

## ***NORTH SEA OFFSHORE GRID – INTEGRATION TOWARDS 2050***

Lise-Lotte Pade, DTU, [llph@dtu.dk](mailto:llph@dtu.dk)

Lauge Larsen, DTU, [ltla@dtu.dk](mailto:ltla@dtu.dk)

Athanasios Papakonstantinou, DTU, [athpapa@dtu.dk](mailto:athpapa@dtu.dk)

### **Overview**

The EU renewable energy targets towards 2030 and further into 2050 and the establishment of its internal energy market call for ambitious development of transmission capacity and interconnections between European countries. A large share of the renewable energy push is expected to take place in the North Sea with its substantial offshore wind potential. As a consequence the offshore grid in the North Sea has to be expanded over the coming decades and while regional coordination is an ongoing process supported by EU and national initiatives barriers towards integrated grid architecture remains.

### **Methods**

In this paper examine the potential barriers towards the development of an integrated North Sea offshore grid and analyse regulatory barriers as well as market barriers. We assess the extent to which the existing regulation support the development of an integrated offshore grid and if not – which changes to the regulation should be implemented to assure the desired grid expansion. We consider technical, political, economic as well as legal barrier. Furthermore, we analyse the market mechanisms for electricity trade between countries and between markets and assess the extent to which the existing market mechanisms are able to handle the potential trade with an integrated offshore grid. If not – we suggest possible changes to the existing market structures to support the offshore wind development as well as the offshore grid development.

### **Expected output**

The paper results in as regulatory and market design roadmap identifying stepwise adjustments to regulation and market design to support an integrated offshore grid in the North Sea. We suggest regulatory as well as market design alterations in order to pave the way for the integrated offshore network including potential harmonization of regulation, support mechanisms and market regulation including potential setup for sharing costs and benefits from the development of an integrated offshore grid.