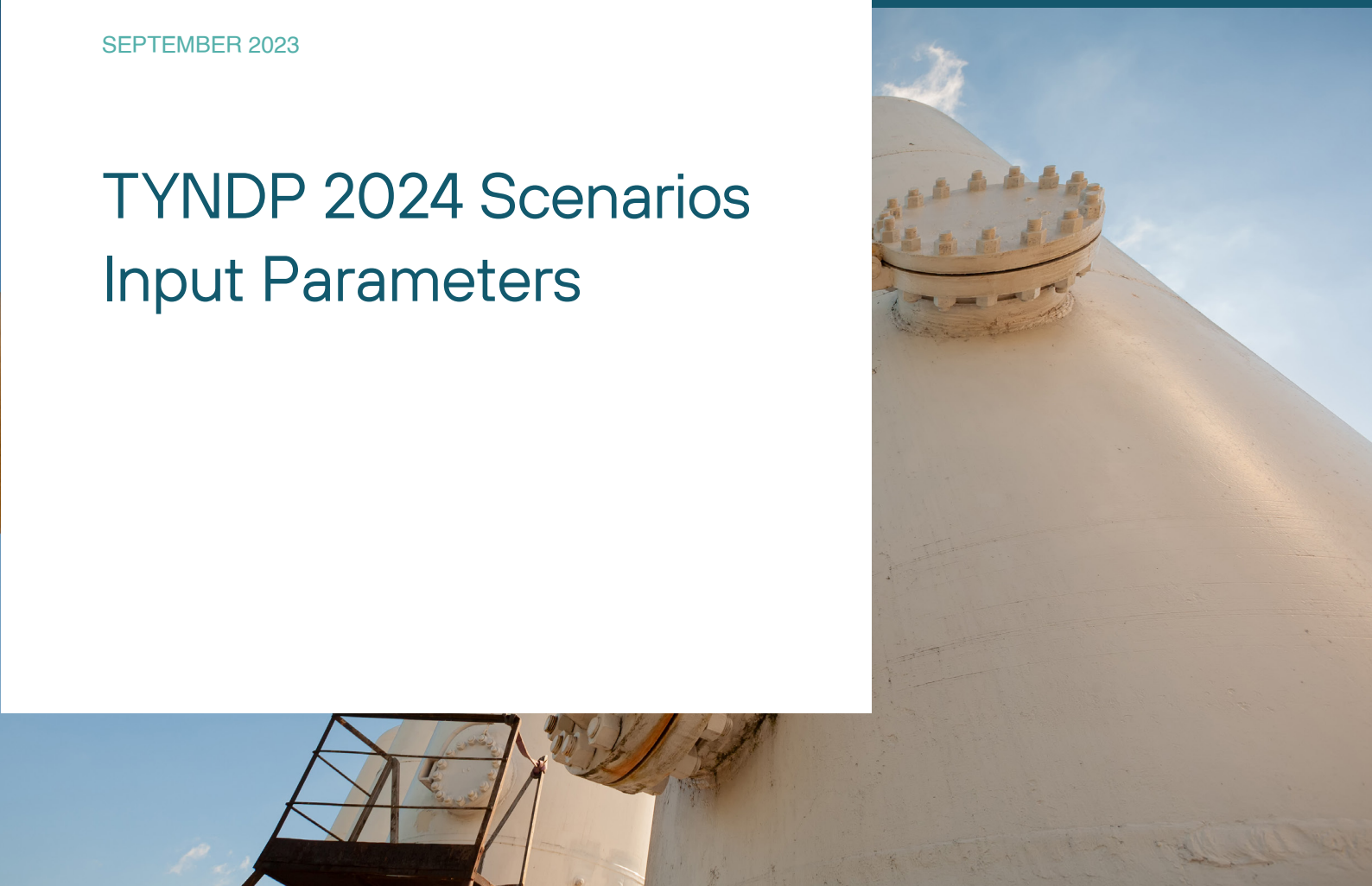
BELLONA EUROPA

CONSULTATION RESPONSE

SEPTEMBER 2023

TYNDP 2024 Scenarios Input Parameters



Response ID ANON-1MSW-3HH5-Z

Submitted to TYNDP 2024 Scenarios Input Parameters
Submitted on 2023-08-08 18:05:33

Introduction

1 What is your full name?

Name and Surname:
Ganni Vassallo

2 What is your email address?

Email:
ganni@bellona.org

3 What is your organisation?

Organisation:
Bellona Europa

Scenario Strategy & Storylines

4 Please provide your comments about the TYNDP 2024 scenarios strategy.

Specify :

The TYNDP 2024 scenarios strategy has several notable features, along with some potential drawbacks and points of consideration:

The strategy's approach to presenting different scenarios makes it somewhat challenging to compare and evaluate their relative merits effectively. This hinders a clear understanding of the scenarios and their implications.

One noticeable concern is the apparent lack of strong ambition when it comes to the integration and expansion of renewable energy generation. While the scenarios do not factor in a reduction in electricity demand (rightfully so), then it becomes even more crucial for the deployment of renewable energy generation to be of a higher amount. Having said that, the failure of the models to factor in the foreseen substantial increase in electricity demand raises considerable doubts about the reliability of the modelling exercise.

It is particularly concerning that the scenarios exceed both the carbon budget and final energy consumption targets. This discrepancy raises doubts about the strategy's alignment with the imperative of sustainability and combating climate change effectively. Such misalignment represents a red flag, indicating that the scenarios will likely fall short of the necessary efforts to address climate concerns adequately.

Moreover, although the strategy adheres to the principle of prioritising energy efficiency, this commitment is not fully reflected across the entirety of the outcomes of the scenarios. This aspect should be more prominent in the strategy's results, showcasing the positive impacts of focusing on energy efficiency across various sectors, both at energy use and generation level.

A noteworthy aspect is the strategy's reliance on NECPs for its methodology. This could, in theory, be a valuable bottom-up approach, however, since not all Member States have submitted their drafts yet, this could lead to uncertainties and potentially impact the final results.

A very positive note for Bellona is the strategy's commendable effort to involve a wide range of stakeholders in the process, indicating increased transparency and openness. Engaging diverse expertise and perspectives is crucial for producing more comprehensive and well-rounded scenarios, ultimately leading to better-informed decision-making. A continued opening in this direction would thus be welcomed and support the continuous improvement of the TYNDP process.

5 Do you agree on one central scenario in 2030 aligned with ACER's Framework Guideline?

No

If you selected No, please specify:

A central scenario in 2030, which reflects the NECPs while also incorporating enhancements to ensure its alignment with EU targets, is a viable and sensible approach. However, it's important to note that this approach should not be narrowly interpreted according to the guidelines set forth by ACER, which primarily emphasises economic growth as the principal driver. It's crucial to remain cautious about potential deviations that may arise in subsequent TYNDP cycles due to overemphasising economic growth.

Nevertheless, as mentioned in other questions, a significant portion of Member States have yet to submit their NECPs, and these plans have not undergone consultation processes. This limitation makes it challenging to base our analysis on hypothetical assumptions about national efforts.

6 What are your views about the updates for the 2024 Scenarios Storylines Report?

Specify :

Regarding the updates introduced in the 2024 Scenarios Storylines Report, there are a few shortcomings worth taking into consideration:

The communication and definition of the updates from previous reports to the current one lacks clarity. This absence of specific information makes it challenging to grasp the precise nature of the changes and improvements implemented in the latest version of the report. A more transparent and detailed explanation of these updates would enhance understanding and facilitate a more thorough assessment of the report's evolution.

Upon closer examination, the updates represent a continuation of the existing narrative or incremental improvements rather than a complete and transformative reimagining of the scenarios. Given the rapid and profound changes occurring over the past year, with a drastic revision of the energy and climate policies and targets, a more substantial and far-reaching revisions of the scenarios would have been more appropriate. This would ensure the report remains highly relevant and responsive to the dynamic challenges and opportunities in the current energy transition landscape.

7 What would be the other important drivers (please see the 2024 Scenarios Storylines Report, Figure 3) that you would like to see in the next cycle? (Please provide an explanation on how it could be included and differentiated among scenarios)

Specify :

The inclusion of drivers such as the "green transition" and "energy efficiency" in the current report is very positive. However, to what extent the development of the scenarios relies on them is a crucial consideration. The outcomes of these drivers are what ultimately matter, and their impact in driving the overall energy transition narrative should be well-defined and differentiated.

As previously mentioned, there are concerns about the low levels of climate ambition and energy efficiency in the current scenarios. To enhance the relevance and effectiveness of the scenarios, it would be necessary to further strengthen the impact of these drivers to achieve the desired outcomes. Addressing the current issues of overshooting carbon budgets and inefficient use of scarce renewable resources (such as in using hydrogen or biomass in sectors that could be electrified directly) is essential to ensure that the scenarios provide a representation of potential future pathways in line with the European climate ambitions.

In addition to the existing drivers, including a dedicated societal or human-centric driver in the next cycle would allow for a better representation of the societal transformations driving the undergoing energy transition. While behavioural changes are considered under the energy efficiency driver in the current configuration, a more specific and comprehensive societal driver is needed. This driver would assess how each scenario accounts for social factors and human behaviours throughout the transition. Incorporating socio-technical and socio-cultural considerations into the scenario frameworks and underlying modelling would provide a more holistic understanding of the potential outcomes and challenges of the energy transition. Differentiated levels of goods consumption and trade, waste reduction and circularity, and demand for high energy modes of transport such as aviation and private vehicles use are examples of a human-centric drivers that should be included in the methodology to assess different decarbonisation pathways.

8 What are your views about the gap closing methodology for NT+ scenario? (Please see the TYNDP 2024 Scenarios Storyline Report, Annex 2)

Specify :

One notable positive aspect of the methodology is its agnostic and unbiased nature. This approach ensures a fair and neutral distribution of gap-closing efforts among sectors within each Member State. It thus avoids favouring specific technologies or sectors, promoting a level playing field in the energy transition process.

However, a clear drawback of the methodology is its limited ability to identify ambition shortcomings in specific sectors and promote a narrative of technology neutrality, which does not maximise efficiency. The current methodology does not highlight where a Member State has the potential to achieve higher levels of decarbonisation beyond what is indicated. The distribution of adjustments by percentage across all sectors in a technologically neutral manner may lack prioritisation and overlook the potential for more substantial improvements in certain areas or technologies.

Moreover, to enhance the methodology's effectiveness and transparency, it is important to incorporate mechanisms that provide clearer insights into the adjustments made and how countries are falling short of their targets. A more detailed breakdown of each country's gaps and the adjustments applied would offer a more informative picture of the potential for improvement. A methodology that identifies and highlights specific ambition gaps would provide a clearer picture of the specific sectoral and geographic areas that require greater attention.

Demand Figures for DE & GA Scenarios

9 What are your views about the added value of this transition to the new tool (ETM) for the transparency of the scenarios building process?(1 - no added value ; 10 very high added value)

7

10 Do you think the demand figures within DE & GA scenarios are consistent with their storylines?

No

If you selected No, please explain:

Based on the information provided, the demand figures within the DE and GA scenarios appear inconsistent with their respective storylines. The storylines suggest that by 2030, both scenarios should align with the energy efficiency first principle and the EU's 2030 targets. Additionally, by 2050, both scenarios should achieve carbon neutrality and compliance with EU strategies (LTS).

However, a closer look at the demand projections reveals some discrepancies. In 2040, both scenarios still show significant reliance on methane and fossil liquids, with even some use of fossil solids, in sectors that could be electrified, achieving a great level of efficiency. This indicates that the energy efficiency first principle is not implemented to its full potential. Furthermore, the demand for liquids and oil should be substantially lower due to the expected electrification of the transport sector , which does not seem to be adequately reflected in the scenarios.

These inconsistencies persist into 2050, preventing the achievement of carbon neutrality by that year. Additionally, considering the rapid uptake of direct electrification in the heating and the transport sector, an increase in electricity demand should be factored in. Moreover, the demand for electricity should also account for the significant amount of renewable hydrogen used in the GA scenario, as electrolytic hydrogen production entails substantial electricity demand. The failure of the models to factor in the foreseen substantial increase in electricity demand raises considerable doubts about the reliability of the modelling exercise.

To effectively reach the goals of energy efficiency, carbon neutrality by 2050, and compliance with EU strategies, there is a need to reassess the demand projections and ensure they reflect the anticipated changes in the energy landscape, including the electrification of key sectors and the role of hydrogen. Aligning the demand figures with the expected trends would strengthen the credibility of the scenarios and their ability to guide effective energy policy decisions.

11 Do you think the market shares of technologies within DE & GA scenarios are consistent with their storylines?

No

If you selected No, please explain:

The market shares of technologies within the DE and GA scenarios are inconsistent with their storylines. Both scenarios are supposed to comply with the energy efficiency first principle, but certain aspects do not align with this principle.

The use of hydrogen for low-temperature heat in both scenarios is questionable when heat pumps are at least three times more efficient. Similarly, adopting hydrogen fuel-cell electric vehicles (FCEVs) is not in line with energy efficiency nor with the current market developments, as electric vehicles (EVs) are significantly more efficient and have proven to be preferred by consumers. It is positive that the scenarios do not consider the use of E-fuels, as they are even less efficient and rely on the supply of carbon whose source might not be sustainable. Moreover, the continued utilisation of methane trucks contradicts the goal of reaching carbon neutrality by 2050 since they still rely on fossil fuels and continue a value chain that results in leakages of a potent greenhouse gas.

With behaviour change being one of the key drivers to achieve carbon neutrality, reductions in emissions should be considered through modal changes, such as shifting from aviation to rail transportation and reducing global trade and goods demand, in at least one of the scenarios. An example of this should stem from the demand reduction for fuels that are currently used to transport oil and LNG via ships, which should undergo a considerable shrinking due to decreased reliance on fossil fuels over time.

Finally, the scenarios' inclusion of methane use in industry raises concerns about its compatibility with achieving climate neutrality. Maximising efficiency should prioritise direct electrification in all sectors, likely reducing the need for gases such as methane and hydrogen in industry where possible. Moreover, technologies such as smart charging and smart metering, which significantly contribute to aligning the electricity demand with its production from variable renewable sources, should have a prominent presence in both scenarios. However, they seem to be overlooked, which is inconsistent with the focus on the energy efficiency of the overall system and with achieving carbon neutrality within the boundaries of available resources.

12 Do you think the amount of biomass in the scenarios is sustainable?

No

If you selected No, please explain:

Based on the information provided in the initial input, the amount of biomass in the scenarios appears high in both the DE and GA scenarios by 2050. The crucial factor lies in how biomass is sourced and used.

Direct electrification should be the preferred solution wherever available, as it emits no direct greenhouse gases on site and is highly efficient since it incurs minimal conversion losses. Various sectors, such as land transport and domestic heating, are already making significant progress in adopting direct electrification, and this should be further strengthened by avoiding the use of biomass directly or through gasification. In cases where direct electrification is impossible, such as industries requiring high-temperature heat, the use of hydrogen should be considered.

It is crucial to recognise that biomass should be reserved for sectors where viable alternatives do not exist and where carbon sequestration can occur. Although biomass is often seen as carbon-neutral, its harvesting, processing and transporting requires extra energy input, its production often causes land use change and its combustion releases carbon back into the atmosphere. To derive the most benefits, biomass should be targeted for applications where the CO2 emitted during combustion can be captured and stored, leading to potential negative emissions and creating valuable products.

For example, using biomass in cement facilities with carbon capture and storage (CCS) could enable the continuation of cement production while removing atmospheric CO2, benefiting a challenging decarbonising sector. On the contrary, using biomass for biofuels in the transport sector has resulted in significant indirect land use change and has only lowered the GHG intensity of transport fuels overall by 2.1%.

Finally, considering the limitations in sustainable biomass supply, the deployment of Bio-CCS (biomass with carbon capture and storage) should be prioritised in sectors with few viable alternatives. For instance, Bio-CCS for industrial applications should be favoured over Bio-CCS for power production, as renewable alternatives are more readily available

13 In your view, are the RES trajectories (wind, solar, battery) & nuclear capacities reasonable?

RES trajectories:

The RES trajectories outlined in the scenarios appear to fall short of the ambition required to meet climate objectives effectively. While some progress is evident, the trajectories do not seem to align adequately with the scale of the energy transition needed to address climate change. Achieving significant emissions reductions and transitioning to a sustainable energy system demands a more robust commitment to renewable energy sources. This would involve increasing the overall deployment of renewable generation and accelerating their integration into various final-use sectors.

The notable demand for hydrogen in both scenarios raises additional concerns. Meeting this demand would require an even higher level of RES deployment than currently indicated. Without a corresponding increase in RES capacities, fulfilling the hydrogen demand without resorting to less sustainable energy sources becomes unachievable. The failure to massively deploy renewable generation to match the enormous demand for hydrogen will effectively result in the maintenance or even further reliance on fossil fuels in the power sector, de facto cannibalising the undergoing energy transition.

Furthermore, the trajectories for energy efficiency improvements seem to be a missing component in the scenarios. Energy efficiency measures are critical in reducing energy consumption and mitigating greenhouse gas emissions. This should happen both through technological improvements, a switch to more efficient practices (such as through modal shifts in transport) and a transition to more efficient generation technologies. A stronger emphasis on energy efficiency would complement the efforts to expand renewable energy capacities and contribute to more substantial progress toward climate goals.

14 In your view, are the technology costs appropriate?

technology costs:

15 In your view, are the prices (presented in the 20230704 – Draft Supply Inputs for TYNDP 2024 Scenarios.xlsx, sheet 3) appropriate?

prices:

16 In your view, are the extra-EU methane import potentials reasonable?

No

If not, please provide us an alternative source (should be reliable and cover 2050 time-horizon):

While there are significant drops in the amount of imported methane, it is evident that this is not sufficient as the EU should prioritise moving beyond methane imports completely and explore pathways for decarbonisation that do not rely on fossil fuels. Therefore, the import of such fuels should drop to close to zero by 2050. The switch to renewable energy forms and direct electrification presents an effective means to reduce gas demand substantially in most sectors. In particular, transitioning low-temperature heat generation to heat pumps and electrifying heavy-duty vehicles has the potential to close the current gap and avoid the continuation of reliance on fossil gas imports from third countries.

Moreover, energy efficiency must be elevated as an energy security priority. Key renewable energy and efficiency policies under the EU's "Fit for 55" and RePower EU packages should be followed and used as minimum targets. Identifying latent reduction potential, such as addressing inefficiencies in gas use, methane leakage, and end-use electrification, can further contribute to moving away from methane imports. Following the invasion of Ukraine by Russia, Bellona looked into the role imported methane would have. This study can be used as a blueprint to identify the low-hanging fruit sectors that could stop relying on methane in the immediate future.

https://network.bellona.org/content/uploads/sites/3/2022/03/EU-can-stop-Russian-gas-imports-by-2025-Final.pdf

https://network.bellona.org/content/uploads/sites/3/2022/03/RepowerEU-analysis-Bellona.pdf

By embracing renewable electricity, direct electrification, and targeted hydrogen deployment, the EU can take substantial steps towards reducing greenhouse gas emissions and achieving its climate objectives. Transitioning away from methane imports aligns with the broader vision of building a greener and more resilient energy system for the future, which is the goal of the multiple policy packages adopted after the climate law, including FitFor55, RePowerEU and the most recent Green Deal Industrial Plan.

17 In your view, are the extra-EU H2 import potentials & prices reasonable?

No

If not, please provide us an alternative source (should be reliable and cover 2050 time-horizon):

Several concerns need to be addressed in considering the extra-EU hydrogen import potentials and prices. While Europe will potentially rely partially on hydrogen imports in the long run due to higher renewable energy potential in other regions, this poses challenges that cannot be overlooked. Applying the additionality principle for renewable hydrogen production becomes even more crucial when looking at imports. This is the only safeguard that ensures that exporting countries continue their own decarbonisation efforts and not divert their local RES production into hydrogen generation for exports. Neglecting this principle could hinder decarbonisation in other areas of the world, particularly those in the developing world, and may even impede access to electricity for local use. Furthermore, importing hydrogen from water-stressed areas might incur water availability issues.

Additionally, hydrogen transportation poses significant challenges. As this molecule is difficult to transport in its pure form, it would most likely be transported as ammonia or methanol, requiring extra energy for cracking back to hydrogen, making the overall process less energy efficient and costly. Moreover, the source of carbon in the case of methanol can also be problematic, as fossil carbon captured from industrial emissions is not carbon-neutral, sustainable biogenic CO2 is limited and Direct Air Capture (DAC) is highly energy-intensive (further reducing efficiency). The choice of fuel used for transport also impacts the climate footprint of hydrogen, with traditional fuels increasing the footprint and carbon-neutral fuels diminishing the overall system efficiency. When planning import infrastructure, these factors must be taken into account to minimise imports and ensure sustainability of the entire value chain.

Moreover, deploying hydrogen-ready import infrastructure does not align with climate neutrality, as it most likely leads to locking in more fossil gas usage. As hydrogen and methane are very different molecules, they require very different technical specifications for the infrastructure, especially due to the difference in energy density and size of the molecules. In addition, if the idea is to convert LNG terminals into hydrogen terminals, the significantly high price of such a process must be considered; more can be found here: https://bellona.org/news/climate-change/hydrogen/2023-03-7-reasons-why-hydrogen-ready-is-a-myth. Therefore, if any import infrastructure is to be deployed, it must be built on purpose for hydrogen and/or ammonia and not for methane.

18 Do you agree with the methodology on how the demand is supplied per energy carrier and how the conversion factors are used? (See 20230704 - Draft Supply Tool (EU-level).xlsx)

Not Answered

If you selected No, please specify:

19 Do you think the preliminary supply figures are differentiated according to the storylines?

Not Answered

If you selected No, please specify:

20 What are your views on the cost methodology of H2 investment projects? I.e., 75% repurposing and 25% new build, European Hydrogen Backbone report as cost basis, 15% distance between capitals?

Specify :

The cost methodology of H2 investment projects raises several concerns:

Regarding the European Hydrogen Backbone report, one must consider any potential conflict of interest. The European Hydrogen Backbone is not an independent study but rather a vision promoted by gas operators. As such, their vested interests strongly influence the report's results, leading to biased cost estimates and project prioritisation.

The updated study published in April 2022 assumes that over 20 Mt of hydrogen will flow across Europe by 2030. However, other demand studies suggest that achieving such volumes may take more time than projected. This raises doubts about the accuracy and reliability of the report's baseline assumptions, which could impact the cost estimates and the timeline of infrastructure deployment (See figure 28 here: A-EW_292_Breaking_free_WEB.pdf (agora-energiewende.de)

Realistically, it is highly unlikely that the entire European Hydrogen Backbone will be built by 2030. In particular, as in the upcoming years, most hydrogen projects are expected to rely on on-site hydrogen production rather than extensive cross-continental transportation through a vast pipeline network.

The initial focus will likely be connecting industrial clusters with nearby hydrogen production areas or ports rather than achieving a comprehensive pan-European interconnection. This phased approach may require more time for full implementation. In addition, when assessing whether repurposing or newly built infrastructure should be the preferred option, especially in the short term, it is crucial to consider that there is a high chance that new hydrogen pipelines will be constructed rather than repurposing existing gas pipelines. Most gas pipelines are still in use and will not be immediately available for refurbishing and switching fuel until gas decommissioning starts.

An accelerated gas phase-down could facilitate the repurposing of gas infrastructure for hydrogen delivery. Therefore, including such measures in the TYNDP would be essential to support the vision of the European Hydrogen Backbone.

21 What are your views on the cost methodology to for electricity investment candidates? I.e., to use submitted candidate projects as electricity investment candidates?

Specify :

Modelling Methodology and Assumptions

22 In your view, is the carbon budget methodology appropriate?

No

If you selected No, please provide an alternative source:

The carbon budget methodology appears to have certain limitations that raise questions about its appropriateness. Stricter integration of the carbon budget into storylines and scenario development is required, especially since the carbon budget is clearly overshot, raising concerns about the climate credibility of the scenarios. Moreover, given this overshot, it would be critical to analyse and clearly present its ramifications and causes.

Additionally, the extrapolation of the global carbon budget until 2100, with a consideration of possible negative emissions, could indicate an inherent uncertainty in the methodology and over-reliance on future carbon removals, which may never happen.

This uncertainty poses significant doubts regarding the accuracy of the figures generated, especially due to the fact the end date of such scenarios is 2050. Therefore, limiting the analysis to figures from 2020-2050 would definitely improve the overall methodology.

23 What do you think about the EV innovation & its relevance to the scenario model? (rank 1 to 10 - 10 most satisfactory)

3

24 In your view, are the assumptions on the EV methodology reasonable?

No

If not, please provide us an alternative source (should be reliable and cover 2050 time-horizon):

25 How could the methodology be improved for the next cycle?

Please explain:

The current assumptions on the EV methodology have significant limitations that should be addressed to improve the overall analysis for the next cycle. Firstly, the methodology overlooks a significant portion of charging infrastructure by only considering home and street parking chargers. Fleet chargers, especially those catering to commercial and corporate vehicles, play a crucial role in transportation electrification. Ignoring them can lead to underestimating the potential impact of electric vehicles in the power sector and market.
Secondly, the absence of superchargers in the modelling is a significant oversight. Superchargers offer high-power fast charging, which is essential for long-distance travel and significantly reduces charging time. With the anticipated rise in electric vehicle adoption, superchargers are expected to promote EV usage and address range anxiety concerns substantially. This will be further driven by the deployment of charging infrastructure through varied policies. Failing to include them in the modelling entails overlooking substantial high electricity load demand and its associated grid infrastructure needs. Moreover, while not directly linked to this specific methodology, when discussing EVs adoption, one must consider social changes that will occur, driving a change in personal vehicle usage, including higher usage of public transport (which would also be electric), car sharing or other forms of transport/mobility.

26 What do you think about the P2G innovation & its relevance to the scenario model? (rank 1 to 10 - 10 most satisfactory)

Not Answered

27 In your view, are the assumptions on the P2G methodology reasonable?

Not Answered

if not please provide us an alternative source (should be reliable and cover 2050 time-horizon):

28 How could the P2G methodology be improved for the next cycle?

Please explain:

29 What do you think about the offshore innovation & their relevance to the scenarios model? (rank 1 to 10 - 10 most satisfactory)

Not Answered

30 In your view, are the assumptions on the offshore methodology reasonable?

Not Answered

if not please provide us an alternative source (should be reliable and cover 2050 time-horizon):

31 How could the methodology for offshore be improved for the next cycle?

Please explain:

32 What do you think about the Hybrid Heat Pump innovation & its relevance to the scenario model? (rank 1 to 10 - 10 most satisfactory)

1

33 In your view, are the assumptions on the Hybrid Heat Pump methodology reasonable?

No

If not, please provide us an alternative source (should be reliable and cover 2050 time-horizon):

34 How could the methodology for hybrid heat pumps be improved for the next cycle?

Please explain:

Home heating and low and medium temperature industrial heating are sectors that can fully and efficiently rely on direct electrification. Therefore, assuming that space and water heating will be driven by hybrid systems depending on hydrogen or methane is unreasonable.

Over 30 independent studies (https://www.researchgate.net/publication/363913282_Is_heating_homes_with_hydrogen_all_but_a_pipe_dream_An_evidence_review) have shown that relying on hydrogen is associated with higher energy system costs than alternative technologies like heat pumps, district heating, and solar thermal. The higher electricity needs for green hydrogen than electrification via heat pumps contribute to this cost disparity. Additionally, hydrogen for heating leads to higher consumer heating costs, higher environmental impacts and requires more energy supply infrastructure and resources. Overall, this alone should discourage the application of hydrogen for any home heating.

Moreover, installing new heating systems running, even if only partially on methane, locks society into fossil gas dependency in the long term, whereas the gas infrastructure should undergo decommissioning to transition to more sustainable energy sources.

Finally, biomethane and e-methane are valuable resources that should be reserved for applications where there is no alternative, such as industries that require carbon as a feedstock and where their emissions can be captured, resulting in negative emissions. Utilising them for home heating would be a waste of these limited resources and a missed opportunity for carbon removals.

35 Do you find the assumptions on the H2 steel tanks methodology appropriate?

Not Answered

If not, please provide us an alternative source (should be reliable and cover 2050 time-horizon):

36 What are the most important modeling innovations that you would like to see in the next cycle?

Please explain:

Conclusion

37 Privacy Policy

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CONTACT

Ganni Vassallo
Policy Advisor

Phone

Mobile: +32 (0) 456 616B195

Online

Email: ganni@bellona.org
Website: www.bellona.org

Bellona Europa is an independent, non-profit organisation that meets environmental and climate challenges head-on. We are result-oriented and have a comprehensive and cross-sectoral approach to assess the economics, climate impacts and technical feasibility of necessary climate solutions. To do this, we work with civil society, academia, governments and polluting industries.