

# EnBW market entry offshore wind in Taiwan:

- Acquisition of 37,5% stake in 2 GW pipeline
- Joint development with Macquarie Capital & Swancor >

Press Call 12.02.2018

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# EnBW Energie Baden-Württemberg AG

One of the largest energy supply companies in Germany.

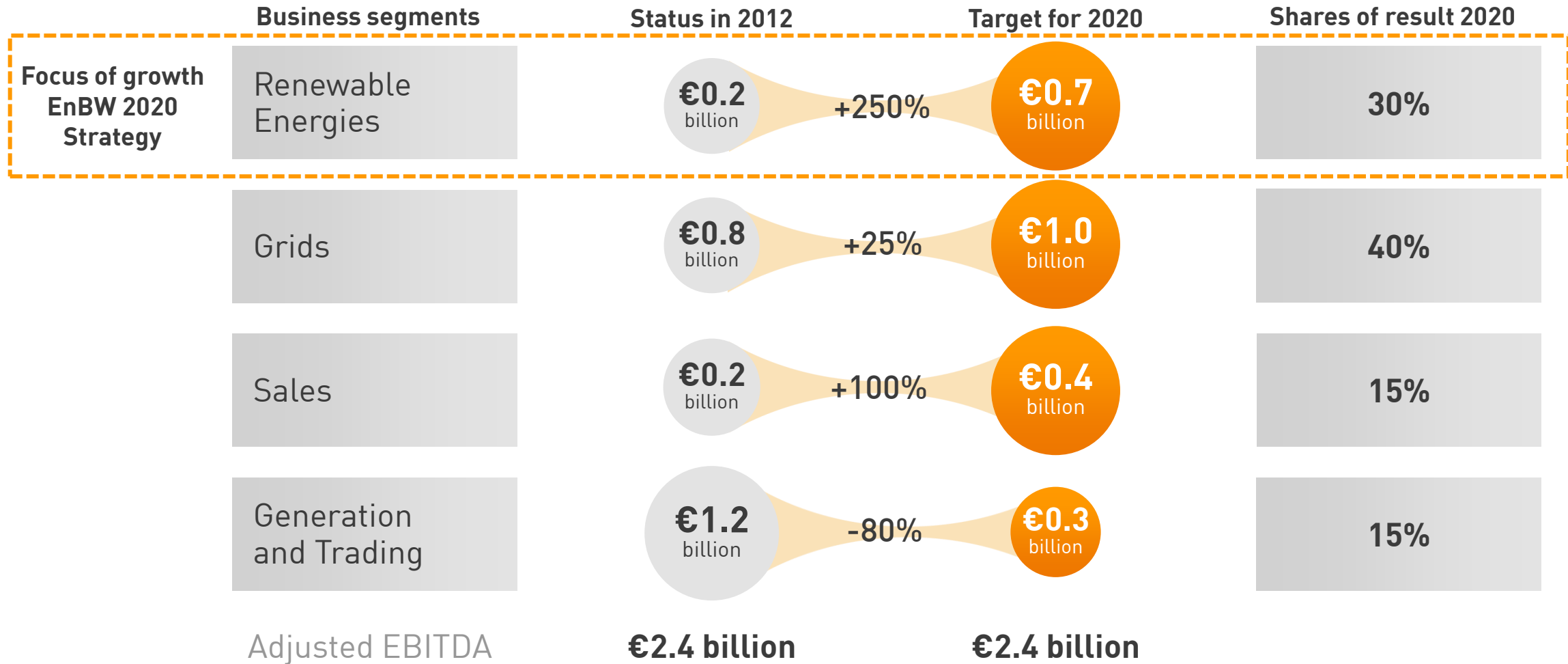


- › Business segments: renewable energies, grids, sales, generation and trading
- › Annual revenue: more than 19 billion euros
- › Customers: around 5.5 million
- › Employees: around 20,000



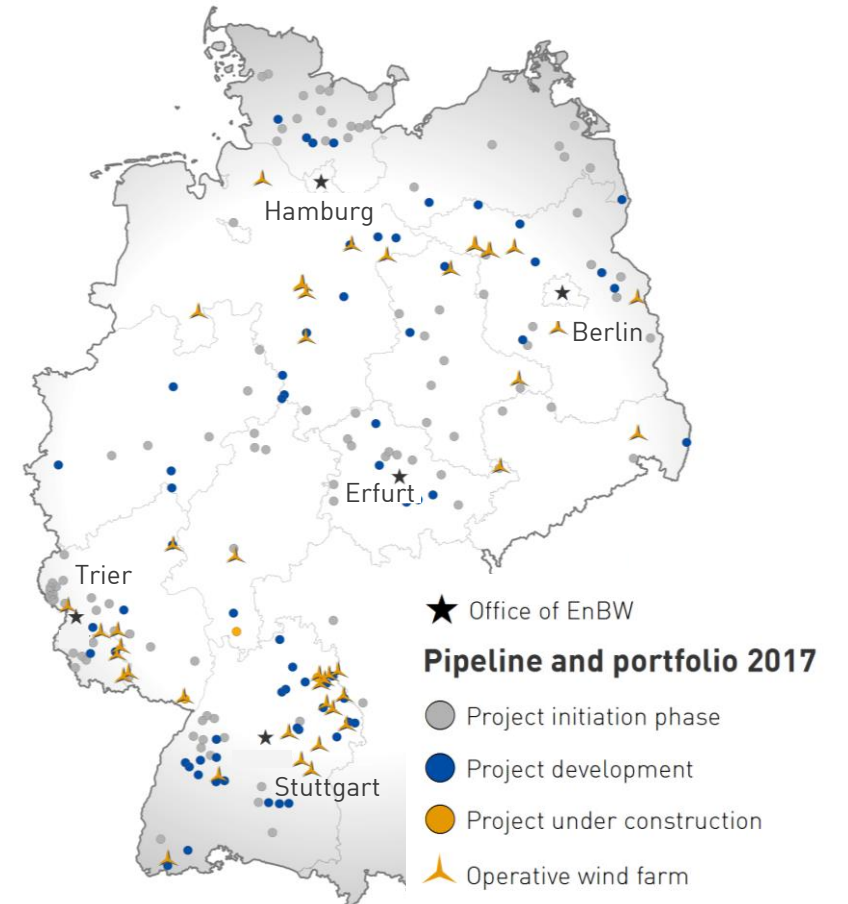
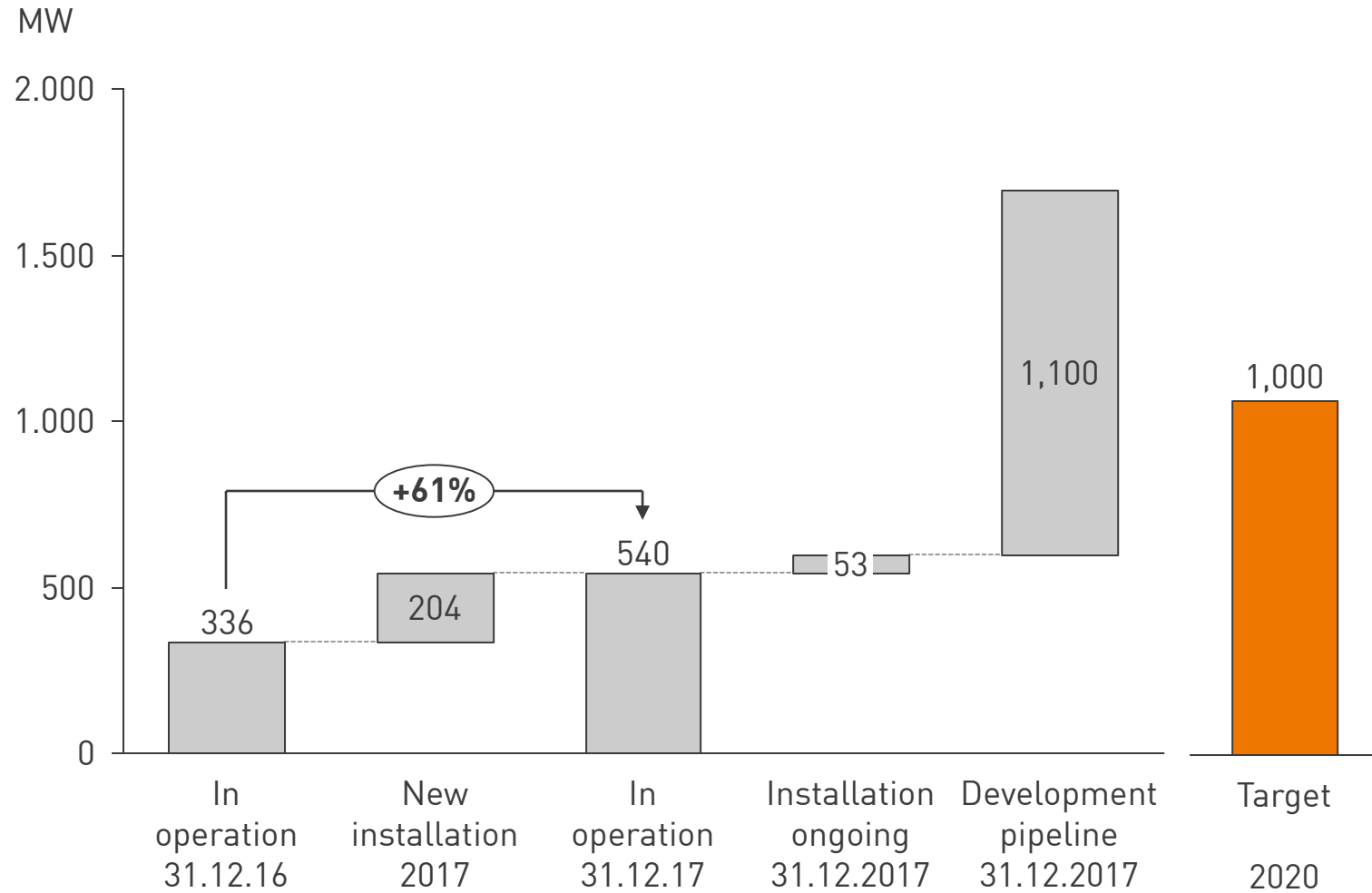
# EnBW 2020 strategy

Focused on a new energy world – growth in wind on-/offshore and grids.



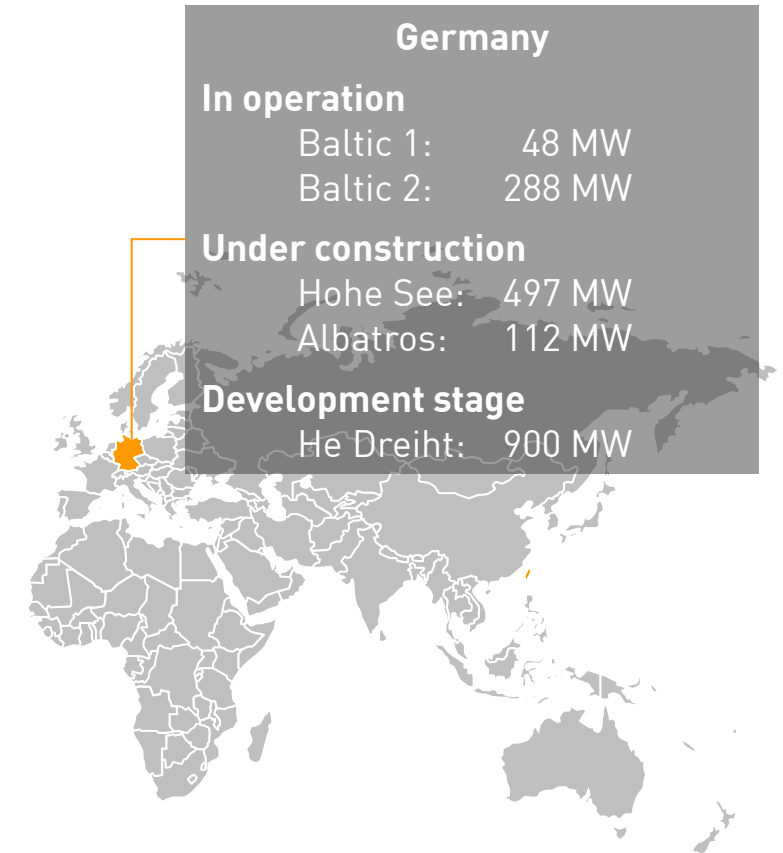
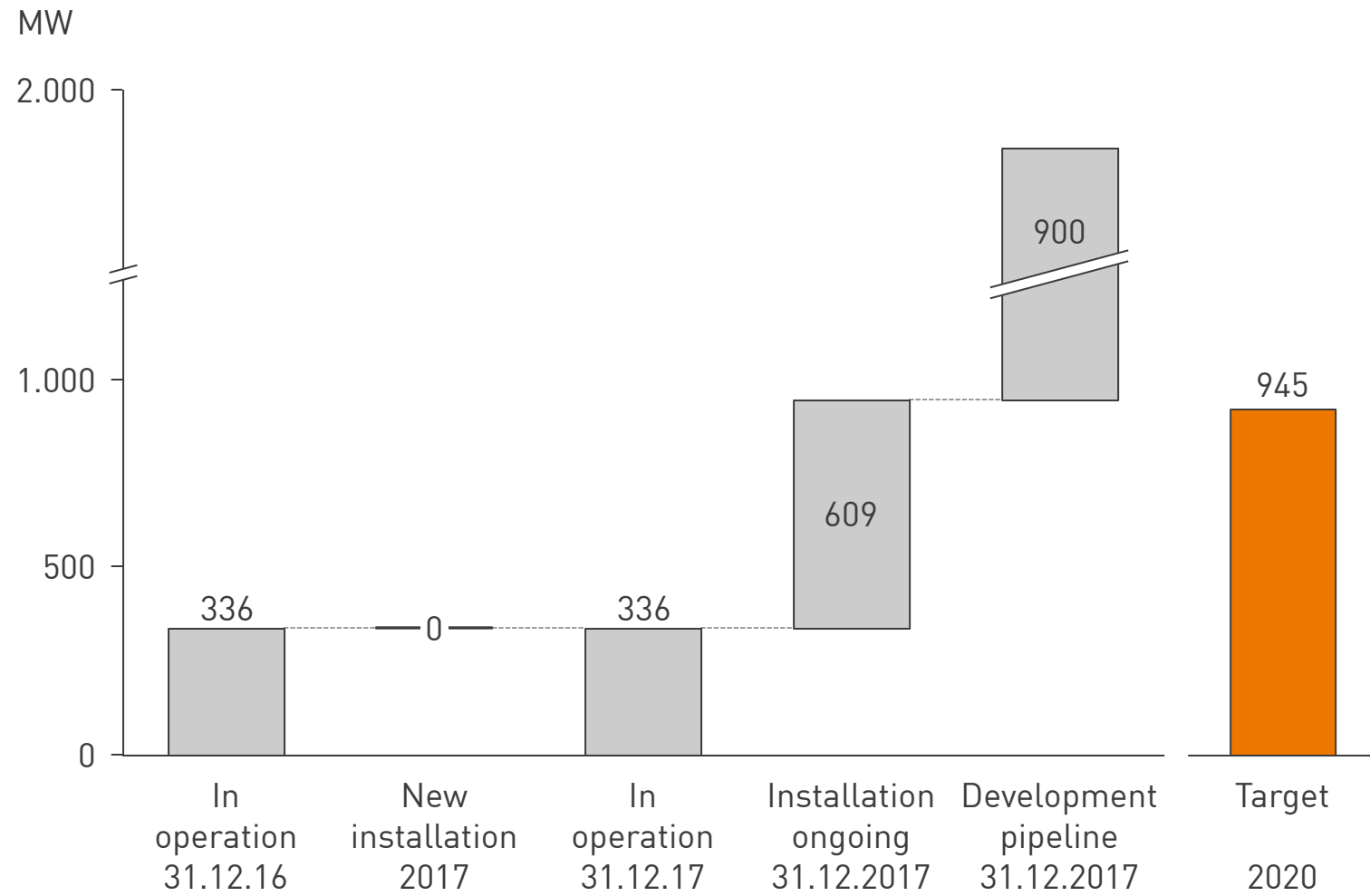
# EnBW onshore wind portfolio

Becoming a leading player in the German onshore wind market.



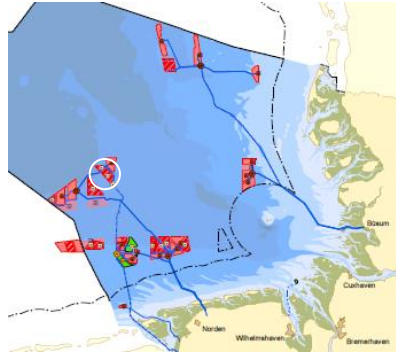
# EnBW offshore wind portfolio

An experienced offshore wind developer and operator with a highly attractive growth outlook.



# EnBW offshore wind portfolio

Offshore wind projects Hohe See (497 MW) and Albatros (112 MW) on their way – in time, quality and budget.



## Development

- Design ready and certified
- Partner on board ✓
- Final investment decision in 2017

## Fabrication

- Fabrication started for FOU, OSS and IAG
- Fabrication OTM to start shortly
- Fabrication WTG nacelle to start mid 2018

## Installation

- Installation 2018: scour protection; FOU, OSS and IAG (1. campaign)
- Installation 2019: WTG, OTM und IAG (2. campaign)
- Start of operation by end of 2019

## EnBW offshore wind portfolio

Offshore wind project He Dreiht (900 MW) - the first zero-subsidy project is taking shape.



### Auction for feed-in-tariff

- > Won the first German offshore wind auction in April 2017 with zero-subsidy-bid



### Permitting

- > Relevant application for permit documents ready and to be submitted in April 2018



### Tender process

- > Invitation to tender in preparation



### Final investment decision

- > Expected 2023

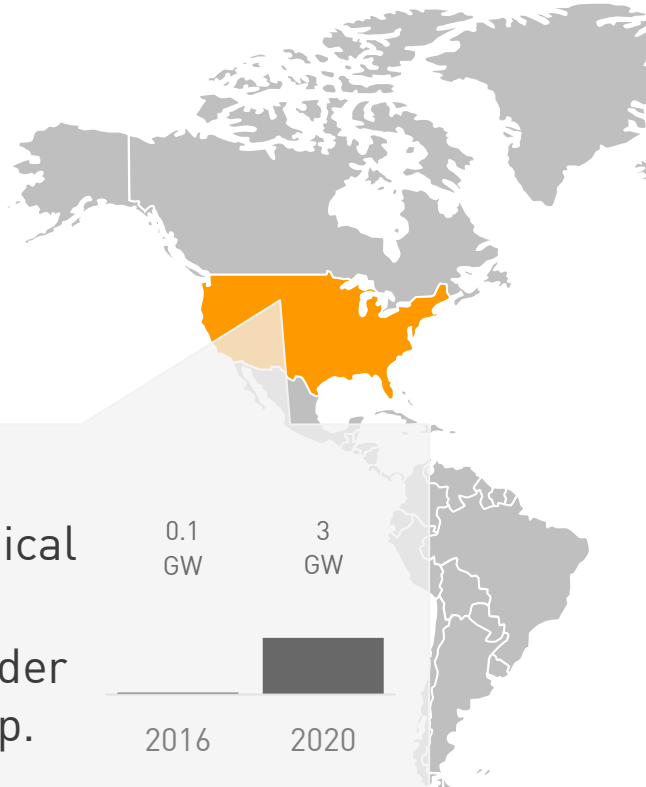
**He Dreiht – winner of the highly competitive first German tender with a bid of 0 €/MWh**

Current technological developments confirm the bid's underlying assumptions, e.g. offshore wind turbines with a capacity of 10+ MW announced by several manufacturers

# Offshore wind markets

Traditionally a European business - future growth prospects on a global scale.

- Established European markets
- Developing markets



## Europe

- Established supply chain
- Auction-based tender procedure
- Limited potential for future growth beyond existing projects under development



## USA

- Significant technical potential
- First projects under development (esp. East coast)



## Asia (esp. Taiwan)

- First projects under development in Taiwan
- Supply chain under development
- High-growth market with challenging conditions





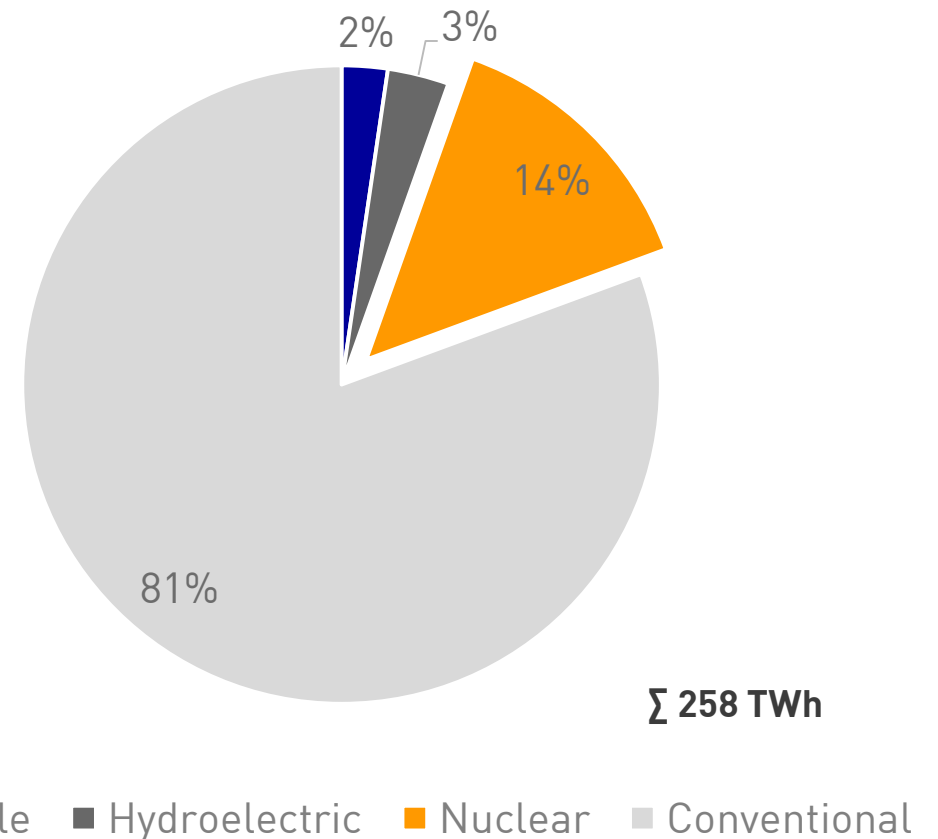
# Transition of the Taiwanese energy market

Market liberalization, nuclear phase-out and offshore wind development.

## Key topics in the transition of the Taiwanese energy market are well-known to EnBW:

- > **So far, monopolistic structure** of the energy market dominated by state-owned Taipower
- > **Liberalisation** of the energy market as a major objective of the government
- > **Nuclear phase-out** until 2025 resulting in a generation gap of 36 TWh per year
- > Deficit to be closed by **offshore wind**, solar energy and gas-fired generation capacity
- > Well-defined **political roadmap** and substantial subsidies for offshore wind

Electricity generation 2015



## Project location Taiwan

A highly developed market economy based on democracy and the rule of law.



### Taiwan - at a glance

- › Reliable business partner with a highly skilled workforce, good transport, communication and IT-infrastructure
- › Democratic political institutions which guarantee the rule of law
- › Investment- and innovation-friendly conditions:
  - Credit Rating: AA-
  - Ease of Doing Business: 11 out of 190 countries
  - Global Competitiveness Index: 14 out of 138 countries
  - Corruption Perceptions Index: 31 out of 176 countries
  - Corporate Tax Rate: 17%

A map of Asia with Taiwan highlighted in orange. The rest of the map is in light gray. The word "Taiwan" is written in bold black text next to the highlighted island.

**Taiwan**

# Taiwan's offshore wind program

Long-term growth expected fuelled by ambitious targets.

current phase

## First phase Demonstration projects

- > Six demo turbines in 2016, three demo wind farms by 2020
- > Government to provide subsidy for both equipment and development process

## Second phase Transition phase

- > 36 potential offshore wind farm sites defined, to be developed until 2025
- > Fixed feed-in tariff for 3 GW and auction-based subsidy scheme for 2.5 GW (projects 2021-25)
- > Next auction expected in April 2018

## Third phase Market integration (post 2025)

- > Full market integration expected based on an auction-based subsidy scheme
- > Long-term goal to develop a total capacity of up to 11 GW until 2030

## Offshore wind projects: Formosa 3 (approx. 2,000 MW)

Excellent wind conditions, large development sites and highly attractive feed-in tariff.



Formosa 3 – three project sites with a total capacity of **approx. 2,000 MW**

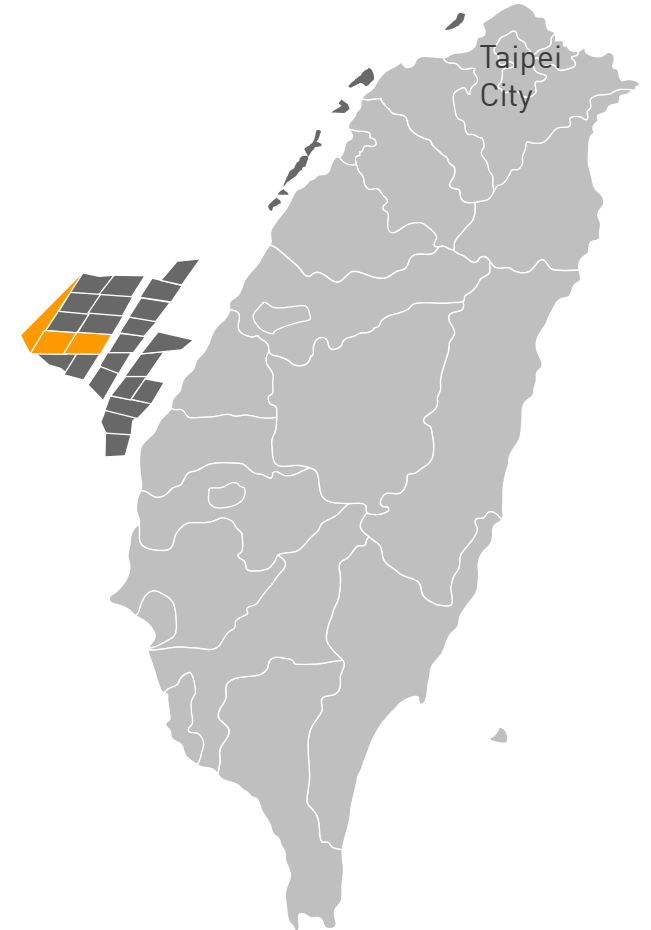
**Fixed 20-year PPA** (power purchase agreement) with a feed-in tariff higher than European benchmarks

**Advanced approval process** for environmental impact assessment

**Good wind energy potential** facing prevailing winds and **lower water depth**

**Technical solutions available** for challenging geotechnical conditions, earthquakes and typhoons

**Formosa 3 project sites**



Potential offshore wind farms Taiwan

## Project sponsors

A strong partnership with complementing capabilities creating synergies.



- › Strong financial capability of a global infrastructure investor
- › Experienced technical and development expertise
- › Financial management and analysis
- › Debt financing expertise in offshore wind
- › First hand offshore experience in Taiwan



- › European offshore wind development and operating experience
- › Technical resourcing and in-house expertise
- › Successful project bidding experience
- › Access to capital and funding capability
- › Leading European fully integrated utility



- › Strong industrial knowledge and local network
- › Leading the consent and permitting process
- › Leading local offshore development and integration expertise through a preceding project (Formosa 1)
- › Strong government and community relationships
- › Close ties with domestic banks

# EnBW's holistic, industrial approach

Key success factor – in-house competencies across all stages of a project.



## Project development

- › Headquarter for offshore wind energy in Hamburg
- › Best-in class competencies in relevant engineering disciplines
- › Comprehensive industrial network



## Operations and maintenance

- › Covering all regular aspects of maintenance services
- › Early involvement during design and construction ensuring that O&M requirements are met



## Other services

- › State-of-the-art remote control center
- › Operating offshore service harbors
- › Procurement team, in-house project management and finance team



## **Next steps offshore wind Taiwan**

- › Obtaining merger control clearance
- › Establishment of project development team with partners Macquarie and Swancor
  - › Near-term focus on securing grid connection capacity for the three projects
  - › Detailed project planning under way, invitation to tender in preparation
- › Start of local recruitment and training program

## **Outlook 2018**

- › Extending strong position in the German renewable markets with a clear focus on projects being "in time" and "in budget"
- › Further growth by expanding international activities
  - › Onshore: French and Scandinavian markets
  - › Offshore: Europe and North America