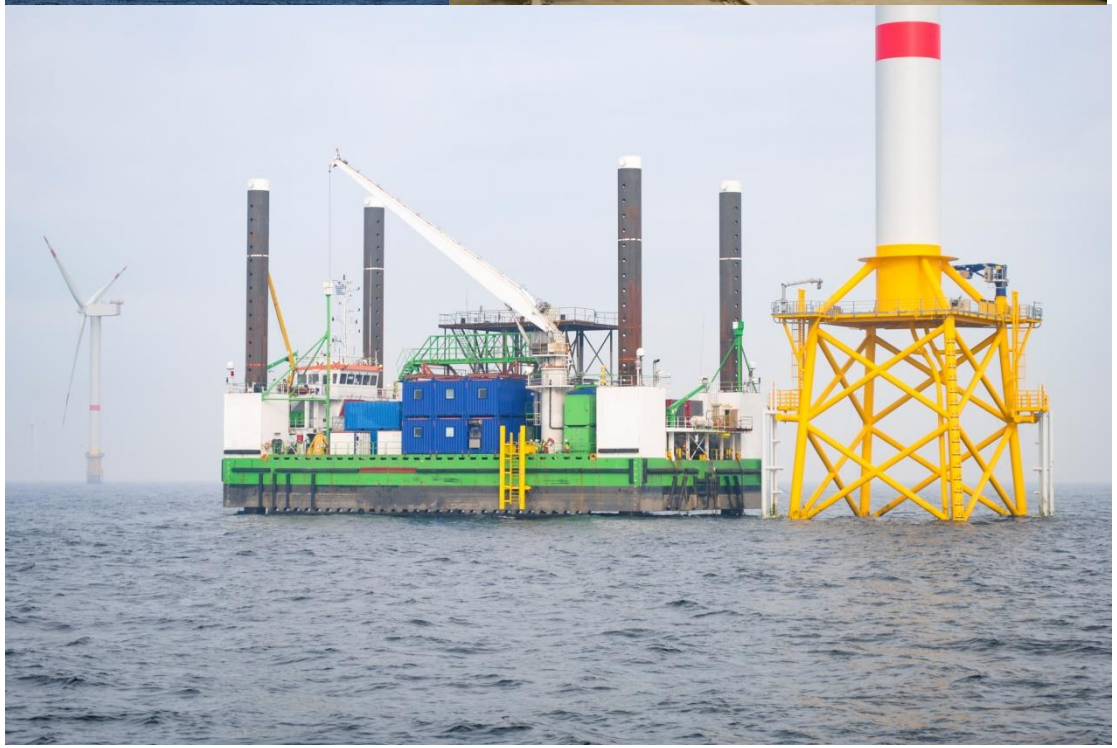


Offshore wind energy Poland – the next Baltic Sea market?

Mariusz Wójcik

Foundation for Sustainable Energy

Warsaw, 18 April 2018

Structure

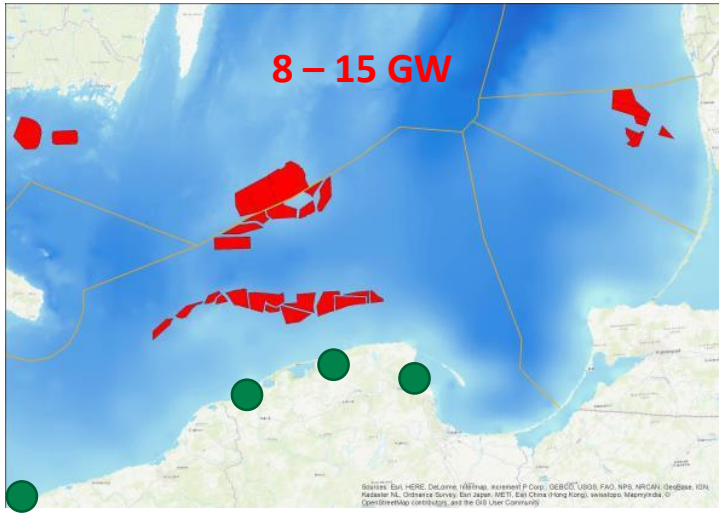
1. Offshore wind potential in the South Baltic
2. Why offshore wind is needed in Poland?
3. What is the potential of OWE in Poland?
4. Current status of projects
5. Key conditions for the development of offshore wind Poland
6. Supply chain for Polish OWE projects

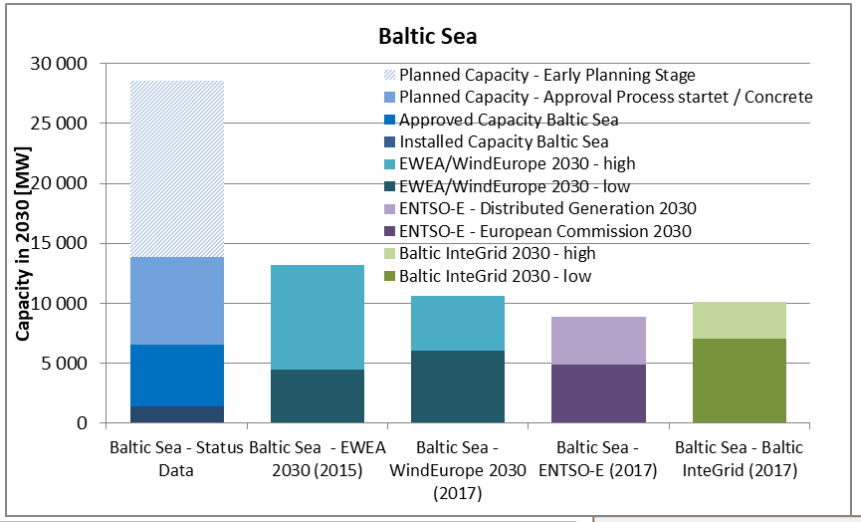
Offshore wind energy in Poland

Potential of offshore wind energy – South Baltic

Offshore wind energy

- 40 GW – energy potential of the Baltic Sea (10 GW until 2030)
- South Baltic – main area for offshore wind energy development in the Baltic
- Poland – one of the key markets until 2030
- After 2030 new market in Sweden and Baltic states will be unlocked,





Subsea cables

Inner array cables

2 000 – 3 750 km

Export cables

2 800 – 4 000 km

Turbines and foundations

700 – 1 400 items*

* 7-14 years of capacity usage

1 GW in OWF

200 th. tonnes of steel,

22,5 th. tonnes coal,

6-8 th. tonnes of copper

Vessels

cable laying: 4-6 vessels*

installation: 2-3 vessels*

O&M: 20-40 vessels*

* - solely for installation and servicing of 8-15 GW

Offshore stations

30 – 40 stations

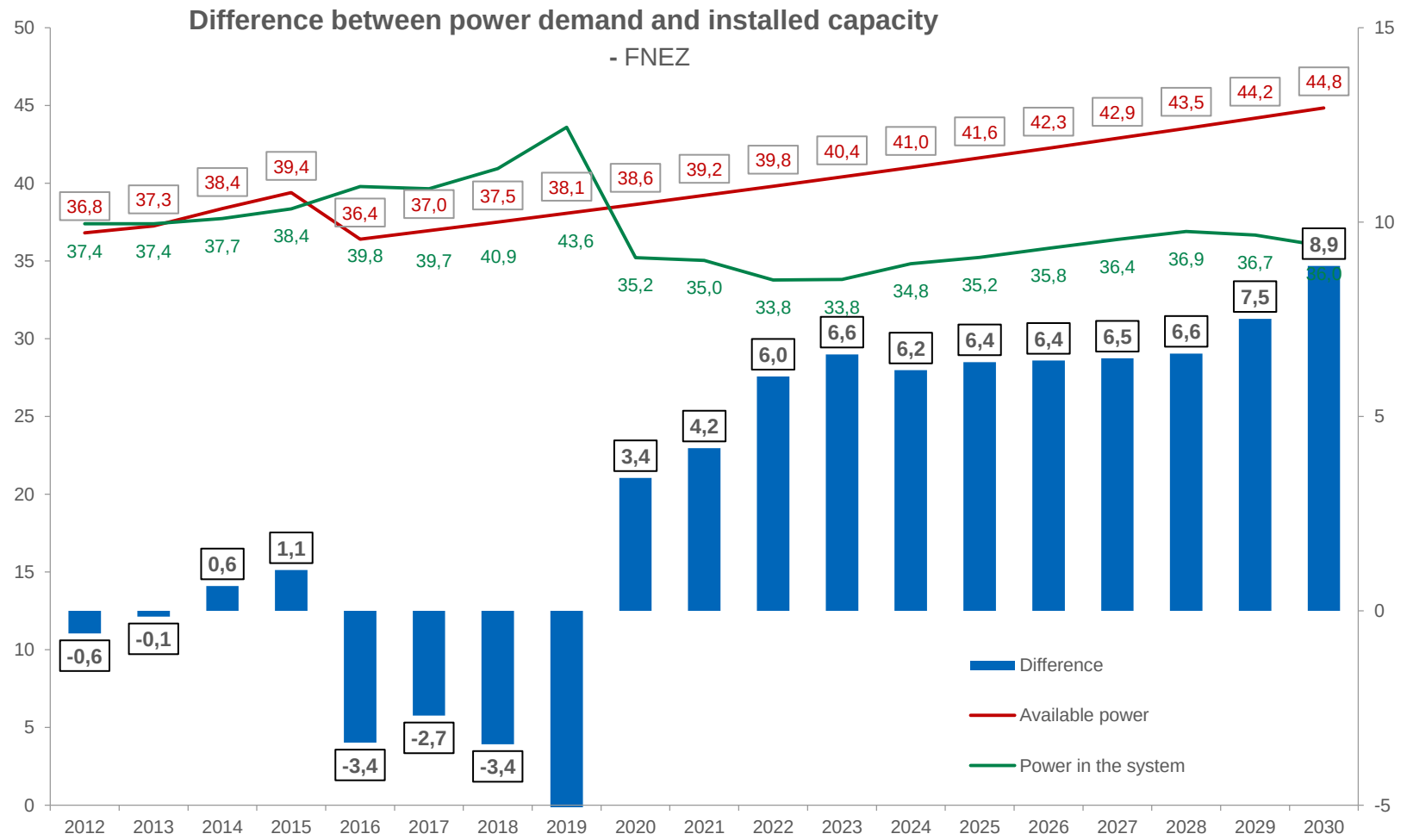
Offshore wind energy in Poland

Does Poland need new generation capacities?

Facts about NPS*

- **Actual demand** for peak capacity:
  - Summer peak **22,7 GW**
  - Winter peak **26,2 GW**
- **Forecast of growth of demand** for peak capacity in 2030 + 25%
  - Summer peak **32,7 GW**
  - Winter peak **30,1 GW**
- **5,6 GW** will be **phased out** until 2030, **13,9 GW JWCD** until 2035 (BAT modernisation scenario)
- **Forecast shortfall of overcapacity**, impossible to compensate by the operator can occur from 2023 (1 GW) and in **2035 may reach 13 GW**
- **Vital increase in installed capacity 6,5 GW by 2030 and 15,8 GW by 2035**

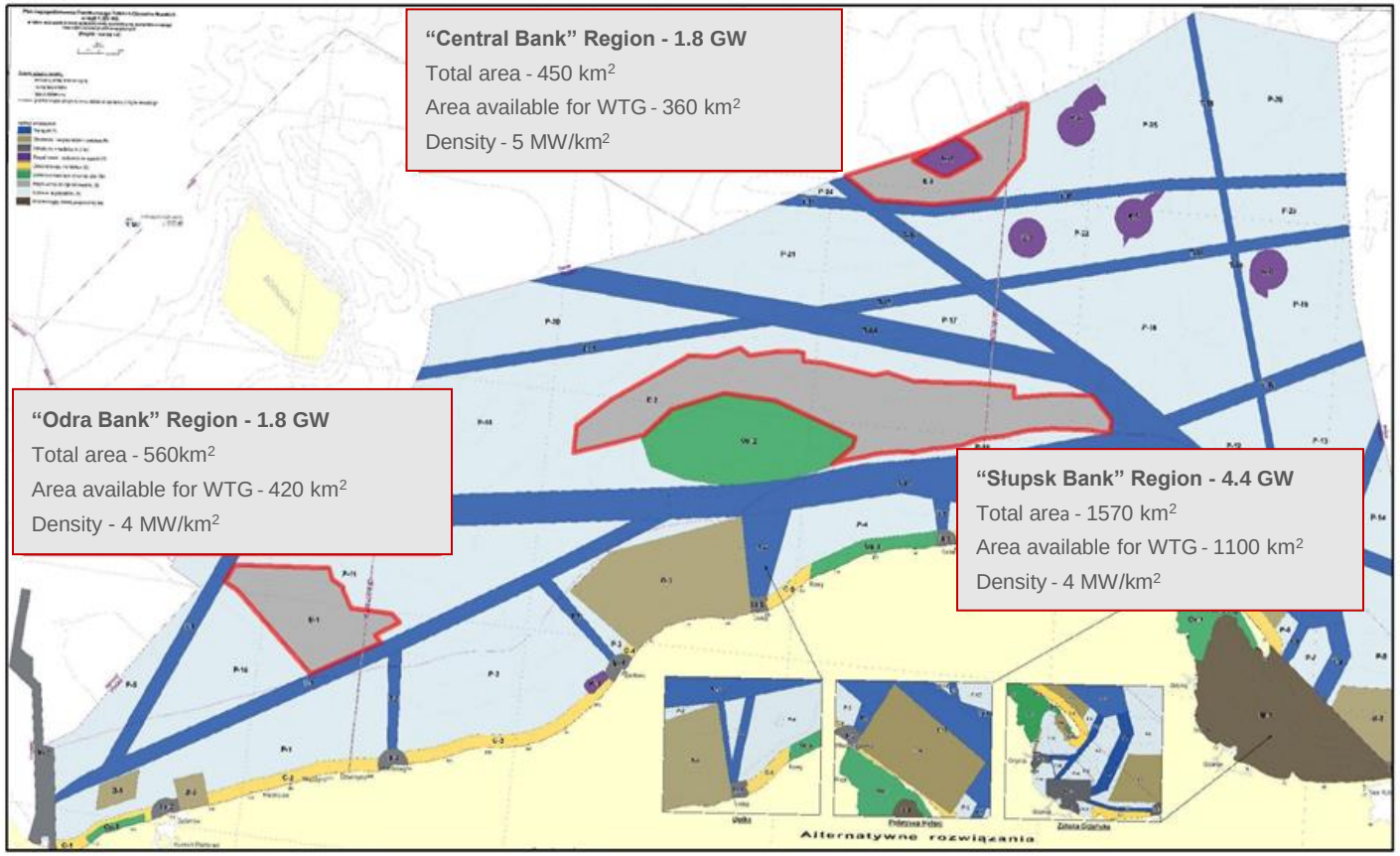
*based on „Prognosis of peak demand for power in 2016-2035. PSE Operator 2016



Offshore wind energy in Poland

OWE potential

Region of potential development of offshore wind energy on Polish maritime areas



Offshore wind energy in Poland

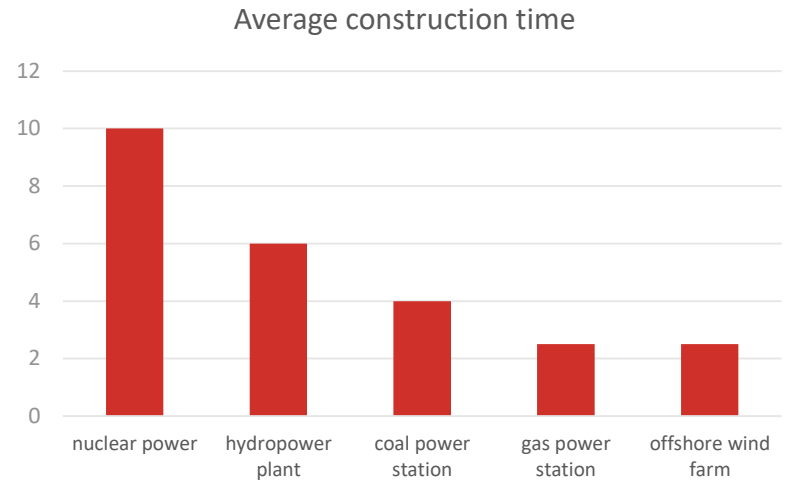
- **2,500 km2** – area dedicated for OWF development based on draft of spatial plan for maritime areas
- **2,000 km2** – real area for development EW
- **4 MW/km2** – forecasted density (conservative approach)
- **8 GW** – real market potential in the perspective of the year 2035

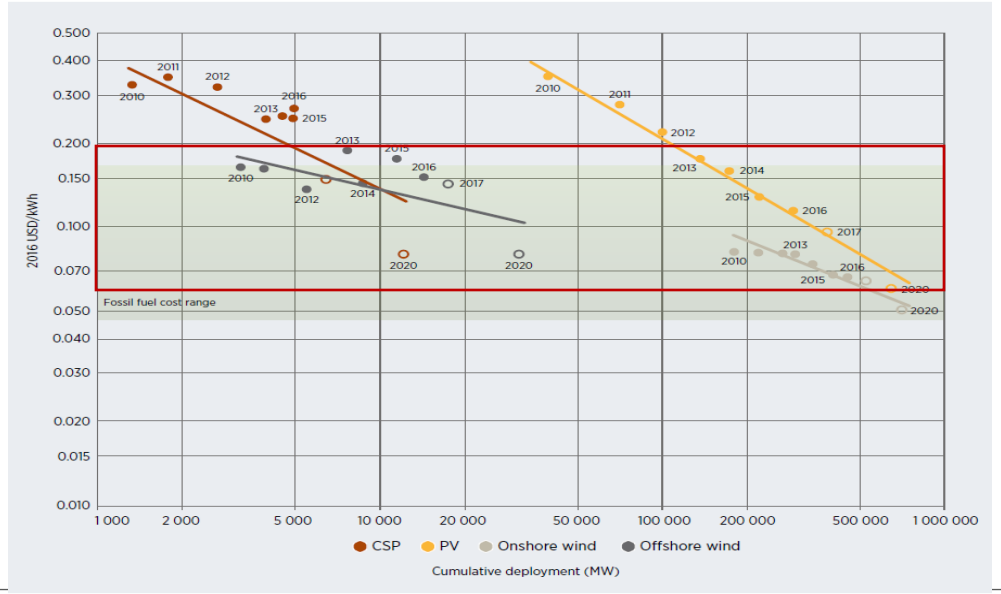
Offshore wind energy in Poland

Does Poland need new generation capacities? (2)

Preferred features

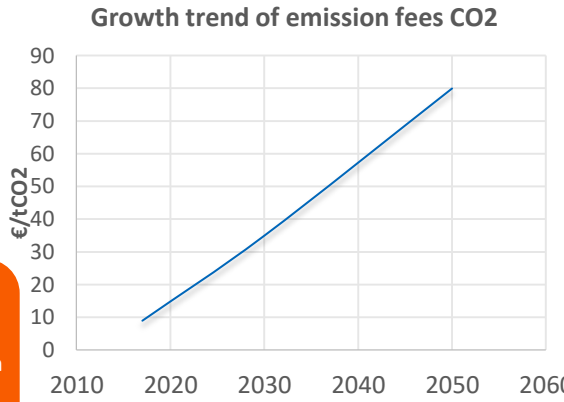
- They can be put into service in the years 2020 - 2030
- Ensure security of supply up to 2060
  - National sources
  - Inexhaustible or renewable sources
  - Sources with a diversified and reliable delivery
- Will be competitively priced
- They will allow to meet emissions reduction goals
- Will allow the fulfilment of the objectives on the use of RES
- Their use will positively affect the development of the national economy
- Their use will not cause significant social and environmental conflicts





EU Climate Policy

CO2 emission price growth



increasing cost of energy production from conventional sources

greater competitiveness and profitability of investments in non-emission sources

Offshore wind energy in Poland

Available area for offshore wind

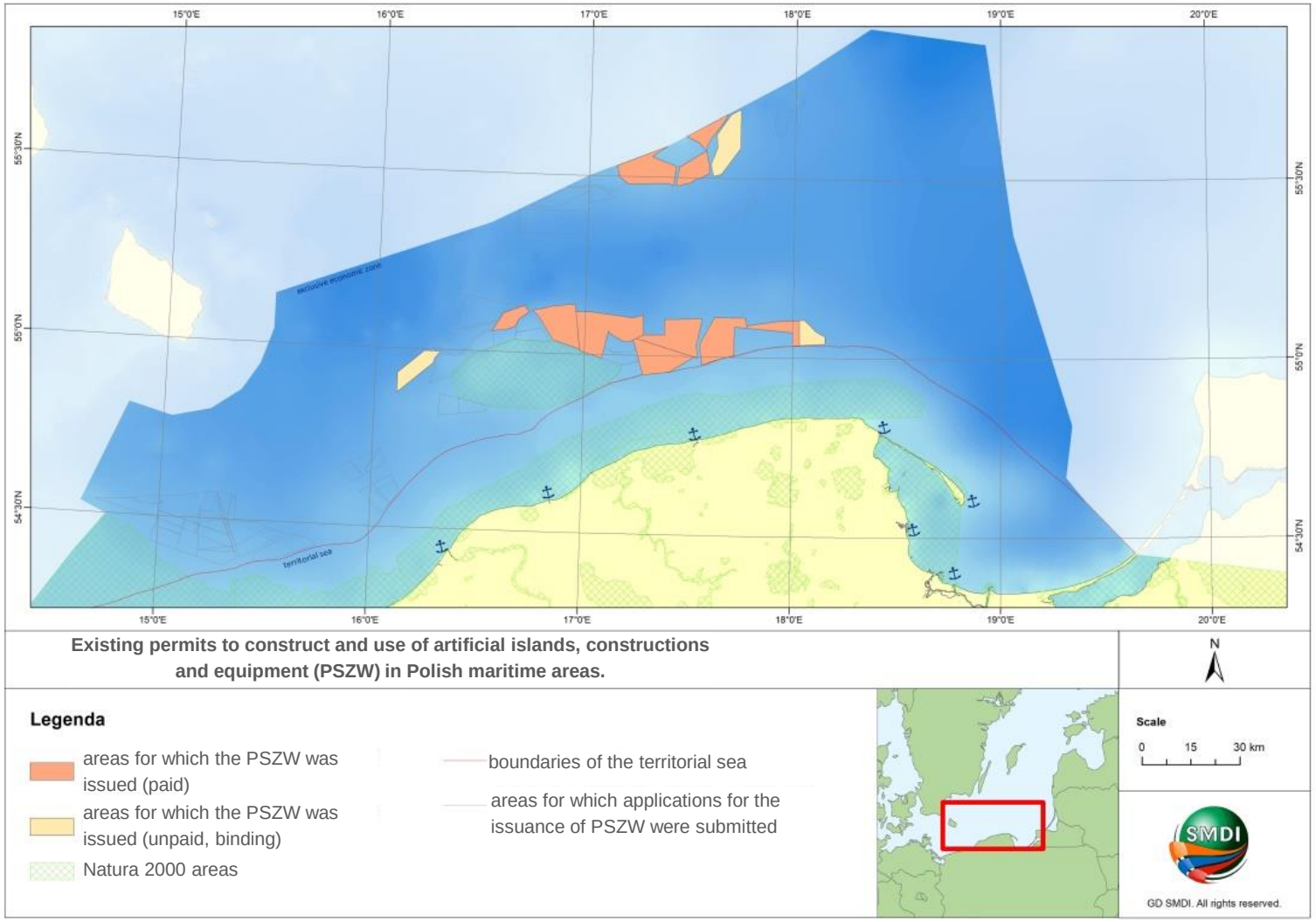
1. **Constraints related to maritime spatial planning:**
   - Construction free zones around navigational routes
   - Navigational routes among offshore wind farms
   - Spatial constraints due to protected winter birds and migratory birds
   - Other planned investments
2. **Other constraints:**
   - Inward buffer around issued permits free of constructions
   - Provisions in environmental decisions (migration corridors, temporary stoppting of wind turbines)
   - Geological conditions

Available area for OWE development

	Available area	Area including constraints
Slupsk Bank	1570 km2	1100 km2
Oder Bank	560 km2	450 km2
Middle Bank	450 km2	360 km2

Offshore wind energy in Poland

Project status

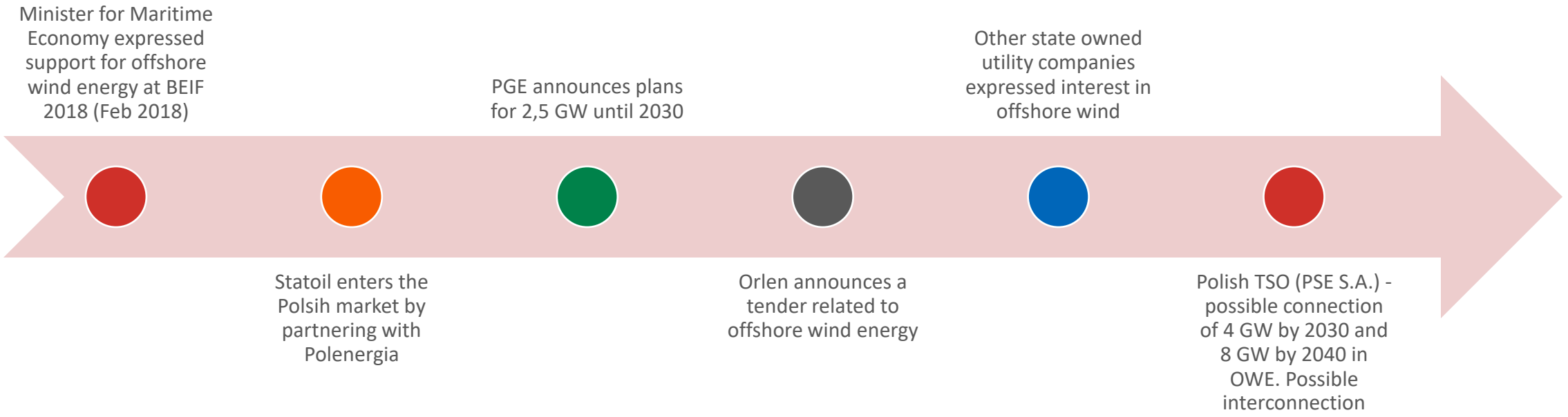


OWF Projects in Poland

- **I group** – projects which will have environmental decisions and connection agreements at the end of 2018 – 2,2 GW
- **II group** – projects which have legally valid PSZW, but which do not have connection conditions – 3,8 GW
- **III group** – projects boundaries can be defined in the areas designated in the plan for the development of maritime areas for development of offshore energy – 2 GW

Offshore wind energy in Poland

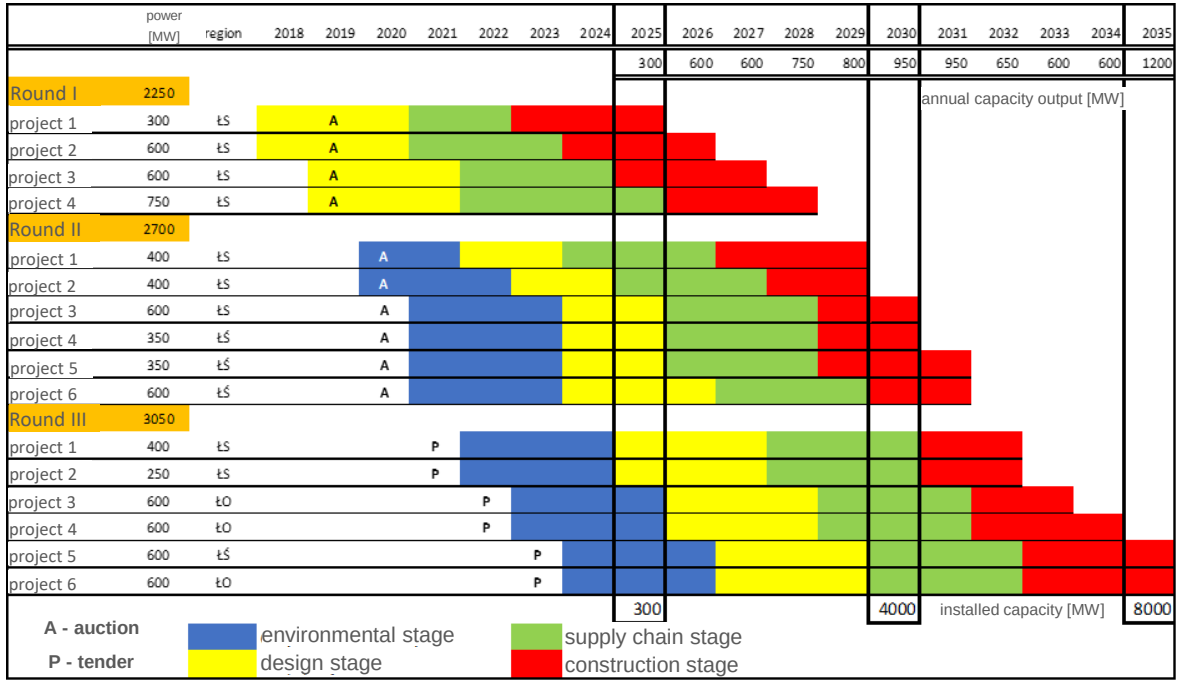
Current developments



Offshore wind energy in Poland

Key conditions for development of offshore wind in Poland

Scenario of sustainable development of OWF in Poland

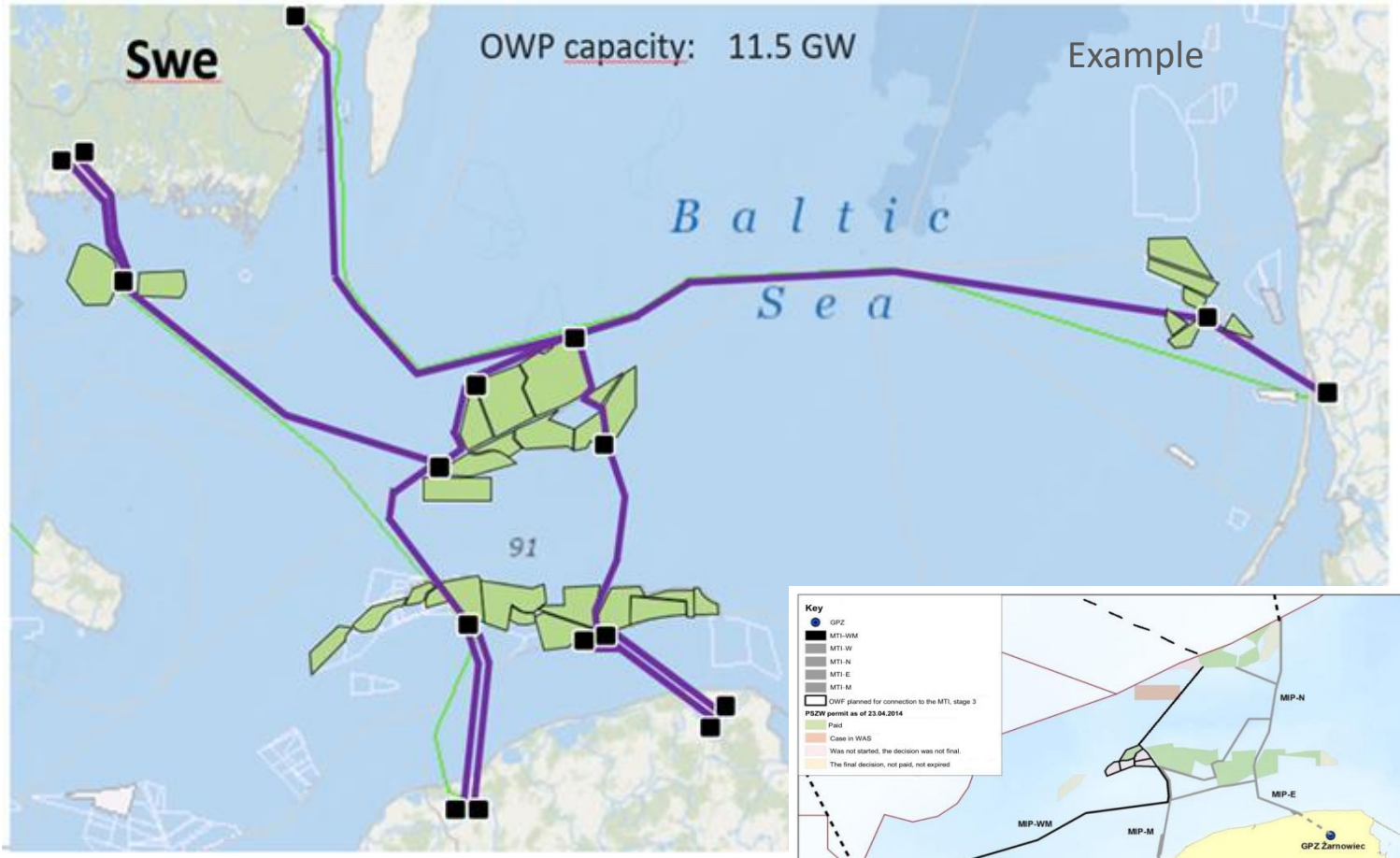


Key conditions for market development 8 GW:

1. Implementation of system mechanisms in 2018-2020 enabling:
   a. Determination of investment conditions for the first group of projects
   b. Issue of connection conditions for the second group of projects
   c. Determination of the boundaries of location and connection conditions for the third group of projects
2. Organization of two logistic and construction centers Gdańsk-Gdynia and Szczecin-Świnoujście
3. Construction of the offshore grid, including transboundary connections with connection points for the OWF
4. Planning and design construction of subsequent projects in such a way as to minimize the cumulative impact on the environment and other users of the sea areas
5. Starting system of training and educational programs enabling employment growth in the Polish offshore energy industry companies

Offshore wind energy in Poland

Offshore grid



Advantages of offshore grid:

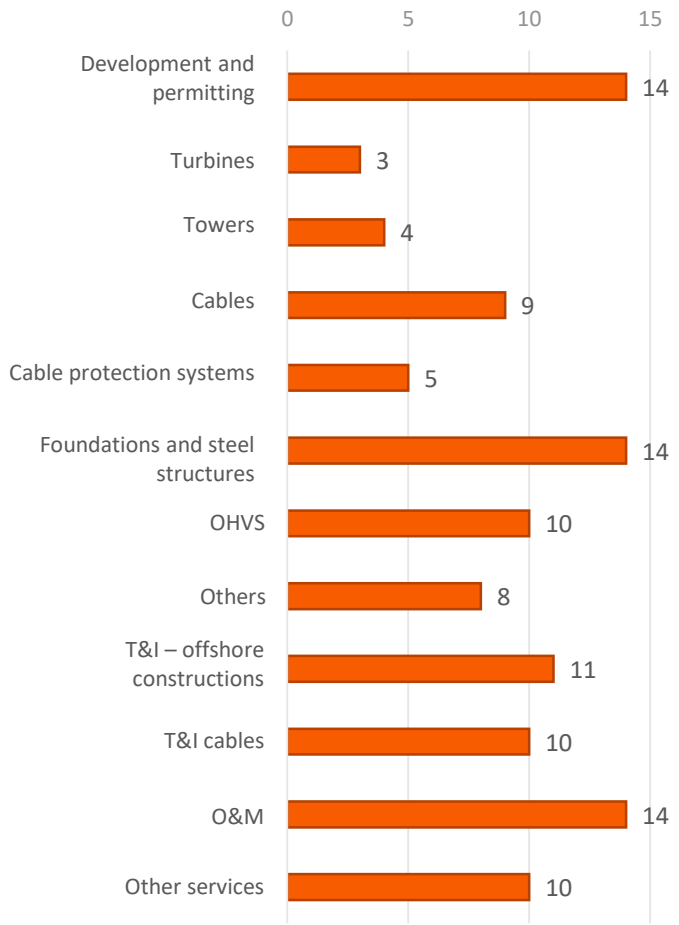
- Increasing safety of power supply:
  - in the case of calm weather, inter-system transmission,
  - alternative connection Słupsk Wierzbięcino – Żarnowiec (connection redundancy)
- reduction of project connection costs – common infrastructure
- limited space in maritime areas – grouping (clustering) projects means fewer cables and more efficient use of space
- fulfilment of EU requirements in terms of transboundary connections - planned increase of up to 15% of the system's capacity
- the potential for EU funding (only for transboundary connections)

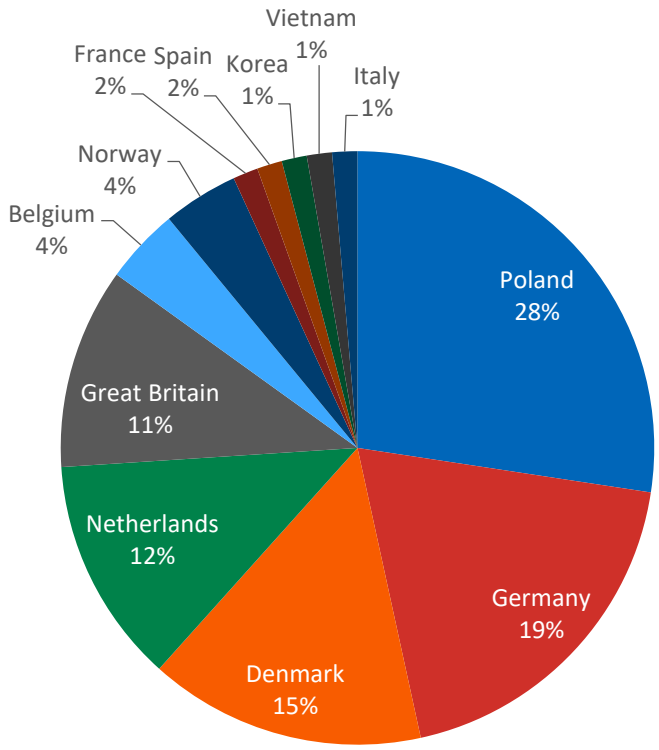
Offshore wind energy in Poland

Supply chain for offshore wind farms in Poland

Supply chain analysis

- High interest of international companies in the Polish market – high competition
- High share of companies located in Poland – potential local content





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