The EEG 2017: Germany’s New Renewable Energy Act and Impacts on Offshore Wind

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German Offshore Wind Energy Foundation


Baltic InteGrid Conference – Offshore Wind in the Baltic Sea
German Offshore Wind Energy Foundation
Stiftung OFFSHORE-WINDENERGIE

- Founded in 2005 as an independent, non-profit organisation to promote the utilization and research of offshore wind in Germany

- Acquisition of ownership rights (permit) of alpha ventus – moderated/accompanied process of Germany’s first OWF

- Platform for offshore wind/maritime industry, incl. trade associations, policy-makers and R/D

- Involved in various projects (EU and national), e.g. OffWEA - consultation, support, moderation of the Geman government (2011-14); PROMOTioN (Horizon 2020), and Baltic InteGrid (Interreg-Programme)
*alphaventus (test site)*

First Offshore Wind Farm (OWF) in Germany, **Pioneering project** - paving the way for commercial projects

- 60 km distance to shore, 30 m water depth
- First OWF with 5 MW class (12 turbines) → **60 MW**
- 2 turbine manufacturers (Multibrid-Adwen, REpower-Senvion), 2 types of foundations (tripods, jackets)
- Permits acquired by SOW in 2005 - Leased to DOTI end of 2006 (EWE, E.ON, Vattenfall)
- Construction start in 2008, *commissioned in 04/2010*

- Impressive operational results – **50 % capacity factor** (4,450 full load hours) > **1 TWh** electricity production by 2014
- **RAVE** – Research at alphaventus:
  Extensive ecological and technological R&D Program funded by the German government (50 Mio €)
TURBINES FEEDING INTO THE GRID
(AS OF 30 JUNE 2016)
Status of German Offshore Wind Development
Status 30 June, 2014

New govt. targets (2014):
2020: 6.5 GW
2030: 15 GW

> 1 GW online by 2014, > 3 GW by 2015
OFFSHORE-WIND FARMS IN GERMANY
STATUS BY 30 JUNE, 2016

CAPACITY OF OFFSHORE WIND TURBINES IN THE GERMAN NORTH AND BALTIIC SEAS

- Fully operational
- Partially operational
- Construction in progress
- FID

Legend:
- German territory and EEZ
- Construction zone offshore wind energy
- 12 sea mile border/EEZ

Map showing various offshore wind farms with their capacities and locations in German North and Baltic Seas.
# OFFSHORE WIND ENERGY DEVELOPMENT BY 30 JUNE 2016

<table>
<thead>
<tr>
<th>Status of Offshore Wind Energy Development</th>
<th>Capacity [MW]</th>
<th>Number of OWT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Additions 1st half 2016</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OWT’s (feeding in)</td>
<td>258.0</td>
<td>43</td>
</tr>
<tr>
<td>Installed OWT’s (no feed-in)</td>
<td>312.0</td>
<td>52</td>
</tr>
<tr>
<td>Foundations w/o OWT</td>
<td></td>
<td>76</td>
</tr>
<tr>
<td><strong>Cumulative (2016-06-30)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OWT’s (feeding in)</td>
<td>3552.22</td>
<td>835</td>
</tr>
<tr>
<td>Installed OWT’s (no feed-in)</td>
<td>324.00</td>
<td>54</td>
</tr>
<tr>
<td>Foundations w/o OWT</td>
<td></td>
<td>142</td>
</tr>
</tbody>
</table>
Due to differences between the installed or planned capacity of offshore wind projects and the assigned grid connection capacity, the sum of the projects does not reach exactly 7.7 GW.
## Present Offshore Turbine Configurations

<table>
<thead>
<tr>
<th>Average Turbine Configuration of OWT (feeding in)</th>
<th>Additions 1st half 2016</th>
<th>Cumulative (2016-06-30)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Nameplate Capacity</td>
<td>6 000 kW</td>
<td>4 254 kW</td>
</tr>
<tr>
<td>Average Rotor Diameter</td>
<td>154 m</td>
<td>121 m</td>
</tr>
<tr>
<td>Average Hub Height</td>
<td>110 m</td>
<td>90 m</td>
</tr>
</tbody>
</table>
Legal Framework for Offshore Wind Energy

The Renewable Energy Act - EEG

Support for renewable energy via the EEG since 2000 – specifies remuneration, technology differentiation.

Issues in the past for offshore wind (prior to 2009)

- No investments due to insufficient remuneration for offshore wind energy (9.1 ct/kWh)

- **EEG of 2008** (entered into force on 1\textsuperscript{st} Jan. 2009)
  - Increased initial Feed-in-Tariff (FiT) to 13.0 ct/kWh, plus starter bonus of 2 ct, granted for 12 years after commissioning (if commissioning before 1 Jan. 2016)

- **EEG of 2011** (entered into force on 1\textsuperscript{st} Jan. 2012)
  - Compressed FiT: Option to claim an increased initial rate of 19 ct/kWh – only granted for 8 years after commissioning, afterwards FiT drops to 3.5 ct/kWh
  - Important boost for investment decisions

- **New issues emerging in 2013 - “Strompreisbremse”** (Electricity price brake) – debate since Feb. 2013 - created Uncertainty about future prospects of the EEG
EEG 2014/2017 – Support instrument

Current Remuneration Scheme (based on FIT) – EEG 2014

- Offshore wind energy producers can choose between the **basic model** and the **acceleration model**. The latter is valid until the end of 2019 (final commissioning date for an OWF). The **basic remuneration** set at **€0.039/kWh** only (for a period of 20 years).
- Under **basic model** the initial tariff is **€0.154/kWh for at least 12 years**. Extension possible, if water depth > 20 meters, and/or distance to shore > 12 n.miles.
- Under the **acceleration model** initial tariff set at **€0.194/kWh for the first eight years**. Extension conditions apply, only the initial tariff of basic model is paid in extension period.
- **Degression component** for offshore wind farms is built into the law. Initial tariff under acceleration model is reduced by **€0.01/kWh** for all projects which go online after 31st Dec. 2017. Under the basic model, the degression is **€0.005** as of 1st Jan. 2018, and another degression of **€0.01** as of 1st Jan. 2020 (para 30 of the EEG)2014.
**EEG 2014 – Revised targets for OWE**

<table>
<thead>
<tr>
<th>Year</th>
<th>IECP* of 2007</th>
<th>§ 3 EEG 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>2020</td>
<td>10 GW</td>
<td>6,5 GW</td>
</tr>
<tr>
<td>2030</td>
<td>25 GW</td>
<td>15 GW</td>
</tr>
</tbody>
</table>

* Integrated Energy and Climate Programme of German Govt.

**Degression of FIT for Offshore Wind**
acc. to para 26 EEG 2014

**... but 2-year FIT-extension until Dec. 2019;**

**NOTE:** After 2020, new tendering scheme for OWE likely – For other RES tenders in 2017, based on outcome of PV (greenfield) pilot tender

<table>
<thead>
<tr>
<th>Degression of FIT</th>
<th>para 20 EEG 2012</th>
<th>para 26 EEG 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard (base) model</td>
<td>7 % annual degression after 2017</td>
<td>in 2018: 0,5 €ct/kWh</td>
</tr>
<tr>
<td>Compressed FIT</td>
<td>No degression</td>
<td>in 2018: 1,0 €ct/kWh</td>
</tr>
</tbody>
</table>
EEG 2017 – Support instrument

Flexible market premium

• Electricity generated from OWF is remunerated via a flexible market premium on top of the spot market price, has to be sold directly at the electricity market.
• All forms of EEG remuneration is granted through 20 year-contracts.
• OWF which are commissioned until the end of 2020, and which have grid connection guaranteed by the regulator, are eligible of the FIT, according to the EEG2014.

Negative prices:

• Remuneration level is zero, if hourly contracts during the day-ahead auction at the EPEX-Spot market are negative for at least six consecutive hours. Does not apply for wind energy projects (WEPs) with an installed capacity < 3MW, nor for pilot-WEPs (on- and offshore).
EEG 2017 – WindSeeG (Wind@Sea Law)
Offshore targets and new installation trajectories until 2030

• Government target for OWE capacity by 2020 is 6.5 GW, and 15 GW by 2030.
• +1.2 GW additional buffer for offshore grid capacity by 2020, i.e. total OWE capacity by 2020 may potentially grow to a max. of 7.7 GW
• Until EEG2014, 10 GW target by 2020, 25 GW by 2030.
EEG2017 - new installation trajectory for 2021–2030 based on the differential of a max. capacity of 7.7 GW by 2020, and 15 GW by 2030
→ total capacity of 7.3 GW from 2021-30, equals average of 730 MW/yr during the 2020s
• SOW and offshore wind industry called for at least 900 MW/year to stimulate further cost reduction and industrial development.
• Tender volume reduced to 500 MW in 2021 (exclusively in Baltic Sea) and 500 MW in 2022 (up to 50 % for Baltic Sea), plus 700 MW per year during 2023-2025, and 840 MW per year during 2026-2030
• Political reasoning for reducing offshore wind targets in 2021/22: better synchronise onshore grid expansion and offshore wind development.
EEG 2017 – WindSeeG (Wind@Sea Law) -

**Allocation mechanism – Tenders in transition phase**

**Responsible authority:** BNetzA (electricity regulator) organising the tenders

**Auction volume and rounds:**

- **Two auction rounds** will be organised for OWF for the transitional period (2021-25). The **first auction** is scheduled on 1\(^{st}\) March 2017, second auction on 1\(^{st}\) March 2018.

- Each of the two tenders will have a volume of 1.550 MW - **Total of 3,100 MW** tendering capacity during the five-year transitional period until 2025. On average, this is only 620 MW per year.

- **Eligible projects:** all OWF in Cluster area 1-9 (EEZ North Sea), and in area 1-3 (EEZ Baltic Sea) with a permit, or which can prove an advanced application state prior to 1\(^{st}\) August 2016, including OWF in coastal waters
EEG 2017 – WindSeeG (Wind@Sea Law)

Allocation mechanism – Tenders in transition phase

• **Only 500 MW** granted to OWF commissioned **in 2021** (in the Baltic Sea only), and **in 2022** respectively.

• OWF which will be commissioned **from 2026 onwards**, a new so-called ‘Central Model’ (similar to the Danish tendering approach) will be introduced with an annual capacity foreseen of 840 MW. The first call for tenders under the Central Model is scheduled on 1st Sep. 2021.

• BSH is developing a so-called **Flächenentwicklungsplan (FIEP)**, i.e. OWF site development plan for the EEZ under the ‘Central Model’. It will contain information on the areas to be tendered between 2026 and 2030.

• First FIEP published by 30 June 2019, after stakeholder consultation, and following prior agreement with BNetzA and TSOs.
EEG 2017 – WindSeeG (Wind@Sea Law)

Allocation mechanism – Tenders in transition phase

- **Bid size:** dependent on the available grid capacity. One bidder can submit more than one bid per auction round, but not for the same project.
- **Tendering subject:** remuneration level/price per kWh
- **Awarding procedure and criteria:**
  - “Pay as bid”, lowest price wins.
  - Awards and support licenses must not be transferred to other projects.
  - Max. awarding price for offshore wind set at 12 ct/kWh in the first auction → afterwards lowest bid determines the max. price.
- **Prequalification criteria:**
  A financial security of **100 EUR/kW** of planned installed capacity has to be deposited for bids during the transitional period. For the ‘Central Model’, starting in Sep. 2021, a financial security of **200 EUR/kW** is foreseen.
- Bids who don’t win in the auction will be reimbursed by BNetzA immediately after the results of the auctioning have been published.
Allocation mechanism – tenders

Penalty regime:
• Realisation period for the OWF is set by the BNetzA, dependent on the completion date of the offshore grid connection.

Special regime for pilot offshore wind installations:
• First three of a new and innovative offshore wind installation, i.e. turbine or foundation
• Maximum of 50 MW/year granted to a pilot scheme during transitional period (2021-25)
• Eligible to receive the maximum price of 12 cents/kWh during the first auction round, if commissioned between 1st Jan. 2021 and 31st Dec. 2025.
• Grid capacity for the pilot installation is awarded by BNetzA
EEG 2017 – WindSeeG (Wind@Sea Law)

Allocation mechanism – tenders

Lack of differentiated remuneration:
Under the EEG2017 (WindSeeG), no more differentiation of remuneration is foreseen for water depth or distance to shore.

Lack of financial compensation:
Permitted or advanced projects which have not won a contract in the transitional tendering rounds (2017 and 2018), are not eligible for any financial compensation. Some market players have already indicated to take legal measures against this provision.
Cost Reduction Roadmaps – UK, Germany

Cost reduction pathways TCE, 2012 (LCOE vs. Time/Capacity)

Cost reduction potentials study (Stiftung, 2013 (LCOE vs. Time/capacity)
Prognos/Fichtner scenario assumptions

2 growth scenarios at 3 sites (North Sea) – Market Volume determining potential for cost reduction
“Cost reduction comes through volume!
Volume needs confidence,
Confidence needs consistent policies”.
(Andrew Garrad, former EWEA President, Windkracht 2014)
Offshore Wind is different ...  
Idealized Project Schedule

- **Project development**: 4-6 Years
- **Construction**: 1-2 Years
  - **Financial Negotiations**: 2-4 Years
  - **FID**: 2-4 Years
- **Operation Phase**: 20 Years
  - **Commissioning**: 5 Years
- **Extension of operation**: 1-2 Years
- **Decommissioning**: 27-37 years

Long lead times for OWF development

Reliable & stable legal framework crucial
Policy Priorities/Actions to realize OWE’s full potential in Europe → 23.5 GW by 2020, up to 65 GW by 2030*

Industry is committed to cost reduction (< 80 Euro/MWh by 2025) needs to be supported & facilitated by:

- Long-term Visibility of ambitious government targets, complemented by Stable Regulatory Framework, i.e. adequate support schemes and Electricity Market Design
- Improved Access to Finance
- Cost-effective and timely Grid Investment and Connection
- Addressing Planning/Permitting System issues (incl. MSP)
- Strong Supply Chain and Logistics
- Support Innovation (RDD) and Training - Enhance (cross-border) synergies
- Awareness Raising and Public Information Activities

* Source: Ernst & Young, 2015
Offshore Wind Energy in Germany – An illustration of initial positive results

Positive operational results:
- *alpha ventus*:
  > 4,450 full load hours in 2011 (267 GWh) ➔ 15 % above expectations,
- *Baltic I* – similar results; turbine availability 98 %

➔ Offshore wind: important contribution to energy system security & reliability!

> € 2 billions already invested along the German coast,
> e.g. in
  - Port infrastructure,
  - Production facilities (offshore turbines/components),
  - Construction/service vessels, (converter) platforms ...

Vast opportunities for maritime industries, e.g.
> 10 billion Euro investment for OWF built by 2015

18,000 jobs created in German OWE industry (and associated maritime sectors)
Status & Outlook - Offshore Wind in Germany

• Strong Pipeline until 2020: 6+ GW unconditional orders → 3.5 GW online by mid 2016 BUT
  Reduced government ambitions (targets down from 10 GW to 6.5/7.7 GW by 2020, and from 25 to 15 GW by 2030 - equals 60-70 TWh (10-12 % of German electricity demand), Total investment volume of € 50–60 bn

• Germany has a strong expertise in R&D, turbine & component technology, skilled labour force, port infrastructure development

• More cost reduction possible with more political ambitions (COP21/Paris agreement of Dec. 2015 – German Climate Protection Plan 2050 of 14 Nov. 2016)

• New growth opportunity for supply chain (machinery & engineering sector, construction and maritime industries
  → Siemens turbine production facility in Cuxhaven
The German Wind Energy Market

RE share in 2012 - 23% of German electricity consumption, 3 years later (2015) grown to 31.5%

Gross Electricity Consumption from RE in Germany 2012¹)

Wind energy - main driver of future growth!!

Sources: 1) BDEW, 2013; 2) DLR, Fraunhofer IWES, IfnE, 2012

Prognosis of Electricity Production (in TWh/A) from RES in Germany²)

²) DLR, Fraunhofer IWES, IfnE, 2012
Thank you for your attention!

Stiftung OFFSHORE-WINDENERGIE

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