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Consultation on the European Commission's Renewable energy projects – permit-granting processes & power-purchase agreements 2022

CurrENT
Enabling Network Technology throughout Europe

currENT Response to European Commission's Consultation on Renewable energy projects – permit-granting processes & power-purchase agreements 2022

currENT, the voice of innovative grid technologies, thanks the European Commission and DG ENER for the opportunity to contribute to this consultation on renewable energy projects and their permit-granting processes and power-purchase agreements. Removing obstacles for renewable energy projects and power networks will be crucial in achieving the goals of the European Green Deal and meeting the increased ambitions stated in the REPowerEU communication, including security of supply moving away swiftly from fossil fuel imports.

It is clear that achieving Europe's renewable energy ambitions will require powerful and climate-proof power grids, both at the transmission and distribution level. Any guidance aiming to reduce obstacles for renewable energy projects must therefore take into consideration grid connection, grid optimisation, grid reinforcement and grid expansion..

Powerful and climate-proof power grids are already possible today. Technologies such as FACTS devices like modular SSSC, dynamic line rating (DLR), superconductor cable systems, sensors and digital solutions - can significantly contribute to increasing capacity on the network. Regulatory support is needed to ensure these technologies are considered alongside other alternatives to deliver the most cost-effective solutions.

1. **Prepare the grid for net-zero:** Europe is already experiencing the challenges of integration limitations on weather-dependent electricity technologies. Europe needs to dramatically increase power system capability and flexibility in the coming decades to accommodate renewables. This must be provided for by increased interconnection and innovative grid infrastructure, including in the offshore space where no grids exist today. Such infrastructure require a long-term pan-European infrastructure plan.

2. **Encourage deployment of widely-available Innovative Grid Technologies:** Especially energy system operators must be informed, encouraged, and incentivised to update their toolbox of deployable technologies for existing and future grids to accommodate increased levels of solar energy.

3. **Introduce the NOVA Principle in National and European Grid Planning**: This means that optimisation of the existing grid should happen before reinforcement and grid expansion, in order to not saddle citizens with unnecessary costs. Countries like Germany, Austria, and Switzerland have already committed to this principle.

4. **Ensure innovative technologies are considered in Network Development Plans**: Both national and European long-term grid plans must consider innovation in transmission technologies, and work towards greater coordination with neighbouring grids.

5. **Reward TSOs for investing in Grid Enhancement Technologies:** TSO investment frameworks should

properly reward TSOs for investing in cheaper and easily deployable grid optimisation technologies, instead of exclusively investing in high CAPEX conventional grid infrastructure. The clear benefits of these innovative grid technologies in a benefit-sharing regime include lower energy bills for consumers, larger shares of variable renewables in the system and lower CO_2 emissions.

6. **National Regulators should consider the role of innovation in Smart Grid Indicators and other KPIs:** Smart Grid Indicators and other KPIs could bring more clarity and long-term perspective to permit-granting processes, as stated in the Clean Energy Package, in particular Article 59 of the Electricity Directive. We particularly encourage regulators to consider the role of innovation here, whose technological readiness level can be assessed in ENTSO-E's Technopedia.

In the following pages we give a further elaboration on the benefits Grid Enhancing Technologies, and how they could contribute to removing barriers to an increasingly renewable electricity system. These innovative technologies are also widely described in ENTSO-E's Technopedia[1], as well as on currENT's website[2].

[1] ENTSO-E Technopedia - ENTSO-E (entsoe.eu)
[2] www.currenteurope.eu

A NET-ZERO GRID CAN REMAIN RESILIENT AND RELIABLE, BUT REQUIRES PLANNING AND APPLICATION OF INNOVATIVE GRID TECHNOLOGY

All EU countries, as well as the UK and Norway, must follow the same path as Ireland of decarbonising their economies through increased electrification based on renewable energy resources. These will mainly take the form of solar PV and wind energy, which are already undercutting fossil fuels on cost.

A European energy system largely running on renewable electricity is feasible and can remain reliable and resilient. However, it requires that Europe's electricity grids are expanded, reinforced and optimised, as pointed out in a recent report on power grids published by WindEurope and Hitachi Energy[3].

A great deal more optimisation and grid enhancement will be needed to significantly increase the levels of transferred capacity of renewable energy. Latest Development Plans clearly lay out the challenges faced in completing large-scale renewables integration on both national and continent-wide levels. Optimisation technologies such as those represented by currENT membership - FACTS devices, modular SSSC, dynamic line rating (DLR), superconductors, sensors and digital solutions - can significantly contribute. These technologies are widely described in ENTSO-E's Technopedia[4], as well as on currENT's website[5]. Regulatory support is needed to ensure these technologies are considered alongside other alternatives to deliver the most cost-effective solutions.

Current transmission grid technology is insufficient to move around the vast quantities of energy needed in Europe's future, weather-based energy system. Therefore, innovative grid technology must be developed, tested and applied to minimise energy losses and the cost of developing the necessary pan-European meshed grid. Transmission technology based on superconductors is being developed that can carry very large amounts of power, at no losses, low voltage levels and with a much smaller footprint than conventional cables, requiring significantly less infrastructure, materials, space and cost. Efforts to develop innovative grid technology, must be encouraged by national and EU research, innovation and demonstration programmes.

Europe has its best wind resources in the North and best solar resources in the south, while its major demand centres lie in Central Europe. A wider grid would allow for Europe to locate its renewable generation capacity where the resource is best and move this power to where it is needed. Locating generation with

[3] Enabling Europe's net zero vision by proactively developing its power grids, 7 April 2022.
[4] ENTSO-E Technopedia - ENTSO-E (entsoe.eu)
[5] www.currenteurope.eu

the best resource results in a lower cost of electricity for consumers, with the larger grid reducing the levels of dispatch down and curtailment.

The European Commission's "An EU Offshore renewable Energy Strategy" stated that to step up offshore renewable energy deployment in a cost efficient and sustainable way, a more rational grid planning and the development of a meshed grid is key. It also stated that for every Euro that must be invested in offshore renewable generation assets, two Euros would need to be invested in offshore grids. To minimise costs, a European approach is needed. The development of such a pan-European grid would be one of the largest infrastructure projects in history.

The lack of European cooperation to date makes the development of such a grid challenging and its construction much more costly than if European coordination was more effective. A pan-European, meshed transmission grid would be layered on top of and feed into the existing grid, acting like a motorway for electricity. The current grid would still operate at a national level. Hence, a SuperGrid would not replace national grids. It would support and strengthen them.

NOVA PRINCIPLE TO BE INTRODUCED IN NATIONAL AND EUROPEAN GRID PLANNING

Countries like Germany, Austria and Switzerland are committed to the so-called NOVA principle[6], which holds that optimisation of the existing grid should happen before reinforcement and grid expansion. currENT recognises the need to expand renewable power capacities and grid infrastructure to ensure increased resilience across Europe. However, the full potential of existing networks must be encouraged and achieved. currENT advocates efficiently combining optimisation, reinforcement and expansion to address to put our networks at the centre of our electrification and renewables uptake needs. The potential of innovative grid technologies has been assessed by a range of studies that are listed at the beginning of our contribution.

INNOVATIVE NEW GRID SOLUTIONS MUST BE ADDED TO THE POWER NETWORK

Innovative transmission technologies are being developed and many are ready for deployment today. Long-term grid planning must include innovative technologies to maximise the efficiency and effectiveness of new grid developments required for integrating renewables. Technologies such as FACTS devices, modular SSSC and DLR have been widely deployed across many countries, bringing the advantages of both significant increases in transmission capacity and cost-effective, speedy deployment. Superconductors are

[6] see the principle explained for example here on the website of TransnetBW [NOVA principle | TransnetBW GmbH]

already in use in distribution grids today in cities such as Essen, Germany, and Seoul, South Korea. Their implementation has proved invaluable due to their high-power density and small footprint. High Temperature Superconductors (HTS) are considered to be at TRL 8 for AC applications and TRL 6 for DC applications according to ENTSO-E's Technopedia[7]. Work is being undertaken by European companies to develop an MVDC (medium-voltage direct current) transmission system capable in excess of 2GW of bulk power transfer based on superconducting cables. To carry one kA one metre, such superconducting cables require 150 times less raw material than conventional, copper-based power cables.
All of these technologies will play important roles in facilitating higher levels of renewables so as to help Europe achieve its climate targets.

PLANNING THE TOOLBOX

Given the decades-long lifetime of new grid assets, upcoming and new, innovative and technological advancements must be taken into account when planning new grids. currENT recommends to review the processes for qualifying new technologies that have been proven in several geographical areas in terms of power network structure, power flow constraints, physical conformations and climate to ensure that technologies that can deliver significant value in the long-term are sufficiently included and reasonably considered as part of the network development planning. Such analysis would need to be supported by a substantial sharing of learnings and best practices between regulators and stakeholders to minimise the risk of wasting research money and duplicating work on proving technologies that have already been proven on other networks.

There is a need to include innovative grid technologies in the current and future development plans. Such measures are in line with recent European legislation which seeks to accelerate the transition to smarter low carbon grids. For example, NRAs have been tasked to develop Smart Grid Indicators by the end of 2020, and relevant provisions in the Energy Efficiency Directive also relate to ensuring the efficiency of networks[8]. Such tools are valuable for transmission networks and climate targets, as well as on cross borderlines where GETs can support Europe's linear progress towards the EU 70% market available capacity target (MinRam).

RAPIDLY DEPLOYABLE SOLUTIONS ENABLE DELIVERY OF PROJECTS AND RENEWABLES INTEGRATION

Given that delays are common in implementing new infrastructure projects due to permitting, public acceptance challenges and the identified limitations in volume of connecting new renewable generation in

[7] https://www.entsoe.eu/Technopedia/techsheets/high-temperature-superconductor-hts-cables
[8] Please see the report commissioned by currENT's sister association in the US, WATT Report: Unlocking the Queue – WATT (watt-transmission.org). See here also the JRC report of December 2020 Improving Energy Efficiency in Electricity Networks | EU Science Hub (europa.eu).

the NDPs, there may be particular value in using such rapidly deployable solutions as DLR and modular power flow control solutions or SSSC devices[9]. These rapidly deployable solutions can often be delivered in a matter of months, leading to quicker increases in transmission capacity and efficiency of the existing network without compromising the safety of operation. currENT recommends that the European Commission considers how the existing targets identified in the strategy could be achieved even sooner than expected through using rapidly deployable solutions as an interim or enabling measure, or in some cases, as a solution that can defer the need for other reinforcement. As highlighted in the beginning of the consultation, such technologies have already been deployed in research projects. DG ENER and other Directorates General working with renewable energy should also review existing selection and evaluation processes for projects to ensure that the methods fairly value the benefits of rapidly deployable solutions. This approach does not preclude ROI and "time-to-money" evaluations and benchmarking, but should ensure research projects move from evaluation to actual implementation within the technology toolbox.

COMPLEMENTARY SOLUTIONS OPTIMISE THE USE OF THE EXISTING ENERGY GRID

Finally, currENT would like to highlight the complementarity of GETs, particularly in maintaining network resilience, managing congestion and optimising power flow across the network. By leveraging multiple GETs with different functionalities to meet a network need, in most cases, the overall impact will be far more significant than if only one technology was used in isolation[10]. currENT recommends that GETs are not only considered as standalone solutions but also as solutions that can be combined to maximise the benefits of an existing or new project, and ultimately provide maximum value to both the network and consumers.

[9] The static synchronous series compensator (SSSC) is a power quality FACTS device that employs a VSC connected in series to a transmission line through a transformer or multilevel inverters [ENTSO-E Technopedia].

[10] Consentec GmbH for currENT Europe. 2021. The Benefits of Innovative Grid Technologies.

WHO IS currENT

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 Grid Enhancing Technologies (GETs), as well as innovative technologies for new grid development, and accelerate their implementation. We do so by working with the broader stakeholder ecosystem on future-proofing regulatory and policy frameworks in Europe.

RELEVANT PUBLICATIONS

We specifically refer to the following publications both on available technologies and recommendations for updating the regulatory approach to accommodate new solutions. Reports on the technological advancement are showcased on a large scale through:

- WATT's Brattle Report evaluating the economic and renewables deployment benefits of applying GETs in the U.S.[11];
- ENTSO-E's Technopedia underlining the readiness levels of innovative new technologies[12];
- The German Ministry for Economy and Energy's study on the central role of grid optimisation and higher utilisation of the existing networks[13];
- THEMA Consulting's report on higher available capacity and increased market integration in Northern Europe[14];
- IAEW's scientific exemplary study on modular power flow control enhancing the German transmission grid capacity as commissioned by Smart Wires[15];
- Consentec's study for currENT on the economic and renewables deployment benefits of smart transition technologies[16].

Recommendations for updating the regulatory approach to optimise the European power grid have been stated by:

- The Ecorys Report at the European Energy Infrastructure Forum 2019[17];

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[11] WATT, Brattle. 2021. Unlocking the Queue with Grid-Enhancing Technologies: Case study of the southwest power pool. https://watt-transmission.org/wp-content/uploads/2021/02/Brattle__Unlocking-the-Queue-with-Grid-Enhancing-Technologies__Final-Report_Public-Version.pdf90.pdf

[12] ENTSO-E Technopedia. https://www.entsoe.eu/Technopedia/

[13] Bundesministerium für Wirtschaft und Energie. 2021. Netzbetriebsmittel und Systemdienstleistungen im Hoch- und HöchstspannungsnetzErster Ergebnisbericht zur „Netzbetriebsmittel Studie".
https://www.bmwi.de/Redaktion/DE/Publikationen/Energie/netzbetriebsmittel-und-systemdienstleistungen-im-hoch-und-hoechstspannungsnetz.html

[14] Heimdall Power, THEMA Consulting Group. 2021. Effects of higher available Capacity and increased Market Integration. https://heimdallpower.com/wp-content/uploads/2021/08/Report_Thema_Consulting_Group.pdf.

[15] IAEW, RWTH Aachen. 2020. Modular Power Flow Control enhancing German Transmission Grid Capacity: An Investigation.

[16] Consentec GmbH for currENT Europe. 2021. The Benefits of Innovative Grid Technologies.

[17] https://ec.europa.eu/info/publications/energy-infrastructure-forum-2019-background-papers_en

- CSEI's and FSR's paper on the economic issues and regulatory options to promote energy network innovation for a green transition[18];
- Decision No 35/2020 of the European Union agency for the Cooperation of Energy Regulators (ACER)[19].
- Report on Effective Incentives for New Challenges: Strategies for regulating Austrian Power Grid APG[21]

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[18] Copenhagen School of Energy Infrastructure (CSEI), Florence School of Regulation (FSR). 2020. Energy Network Innovation for Green Transition: Economic Issues and Regulatory Options.

[19] https://documents.acer.europa.eu/Official_documents/Acts_of_the_Agency/Individual%20decisions/ACER%20Decision%2035-2020%20on%20Core%20RDCT%2035.pdf