Offshore Grid Development in Germany

Hamburg, 26 September 2017

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Federal Maritime and Hydrographic Agency
I. Current status of offshore wind energy in the German North and Baltic Sea

II. Spatial planning for offshore wind energy
   • Background: Maritime Spatial Plan
   • Spatial Offshore Grid Plan for the North and Baltic Sea

III. Site Development Plan (FEP)
Content of Presentation

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III. Site Development Plan (FEP)
Main Driver: Renewables Policy

  25 GW offshore wind energy by 2030

  confirmed 25 GW target

- **2014 – New Renewable Energy Act**
  reduced target of 15 GW by 2030

  confirmed 15 GW target + introduction of competitive determination of funding via auction model
Development of Offshore Wind Energy

Legal development target 15 GW until 2030

State of development end 2017: 5.4 GW
Development of Offshore Wind Energy
North Sea EEZ: State of offshore wind energy 2018

North Sea: Offshore Windfarms

Status offshore wind farms 2018:

- 5 projects under construction
- 15 projects operational
- 948 turbines with ca. 4.423 MW operating
- 7 DC converter platforms built
- 218.7 MW operating in coastal areas
Development of Offshore Wind Energy
Baltic Sea EEZ: State of offshore wind energy 2018

Baltic Sea: Offshore Windfarms

Status offshore wind farms 2018:

- 1 project under construction
- 2 projects operational
- 150 turbines with ca. 638 MW operating
- 48.3 MW operating in coastal area
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Maritime Spatial Plan

- priority areas for shipping, pipelines and offshore wind energy (i.e. must be kept free from obstacles)
- reservation areas (i.e. shipping has special weight in balancing process)
- no wind turbines in Natura 2000 areas
- targets and planning principles
- clarity for investors and stakeholders
Spatial Offshore Grid Plan

Background

- Numerous applications for offshore wind parks covering large parts of the German Exclusive Economic Zone (EEZ)
- New role for BSH given by Renewable Energy Act (EEG) in 2011:
  - Development and update every second year of a Spatial Offshore Grid Plan
    - for the German EEZ of North and Baltic Sea
    - in consultation with the Federal Network Agency, the coastal states and the Federal Agency for Nature Conservation

Aim

Ensuring coordinated and consistent spatial planning of grid infrastructure - especially for offshore wind farms.
Legal Requirements

Spatial Offshore Grid Plan must contain

- Offshore wind farms in spatial context and suitable for collective grid connections ("clusters")
- Corridors for grid connections of offshore wind farms
- Gates for cables crossing the border between EEZ and the territorial sea
- Sites for converter platforms or transformer substations
- Corridors for interconnectors
- Corridors for possible cross-connections
- Standardized technical rules and planning principles

→ Strictly spatial plan, chronological order was set by the TSOs within the Offshore Grid Development plan.

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North Sea: Spatial Offshore Grid Plan – Technical Concept

33 kV
155 kV
+/- 320 kV
substation
converter platform
converter station
AC (alternating current)
DC (direct current)
North Sea: Spatial Offshore Grid Plan – Technical Concept

Source: TenneT
North Sea – EEZ:
Spatial Offshore Grid Plan 2016/2017
Baltic Sea: Spatial Offshore Grid Plan – Technical Concept
Baltic Sea – EEZ: Spatial Offshore Grid Plan 2016/2017

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Fundamental Change in Legal Framework

- Amendment of Renewable Energy Act (EEG 2017)

- The objective remains: 15 GW offshore wind energy in 2030

- Amendment of the Energy Industry Act (EnWG) and introduction of the Offshore Wind Energy Act (WindSeeG)
  - „competitive“ determination of funding via „auction model“
  - Fixed yearly installations of 700 MW – 900 MW

Relevant provisions of the EnWG/WindSeeG for the Spatial Offshore Grid Plan

- No update of the Spatial Offshore Grid Plan as of 31 December 2017

- As of 2018 the Spatial Offshore Grid Plan will be replaced by the Site Development Plan (FEP)
  - Publication of first Site Development Plan by 30 June 2019 at the latest
Offshore Wind Energy – Central System

Site Development Plan
- Preliminary investigation
- Examination of suitability
- Auctions for sites
- Planning approval application
- Official approval of plans

Commissioning by Federal Network Agency (BNetzA)

BSH: Bundesamt für Seeschifffahrt und Hydrographie
BNetzA: Bundesnetzagentur
Developers

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Definitions of the Site Development Plan

- Areas („Cluster“) for offshore wind energy installations at sea
- Sites („wind farm“) in the areas
- Time sequence in which the sites are to be auctioned by the Federal Network Agency
- Calendar years in which the offshore wind energy installations awarded funding
- Calendar years in which the corresponding offshore connection lines are to be commissioned
- Likely amount of capacity of offshore wind energy installations to be installed (≥ 840 MW)
- Sites of converter platforms, collector platforms and, as far as possible, substations
- Routes or route corridors for offshore connection lines
- Gates for cables crossing the border between EEZ and the territorial sea
- Corridors for interconnectors
- Corridors for possible cross-connections
- Standardized technology and planning principles
- Available grid connection capacities for pilot offshore wind energy installations
Site Development Plan (FEP)

- Central planning instrument for offshore grid connections and offshore wind farms from 2026.
- Merging of Spatial Offshore Grid Plan and Offshore Grid Development Plan
- Public Participation (written comments and hearing)
- Publication at the latest 30 June 2019
Transitionary Phase for „existing projects“

**Old system**
Spatial Offshore Grid Plan
Offshore Grid Development Plan
Investigations by companies in licensing procedure

**Central system**
Site Development Plan
Preliminary Investigation by the state

**Transitionary system**

- **Today**
- **2021**
- **2026**

Date: 26 September 2018
Preliminary draft of the Site Development Plan – North Sea

- former clusters of Spatial Offshore Grid Plan as basis for areas in Site Development Plan
- pre-draft includes stipulations only for areas and sites
- sites for platforms and routes for grid connections to be added in draft
Preliminary draft of the Site Development Plan – Baltic Sea

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## Preliminary draft of the Site Development Plan – Sites

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</table>
Baltic Sea:
• AC grid connection systems with a voltage of 220 kV and a capacity of 300 MW
• large-scale DC systems seem unfitting due to limited potential sites for offshore wind energy

North Sea:
• Spatial Offshore Grid Plan determined standard of 900 MW DC systems
• Continuation of DC systems in Site Development Plan with increased capacity
• 66 kV direct connection of offshore wind turbines to the converter platform as new standard concept
• Spatial restrictions (esp. in coastal areas) lead to the aim of increased transmission capacity and thus a reduced number of connection systems
• Are 525 kV DC systems an option for offshore grid connection systems?
Thank you for your attention!

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