyline Report?

X Yes

Neutral

No

If no, please explain why: -

19. Biomass: As outlined in the Storyline Report in April 2021, the biomass assumptions for the Distributed Energy and Global Ambition scenarios were based on the EC Impact Assessment scenarios. Do you agree that these scenarios are consistent with the assumptions made in the Storyline Report?

Yes

Neutral

X No

If no, please explain why:

See our response to question 16 on the consistency with regards to the LULUCF potential and the increase in bioenergy use in the Distributed Energy scenario compared to its previous version.

20. BEV and FCEV: The Storyline Report outlined ranges for the development of battery electric vehicles and fuel cell electric vehicles based on stakeholder consultation feedback. Do you agree that these scenarios are consistent with the assumptions made in the Storyline Report?

X Yes

Neutral

No

If no, please explain why: -

21. Heat Pumps: The Storyline Report defined ranges for the share of electric and hybrid heat pumps in 2030 and 2050 based on stakeholder consultation feedback. Do you agree that these scenarios are consistent with the assumptions made in the Storyline Report?

Yes

Neutral

X No

If no, please explain why:

We did not find any data indicating the EU27 market shares of electric and hybrid heat pumps in the TYNDP 2022 Draft Scenario Report, in the TYNDP 2022 Scenario Building Guidelines or in the downloadable datasets. As a consequence, it was not possible to compare to what extent the shares suggested in the Distributed Energy scenario and in the Global Ambition scenario are consistent with the assumptions made in the TYNDP 2022 Storyline Report.

Given that there is a huge variety of technologically and economically viable alternatives to gas boilers as flexibility option for heating, CAN Europe earlier questioned the relatively high market share suggested in the TYNDP 2022 Storyline Report. A continued dependency on (fossil) gas and its infrastructure might tend to make a fast decarbonisation more difficult and costly. CAN Europe recommends the Heat Roadmap Europe 4 as a reference for the potential of renewable heat sources and district heat networks. In our PAC scenario, we assume that the heat delivered by heat pumps in the residential sector reaches 417 TWh in 2030 and 544 TWh in 2050. This amount includes the ambient and geothermal heat captured by heat pumps and the electricity input for heat pump operation. In the tertiary sector, 157 TWh are supplied in 2030 and 319 TWh in 2050.

22. District Heating: The Storyline Report defined ranges for the share of district heating in 2030 and 2050 based on stakeholder consultation feedback. Do you agree that these scenarios are consistent with the assumptions made in the Storyline Report?

Yes

Neutral

X No

If no, please explain why:

We did not find any data indicating the EU27 market shares of district heating in the TYNDP 2022 Draft Scenario Report, in the TYNDP 2022 Scenario Building Guidelines or in the downloadable datasets. As a consequence, it was not possible to compare to what extent the shares suggested in the Distributed Energy scenario and in the Global Ambition scenario are consistent with the assumptions made in the TYNDP 2022 Storyline Report.

23. Wind Energy: The Storyline Report defined ranges for the share of wind energy in 2030 and 2050 based on stakeholder consultation feedback. Do you agree that these scenarios are consistent with the assumptions made in the Storyline Report?

Yes

Neutral

X No

If no, please explain why:

The variation of the Global Ambition scenario and the Distributed Energy scenario values for 2030 in the TYNDP 2022 Draft Scenario Report is relatively small. Despite the increase compared to the range presented in the TYNDP 2020 scenarios, the two values are still situated at a relatively low level within the draft range of the TYNDP 2022 Storyline Report (but in line with the updated range). We would have liked to see how higher shares of domestic hydrogen production from dedicated offshore wind capacities potentially could ease transmission infrastructures, for instance though offshore wind farms producing hydrogen on energy islands or operating as offshore hybrid projects forming interconnectors.

24. Solar/PV: The Storyline Report defined ranges for the share of solar/PV energy in 2030 and 2050 based on stakeholder consultation feedback. Do you agree that these scenarios are consistent with the assumptions made in the Storyline Report?

Yes

Neutral

X No

If no, please explain why:

There is no variation of the Global Ambition scenario and the Distributed Energy scenario values for 2030 in the TYNDP 2022 Draft Scenario Report. Compared to the updated range of the TYNDP 2022 Storyline Report (up to 2,000 GW), the values for 2050 (987 GW to 1,110 GW) are both conservative. Our PAC scenario foresees up to 1,800 GW in the EU27 in 2050.

25. Nuclear: The Storyline Report defined ranges for the share of nuclear in 2030 and 2050 based on stakeholder consultation feedback. Do you agree that these scenarios are consistent with the assumptions made in the Storyline Report?

X Yes

Neutral

No

If no, please explain why: -

26. Energy Imports: The Storyline Report defined ranges for the share of energy imports in 2030 and 2050 based on stakeholder consultation feedback. Do you agree that these scenarios are consistent with the assumptions made in the Storyline Report?

X Yes

Neutral

No

If no, please explain why: -

27. Hydrogen: The Storyline Report gave an outlook of hydrogen sources available for each scenario. Do you agree that the hydrogen supply in these scenarios is consistent with the assumptions made in the Storyline Report?

Yes

Neutral

X No

If no, please explain why:

The Global Ambition storyline stresses the importance of digitalisation and automation. Under this headline, a broad deployment of demand side flexibility and direct electrification could be expected. Against this backdrop, the strong cross-sectoral emphasis on hydrogen beyond certain industry sectors and aviation does not appear to be fully consistent. Using hydrogen should not be considered as an aim in itself but as one storage technology amongst others that facilitates the increased integration of renewable energy sources.

28. Electrolysis: The Storyline Report defined ranges for the level of electrolysis capacity in 2030 and 2050 based on stakeholder consultation feedback. Do you agree that these scenarios are consistent with the assumptions made in the Storyline Report?

Yes

Neutral

X No

If no, please explain why:

In our understanding, the TYNDP 2022 Storyline Report did not yet define clear ranges for the level of electrolysis capacity for the TYNDP 2022 scenarios. The variation between the Distributed Energy scenario and the Global Ambition scenario suggested in the TYNDP 2022 Draft Scenario Report is relatively limited. It would be good to provide an explanation why fossil hydrogen produced through steam methane reformation with CCS still remains in the mix until 2050.

29. ENTSO-E and ENTSOG have made several improvements to methodologies in relation to prosumer and vehicle-to-grid modelling. Do these improvements reflect your expectations?

Yes

X Neutral

No

Please comment:

See our answer to question 15.

30. ENTSO-E and ENTSOG have made several improvements to methodologies in relation power-to-gas configurations. Do these configurations reflect your expectations about the future operation of these units?

Yes

X Neutral

No

Please comment:

See also our answer to question 15. Given that it is very likely that European hydrogen demand besides in transport will mainly occur in the steel and chemical industry that are geographically concentrated in a few regional clusters, the geographical location of the electrolyser matters a lot in view of their operation mode. Accordingly, it influences the optimisation of the infrastructure connection (electricity transmission to industries' on-site electrolysers versus hydrogen from dedicated renewable capacities (DRES) being transported to industries). TYNDP modelling should better illustrate the potential advantages from linking geographically close clusters of hydrogen demand and potential hydrogen supply in contrast with hydrogen imports and related transport costs (shipping, repurposed or newly built pipelines).

Furthermore, we would like to question the integration of its principles and key assumptions of the European Hydrogen Backbone study into the TYNDP modelling. The European Hydrogen Backbone study was commissioned by gas industry stakeholders to analyse the benefits of a further use of fossil gas infrastructure.

As a consequence, despite being a comprehensive analysis, it does not necessarily pursue the optimisation of the EU's entire energy system (demand, supply, infrastructure and flexibility options) in view of the Paris Agreement. We would have seen this exercise as an opportunity to run a peer-reviewed process with independent researchers. Recent studies show that large parts of the existing fossil gas infrastructure might be superfluous if the EU energy infrastructure planning is optimised consistently towards the 1.5°C objective (see Artelys: What energy infrastructure to support 1.5°C scenarios?, November 2020, https://www.artelys.com/wp-content/uploads/2020/11/Artelys-2050EnergyInfrastructureNeeds.pdf).

31. As a stakeholder, do you intend to use our scenarios, or do you see opportunities for further use of these outside the TYNDPs?

Yes

X Neutral

No

If yes, how would you consider them? -

32. If you have any further comments on the scenarios, please state them here.

The widespread roll-out of hydrogen and partly the reliance on carbon capture and storage technologies contradict the TYNDP's 'Energy Efficiency First' claim. One of the two top-down scenarios should have assessed the costs and benefits of a more ambitious direct electrification with renewable electricity instead of allowing high losses from the introduction of hydrogen in sectors where more efficient alternatives for decarbonisation could be used. The presentation of hydrogen as a 'game changer' that 'can unlock the full potential' of renewables is questionable because the growth of variable renewable electricity generation is the driver of energy transition that alone allows for the production of hydrogen with a climate benefit at all. Renewable hydrogen is without any doubt an important energy carrier in certain hard-to-decarbonise sectors but hydrogen as such it is not a prerequisite for deploying renewable energy resources.

CAN Europe would have welcomed the integration of one new storyline that describes a fully renewable energy system. That storyline would be compatible with the Paris Agreement's 1.5°C target without relying heavily on CCS technologies and on nuclear power (see Climate Analytics' 1.5°C pathways for the EU and its Member States, building on CAN Europe's Paris Agreement Compatible (PAC) scenario, October 2021, https://climateanalytics.org/publications/2021/15c-pathways-for-europe-achieving-the-highest-plausible-climate-ambition).

The role of nuclear power is in line with the assumptions laid out in the TYNDP Storyline Report. We however would like to question again the assumption that an important number of new reactors would be added to the EU grid as unrealistic. With higher shares of variable renewable electricity generation, the economic attractiveness of existing nuclear capacities will decline while operation costs will rise. Investment in modernisation and maintenance costs are higher than the expected future income from wholesale markets. The likeliness that nuclear power could benefit from sufficient national support schemes appears

to be small and limited to a minority of Member States. Against this backdrop, an earlier and stronger decrease of capacities is realistic. This should be reflected in the TYNDP 2022 scenarios. The TYNDP 2022 assumptions on investment costs for new nuclear power capacities and their construction time are not clear. The assumption that nuclear fuel costs despite an accelerated addition of capacities remain on a stable level also deserves further analysis.

Regarding the modelling on the gas side, it is not clear whether the emissions from methane leakage in particular along the methane extraction, transmission and distribution chain have been integrated appropriately in the assessment of greenhouse gas emissions. As methane (including its imports) plays an important role in both the Distributed Energy scenario and the Global Ambition scenario, the relevance of the leakage from the gas infrastructure should be made transparent.

The strong increase of hydropower capacities in the EU27 until 2050 does not appear to be realistic as the potential for additional hydropower capacities is limited by space, regulatory frameworks and by the impact of climate change on water availability.