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Network Development Plan of Germany. First draft Consultation Response

CURRENT
Enabling Network Technology throughout Europe

We welcome the German Network Development Plan 2021 first draft and the reflected renewable energy targets, as well as the ambition to cover 70% of the increased power demand by 2035 from Renewables.

We congratulate the highly skilled collaborators of the four TSOs for their sound and detailed proposal, their documented openness for new solutions, and we agree that network development is a task for society at large.

currENT is the industry association representing innovative grid technology companies that operate in Europe and empower the grid. currENT aims to generate greater awareness of new grid enhancing technologies and to accelerate their implementation. We do so by working with the wider stakeholder ecosystem on future-proof regulatory and policy frameworks in Europe.

We believe that renewable generation and energy efficiency are the 'first order' solution for taking the Green Deal ambition and the Climate Law from promise to practice. Renewable-based electricity solutions can meet more than 70% of our total energy needs by 2050. As to make the 'can do' a 'will do' we need powerful climate proof ´clean´ power grids. Such grids are already possible today.

- Power networks – both transmission and distribution – have to become even stronger enablers and accelerators of the energy transition, paving the way for further electrification, rising demand and sector coupling.

- Innovative grid technologies will assist and promote the integration of higher levels of renewables.

- Designing tomorrow's grid by using today's technology and an incremental approach is no longer possible if the COP21 and Green Deal ambition shall be implemented.

Therefore, energy system operators need to be encouraged and incentivised to update their toolbox for existing and future grids.

On the qualification and the use of new technologies in NDPs currENT recommends to:

- Develop '**best practices'** across Europe for qualifying new technologies:
  -Increase **transparent sharing of learnings** among system operators, countries and wider industry – avoid duplication of pilot projects which slows down the uptake of new solutions and ultimately delays benefits to customers.
- Require system operators to consider all possible solutions for an identified network need.
- Align the **priorities for innovation** to ensure the highest potential innovations are funded, developed, trialled and ultimately rolled out. [1]

We welcome that the grid development in Germany is based on the **NOVA principle and have advocated in Europe for adopting similar NOVA approaches in other regions.**

We appreciate the opportunity to contribute, and we see such transparency as paramount for best possible NDPs, and for the buy-in of society on behalf of which and for who the networks are developed.

General Remarks on the first draft of the NDP 2021

Scenarios are required to stress-test project portfolios and strategies. The scale of investment being proposed requires adequate stress testing to ensure that investments can be justified to society. Uncertainty is growing in the influencing factors that will determine the needs of the transmission network in the future. Notably, rapid growth areas in the economy, scale and location of generation, rises in new categories of demand, and the extent of sector coupling should be mentioned here. Given the difficult economic situation for coal generators and the increasing Co2 costs, currENT is wondering whether a sensitivity of coal phase out by 2030, not 2035, should be calculated. Possibly another sensitivity to be considered is a higher deployment of offshore wind by 2030, exceeding the foreseen 20 GW by 5 MW. Such an increase results from the need to raise RES targets as to achieve the 55% GHG reduction target set by the Green Deal (as the expansion of onshore is very difficult in Germany, most probably offshore would be an easier option).

NOVA principle

1. Scope of the NOVA principle

currENT believes that optimisation applies to existing AND future grids. This means that the first block in the principle ´optimisation´ has to be seen as horizontal and applying also to the two others (reinforcement and expansion). This would translate into Optimisation of existing assets, optimised reinforcement, and optimised expansion. Page 111 states that *´new and innovative technologies limit the need for network expansion´*. While we agree with this statement, the scope needs to be wider and thus should be updated as follows: *´new and innovative technologies reduce the need for network expansion, provide for interim and short-term solutions when networks are delayed, and make newly deployed networks more efficient´*.

Justification of the change:

-several available new technologies, such as for example the modular Static Synchronous Series Compensator (SSSC), are limiting costs that result from delayed networks. Such technologies are flexible, can deploy fast, and are relocatable and modular. The value of such short-term solutions needs to be recognized by the NDP more generally, and regulation has to make sure that such solutions become part of the TSOs operational toolboxes.

-new technologies make also newly developed networks more efficient and thus also limit the need for those.

-make better use of the temporarily available greater capacity that DLR can provide.

2. Complementarity of optimisation, reinforcement and network expansion.

currENT suggests to add a sentence that optimisation, reinforcement and network expansion are not alternative to each other but complementary and that network expansion is crucial with electrification and RES expansion.

3. Be technology agnostic when mentioning technologies under NOVA and in the concrete adhoc measures of the *Zubaunetz* that are proposed in the NDP 2021.

The group of technologies mentioned under the NOVA optimisation heading in the first draft of the NDP 2021 needs to be put under scrutiny: the report only describes technologies that have already been used in NDP 2019 (PST, TCSC, AC lines, HTL, HVDC, Netzbooster) and does not refer to other already existing but not yet deployed solutions for Germany.

currENT misses a more systematic approach to technology presentation under NOVA and the overall reference to a toolbox of solutions that TSOs dispose of. We suggest that the NDP applies a transparent and systematic approach when it comes to listing available technology solutions.

Hence, it should include an overview of available technologies, quoting relevant publications such as the ENTSO-E Technopedia[1], the *Betriebsmittelstudie* (Operational Devices Study), the results of which will be released in Summer 2021[2], or the CETTIR report by EC as released in November 2020 together with the State of the Union[3]. Such an overview should refer to the specific capabilities of the technologies, Technology Readiness Levels (TRLs), as well as implementations in other geographies, and here in particular in the EU, very much like in the ENTSO-E Technopedia. As the NDP, this part would be also consulted publicly and updated regularly.

The NDP 2021 should at once, be technology agnostic when it comes to the specifically mentioned ad hoc measures that have yet to be approved by the BNETZA: instead of mentioning one specific technology to provide a solution, it should refer to the need, for example load flow management, and leave it open to the TSO to use the most appropriate solution when it comes to implementation. That way regulation would be more straightforward, while TSOs dispose of the flexibility to choose from a toolbox of proven solutions instead of a single tool that worked in the past but might not be the tool of choice in the future. This would mean on the concrete example of power flow control that no PST or TCSC would be mentioned, but that all commercially available technologies will be considered by the TSO.

More transparency is needed on the ad hoc measures technology choice CBA, in particular for the short term horizon of 2023-25.

[1] ENTSO-E Technopedia - ENTSO-E

[2] Betriebsmittelstudie, a catalog of measures, commissioned by BMWI, managed by DENA, participants RWTH and BET.

[3] Report on progress of clean energy competitiveness (EC 2020).

4.Exhaustive reference to studies that relate to network optimisation, not only to Innosys.

currENT agrees with the importance that the 4 German TSOs attribute to the Innosys project. currENT believes however that the NDP 2021 needs to equally refer to relevant publications such as the ENTSO-E Technopedia[4], the *Betriebsmittelstudie* (Operational Devices Study), the results of which will be released in Summer 2021[5], or the CETTIR report by EC as released in November 2020 together with the State of the Union[6]. Further relevant studies are IRENA (Innovation Landscape - System Operation)[7],IEA (Clean Technology Guide under "Grid Infrastructure")[8], RGI Best Practices Database[9], ETIP SNET (Knowledge Sharing Platform under "Technology - Integrated Grid")[10].

5. The development plan should acknowledge the value of early delivery.

The NDP does not currently allow for the value of early delivery to be reflected in the value a project brings. For example, if two technologies can meet the need in the same year i.e. 2025 (four years in the future) but one technology can be built in a year and the other only in four then their evaluation under the current methodology would be the same, even though the first could provide three additional (earlier) years of benefit. In a plan, where some projects will be late and the exact sequence that will actually be built is not known, it is crucial that the value of early delivery is added to the methodology, and that the TSO toolbox includes such flexible and fast to be deployed tools. Having additional capability is highly valuable for managing congestion and accelerating early renewable integration.

6. The NOVA principle should be linked to relevant EU legislation in the NDP 2021.

currENT believes that a cross reference should be added to relevant European legislation addressing innovative and efficient power networks. This is in particular valid when it comes to the German NDP, as Germany with its nine neighbours and its ambitious energy transition highly impacts the region and beyond. Those legislations to mention are the Smart Grid Indicator that, in line with the Clean Energy Package, had to be developed by NRAs by the end of 2020; or the relevant provision in the Energy Efficiency Directive relating to the efficiency of networks.[11]

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[4] ENTSO-E Technopedia - ENTSO-E

[5] Betriebsmittelstudie, a catalog of measures, commissioned by BMWI, managed by DENA, participants RWTH and BET.

[6] Report on progress of clean energy competitiveness (EC 2020).

[7] https://www.irena.org/publications/2020/Jul/System-Operation-Innovation-Landscape-briefs

[8] https://www.iea.org/articles/etp-clean-energy-technology-guide

[9] https://renewables-grid.eu/activities/best-practices/database.html

[10] https://tools.etip-snet.eu/search.html

[11] See here also the JRC report of December 2020 Improving Energy Efficiency in Electricity Networks | EU Science Hub (europa.eu)

7. European solutions for European challenges

Curtailment and price differentials in Europe's power sector cannot be effectively, economically or efficiently addressed through national solutions alone. We suggest thus to highlight the contribution that the German NDP makes to achieving the European objectives as developed with the Clean Energy Package and the Green Deal [12].

8. Update the implementation of the NOVA principle

currENT recommends, very much in line with the Ecorys 2019 report to the Infrastructure Forum 2019,[13] to:

- Move towards an **output-based approach** – reduce bias towards specific technologies, or larger CAPEX solutions only.
- Incentivise the use of **smaller or rapidly deployable** solutions, especially for short-term, temporary or smaller scale needs.
- Increase **transparency and consultation** in national processes.
- **Accountability and penalties** should be foreseen when grid optimisation solutions are delayed, that are explicitly considered in the NDP. The Smart Grid Indicator could be an appropriate reference here.

Detailed comments

Mention of technologies as per NOVA in the NDP

- Page 12 states that *´All important tools for optimization are listed.´* currENT wonders whether this is the case, given that technologies such as the SSSC, different from PST or TCSC are not mentioned (while they are commercially available, are referenced in ENTSO-E Technopedia, in the operational devices study, etc.), that DLR (WAFB), a group of various technologies, that should be reflected as such, or that superconductors are not mentioned as a future solution in particular in the offshore space.
- The same comment applies to page 15: the start network shows the network and already advanced network technologies. What is the criterion here for such a statement? (we suggest that TRL should be mentioned here).
- Page 15 states that the network development shows overloads and that network development measures in line with the NOVA principle are planned as a consequence. As we suggested above,

[12] We also suggest that the German action plan bidding zone, that addresses the implementation of the 70% target in Germany, is updated in line with the NOVA principle and lists solutions that can help implement the target, beyond the BAU that is mentioned in the document.

[13] Report ´Do current regulatory frameworks in the EU support innovation and security of supply in the electricity and gas transmission systems?' Energy Infrastructure Forum 2019 - background papers | European Commission (europa.eu)

optimisation technologies should also be used in the case of delays as well as for future network deployments.

– Page 111 mentions power flow control tools such as PST and TCSC but omits to mention SSSC. We see two options for improvement here:

Option A: be technology agnostic and omit to mention any specific technologies but refer to all commercially available technologies: *´Measures for active power flow control include all commercially available technologies.*'

Option B: if specific technologies are mentioned, the m-SSSC has to be mentioned too.

Justification:

Option A: technology agnostic/ neutral.

Option B: if mention, be complete.

SSSC is TRL 8/9; reference in Technopedia, *Betriebsmittelstudie*, RWTH Aachen Study[14], but also MoU and collaboration with German TSOs.[15]

– Page 105 describes DLR (WAFB): we suggest to present and clarify the range of technologies that are summarized under the heading of DLR.

Offshore wind (Chapter 3)

currENT **recommends to refer to the NOVA principle also in the offshore chapter**, in line with our general statement that new technologies are not only there to improve the use of the existing network, but also to optimise the future grid.

We believe that current technologies will not be sufficient to reach carbon neutrality. The German NDP should facilitate 'Market Shaping Grid Innovation' that has the potential to deliver a credible path towards German / European 2050 objective of becoming Net Zero carbon economies.

– We need multi-terminal DC pilot projects and for superconducting cable systems (SCS) to be allowed access to risk-free testing (post TRL6) in connection with them, e.g. through national or EU projects.
– We should be allowed access to test SCS through electrolyser projects and test facilities. The TSO should be allowed to integrate Hydrogen and SCS – sector coupling synergies.
– In the absence of access to DC testing, the European SCS technology lead will be lost to other nations.

[14] FGE Colloquium 06/22/2020: Flexible assets prevent congestions in the transmission grid. RWTH Aachen University.
[15] Amprion und Smart Wires testen flexiblere Lastfluss-Steuerung im Stromnetz

Using NOVA in the case of offshore means also that the onshore/offshore nexus is strongly emphasized: How can onshore grids further improve the uptake of offshore capacities? The offshore DC lines should not end at the shore but should stretch into the country replacing somewhat the phased-out capacities. Superconductors can do this without losses- different from today's HVDC that loose about 10% of the energy on a distance of 1000 km when operated under full load. As the distance between supply and demand grows with the switch off of conventional load (nuclear, coal) in Germany, and that thus line losses increase, the use of superconductors could reduce such losses by more than 80% under full load.

The importance of an offshore grid is highlighted in the recently published EU Commission "Clean Energy Transition – Technologies and Innovations" report which stated that "to build the offshore energy production, and its connection to onshore consumption, an interconnected grid is needed." This point was further emphasised by WindEurope who stated "The electricity grid infrastructure in Europe should anticipate major growth in both offshore and onshore wind energy. It requires the expansion of offshore grids and the reinforcements of onshore grids. They should support the development of meshed offshore grids. This will require enhanced cooperation between countries." We would expect a reference to the EU offshore strategy and related statements in the NDP 2021.