Energy transition and implications for EnBW ›

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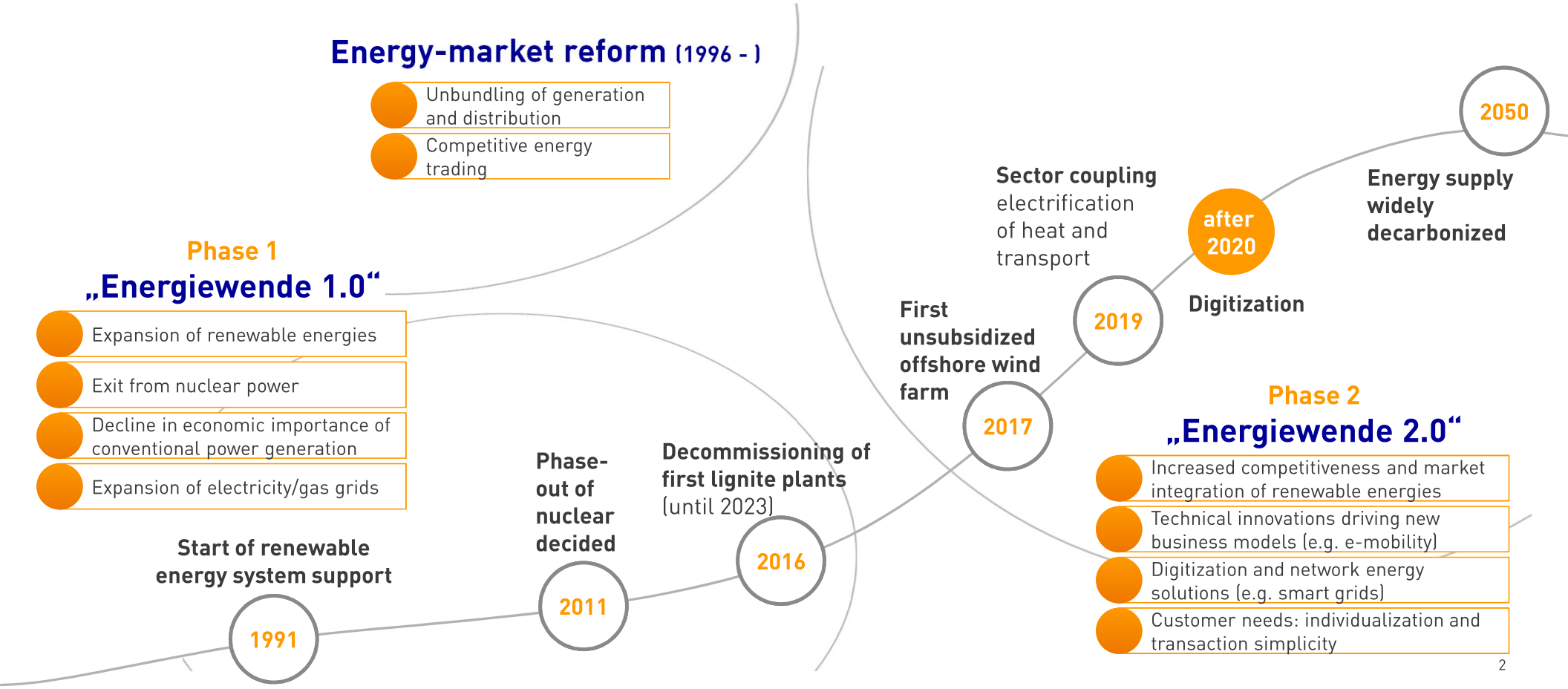
EnBW

Was has happened and is actually happening in the German Energy market: Energy-market reform and "Energiewende"



Vision of the German energy system with 80% CO_2 emission reduction in 2050: The "Energiewende" will cover all relevant sectors

Renewable energies

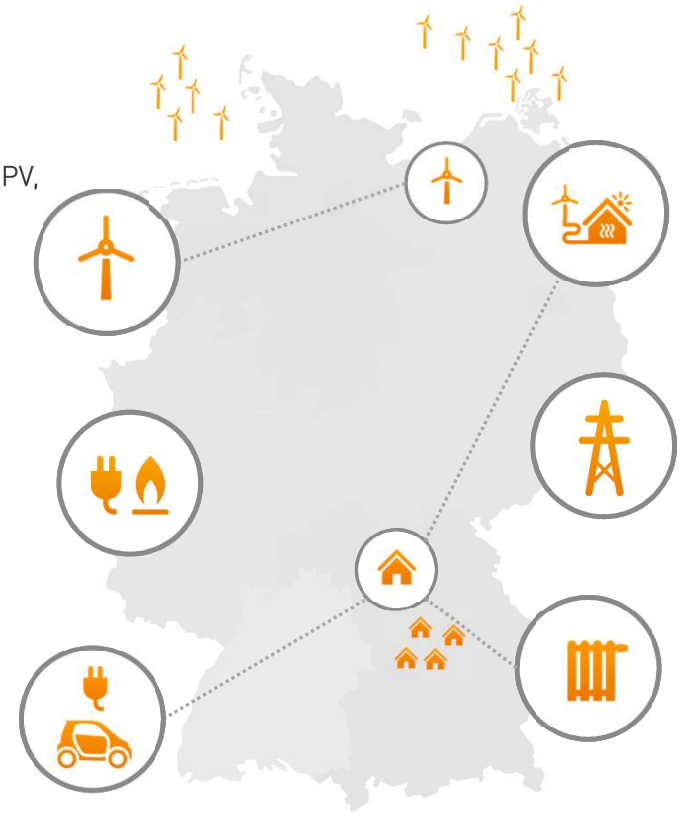
- ... will provide approx. **80% of electricity.**
- **Approx. 250 GW**, (140 GW wind, 100 GW solar-PV, constantly 6 GW hydro)
- Today: approx. 100 GW in total

Security of supply

- ... will be guaranteed by **gas power plants.**
- **60-80 GW** gas and combined cycle turbines (today: ~29 GW)
- Fueled by **natural** gas, rarely by synthetic gas

E-mobility

- ... will be the **standard for passenger cars.**
- **~28 m. E-vehicles**, partly autonomous (passenger and delivery vehicles).
- **Heavy duty/ long distance traffic** 1/3 electrified



Electricity consumption

- ... will further **increase** (today: ~500 TWh; 2050: >600 TWh).
- **Improved energy efficiency** will reduce consumption in existing segments to ~400 TWh (e.g. illumination)
- New consumption purposes (~200 TWh in 2050) with increasing significance, mostly because of **sector coupling (**heat, transport)

Grid

- ... will be **expanding** massively.
- After 2020: E-mobility will require additionally approx. 1 bn. EUR p.a. investment in **distribution grid**
- Until 2035: need for investments of 65-70 bn. EUR for **transmission grid**

Heat supply

- ... will be mainly **electric**
- **Up to 10 m. heat pumps** in private households
- **Heat demand will decrease** by 1/3
- ~20% market share for **natural gas**

Energy system change in Germany and challenges for EnBW

Energy system changes in Germany

Electricity market changes

Energiewende

- 5.5 million customers
- 13 GW generation portfolio
- 21,000 employees
- Revenue: € 22 bn
- Adj. EBITDA: € 2.1 bn
- Group net profit/loss: € 2.1 bn

Challenges for EnBW across whole value chain

Sales

e.g. new products & services:
- e-mobility
- Smart cities

Grids

- Fully unbundled
- Still 100% owned
- Regulated business

Renewable Energies

- Major future pillar
- Active in wind onshore, wind offshore, hydro and solar-PV

Generation & Trading

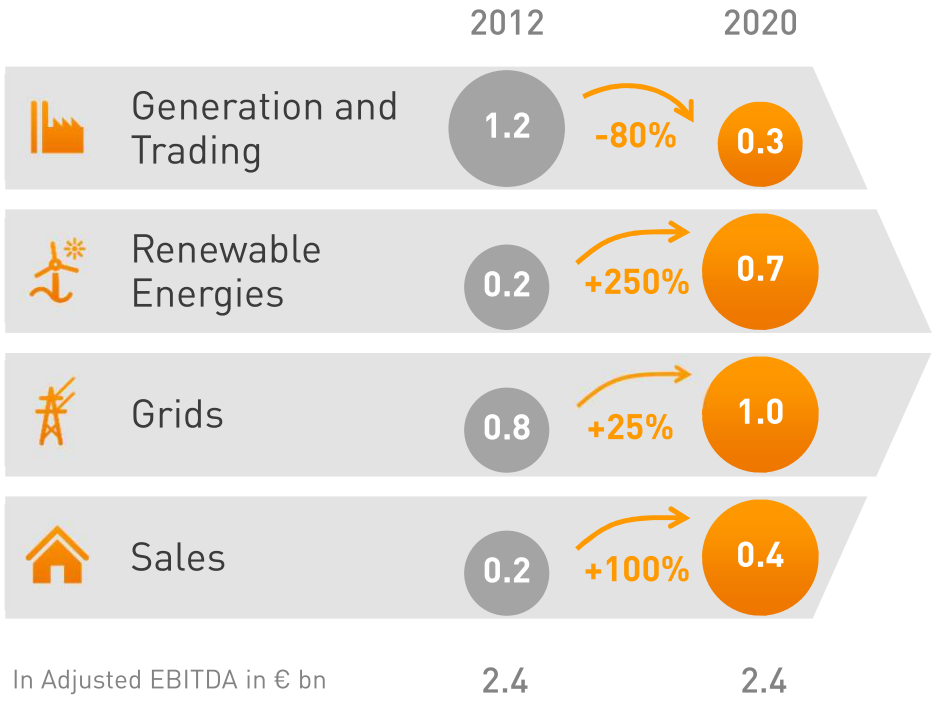
- Focus on cost efficiency
- Security of supply

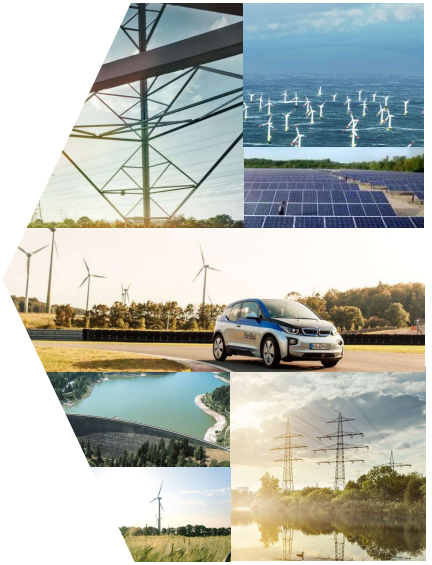
EnBW continues to rigorously implement its 2020 strategy with significant investments

Dr. Frank Mastiaux
CEO

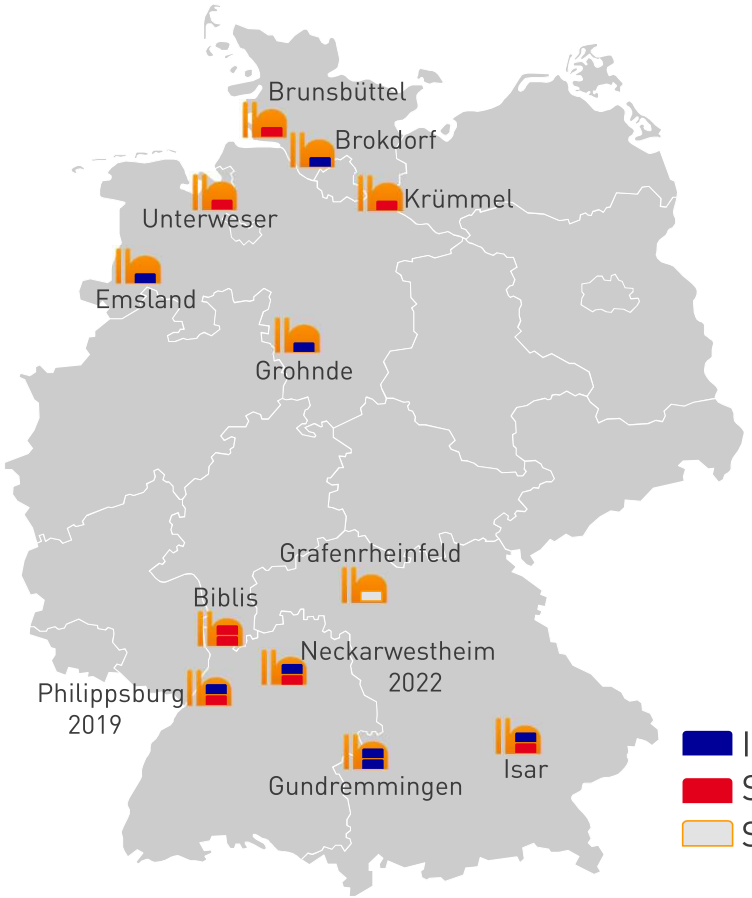
Energiewende. Safe. Hands on.

"EnBW's 2020 strategy is a clear commitment to the energy transition with no ifs or buts. We have the ambition to play a very active role in the development of tomorrow's energy landscape."





One part of the German “Energiewende”: Nuclear generation: phase-out after 2011



In 2011 8 nuclear power plants were decommissioned in Germany.

The duration of the 9 remaining power plants has been limited

Meanwhile, 1 more power plant has been shut down.

The last plant will be decommissioned by end of 2022.

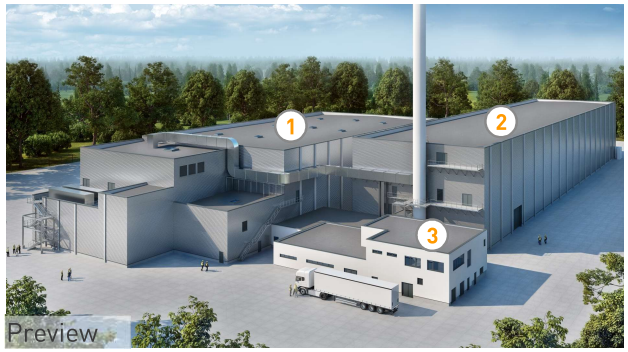
All of **EnBW's nuclear power plants** are formally involved in the decommissioning process

EnBW

Operational phase	Post-operational phase	Decommissioning and deconstruction phase	Conventional demolition

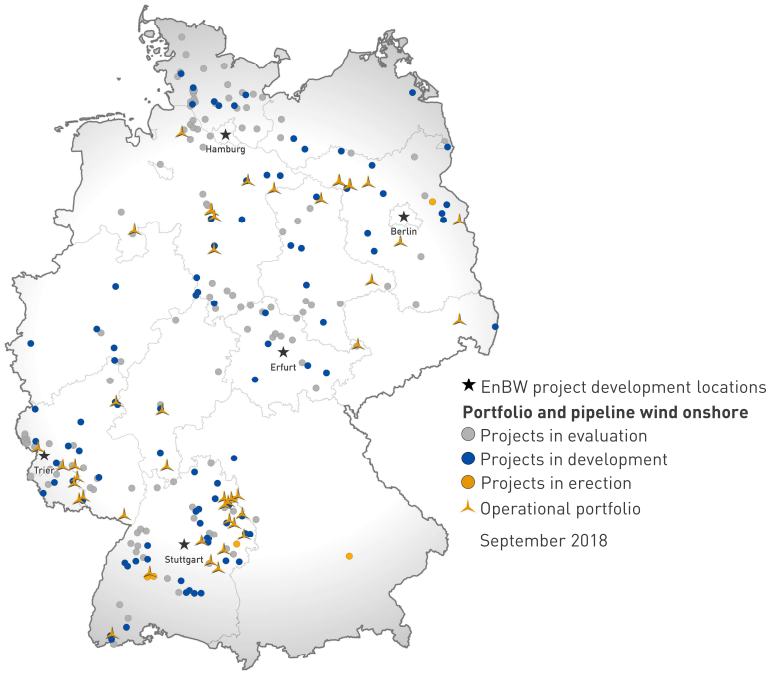
already applied for decommissioning permission

Dismantling infrastructure in Neckarwestheim and Philippsburg:



1. Waste material processing center
2. Local waste storage
3. Social and infrastructure building

Renewable Energy Focus of EnBW:
Onshore wind portfolio and project pipeline in Germany



Forecast End **2018**: approx **500 MW**

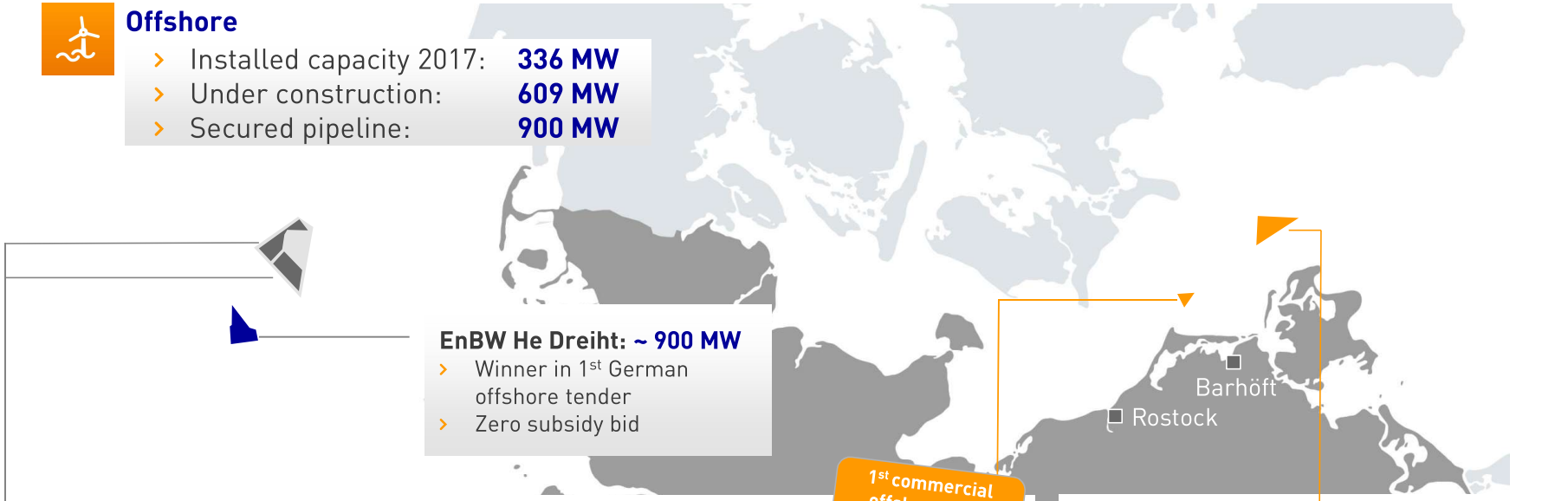
Target **2020**: approx **1000 MW**

Target **2025**: **> 2 GW**

Renewable Energy Focus of EnBW:
Offshore wind portfolio and project pipeline in Germany

Offshore

- Installed capacity 2017: **336 MW**
- Under construction: **609 MW**
- Secured pipeline: **900 MW**



EnBW He Dreiht: ~ 900 MW

- Winner in 1st German offshore tender
- Zero subsidy bid

EnBW Hohe See: 497 MW
EnBW Albatros: 112 MW

- 71+16 = 87 x Siemens SWT 7.0-154 on monopile foundations
- Commissioning planned for 2019
- Shareholders: ~50.1 % EnBW & ~49.9 % Enbridge Inc.

EnBW Baltic 1: 48,3 MW

- 21 x Siemens SWT 2.3-93
- Commissioned in 2011
- Shareholders: ~50.1 % EnBW & ~49.9 % 19 municipal utilities

EnBW Baltic 2: 288 MW

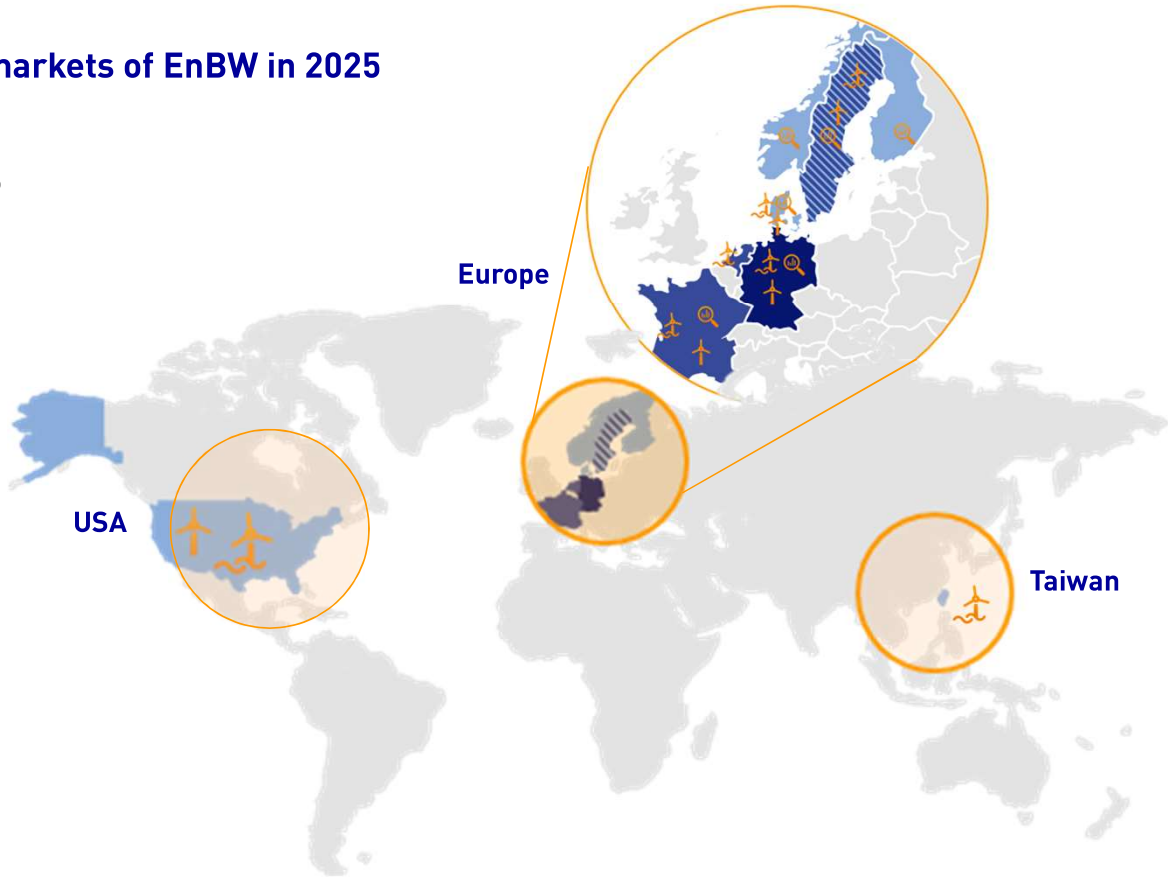
- 80 x Siemens SWT 3.6-120
- Commissioned in 2015
- Shareholders: ~50.1 % EnBW & ~49.9 % Macquarie, PGGM & ÄvWL

Under Construction Development stage In operation

International perspective wind:
EnBW will become a multinational specialist for wind power by 2025

Business segments and markets of EnBW in 2025

- Third party services
- EnBW offshore wind portfolio
- EnBW onshore wind portfolio
- Home market
- New developed markets
- Perspective markets



Way forward – 2025

- Establishment of **new local offices with local employment and network**
- Introduction of **local market, project & supply chain development**
- **Long-term presence** in perspective markets in **North America** and **Asia**

Business rationale

- **Development of new markets** in neighboring European countries and market entry into selective global markets to **consolidate EnBW´s confirmed growth path**
- Focus on **offshore wind project development in promising international markets**, such as **USA, Taiwan** and **?**

Thank you for your attention....

Do you have questions or are you interested in additional / deeper talks?

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