The New Grid Connection Regime – Perspectives for Offshore Wind Farms in Germany

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Overview

1. Stiftung OFFSHORE-WINDENERGIE

2. Status of Offshore Wind Energy Development in Germany

3. New Regime for Offshore Grid Connection
   - EnWG
   - BFO
   - O-NEP

4. Conclusion
German Offshore Wind Energy Foundation

- Independent, non-partisan institution to support the development of offshore wind energy, founded in 2005
- **Platform for offshore wind** (and maritime) industry, policy and research-oriented stakeholders
- **Board of Trustees** - key industry & policy stakeholders
- PR and public acceptance activities,
- **Policy initiatives & studies**
  - OffWEA project
    Consulting and support for the federal government in realising and advancing the German offshore wind energy strategy
  - WINDSPEED
  - SEANERGY 2020
  - **Interreg Projects:**
    POWER Cluster, 4POWER,
    South Baltic OFF.E.R.
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Offshore Wind Energy –

Challenges in German Waters

- **Water depth**
- **Distance to shore**
- **Grids!!!**

Source: IWES/RAVE
Status and Perspectives in Germany

Operational (as per 31.03.2013): appr. 320 MW
Under construction (by late 2013): appr. 2,7 GW
Additionally permitted projects: appr. 6 GW
Offshore Wind in Germany (Q1/2013)
Work in Progress

7 OWF Under Construction (North Sea)
3 more starting construction during 2013
Prerequisite –
A stable & reliable legal framework

• The **Renewable Energy Law „EEG 2012“**:
a reliable framework for investors and for OWE development
(modifications in feed-in-tariff structure accommodate requirements
of offshore wind projects)

• **EEG, para 31: two options** for Offshore Feed-in tariff (OFIT) – limited until 2017!

  a) 0.15 €/kWh for at least 12 years (extension dependant on water depth and distance to shore), afterwards 0.035 €/kWh

  b) ’Compressed‘ OFIT – 0.19 €/kWh for 8 years (extension of 0.15 €/kWh dependant on water depth and distance to shore), afterwards 0.035 €/kWh

• EEG designed to increase pressure on **cost reduction** and to enhance **system integration**

**Challenge:** Political Debate about cost of supporting RE since 2013
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Challenges in 2011/12 – Grid Connection

• Transmission system operator (TSO) has been legally required to provide grid connection in time with completion of wind farm

• **Baltic Sea:**
  Shorter distance to shore - standard AC-connections built/planned (so far); less technical challenges (except seabed condition, etc.) grid connections realised within 24-36 months

• **North Sea – Delays!**
  - Greater distance to shore, larger wind farms (clusters) require HVDC-connections (< 120 km sea cable so far);
  
  - **Supply Constraints** (grid connections take 60-72 months – instead of 30 months as expected by electricity regulator in 2009);
  
  - **TenneT** - TSO in charge of North Sea connections – difficulties to comply with legal requirements (**financing issues!**)  

→ **Legal framework revised in late 2012** to address challenges (liability issues)
North Sea (Tennet) – DC cluster connections & OWF
# Offshore-Wind Projects & grid connections (Q1/2013)

**Operational**

- alpha ventus (since 2009/10) 60 MW AC connection
- Baltic I (since 05/2011) 48 MW AC connection (Baltic Sea)

**Construction**

- BARD Offshore I (BO1)* 220 MW BorWin 1 (DC)
- Construction started in 2012 – appr. 1,8 GW
- BARD Offshore I (BO1)* 180 MW BorWin 1
- Riffgatt 108 MW AC connection
- Borkum West II (1. BA) 200 MW DolWin 1
- Global Tech I 400 MW
- BorWin 2 Meerwind Süd/Ost 288 MW
- HelWin 1 Nordsee Ost 295 MW
- HelWin 1 DanTysk 288 MW
- SylWin 1

**Construction starting in 2013/14 – appr. 1,1 GW**

- Amrumbank West 288 MW HelWin 2
- Baltic II 288 MW AC connection (Baltic Sea)
- Borkum Riffgrund I 277 MW DolWin 3 Butendiek (2014) 288 MW SylWin 1

* Construction started in 2010

## Table

<table>
<thead>
<tr>
<th>Project</th>
<th>Capacity (MW)</th>
<th>Year of operation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>In operation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>alpha ventus</td>
<td>60</td>
<td>2009</td>
</tr>
<tr>
<td>BorWin 1</td>
<td>400</td>
<td>2010</td>
</tr>
<tr>
<td><strong>Under construction/ awarded</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BorWin 2</td>
<td>800</td>
<td>2015</td>
</tr>
<tr>
<td>DolWin 1</td>
<td>800</td>
<td>2014</td>
</tr>
<tr>
<td>DolWin 2</td>
<td>900</td>
<td>2015</td>
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<tr>
<td>HelWin 1</td>
<td>576</td>
<td>2014</td>
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<tr>
<td>HelWin 2</td>
<td>690</td>
<td>2015</td>
</tr>
<tr>
<td>SylWin 1</td>
<td>864</td>
<td>2014</td>
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<tr>
<td>Riffgat</td>
<td>108</td>
<td>2013</td>
</tr>
<tr>
<td>Nordergründe</td>
<td>111</td>
<td>2015</td>
</tr>
<tr>
<td>DolWin 3</td>
<td>900</td>
<td>2018</td>
</tr>
<tr>
<td><strong>Σ built / awarded</strong></td>
<td><strong>6,209</strong></td>
<td></td>
</tr>
<tr>
<td><strong>In tender phase</strong></td>
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<tr>
<td>BorWin 3, BorWin 4</td>
<td>1,800</td>
<td></td>
</tr>
<tr>
<td>To be tendered until 2023 according to O-NEP2013</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 DC-connections</td>
<td>5,400</td>
<td></td>
</tr>
</tbody>
</table>

Source: TenneT
OWP in the Baltic Sea

TSO: 50 Hertz
Baltic 1 (48,3 MW)
Baltic 2 (288 MW)
Wikinger (400 MW)
Arkonabecken Südost (320 MW)

21 OWP haben Anträge für Netzanbindungen gestellt (ca. 5 GW).

GEOFReE (25 MW)
System Change for Offshore Grid Connection (2012)

- **Old System** (EnWG § 17 (2a) of Dec. 2006): TSO obligation to connect OWF ‘on time’ → ‘Position Paper’ (PP) on Offshore Grid Connection by the regulator (BNetzA) of Oct. 2009

- **Delays**: Construction time of DC connections (North Sea) doubled – up to 60 months, instead of 30 months (as envisaged by PP)

- **New System** (EnWG, 3rd revision in autumn 2012 in force 1st Jan. 2013):
  - BFO (Federal Plan Offshore) – set up by BSH
  - Offshore Grid Development Plan: binding grid connection dates - OWPs will follow the grid of the future (2023/33) – drafted by TSOs – consultation rounds & reviews by regulator
  - Prerequisite to develop an optimized (meshed?) Offshore-Grid

- Legal Framework for dealing with liability issues → risk mitigation measure and improved conditions to attract more (third party) investors for the grid
Standstill > 1 year - Adjustment of legal framework
Chronology 2011/12

- 2006: § 17 (2a) EnWG (grid connection obligation, principle of timeliness)
- 2009: Grid connection regime established acc. PP BNetzA (criteria for TSO and OWF developer)

- Since 2010: grid connection delays > 30 months, up to 50(+) months
- Since 2011: Liability and Financing questions raised
- 7 Nov. 2011: TenneT letter to the German government
- From late 2011 until Jan. 2013 no more grid connections awarded by TenneT – Since then no more FIDs (closings) on OWFs

- Q1 2012 – WG Accelerating Offshore-Grid Connection (BMW / BMU) – Moderated by SOW
- 22 Mar. 2012 – WG submitted recommendations and proposals to government

- 2 July 2012 – government launched principles on Liability/System Change
- 15 Aug. – draft bill EnWG-ÄndG, pre-consultation and internal govt. debate
- 29 Aug. – adopted by Federal Cabinet (government decision) → start of parliamentary process
- 22 Oct. – Hearing by Committee on Economics (Bundestag)
- 29 Nov. – bill adopted by Bundestag (Lower House)
- 14 Dec – bill adopted by Bundesrat (Upper House – Länder)
- 20 Dec. – bill published in Bundesgesetzblatt (Official Journal)
- 1 Jan. 2013 – EnWG ÄndG enters into force
North Sea – MSP arrangements by BSH
From Plan to Implementation – Federal Plan Offshore Grid Connection (BFO)

Baltic Sea - MSP arrangements by BSH
From Plan to Implementation – O-NEP (Offshore Grid Development Plan)
From Plan to Implementation – Startnetz (Status Grid)
'Old‘ grid connection regime for offshore wind (in force until 2012) (acc. § 17 para 2a EnWG, supplemented by PP BNetzA)

OWF initiates grid connection (2006 - 2012)
System Change: **Main Objective** – Creation of an efficient and demand-oriented grid infrastructure – prior to OWF connection, resp. as much as possible synchronised development

Gemäß Festlegungsverfahren:

1. Projektreife
2. Kosteneinsparung
3. Netzeffizienz
4. Synchronisierung On- und Offshore-Netzausbau
5. …
Risk mitigation strategies are available (acc. to state of the art) & need to be considered (part of O-NEP, details under consultation):

- **Realisation Schedules** (part of O-NEP acc. para 17d EnWG), incl. option to prioritise certain grid connections

- **Grid connection management** and temporary grid connection measures requ. technical implementation and cost allowance by the regulator

- **Meshed grid** (connection of clusters/converter stations) – ensures system stability in case of damage/failure of a single DC cable/platform

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*Risk mitigation strategies have been incorporated in the EnWG → Aim: Optimise system economic and technical solutions and reduce potential liability exposure.*
OWF cluster connection – today

Approach so far: singular (DC) grid (cluster) connections -
Contains substantial risk to energy system stability and economics
Aim:
Create a „flexible“ offshore grid as an element of ‚applied consumer protection!‘
• Minimising grid interruptions and delays in grid connection
• Continuously ensuring system safety and stability
• Risk mitigation
→ Can/should be implemented in the short/medium-term
Realisation (implementation) Schedules

- Needed to improve and facilitate the information exchange/dialogue between TSO and OWF developers by
  - Overcoming bilateral relationship,
  - Instead, bringing all stakeholders involved around the table (authorities, certifying bodies, insurance and finance service providers, maritime industry, suppliers of components and cables, etc)

- Integral part of the new regime (EnWG para 17d)

- Even more important for the so-called 'Startnetz' the government/regulator needs to make sure that DC capacities already contracted or under construction (6.2 GW) by TSO (TenneT) are sufficiently and timely filled with OWFs

- Realisation (implementation) schedules are needed both on macro and micro level
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Conclusion and open questions

• How can TSOs ensure a sustainable financing of the grid (both offshore, as well as onshore, e.g. overlay-grid)?

→ SOW suggested in 2012 as a short-term and temporary option the involvement of KfW

• In the mid-term, a strong and capable organisational structure is needed (open for third party investors) which ensures system stability and proper management of the 'Energiewende', e.g. a National TSO?

• A systematic approach, incl. meshed (offshore) grid, standardisation and implementation schedules with all parties involved can lead to
  - drastically reduced risk exposure in case of grid failure/damage (BET study 2012)
  - delays can be overcome/mitigated
  - a more flexible and stable (offshore) grid by standardisation
  - spare parts management and downtime/repair times can be reduced drastically (studies by MARSH, Deutsche. WindGuard)

→ Ultimately improving conditions for financing/insurance for (offshore) grid connection systems (DC) and OWFs.
Open Questions & Demands from the sector

What’s needed (in Germany, and elsewhere):

A strong, stable and reliable political and financial framework for OWE, including the grid → requires political leadership →

Creates Sustainable development with jobs and new economic prospects!

Anything else?

Thank you!!

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