Offshore Grid and Offshore Wind Energy in the Baltic Sea – Opportunity for Integrating Energy Markets

- Summary -

On 7 June 2018 in Warsaw the **conference "Offshore Grid and Offshore Wind Energy in the Baltic Sea – Opportunity for Integrating Energy Markets"** was held. Its participants debated on the future development of offshore power grids in the Baltic Sea. The discussion was based on the results of a Pre-feasibility study for two cross-border interconnections: Poland-Sweden-Lithuania and Germany-Sweden integrated with offshore wind farms, as part of the Baltic InteGrid project co-financed by the INTERREG Baltic Sea Region 2014–2020 program. The conference was organized by FNEZ Foundation for Sustainable Energy.

The most important conclusions from the discussions:

The Baltic Sea is an emerging market for the development of offshore wind energy, with great potential and significance for the region's energy security.

- Speakers agreed that the Baltic Sea is the next, after the North Sea, huge market for offshore wind energy (OWE) development.
- 85 GW by 2050 is the technical potential of offshore wind farms in the Baltic Sea estimated as part of Baltic Energy Market Interconnection Plan (BEMIP).
- 9 GW by 2030 and 35 GW by 2050 – this is the economic potential – calculated as part of Baltic InteGrid.
- Ms. Katrien Prins (Senior Policy Officer, DG ENERGY, European Commission) emphasised that this potential can be exploited if the works on offshore wind farm projects will start as soon as possible. Even though economically a gradual approach to build out OWE capacity is required, prolonged decision-making at the level of individual states will make it difficult to meet the European Union goals of the share of renewable energy sources.
- An important element of the OWE market development in the Baltic Sea should be development of cross-border power grids.

Planning the offshore grid development requires a 20-year horizon.

- Cross-border interconnections integrated with offshore farms should be included in the Ten Year Network Development Plan (TYNDP).
- However, the TYNDP planning horizon is too short. The planning period for cross-border interconnections, especially offshore connections, should be 20 years, since the project development and implementation takes 10 years. TYNDP should include an additional time buffer that allows proper project planning and development, taking into account

	international arrangements and obtaining financing, as well as coordination with the OWE development.
"Meshed grid" development should bring benefits	• The development of a "meshed grid" should be supported by the results of cost-benefit analyses and should be cost-effective. • The results of the Preliminary Feasibility Study presented at the conference have confirmed that "meshed grid" solutions can be profitable. The magnitude of the benefits, however, depends on the OWE development and must be analysed on individual basis, taking into account a number of cost factors.
The EU endorses offshore grid deployment by financial support and procedural facilitation alike.	• The EU can co-finance an offshore grid project if at least two Member States benefit from it. • The EU's regulations also facilitate the implementation of projects with the PCI (Project of Common Interest) status. TEN-E regulation provides for a number of solutions that speed up the permit obtaining process.
Member States should create offshore wind farm and power grid development plans	• Each Member State should draw up plans for development of the OWE sector and cross-border interconnections, which would help to coordinate the sector's long-term planning at the European level – emphasized Ms. Iza Kielichowska (Managing Consultant, Ecofys).
Offshore grid design is a legislative, environmental and spatial management challenge	• The Baltic InteGrid project leader, Ms. Anika Nicolaas Ponder (IKEM), pointed out that a major obstacle to offshore wind farm integration with offshore grid will be the lack of a legislative solution dedicated to offshore grid deployment at the European Union level and guidelines for grid investors. The long-term legislative process will require numerous consultations and arrangements with administrative authorities, but also with marine area users. • Another challenge will be the integration of markets and alignment of requirements for electricity transmission to foreign markets. This has been confirmed by representatives of Energinet and 50 Hertz, who shared experiences from the North Sea and the Kriegers Flak project in the Baltic Sea. The EU could support developers with a guideline or templates for contracts for these complex inter-country projects.
Social acceptance will be the key to successful development of offshore wind energy.	• Social acceptance will be increasingly important for the success of investment projects. That is why dialogue and consultations must be conducted with public administration and other stakeholders. • Mr. Marcin Sowiński (Project Manager, Polenergia S.A.) pointed out that radial interconnection of an offshore wind farm in Poland may involve social conflicts due to the large number of projects and significant spatial constraints in the coastal region. • Thus, the view was shared by the speakers that an argument

for planning the meshed grid interconnections is their reduced environmental impact and, consequently, reduced impact on sea users.

- The analysis of results presented at the conference show that the number of cables in connections integrated with offshore wind farms may be 3 to 6 times lower than in radial connections, which will translate into a smaller scale of potential environmental and social impacts.

Flexible solutions are needed as well as cooperation between stakeholders.

- As Mr. Michael Refstrup Pedersen (Head of Analysis and Models, Energinet.dk) emphasized, dynamic technological developments should be expected, therefore we should not stick to a single technology. This was shared by Ms. Iza Kielichowska (Ecofys) who pointed towards the large range of options and has pledged to seriously put other Renewable Energy Sources (e.g. biomass, photovoltaics, etc.) and energy balancing technologies (e.g. sector coupling, natural/synthetic gas, hydrogen, etc.).
- Development and implementation on an offshore grid integrated with offshore wind farms requires close cooperation between all stakeholders (investors, developers, administration, transmission system operators).
- Mr. Thilo Krupp (Project Manager, German Offshore Wind Energy Foundation) remarked that Baltic Offshore Grid Forum had been convened within Baltic InteGrid, conceived as a platform for communication between stakeholders in offshore grid development in the Baltic Sea region, and strives to continue to do so after the end of the project duration in late 2018.

Poland may lead in development of offshore wind farms and grids

- 6-10 GW is the potential of the Polish Maritime Areas, as estimated by Mr. Zbigniew Gryglas, chairman of the Parliamentary Team for Offshore Wind Energy.
- With this high potential and its mature maritime industry environment, Poland may be a leader in the Baltic Sea. Also Ms. Katrien Prins from the European Commission shared this point, arguing that it's maritime industry and OWE potential enable Poland to set up a logistics base for a significant part of the Baltic market. Poland should also participate in cross-border offshore grid deployment projects.

Declared potential investment in offshore wind farm and grid development is 12 GW

- Investors in offshore wind farms in Poland declared in a survey of PSE for its analysis of the offshore potential their willingness to develop and deploy 12 GW – said Mr. Leszek Jesień (Director of International Cooperation Department, PSE S.A.).
- Mr. Gryglas assured that there will be a place for OWE in the national energy mix, which will be confirmed in the planned Polish Energy Policy scheduled for publication by the end of this year.

Possible deployment of an offshore grid integrated with offshore wind farms off the Polish coast, including a Poland-Lithuania interconnection.	• The operator considers the development of an offshore grid along the coast, which will be the connection point for the offshore wind farms, and then can be extended as cross-border connections. • Mr. Waldemar Łagoda (Deputy Director in the Department of Power and Heat Engineering at the Ministry of Energy) pointed out that one of the variants analysed by the Polish government is the construction of an interconnection with Lithuania, in conjunction with the offshore wind farms on the Central Bank.
Offshore wind energy can be an alternative to nuclear energy in the context of meeting EU climate policy goals. However, it will require support of gas energy.	• Mr. Marcin Roszkowski (President of the Jagiellonian Institute) emphasized that OWE is a good alternative to nuclear energy development, in the context of keeping power deficit at bay and fulfilling commitments to increase the RES share and decrease the CO^2 emissions. • However, as important is to coincide the offshore development with diversification of gas supplies and gas energy, which will stabilize the environmentally friendly energy mix.
Offshore wind farm projects on the border between Polish and Swedish exclusive economic zones may be connected to offshore grid. This will improve the projects' cost-efficiency.	• Mr. Marcin Sowiński (Project Manager, Polenergia S.A.) pointed out that the offshore wind farm projects planned for the South Middle Bank (on the border of the Polish and Swedish exclusive economic zone) should be connected in HVDC technology. They can also be connected to a cross-border grid. • An advantage of this solution is the option to connect the offshore wind farms to an interconnection point inland, which will increase the offshore energy's interconnectivity potential. • If the connection costs are not borne by the investor and the OWE sector growth rate is maintained world-wide, then projects can be implemented in Poland without support, especially those located on the South Middle Bank.
Private investors should be allowed to deploy offshore grids	• According to Mr. Lasse Sundahl (Senior Project Manager – Regulatory Affairs, Ørsted), offshore grids may be deployed and implemented by private businesses, which would increase the efficiency of such solutions, while ensuring an appropriate level of grid development coordination. This solution is used in the UK and elsewhere.