ENTSO-E Consultation on the TYNDP 2020, the "Power system needs in 2030 and 2040" report and accompanying documents

ENTSO-E is running an online survey - consultation on the following reports that were recently published:

- The TYNDP 2020 report and Highlights
- The Project sheets, showing how 180 electricity transmission and storage projects can contribute to the European energy transition.
- The power system needs study, investigating where new solutions for electricity exchange are needed to reach decarbonisation targets and keep security and costs under control in the 2030 and 2040 horizons. These present needs at pan-European, regional and country levels:
    - Pan-European Power System Needs report (and summary)
    - Regional investment plans
    - Power system needs 2030 briefs at PCI corridor level
    - Power system needs 2030 factsheets at country level
- Insight reports on operational challenges, inertia and smart sector integration.

TYNDP 2020 CBA Implementation Guideline, Implementation Guideline on redispatch assessment and Implementation Guideline on project-level indicators

WindEurope has analysed an important set of these documents ("Pan-European Power System Needs", "Power system needs 2030 briefs at PCI corridor level", "The inertia challenge in Europe: present and long-term perspective, System dynamic and operational challenges) and has prepared a draft response to ENTSO-E questions. The consultation runs until January 4th.

1. Open comments

- **The foreseen need for additional cross-border transmission capacity post 2030 seems incoherently low compared to the need estimated for the period 2025 – 2030. As a result, estimated investment needs for such capacity are low.**
  The report identifies the need for 35 GW cross-border transmission capacity by 2025, 50 GW between 2025 and 2030 and 43 GW additional capacity between 2030 and 2040. The need for an immediate step-up of additional cross-border capacity in the next decade (~ 7-10 GW/year in 2020-2030, reflecting the increase in GHG reductions and higher RES) does not seem coherent with a much lower need foreseen for the 2030-2040 decade (~4.3 GW/year on average, almost half of the one foreseen for the 2020-2030 period). Besides, the Green Deal requires ramping up (at least duplicating) RES installation rates in the 2030-2040 decade. Considering this one would expect that additional cross-border capacity needs for the same period (2030-2040) would not decrease by half compared to the previous decade (2020-2030) but would rather remain stable after 2030. Therefore, foreseen investments to increase cross-border transmission capacity in 2030-2040 do not seem to be coherent with the Green Deal objectives. As a result, if system needs and the respective projects are underestimated and not identified on time, releasing the necessary investments, and accomplishing the projects will be significantly delayed on its turn.

Here are some points helpful to understand the difference between the estimated grid investment needs in this study and in other sources and the importance of stable (and higher) grid reinforcements and investments after 2030:

1. The latest EC Impact Assessment (2020) presents the investment needs in power grids based on different scenarios and estimates a minimum of €30bn/year from 2031 to 2050.
2. The EC long-term decarbonisation strategy (2018) estimates a minimum of €60bn/year for investments in power grids (Baseline scenario).
3. WindEurope's 'Our energy, our future' report (2019) estimates an average of €15bn/year only for offshore grids up to 2030 and between €10-50bn/year from 2030 to 2050.
4. WindEurope's 'Breaking New Ground' report (2018) estimates that an average of 12 GW-km/year of additional power lines would be needed up to 2050. This is three times the amount that this study estimates in its current version.

- **Central Scenario volumes are not in line with the NECP**

  The National Trends scenario in this study is not in line with the final National Energy and Climate Plans. The National Trends scenario foresees 78 GW of installed wind by 2030 and 131 GW by 2040 in EU27 and the UK. Both are underestimates and should be updated based on the final National Energy and Climate Plans. EU27 and the UK have committed to 111 GW of offshore wind capacity by 2030 in their final NECPs[1]. Power system needs should be estimated based on the final NECPs and not on the draft ones submitted in early 2019 (which indeed foresaw less than 100 GW). In the course of 2019 several Governments increased their offshore wind volume commitments for 2030: the UK by 10 GW; Germany by 5 GW; Ireland by 1.5 GW; Poland by 2.1 GW; France by 2.3 GW, Denmark by 6 GW. Norway will bid next year 4.5 GW and other countries with no on- and offshore breakdown will build offshore wind too. This additional 33 GW takes the total capacity installed to 111 GW.

  Also, it is not clear whether and how this study considers the future geographical location of new renewable generation projects.

- **TYNDP progress compared to previous years and labels**

  The study monitors the evolution of each project since the last TYNDP and assigns relevant labels (since 2014 with standard labels). The meaning of labels "*rescheduled*" and "*delayed*" and the difference between these needs to be clarified. In most cases the argument for rescheduling a project indicates the change of a commissioning date due to delays in permitting procedures or other. Considering this it would be more consistent to merge **the "*rescheduled*" and *"delayed"* labels or clearly stating their difference in practical terms.**

  Additionally, projects might experience a "*cumulative misleading progress*" label if their status is updated only with respect to their last TYNDP status. For example, let us assume a project that was for the first time identified in TYNDP with expected decommissioning date in 2020. If the project gets delayed or rescheduled it will then be labelled with a 'rescheduled/delayed' status to 2022. Then its commissioning date might change from 2020 to 2021 which will read to labelling it as 'ahead of time' in 2022 even though it will have been delayed by one year compared to the original planning. For this reason, it is important to **keep track of changes with respect to the original timeline of each project and not to intermediate timeline updates or to indicate the first year that the project was identified in the TYNDP so that it can be reliably tracked.**

[1] https://windeurope.org/2030plans/

For questions:
Name Surname
name.surname@windeurope.org

- **TYNDP 2020 list of project capacity versus energy system needs figures**
  The study has a clear pipeline of cross-border reinforcements leading to additional 35 GW (2025 – 2030), 50 GW (2025 – 2030) and 43 GW (2030 – 2040). The **TYNDP 2020 has 154 cross-border transmission projects which add up to 26 -27 GW** (depending on whether the sum of capacity increase is from A – B or B – A) **with commissioning dates between 2020 – 2040. Could you please clarify how to compare the different numbers reported in the two processes (TYNDP 2020 versus Power System Needs Report)? Will the TYNDP 2022 be updated to reflect the needs for additional cross-border capacity reported in the Power System Needs study?** Otherwise, it is not clear whether and how delays in such grid reinforcements are planned to be mitigated with specific investments.

- **Hybrid projects – Pipeline of projects and modelling limitations**
  Cost-Benefit Analysis for infrastructure projects addresses only point-to-point ("radial") connections and assumes that offshore wind farms only connect with a point-to-point topology to one single market. This is not in line with the 2030 and 2040 vision because that one considers a pipeline of cross-border ("hybrid") projects. Offshore hybrids[2] have been mentioned as a key cornerstone for the execution of the Offshore Renewable Energy Strategy. Offshore hybrids bring together generation and transmission design and planning and can yield significant cost and space savings compared to currently deployed radial connections. There are at least 10 GW worth of projects to be connected using a hybrid configuration. Omitting their value with a simplified CBA could delay or risk their execution and lead to unrealistically high society costs linked to offshore wind integration.

The current TYNDP 2020 list of projects includes some offshore hybrids – labelled as multi-purpose interconnectors – but it is very limited and they do not feature in the power system needs study

You note in your report that factoring in hybrids is outside your mandate: Page 19: *[…The study does not focus on the optimal connection of (all types of) generation, as this is not part of the current ENTSO-E mandate. For that reason, so called "hybrid projects", i.e. the combination of interconnections and offshore generation units, are not identified with the current System needs methodology…]* .

However, It will be crucial that TYNPD 2022 proposed projects and Power system needs studies are better aligned. That would make it easier for project promoter to identify potential value of hybrid projects and guide them towards designs that can increase power system benefits.

WindEurope assessment shows that at least 4 to 9 offshore hybrid projects with high certainty of execution in the next decade are not yet identified in the TYNDP2020 (table below).

Name	Generation capacity	Interconnector capacity	Classification[3]	Hybrid project status	TYNDP / PCI status	FiD expected date
Kriegers Flak	Kriegers Flak (600 MW), Baltic 1 (48		Combined Grid Solution	Under construction	TYNDP 2014 (ID	

[2] Grid infrastructure with dual functionality combining electricity interconnection between two or more Member States, and transportation of offshore renewable energy, to its sites of consumption (EC, 2020).
[3] Adopted from Roland Berger study on hybrids

For questions:
Name Surname
name.surname@windeurope.org

	MW) and Baltic 2 (288 MW)				36) / PCI 4.1	
Bornholm Island Energy Hub - Phase I	Bornholm area (2 GW) to be tendered in Denmark	1 GW to Denmark and 1 GW to Poland or Germany	Offshore hub (onshore MTDC with offshore generation)	Under permitting procedure	No	2024
WindConnector	Norfolk wind farm (1.8 GW) connected to Ijmuiden Ver (2 GW) wind farm	1.8 – 2 GW between UK and Netherlands	Combined Grid Solution	Under permitting procedure	TYNDP 2020 (ID 260) / PCI 1.16	2025
Estonia - Latvia joint offshore project	Gulf of Riga area (1 GW) to be tendered	1 GW split between Estonia and Latvia	Interconnector Tie-In	Planned	TYNDP 2020 (ID 62) / PCI 4.2[4] *(partial)*	2026
North Sea Energy Island - Phase I	North Sea area (3 GW) to be tendered in Denmark	3 GW split between Denmark and Netherlands or Germany	Offshore hub	Planned	No	2025/2026
Sørlige Nordsjø	Sørlige Nordsjø II (3 GW) to be tendered in Norway	3 GW to be exported to Europe	Neighbour OWF	Planned	No	2026
Nautilus multi-purpose interconnector	Belgian area (2.2 GW) to be tendered	0.9-2.2 GW between UK and Belgium	Interconnector Tie-In	Planned	TYNDP 2020 (ID 121) / No PCI	2024 (interconnector) and 2026/2027 (wind farms)
North Sea Energy Island - Phase II	North Sea area (7 GW extension) to be tendered in Denmark	7 GW split between Netherlands, Germany, Denmark and UK (TBC)	Offshore hub	Planned	No	2025/2026
North Sea Wind Power Hub	North Sea areas (12 GW)	12 GW split between Denmark, the Netherlands and Germany	Offshore hub	Planned	TYNDP 2020 (ID 335) / PCI 1.19	2030

- **System inertia trends**
  The outcomes and published report of ENTSO-E technical group HPoPEIPS (High Penetration of Power Electronic Interfaced Power Sources), which has been done and agreed jointly by the industry, academia and TSOs are ignored
- Even though the study mentions the existence of the technical group the outcomes from the exchanges between the experts and the published report are neither referenced nor considered in the analysis. We strongly recommend that the published report "*High Penetration of Power Electronic Interfaced Power Sources and the Potential Contribution of Grid Forming Converters*" is referenced and that its definitions, conclusions and the open questions it identified for further investigation are summarized in this study. The two reports (Migrate, Osmose EU Projects) that are referenced in the study are anyway among the many references of the HPoPEIPS technical

[4] Not necessarily the offshore grid or the hybrid project but reinforcement as it would be the 3rd interconnector between the countries.

For questions:
Name Surname
name.surname@windeurope.org

report. The HPoPEIPS technical report may not estimate power system needs in terms of inertia or dynamic stability, but it is certainly a good first step in identifying the right questions.

- Similarly, the reports "*The inertia challenge in Europe present and long-term perspective: insight report*" and "*System dynamic and operational challenges*" seem to not be up to date reflecting the HPoPEIPS technical report outcomes.

- **Flexibility from RES not considered**
  Flexibility can also be provided from renewable power plants and renewable hybrid power plants (wind/solar and potentially storage). In the case of wind turbines new technologies and new capabilities are expected to be brought to the market soon (e.g., grid forming capabilities, storage directly integrated at wind turbine level). Wind farms can today provide local downward flexibility (flexible connections e.g., Belgium, France, Netherlands) balancing or frequency regulation (e.g., Spain, UK, Ireland, Germany, Ireland, Belgium, Denmark) and voltage control and both facts should be considered in the study based on existing market and system data from these countries. Other commodities related to inertia and black start are already on the way in some countries (e.g., stability pathfinder in the UK).
  This flexibility can be modelled based on available market data in the respective countries. Inertia and black start services are much more difficult to model as they are in their very early stages in the case of wind. However, there are already some pilot projects that can be considered (Scottish Power/SGRE grid forming project in the UK). In particular in a 2030 – 2040 time horizon, flexibility from RES plants needs to be somehow considered for example in residual load simulations.

- **Grid optimisation devices not considered**
  The study does not seem to consider a wider deployment of grid optimisation technologies (e.g., Dynamic Line Rating, advanced power flow control devices, synchronous condensers …) and their role in grid infrastructure deferral. Synchronous condensers, STATCOMs, HVDC with GFC are mentioned but only as an example to resolve operational issues. It is not clear whether and how the benefits of these solutions are considered when estimating power system needs for 2030 and 2040. **Are such solutions part of ENTSO-E vision for the power system in 2030 and 2040? How is this reflected in this study?**

- **Intermediate short-term measures**
  The report "*System dynamic and operational challenges*" describes the set of operational challenges and only two intermediate short-term measures ((1) Effective use of existing reactive power sources, incl. distribution connected SGUs, (2) Limit RES (!!!), limit bulk power flows and or impose must run conventional units (!!) to ensure the necessary level of short-circuit power. **Are these indeed the only short-term mitigation solutions to operational issues in ENTSO-E vision for 2030 and 2040? What about grid optimisation technologies (see above), digitalisation and interoperability?**

- **CBA Implementation guidelines**
  The current process does not allow a fit for purpose assessment of offshore integrated transmission and generation assets (offshore hybrids or multi-purpose interconnectors). The guideline needs to be amended to reflect the benefits of such assets.
  The same applies for grid optimisation technologies. The current process needs to evolve to monetise benefits such as TOTEX-savings (including new grid infrastructure deferral) thanks to such devices (Dynamic Line Rating, FACTS, synchronous condensers, large utility-scale storage such as Grid Boosters, …)

For questions:
Name Surname
name.surname@windeurope.org

Not only CO_2 but also non-CO_2 emissions should be monetised in the assessment process.
The process currently considers only three climate years. We recommend increasing the number of considered climate years.

2. Use this field for any further comment on the quality, clarity, and length of TYNDP deliverables. How complex is digging in TYNDP documents? How easy was it for you to understand the TYNDP2020?

- **It is useful to have a project ID and there has been a good improvement on how project file (excel) is organised. However, we have some suggestions:**

ENTSO-E records the change of status per project since the last TYNDP (including delays, on time, etc.) but this can lead to a misleading analysis compared to the original timeline. For example: If the original expected commissioning date of a project gets delayed by a few years, in the next TYNDP the progress assessment might read “Ahead of time” or “Investment of time” but is it not a fair comparison because it is still delayed compared to the original schedule. It is important to keep track of changes with respect to the original timeline of each project and not to intermediate timeline updates or to indicate the first year that the project was identified in the TYNDP so that it can be reliably tracked.

A second point related to this cumulative effect: it would be very useful to monetise the gains or losses from a project progress (i.e., being delayed or ahead of time). This can be reflected through KPIs like curtailment or loss of load.

It seems by the analysis tab that both “*delayed*” and “*rescheduled*” refer to almost the same status, in most cases a change in timeline due to permitting or investments. It would make sense to merge these labels or to clarify their difference in practical terms.

In the analysis for rescheduled projects sometimes projects are replaced with new investment IDs or they are divided into smaller investment needs. It would make sense to include in a row the ID from the previous TYNDP otherwise it is easy to keep track of the progress of specific projects.

3. What are your views on the 'central scenario' approach? Is the Current Trends sensitivity a relevant exercise to repeat in future TYNDPs?

- The National Trends scenario in this study is not in line with the final National Energy and Climate Plans. The National Trends scenario foresees 78 GW of installed wind by 2030 and 131 GW by 2040 in EU27 and the UK. Both are underestimates and should be updated based on the final National Energy and Climate Plans. EU27 and the UK have committed to 111 GW of offshore wind capacity by 2030 in their final NECPs[5]. Power system needs should be estimated based on the final NECPs and not on the draft ones submitted in early 2019 (which indeed foresaw less than 100 GW). In the course of 2019 several Governments increased their offshore wind volume commitments for 2030: the UK by 10 GW; Germany by 5 GW; Ireland by 1.5 GW; Poland by 2.1 GW; France by 2.3 GW, Denmark by 6 GW. Norway will bid next year 4.5 GW and other countries with no on- and offshore breakdown will build offshore wind too. This additional 33 GW takes the total capacity installed to 111 GW.

[5] https://windeurope.org/2030plans/

WindEurope
For questions:
Name Surname
name.surname@windeurope.org

- Also, it is not clear whether and how this study considers the future geographical location of new renewable generation projects.
-

4. In your view, how do proposed transmission and storage infrastructure projects compare to future system needs? Are the CBA results consistent with the role of the network in achieving the EU Green Deal and in identifying the value of infrastructure projects and the way forward?

- Replies in the Open Comments session

5. In your view, what is the role of non-TSO transmission projects in the planning of the European network and how do you think this is reflected in this TYNDP?

- Some projects are reflected but we consider the projections of the TYNDP for renewables are still very conservative.
- Regarding offshore transmission/ generation assets: In Europe, offshore grid infrastructure owners, developers and operators might be TSO and non-TSO companies. For example, as enabled by the UK Energy Act, the upcoming offshore transmission system will be developed by non-TSO companies and ultimately owned and operated by Offshore Transmission Owner (OFTO) regimes typically owned by financial (non-TSO) investors.

6. Any suggestions for the TYNDP 2022?

- Consider the suggestions presented above for the excel file to improve even further the standardisation and analysis of projects (i.e. project labels, tracking of progress and measuring the impact of this progress).
- Make sure to fulfil the system needs ENTSO-E has envisioned in the Power System Needs report with a clear pipeline of transmission projects, including hybrid ones. If it is not possible then also clarify why and where the difference arises from.

For questions:
Name Surname
name.surname@windeurope.org