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

Andreas Wagner, Managing Director

German Offshore Wind Energy Foundation

Berlin, 25 Nov. 2016

Baltic InteGrid Conference – Offshore Wind in the Baltic Sea

STIFTUNG OFFSHORE WINDENERGIE

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

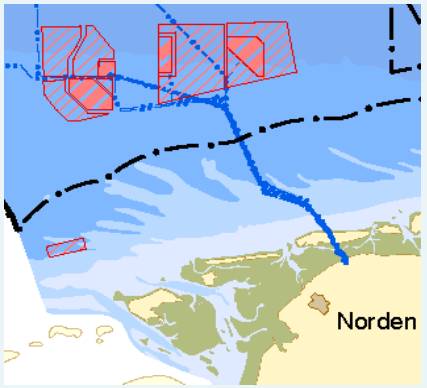
- Platform for **offshore wind/maritime industry**, incl. **trade associations, policy-makers and R/D**

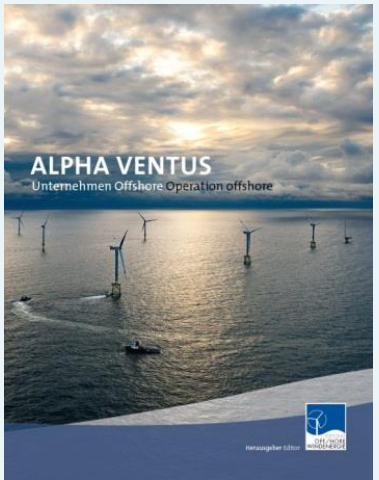
- Involved in various **projects** (EU and national), e.g. **OffWEA** - consultation, support, moderation of the Geman government (2011-14);
  PROMOTioN (Horizon 2020), and
  Baltic InteGrid (Interreg-Programme)

STIFTUNG OFFSHORE WINDENERGIE

alpha ventus (test site)

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

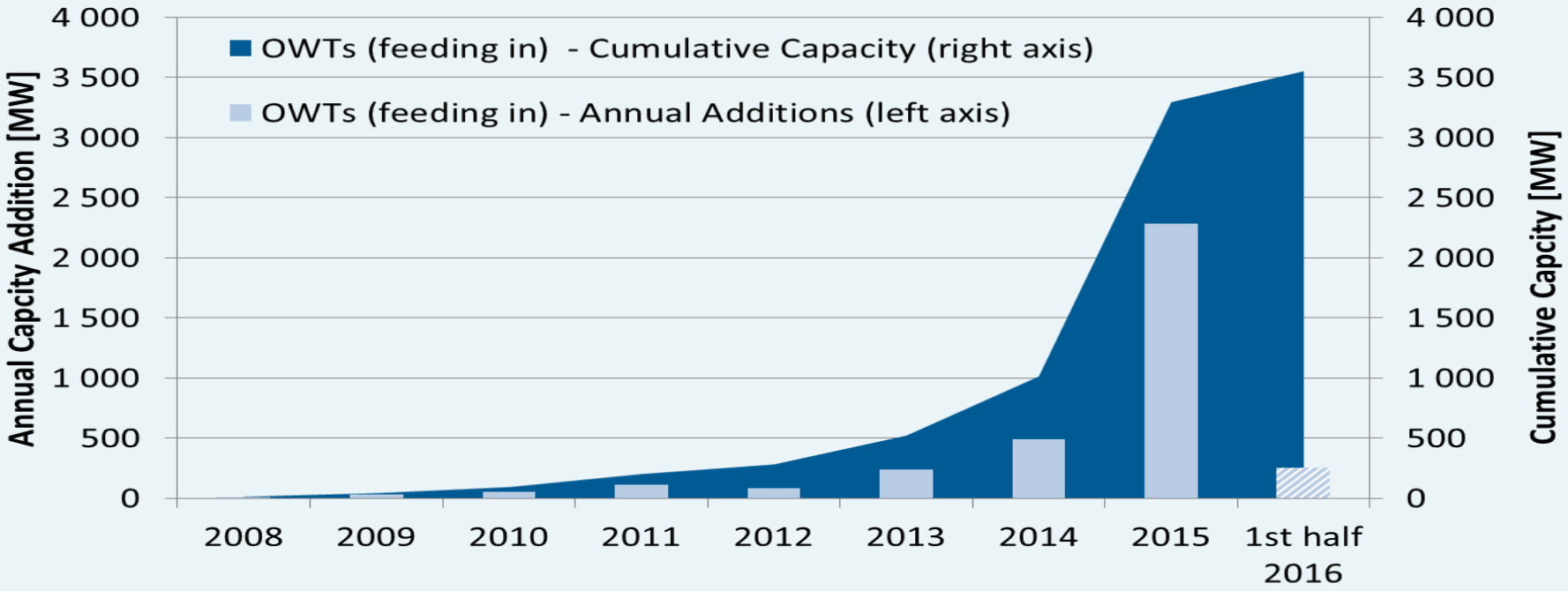




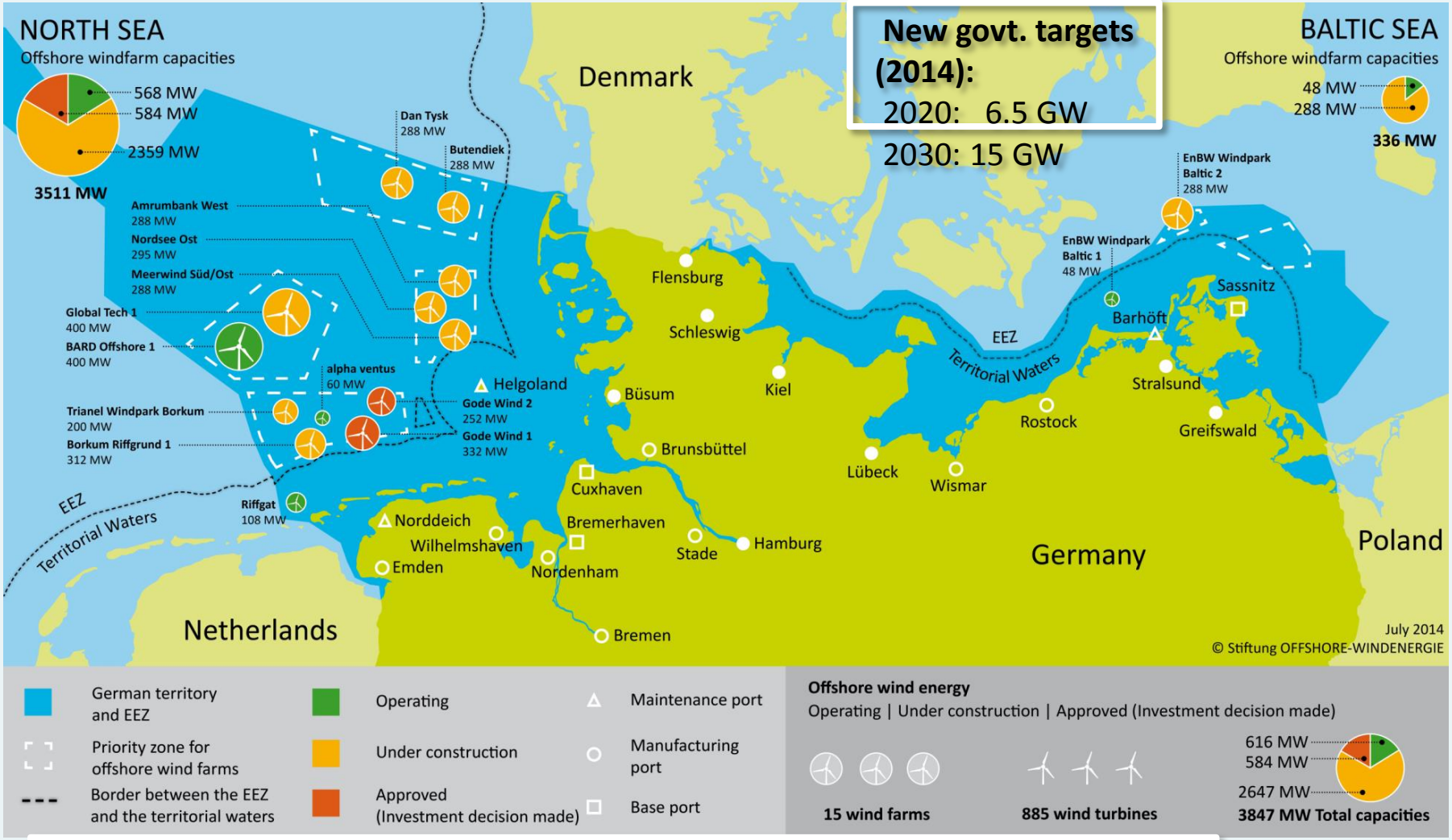
- 60 km distance to shore, 30 m water depth
- First OWF with 5 MW class (12 turbines) → **60 MW**
- 2 turbine manufacturers (Multibrid-Adwen, REpower-Senvion), 2 types of foundations (tripods, jackets)
- Permits acquired by SOW in 2005 - Leased to DOTI end of 2006 (EWE, E.ON, Vattenfall)
- Construction start in 2008, **commissioned in 04/2010**
- Impressive operational results – **50 % capacity factor** (4,450 full load hours) > **1 TWh** electrictiy production by 2014
- **RAVE** – Research at alpha ventus:
  Extensive ecological and technological R&D Program
  funded by the German government (50 Mio €)

STIFTUNG OFFSHORE WINDENERGIE

TURBINES FEEDING INTO THE GRID
(AS OF 30 JUNE 2016)



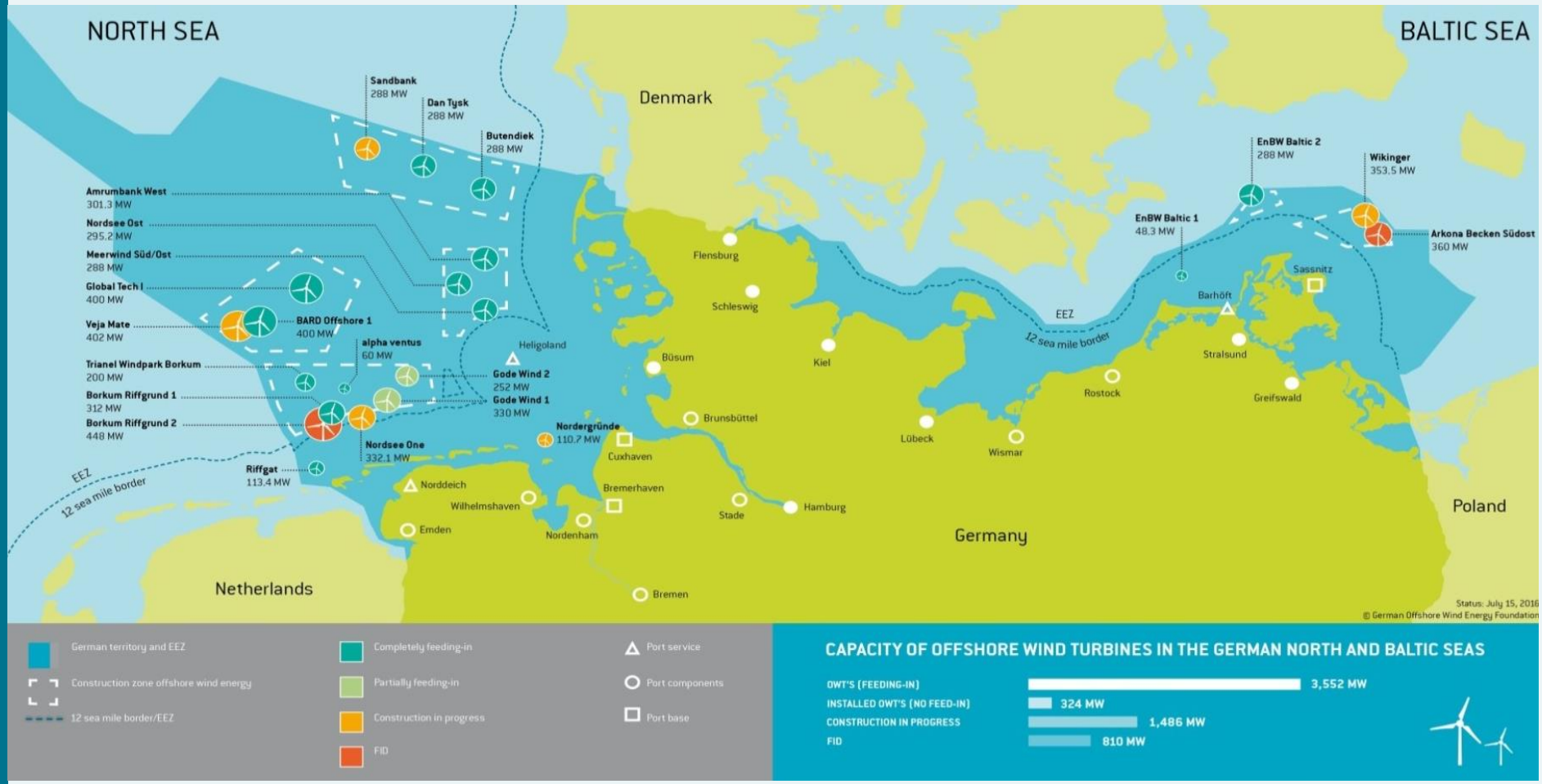
Status of German Offshore Wind Development
Status 30 June, 2014



> 1 GW online by 2014, > 3 GW by 2015

STIFTUNG OFFSHORE WINDENERGIE

OFFSHORE-WIND FARMS IN GERMANY
STATUS BY 30 JUNE, 2016

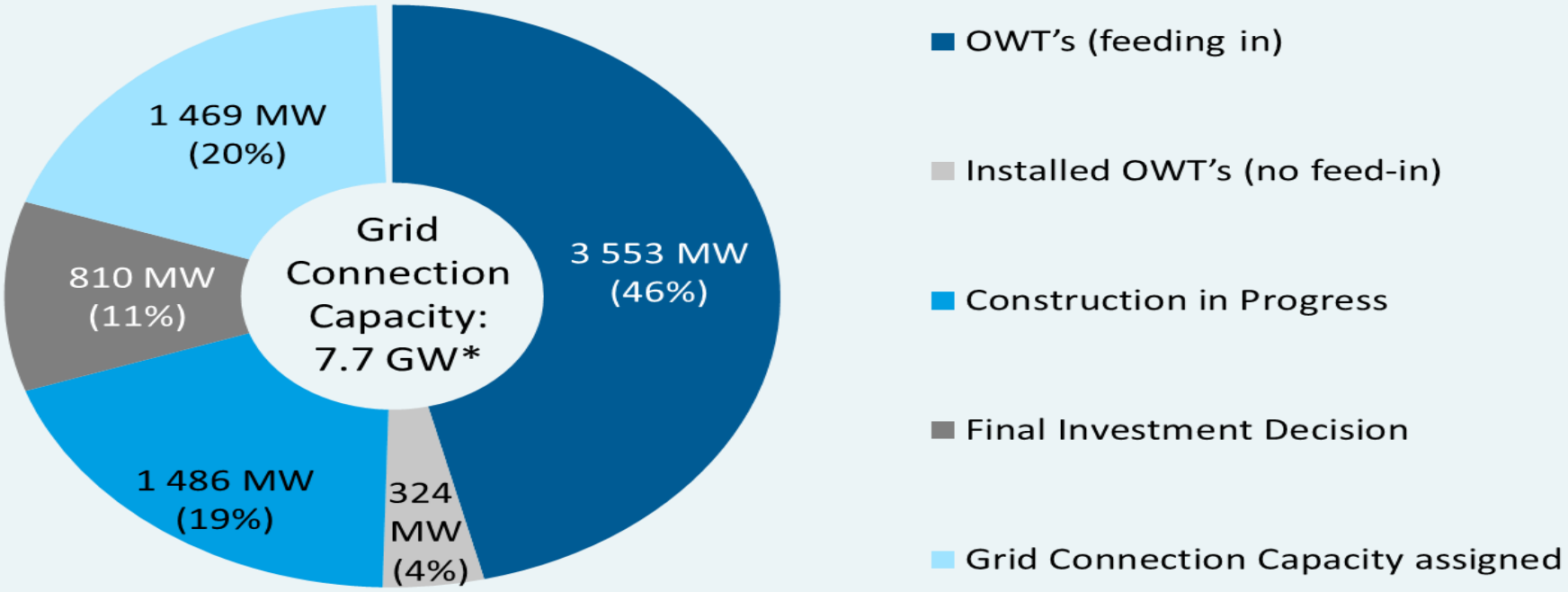


STIFTUNG OFFSHORE WINDENERGIE

OFFSHORE WIND ENERGY DEVELOPMENT BY 30 JUNE 2016

	Status of Offshore Wind Energy Development	Capacity [MW]	Number of OWT
Additions 1st half 2016	OWT's (feeding in)	258.0	43
	Installed OWT's (no feed-in)	312.0	52
	Foundations w/o OWT		76
Cumulative (2016-06-30)	OWT's (feeding in)	3 552.22	835
	Installed OWT's (no feed-in)	324.00	54
	Foundations w/o OWT		142

OFFSHORE WIND IN GERMANY –
On Track achieving political targets for 2020 (6.5 GW), up to 7.7 GW incl. assigned offshore grid capacity



*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.

STIFTUNG OFFSHORE WINDENERGIE

PRESENT OFFSHORE TURBINE CONFIGURATIONS

Average Turbine Configuration of OWT (feeding in)	Additions 1st half 2016	Cumulative (2016-06-30)
Average Nameplate Capacity	6 000 kW	4 254 kW
Average Rotor Diameter	154 m	121 m
Average Hub Height	110 m	90 m

Legal Framework for Offshore Wind Energy
The Renewable Energy Act - EEG

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

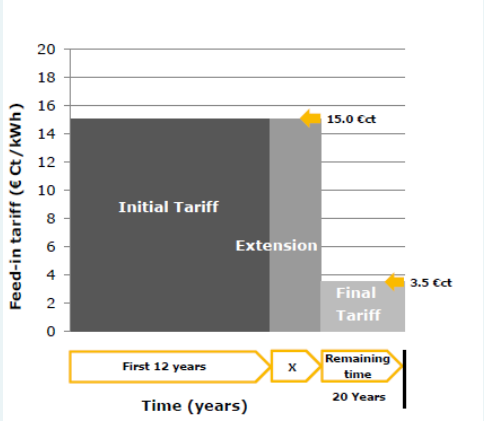
Issues in the past for offshore wind (prior to 2009)

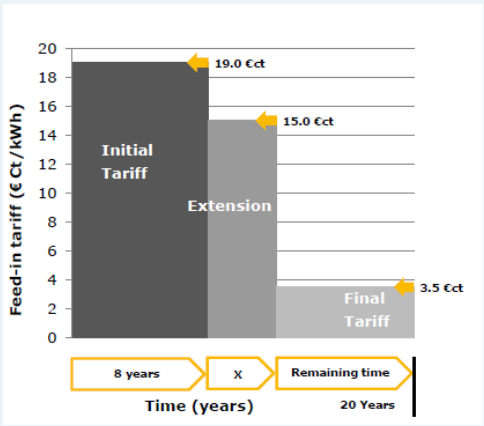
- ➢ No investments due to insufficient remuneration for offshore wind energy (9,1 ct/kWh)

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

- **EEG of 2011**(entered into force on 1st 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*

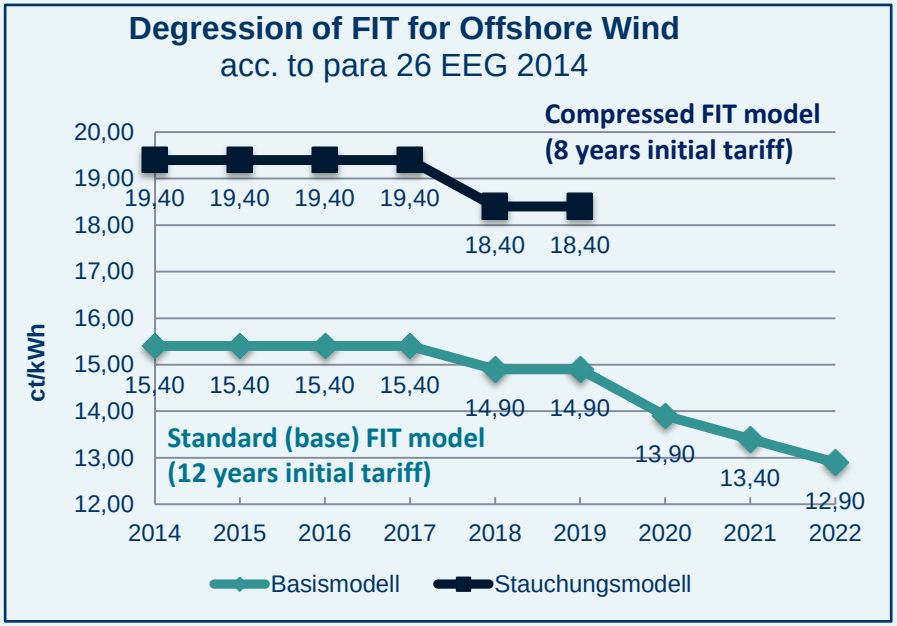
Current Remuneration Scheme (based on FIT) – EEG 2014

- Offshore wind energy producers can chose 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

Year	IECP* of 2007	§ 3 EEG 2014
2020	10 GW	6,5 GW
2030	25 GW	15 GW

* Integrated Energy and Climate Programme of German Govt.



… 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

Degression of FIT	para 20 EEG 2012	para 26 EEG 2014
Standard (base) model	7 % annual degression after 2017	in 2018: 0,5 €ct/kWh in 2020: 1,0 €ct/kWh
Compressed FIT	No degression	in 2018: 1,0 €ct/kWh

STIFTUNG OFFSHORE WINDENERGIE

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 eligibile 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 **1st March 2017**, second auction on 1st 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 1st August 2016, including OWF in coastal waters

STIFTUNG OFFSHORE WINDENERGIE

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 (FlEP)**, 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 FlEP published by 30 June 2019, after stakeholder consultation, and following prior agreement with BNetzA and TSOs.

STIFTUNG OFFSHORE WINDENERGIE

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.

EEG 2017 – WindSeeG (Wind@Sea Law)

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

STIFTUNG OFFSHORE WINDENERGIE

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.

STIFTUNG OFFSHORE WINDENERGIE

Cost Reduction Roadmaps – UK, Germany

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

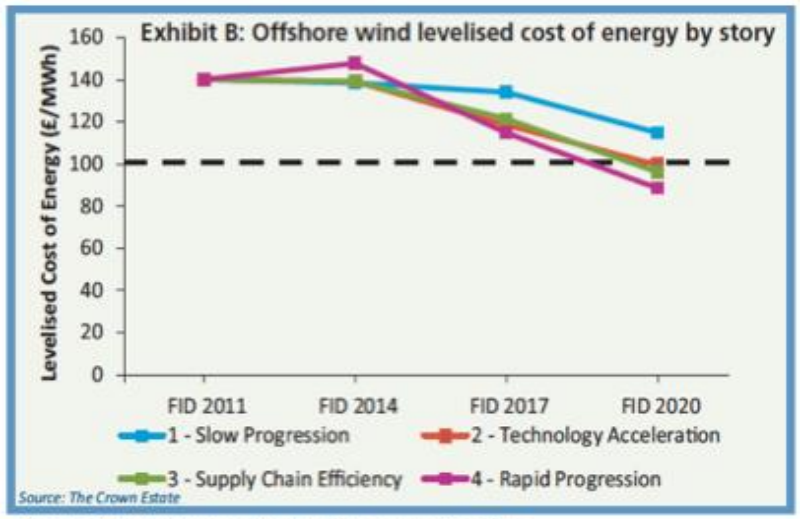
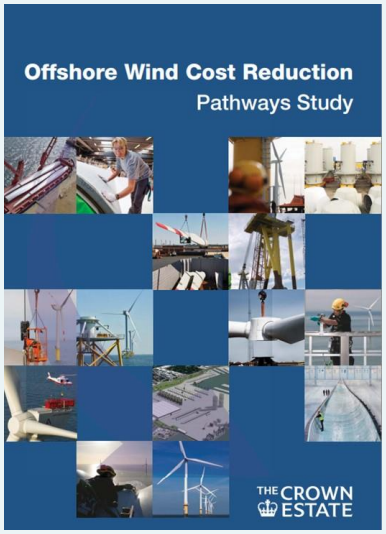
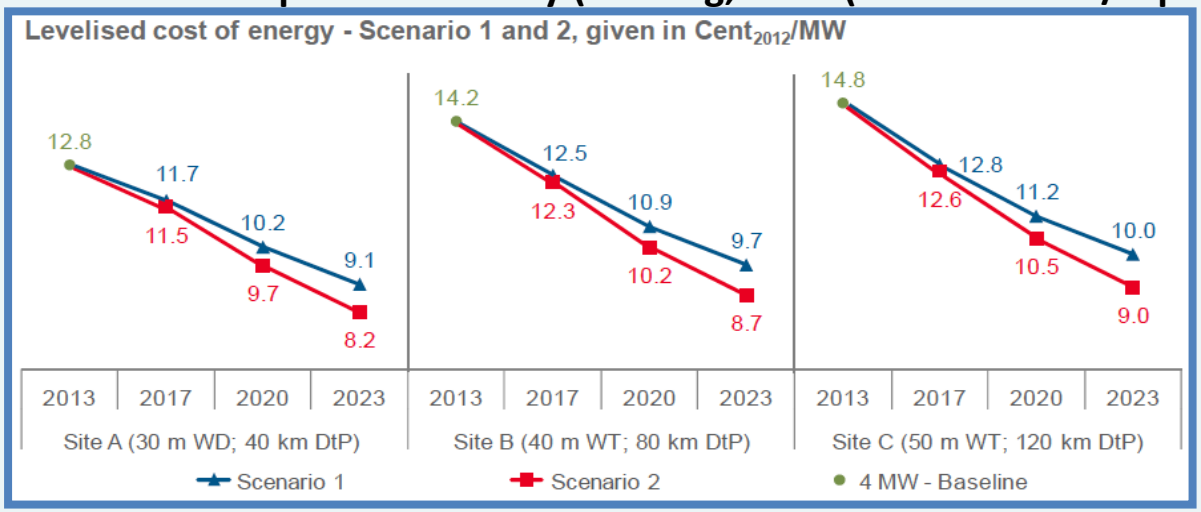
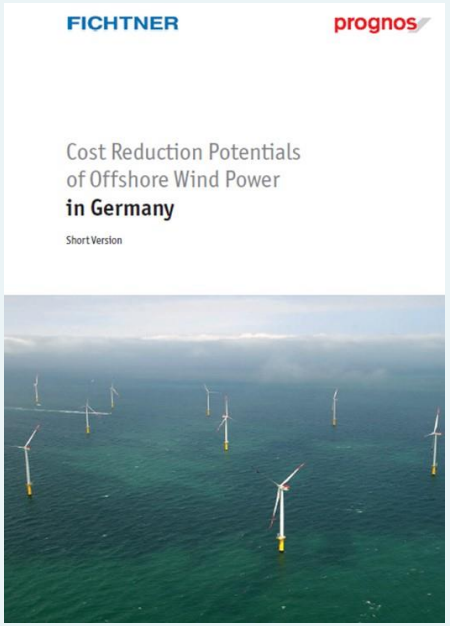


Figure 7, Pathway cost reduction scenarios TCE

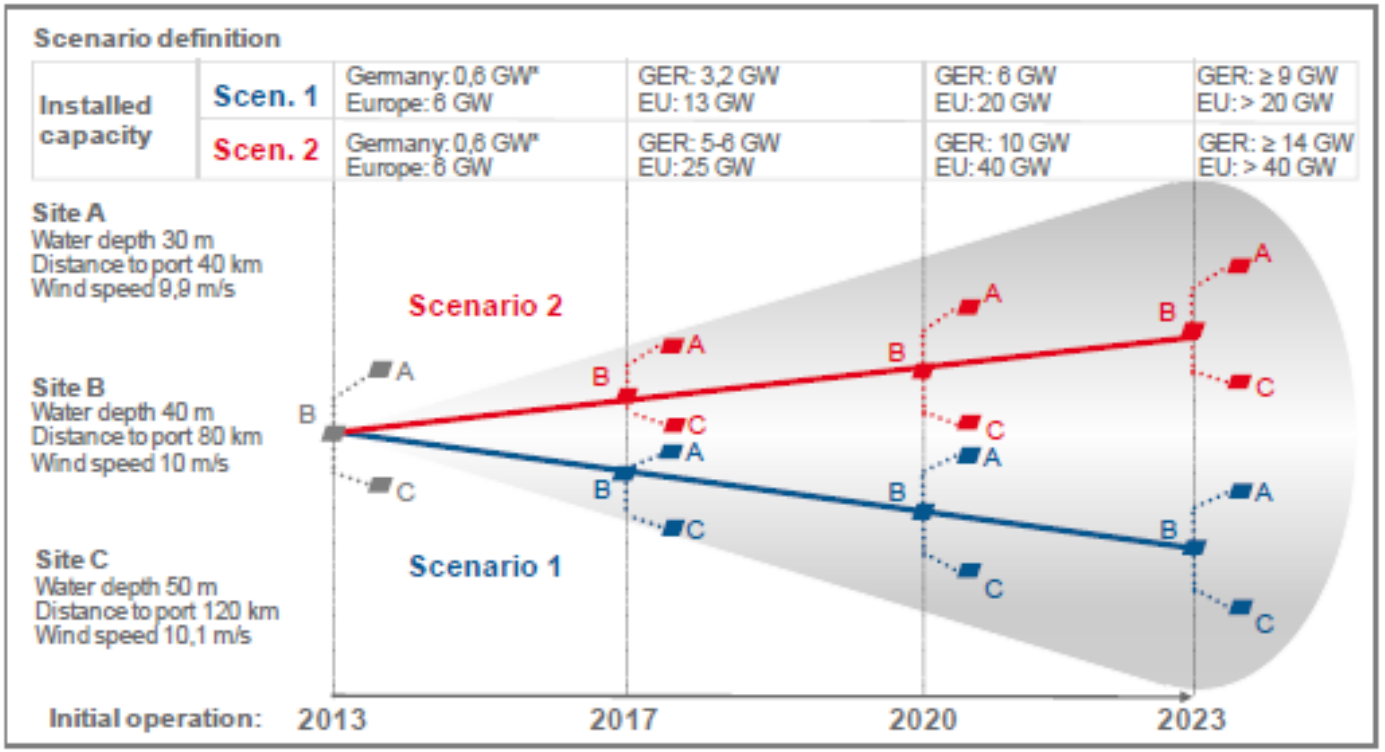


Cost reduction potentials study (Stiftung, 2013 (LCOE vs. Time/capacity)





Prognos/Fichtner scenario assumptions



*Source: [Prognos / Fichtner]; * expected installed capacity by the end of 2013*

Plant and wind farm configuration in the two scenarios

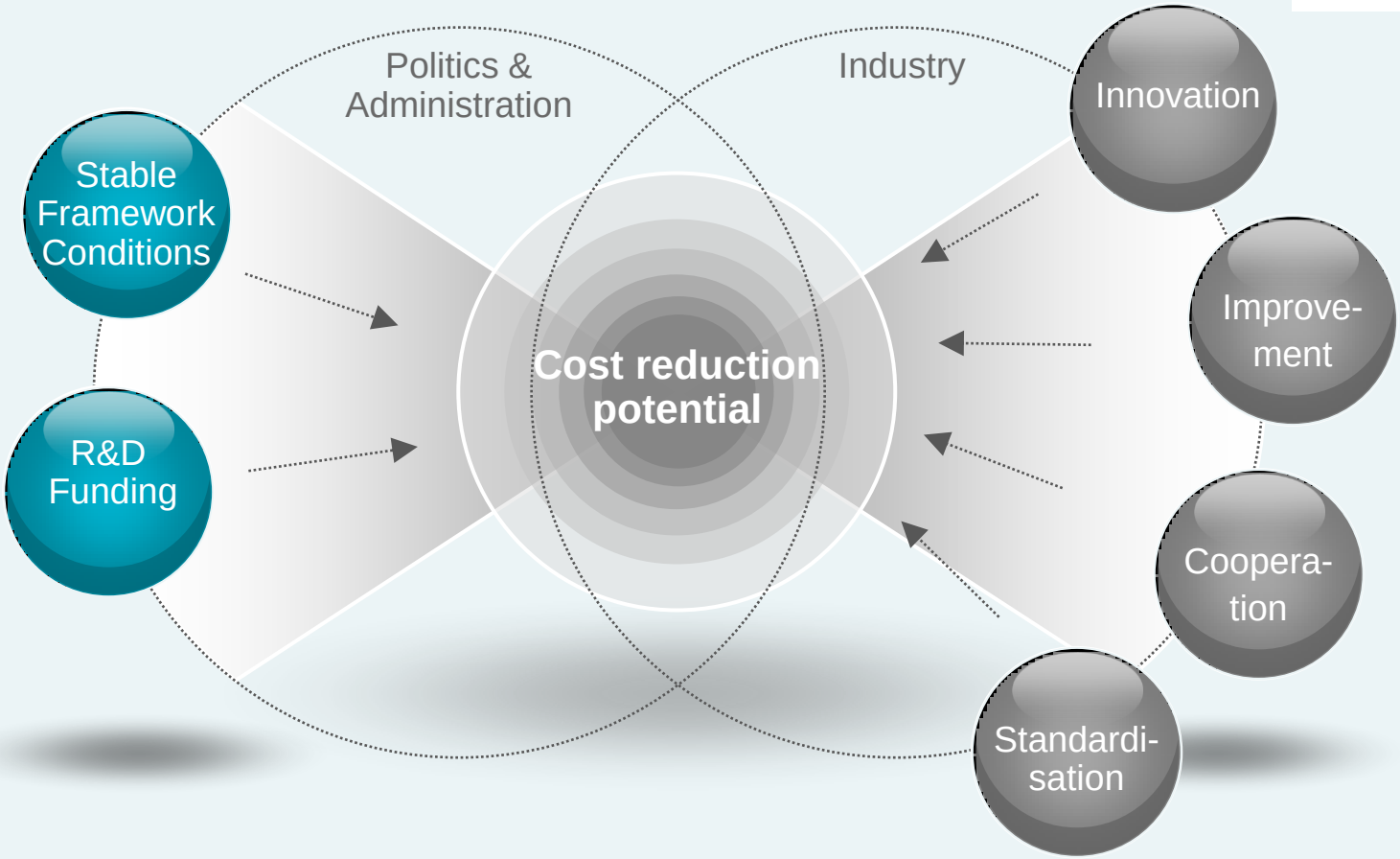
	Scenario 1					Scenario 2				
Initial operation	Number WTG	Capacity WTG	Size wind farm	Hub height	Rotor diameter	Number WTG	Capacity WTG	Size wind farm	Hub height	Rotor diameter
2013	80	4 MW	320 MW	90 m	120 m	80	4 MW	320 MW	90 m	120 m
2017	75	6 MW	450 MW	100 m	145 m	75	6 MW	450 MW	100 m	145 m
2020	75	6 MW	450 MW	100 m	154 m	56	8 MW	450 MW	110 m	164 m
2023	75	6 MW	450 MW	105 m	164 m	56	8 MW	450 MW	115 m	178 m

Source: [Prognos / Fichtner]; WTG = Wind Turbine Generator

2 growth scenarios at 3 sites (North Sea) – **Market Volume determining potential for cost reduction**

STIFTUNG OFFSHORE WINDENERGIE

How to exploit the Cost Reduction Potential



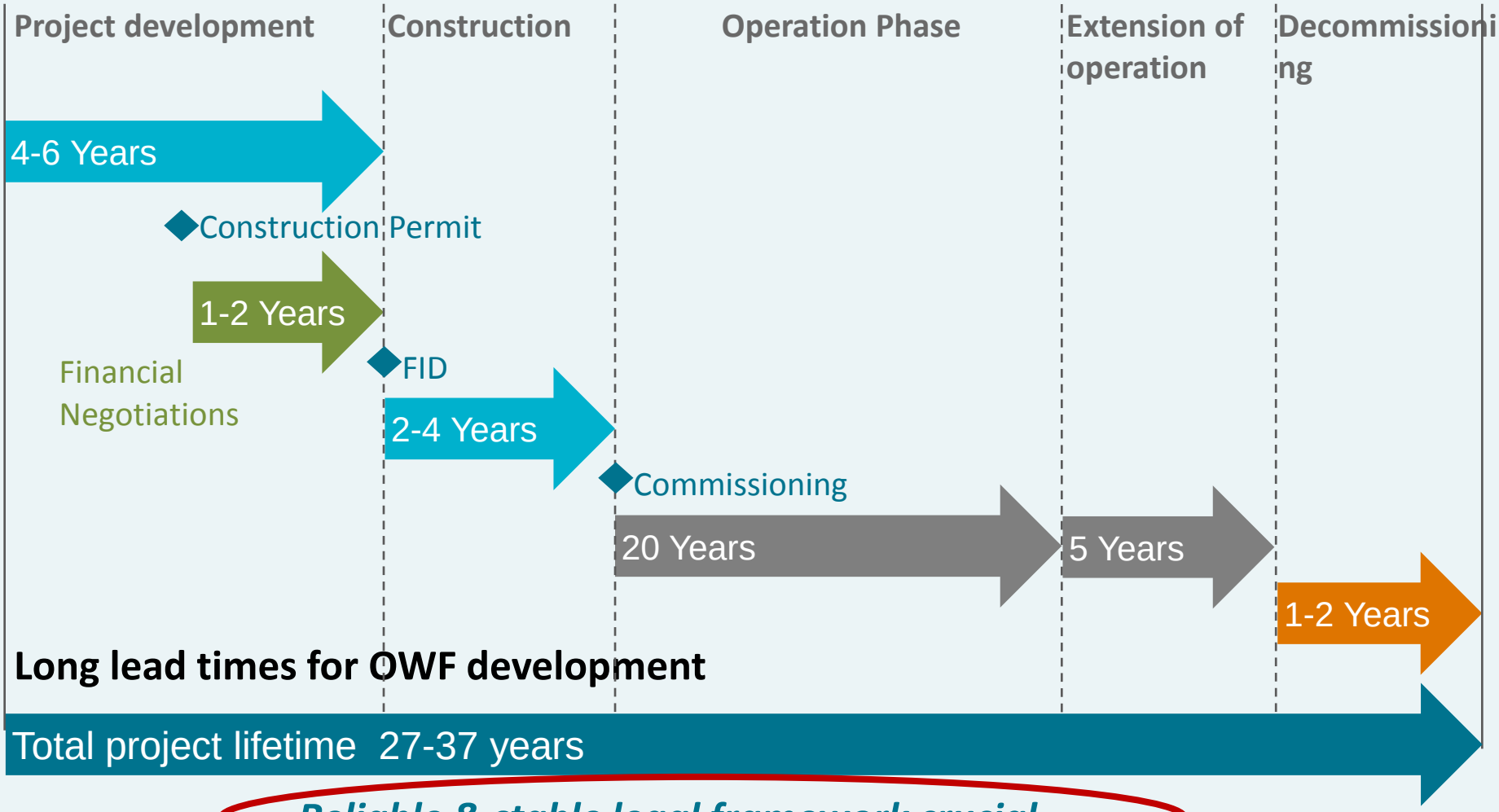
“Cost reduction comes through volume!
Volume needs confidence,
Confidence needs consistent policies”.

(Andrew Garrad, former EWEA President, Windkracht 2014)

STIFTUNG OFFSHORE WINDENERGIE

Offshore Wind is different …

Idealized Project Schedule



Reliable & stable legal framework crucial

STIFTUNG OFFSHORE WINDENERGIE

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

STIFTUNG OFFSHORE WINDENERGIE

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)

STIFTUNG OFFSHORE WINDENERGIE

Status & Outlook - Offshore Wind in Germany

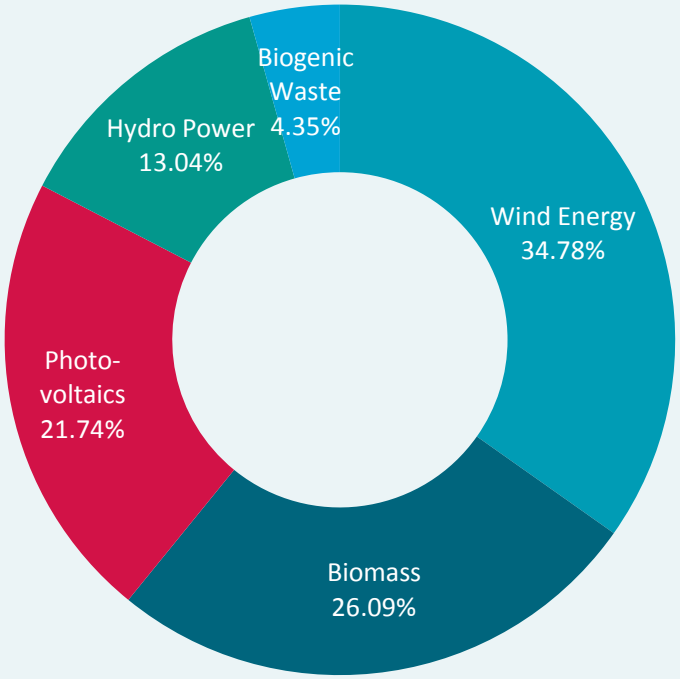
- Strong Pipeline until 2020: 6+ GW unconditional orders → 3.5 GW online by mid 2016 BUT
  Reduced government ambitions (targets down from 10 GW to 6.5/7.7 GW by 2020, and from 25 to 15 GW by 2030 - equals 60-70 TWh (10-12 % of German electricity demand), Total investment volume of **€ 50–60 bn**
- Germany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

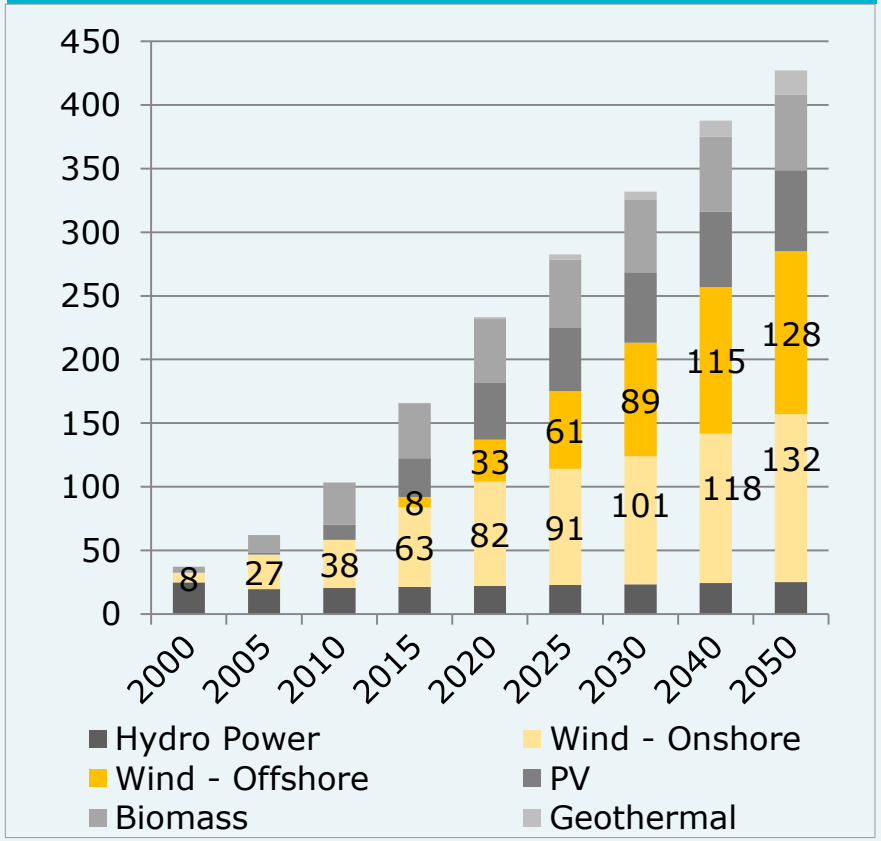
RE share in 2012 - 23% of German electricity consumption, **3 years later (2015)** grown to **31.5 %**

Gross Electricity Consumption from RE in Germany 2012[1)]

Wind energy - main driver of future growth!!



Prognosis of Electricity Production (in TWh/A) from RES in Germany[2)]

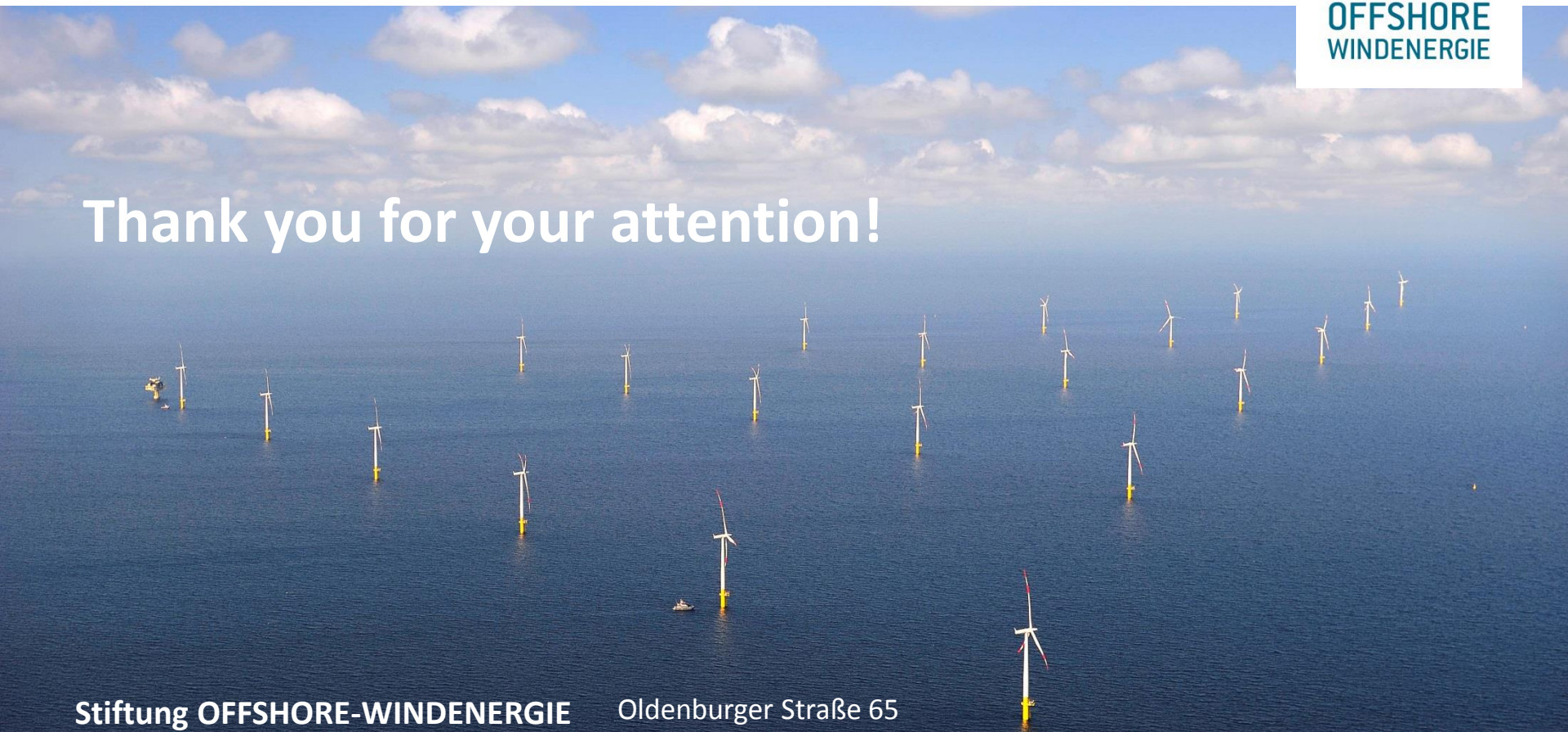


Sources: 1) BDEW, 2013;

2) DLR, Fraunhofer IWES, IfnE, 2012

STIFTUNG
OFFSHORE
WINDENERGIE

Thank you for your attention!



Stiftung OFFSHORE-WINDENERGIE

Stiftung der deutschen Wirtschaft
zur Nutzung und Erforschung der
Windenergie auf See

Oldenburger Straße 65
26316 Varel

Berlin office
Schiffbauerdamm 19
10117 Berlin

info@offshore-stiftung.de
www.offshore-stiftung.de