Berlin, 29 February 2016

Conclusion

Offshore Grid Development Plan 2025, Version 2015, 2ND Draft

The Offshore Grid Development Plan (O-GDP) describes the expansion measures required to the offshore grid over the next ten and twenty years. Together with the Power Grid Development Plan (GDP), the O-GDP shows how power generation in Germany can successfully be restructured and renewable energy be integrated into the grid. The present O-GDP 2025 is the second revised draft. It contains the results of the public consultation process following publication of the first draft. The transmission system operators are to publish this together with the second draft of the GDP on www.netzentwicklungsplan.de and will submit both plans to the German Federal Network Agency.

During the consultation phase, 61 responses were received regarding the first draft of the O-GDP. Of these, 32 statements referred to specific content of the O-GDP. The statements primarily focussed on the consideration of the German Renewable Energy Act 2016, the scheduling timetable of measures, decentralised electricity generation, multi-cluster grid connections, technical concepts for grid connections and the selected grid connection points.

Process and methodology

The O-GDP describes measures for the scenario framework which has been made available for public consultation and was approved by the Federal Network Agency on 19 December 2014. These measures comply with the requirements imposed by the German legislative and regulatory authorities. They depict the current route of expansion for offshore wind energy, based on the most recent amendments made to the German Renewable Energy Act.

The process of grid development planning is made very transparent thanks to the open presentation of these assumptions regarding generation and consumption structure, the objective criteria arranging grid connection systems in sequence and the resultant demand for grid expansion. For the first time, the current scenario framework contains six scenarios (A 2025, B1 2025, B2 2025, B1 2035, B2 2035, C 2025) instead of four. Four

scenarios have been projected for the target year 2025 and two scenarios refer to 2035, so as to gauge long-term development over a period of twenty years. Due to the scope of six different scenarios, the grid expansion measures investigated cover a wide range of possible future developments. With regards to the O-GDP, three of the scenarios (B1 2025, B2 2025 and C 2025) start from the premise of the same level of installed generation capacity for offshore wind energy (10.5 GW in 2025). Both of the scenarios for 2035 are also generated based on the same level of installed generation capacity for offshore wind energy (18.5 GW in 2035). For this reason, considerations in the O-GDP are restricted to the Scenarios A 2025 and B 2025 as well as the forward projection B 2035. Within the scope of the amendments planned for the German Renewable Energy Act in 2016, it is expected that considerable changes will be made to the legal requirements regarding the expansion of offshore wind power. The precise definition of these regulations is currently the subject of broad public discussion and it was therefore not possible for the current O-GDP to make any allowances for this. However, such allowance could still be made in the O-GDP 2025 within the scope of the Federal Network Agency's review and approval procedure for the O-GDP 2025.

The O-GDP draws together the development of the overland transmission network, spatial planning at sea and the basic technical conditions needed to create a basis for sustainable planning, including detailed information on the properties, time scheduling, execution times and costs of the network connection measures necessary for the next ten and twenty years, respectively. Here, particular attention is paid to the timing of the offshore grid expansion measures based on objective criteria. This includes the classification of the North Sea and the Baltic Sea into distance zones, the generation potential of wind farm clusters, as individually mentioned in the Federal Offshore Plan or in respective regional planning, the planned commissioning of the grid connection points detailed in the GDP as well as progress updates on the realisation of the offshore wind farms that are to be connected. The O-GDP therefore plays a key role as a tool for coordinating the efficient and sustainable development of offshore wind energy.

Supplementary to previous connection concepts based on precise clusters, the plan also investigates the use of collection platforms in the Baltic Sea for the connection of multiple clusters that are geographically proximal. Consequently, it can be seen that the economic efficiency of the region

north-east of Rügen can be further increased by using a collection platform connection concept instead of precise cluster connections. In addition to cost benefits, this concept also includes the opportunity to further reduce idle capacity and the ability to react with greater flexibility to future developments.

The O-GDP investigates the demand on network connection systems and selects the start and end points of grid connection systems, taking into account the expected geographic distribution of the offshore wind farms and the network connection GDP capacities available at the grid connection points in the transmission network. Specific line corridors are determined by the Federal Maritime and Hydrographic Agency (Bundesamt für Seeschifffahrt und Hydrographie) for the exclusive economic zone and by the respective German states for German coastal regions on land and at sea.

The coordination of the onshore grid expansion, the development of offshore wind farms, the Federal Offshore Plan and the planning of coastal states is an iterative process. The results of the O-GDP will have repercussions for the offshore wind energy industry and the plans that have been used, which will in turn lead to adjustments being made in subsequent Offshore Grid Development Plans. The O-GDP is therefore not conclusive, but, just like the GDP, will continue to be regularly revised in order to meet changing conditions.

Results

The starting offshore grid forms the basis for network planning in the O-GDP. It indicates all offshore grid connection systems that are assumed to be in place at the time of preparing the O-GDP and whose necessity is not subject to further investigation under the terms of Section 17b of the German Energy Management Act. The expansion measures of the offshore starting grid have a total length of 1,200 km. The necessary amount of investments totals around 5 billion euro.

The length of required extension to the offshore grid is calculated at 371 km in Scenario A 2025, 876 km in Scenarios B 2025 and C 2025, and up to 3,493 km in Scenario C 2035. The total transmission capacity of these extensions to the offshore grid would be sufficient for an additional 1.4 GW in Scenario A 2025, over 3.2 GW in Scenario B 2025 and for up to 10.9 GW in Scenario C 2035. The investment costs for the network measures are

calculated in the O-GDP on the basis of specific cost estimations and are of a provisional nature. Depending on the scenario, the total volume of investments over the next ten years totals between seven and ten billion euro. This already accounts for investments of approximately five billion euro in the expansion of the starting offshore grid. The volume of investments is less than previous Offshore Grid Development Plans as a result of the new expansion targets for offshore wind energy and because several measures relating to the starting offshore grid have been completed in the meantime. These are therefore not calculated into the expansion measures of the offshore starting grid and are thus no longer included in the statement concerning investment volumes.

The successful expansion of offshore wind power requires understanding and widespread acceptance both in politics and in society. It also implies a geared development of offshore wind farms, the offshore power grid and the onshore transmission network. The frameworks for legal planning and regulation as well as extensive social and political support at all levels are going to play a decisive role in implementing this ambitious investment programme. This requires both extensive information and a cooperative and binding collaboration with all stakeholders. The grid development planning process aims to contribute to this by promoting transparency and an open dialogue.