BUNDESAMT FÜR SEESCHIFFFAHRT UND HYDROGRAPHIE

Offshore Grid Development in Germany

Hamburg, 26 September 2017

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Federal Maritime and Hydrographic Agency

Content of Presentation

BUNDESAMT FÜR SEESCHIFFFAHRT UND HYDROGRAPHIE

I. Current status of offshore wind energy in the German North and Baltic Sea

II. Spatial planning for offshore wind energy
- Background: Maritime Spatial Plan
- Spatial Offshore Grid Plan for the North and Baltic Sea

III. Site Development Plan (FEP)

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Main Driver: Renewables Policy

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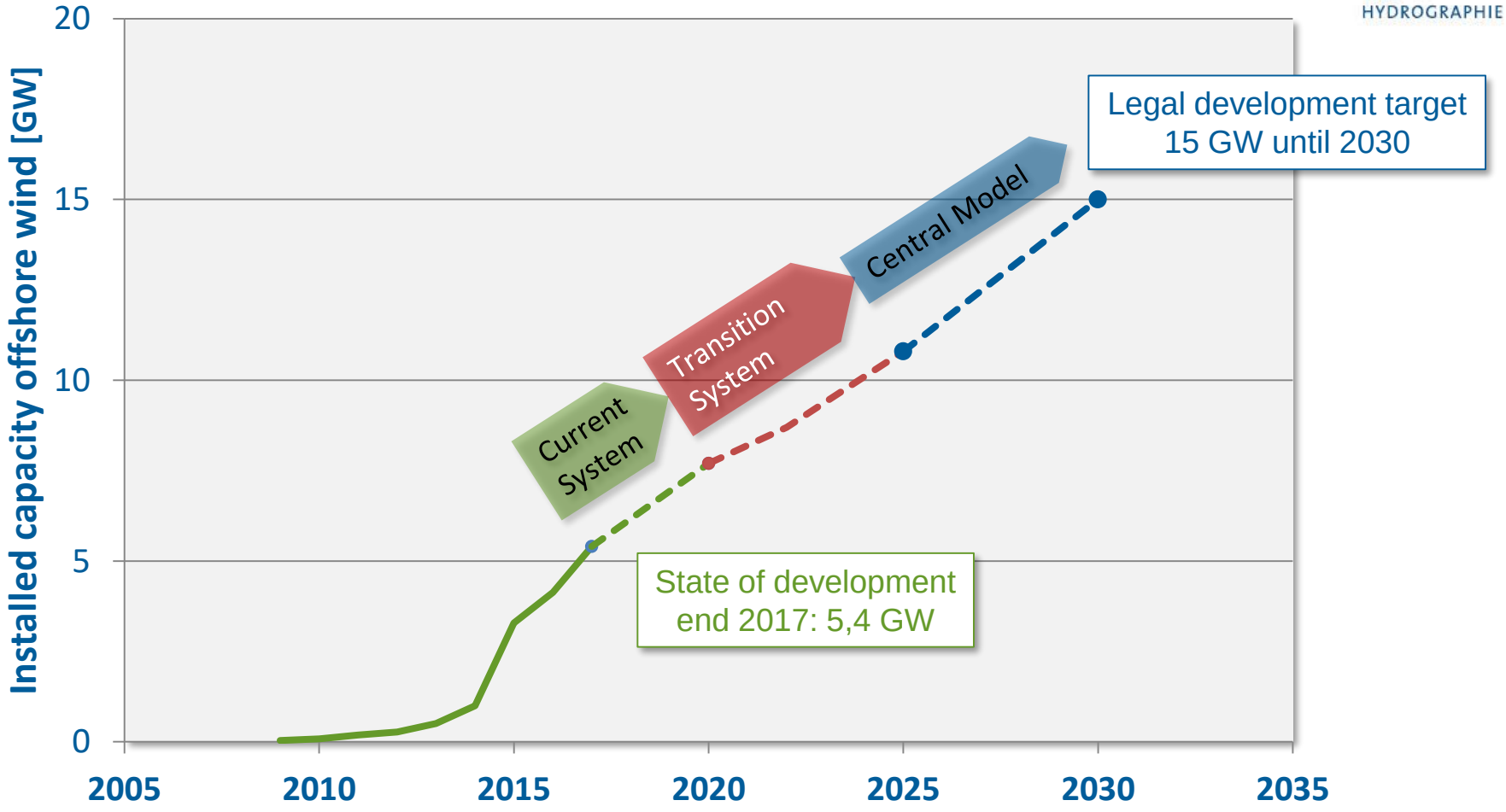
- **2002 – Government Strategy Paper on Offshore Wind Energy**
  25 GW offshore wind energy by 2030
- **2010 – Energy Strategy Paper**
  confirmed 25 GW target
- **2014 – New Renewable Energy Act**
  reduced target of 15 GW by 2030
- **2016 – New Renewable Energy Act (EEG 2017) + Offshore Wind Energy Act (WindSeeG)**
  confirmed 15 GW target + introduction of competitive determination of funding via auction model

Development of Offshore Wind Energy



Development of Offshore Wind Energy
North Sea EEZ: State of offshore wind energy 2018

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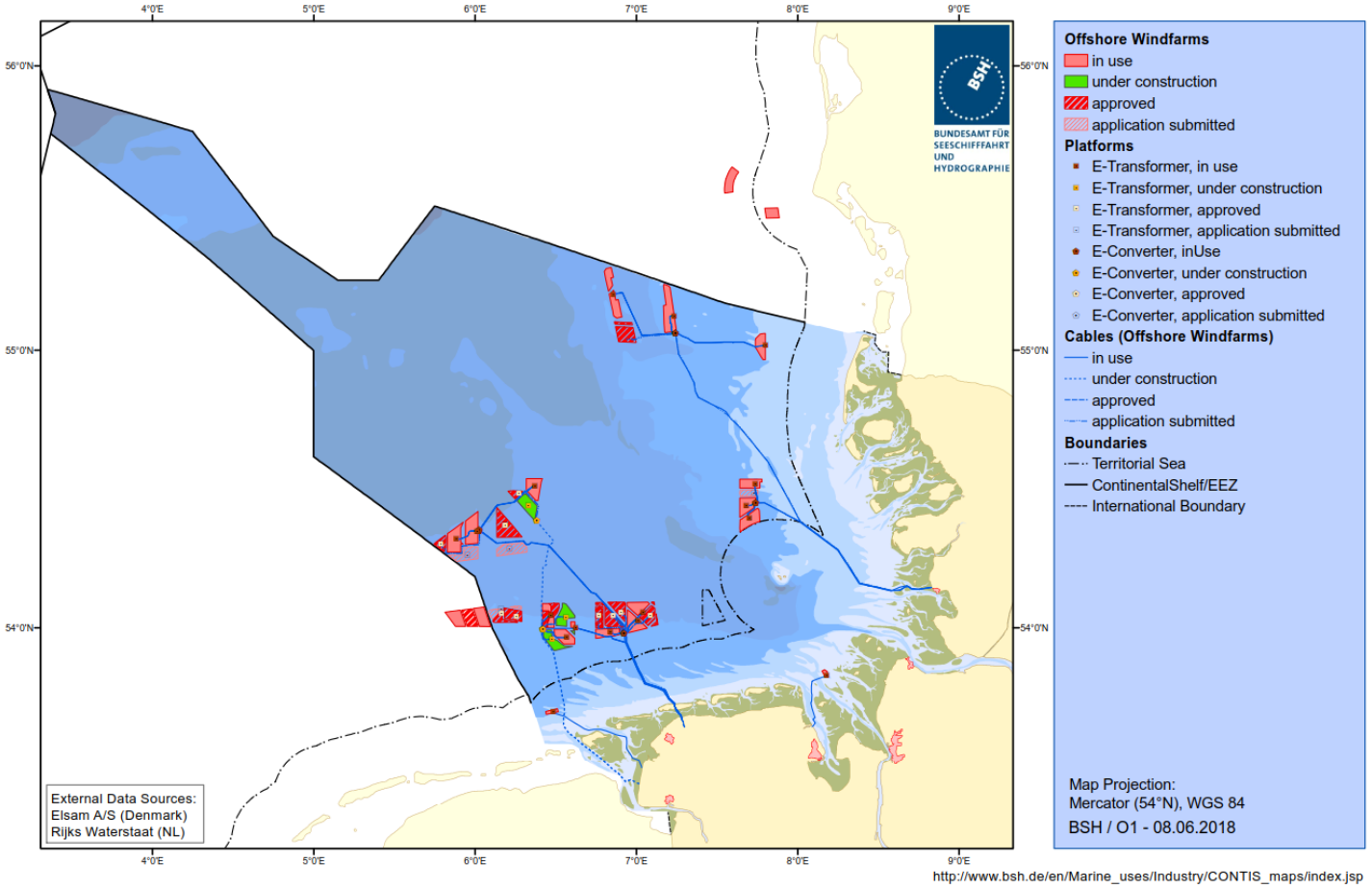
North Sea: Offshore Windfarms



http://www.bsh.de/en/Marine_uses/Industry/CONTIS_maps/index.jsp

Status offshore wind farms 2018:

- 5 projects under construction
- 15 projects operational
- 948 turbines with ca. 4.423 MW operating
- 7 DC converter platforms built
- 218,7 MW operating in coastal areas

Development of Offshore Wind Energy
Baltic Sea EEZ: State of offshore wind energy 2018

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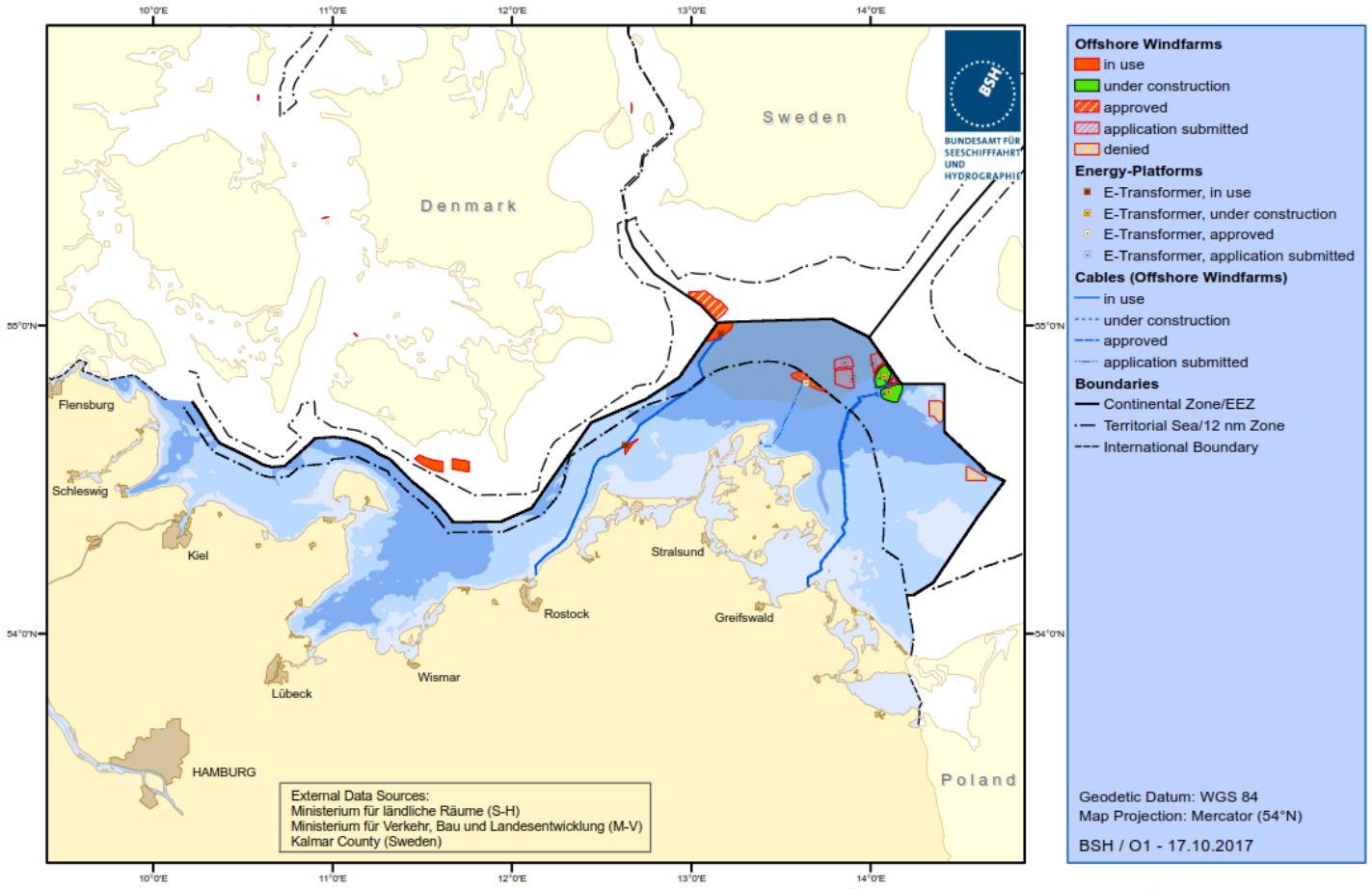
Baltic Sea: Offshore Windfarms



http://www.bsh.de/en/Marine_uses/Industry/CONTIS_maps/index.jsp

Status offshore wind farms 2018:

- 1 project under construction
- 2 projects operational
- 150 turbines with ca. 638 MW operating
- 48,3 MW operating in coastal area

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Maritime Spatial Plan

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- priority areas for shipping, pipelines and offshore wind energy (i.e. must be kept free from obstacles)
- reservation areas (i.e. shipping has special weight in balancing process)
- no wind turbines in Natura 2000 areas
- targets and planning principles
- clarity for investors and stakeholders

Spatial Offshore Grid Plan

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Background

- Numerous applications for offshore wind parks covering large parts of the German Exclusive Economic Zone (EEZ)
- New role for BSH given by Renewable Energy Act (EEG) in 2011:
- Development and update every second year of a Spatial Offshore Grid Plan
  - for the German EEZ of North and Baltic Sea
  - in consultation with the Federal Network Agency, the coastal states and the Federal Agency for Nature Conservation

Aim

Ensuring coordinated and consistent spatial planning of grid infrastructure - especially for offshore wind farms.

Legal Requirements

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Spatial Offshore Grid Plan must contain

- Offshore wind farms in spatial context and suitable for collective grid connections (“clusters”)
- Corridors for grid connections of offshore wind farms
- Gates for cables crossing the border between EEZ and the territorial sea
- Sites for converter platforms or transformer substations
- Corridors for interconnectors
- Corridors for possible cross-connections
- Standardized technical rules and planning principles

→ Strictly spatial plan, chronological order was set by the TSOs within the Offshore Grid Development plan.

North Sea: Spatial Offshore Grid Plan – Technical Concept

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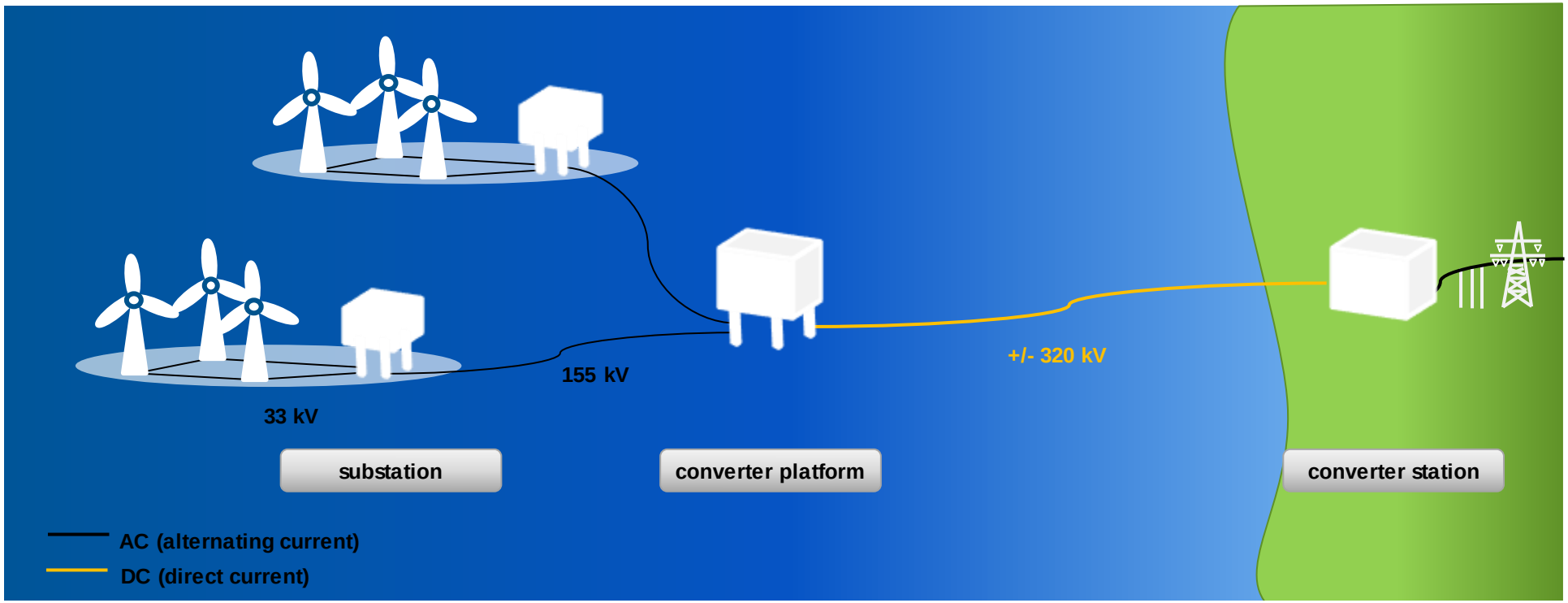

North Sea: Spatial Offshore Grid Plan – Technical Concept

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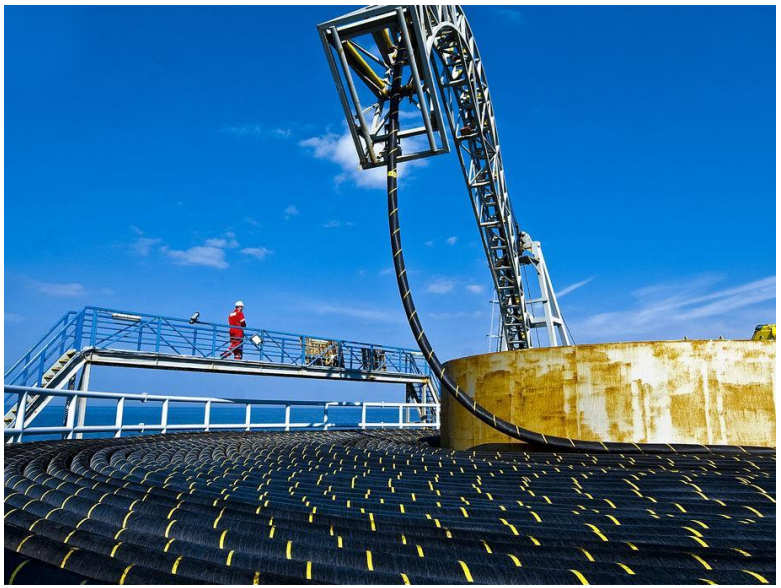

Source: TenneT

North Sea – EEZ:
Spatial Offshore Grid Plan 2016/2017

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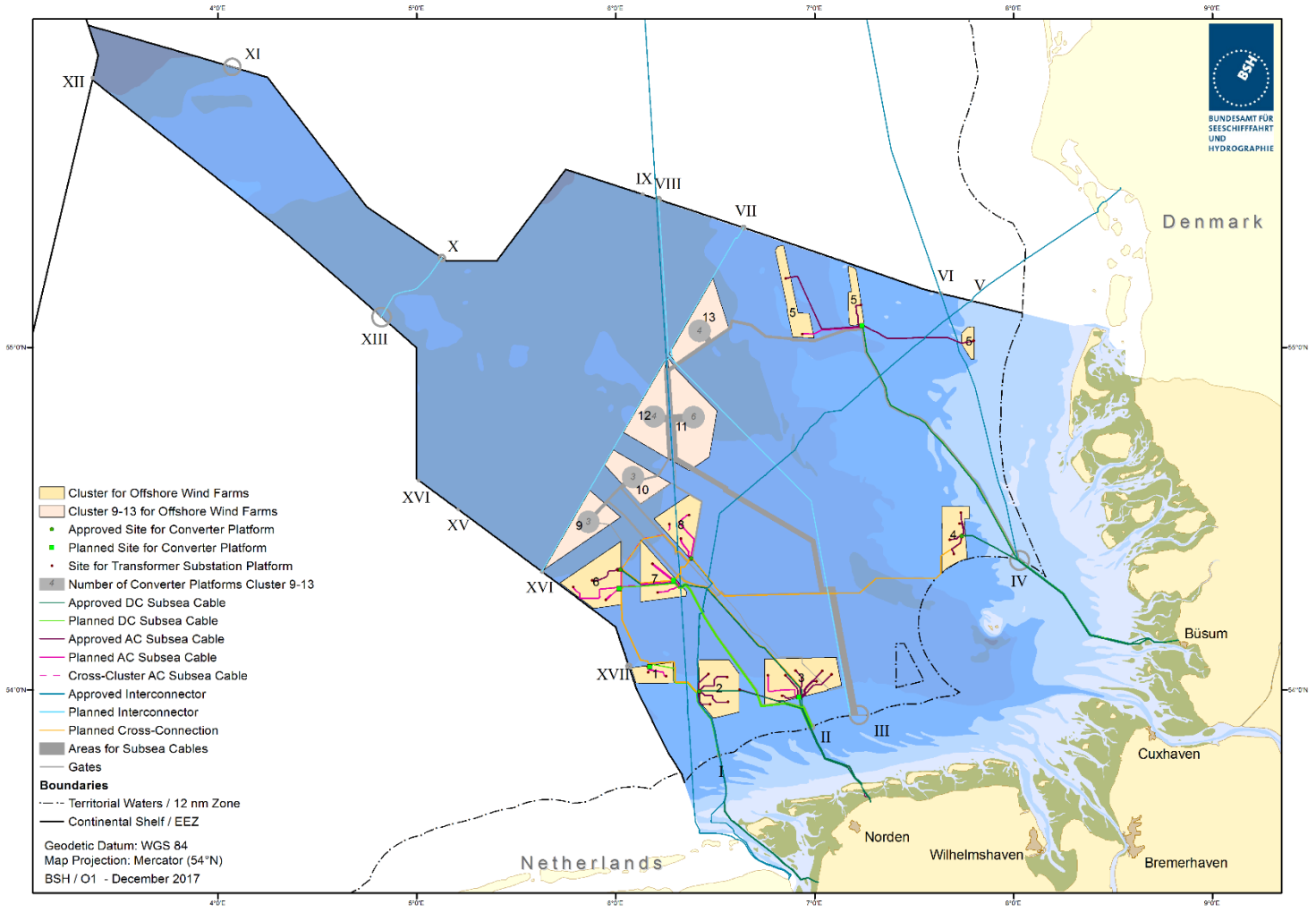

Baltic Sea: Spatial Offshore Grid Plan – Technical Concept

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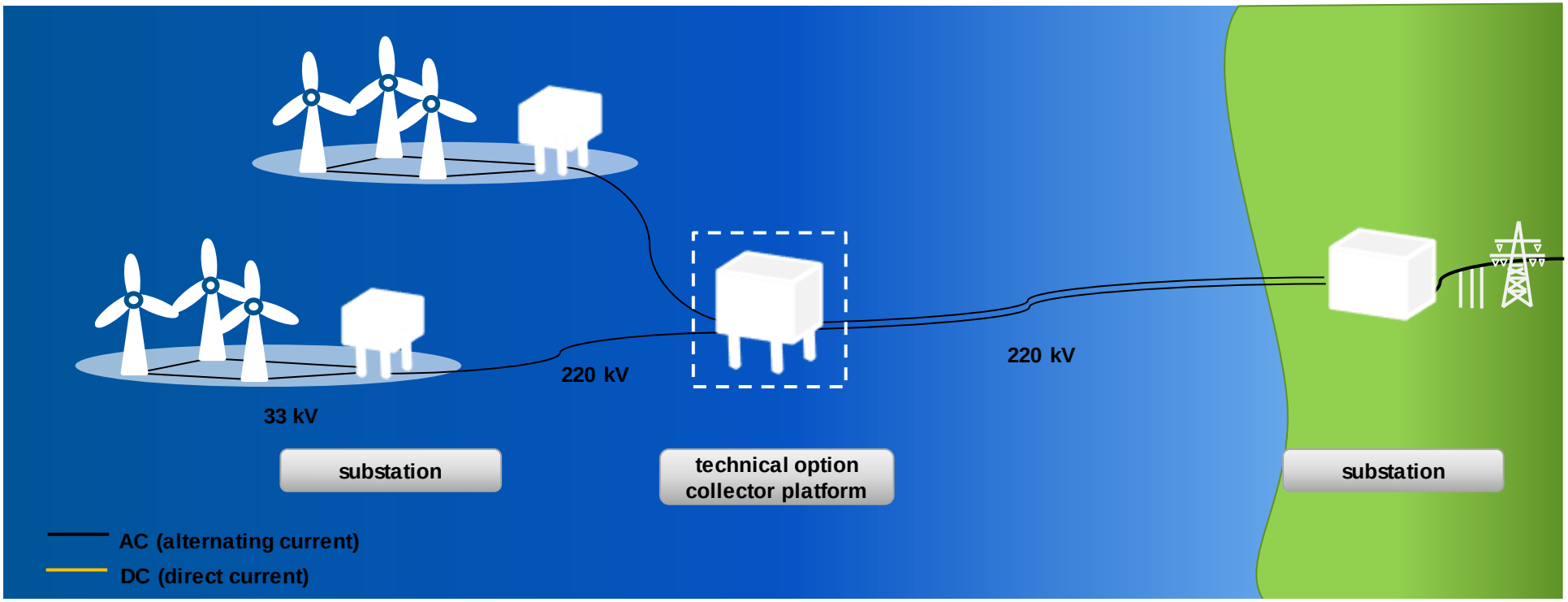

Baltic Sea – EEZ:
Spatial Offshore Grid Plan 2016/2017

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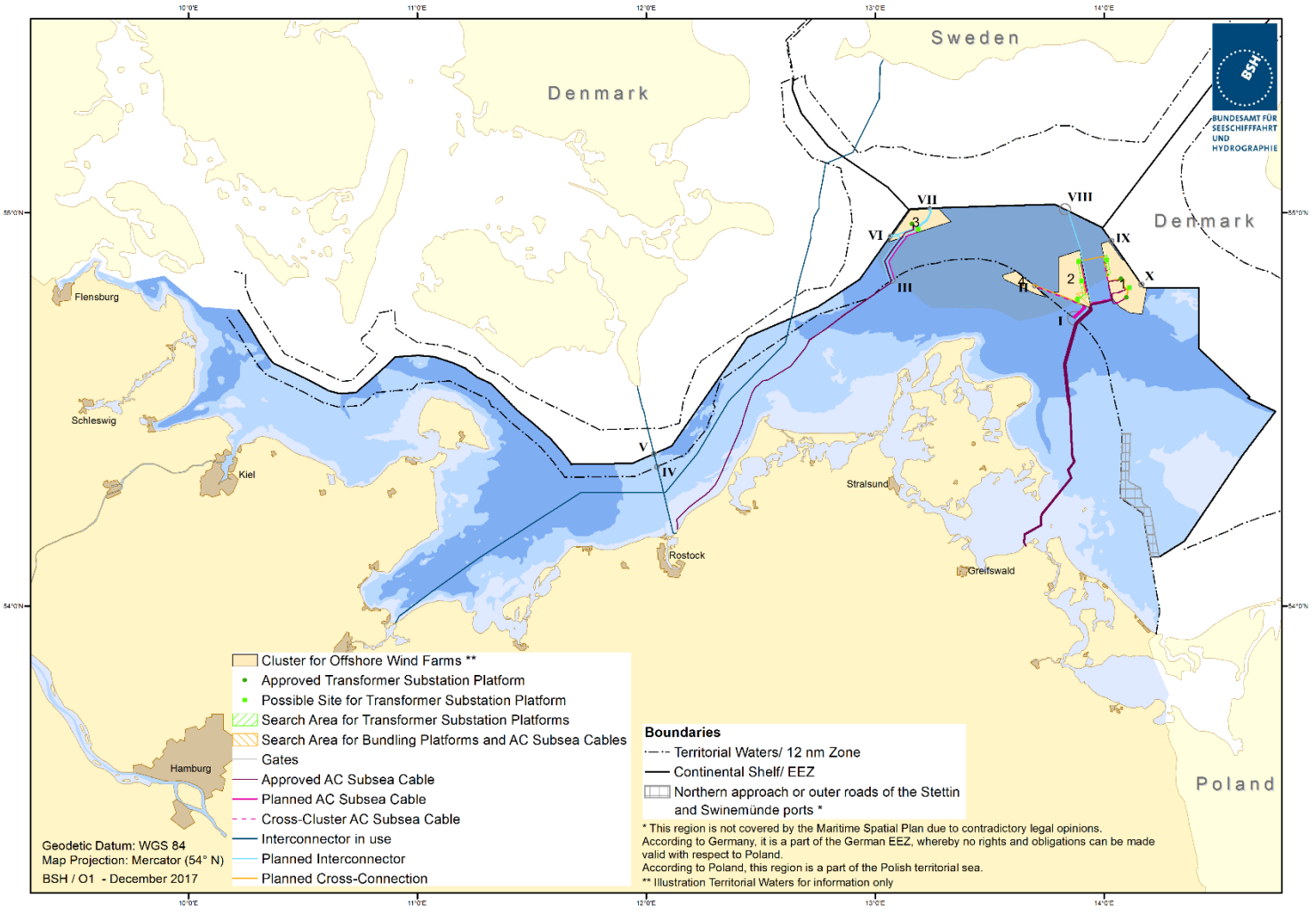

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Fundamental Change in Legal Framework

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- Amendment of Renewable Energy Act (EEG 2017)

- The objective remains: 15 GW offshore wind energy in 2030

- Amendment of the Energy Industry Act (EnWG) and introduction of the Offshore Wind Energy Act (WindSeeG)
  - → „competitive“ determination of funding via „auction model“
  - → Fixed yearly installations of 700 MW – 900 MW

Relevant provisions of the EnWG/WindSeeG for the Spatial Offshore Grid Plan

- No update of the Spatial Offshore Grid Plan as of 31 December 2017
- As of 2018 the Spatial Offshore Grid Plan will be replaced by the Site Development Plan (FEP)
  - ➢ Publication of first Site Development Plan by 30 June 2019 at the latest

Offshore Wind Energy – Central System

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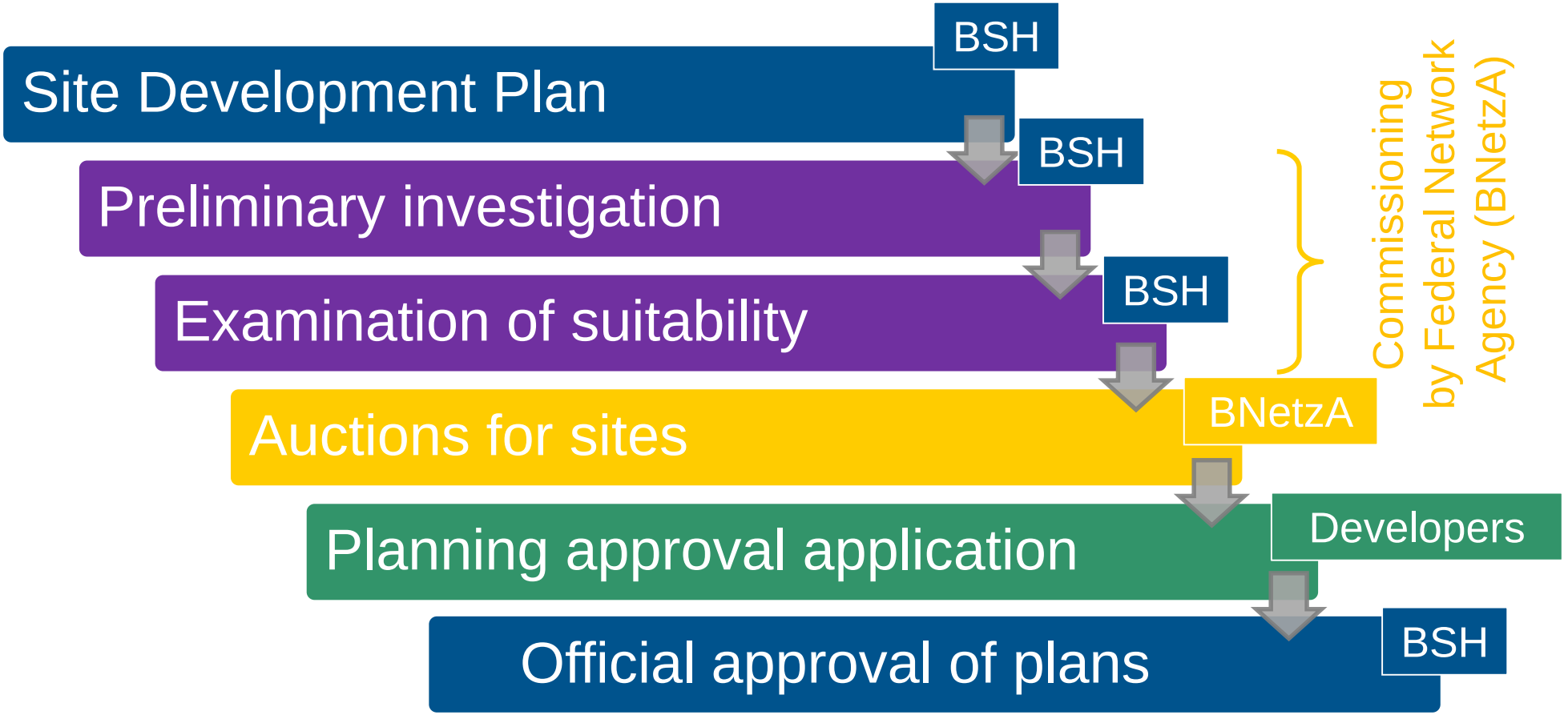

Definitions of the Site Development Plan

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- Areas („Cluster“) for offshore wind energy installations at sea
- new • Sites („wind farm“) in the areas
- new • Time sequence in which the sites are to be auctioned by the Federal Network Agency
- new • Calendar years in which the offshore wind energy installations awarded funding
- new • Calendar years in which the corresponding offshore connection lines are to be commissioned
- new • Likely amount of capacity of offshore wind energy installations to be installed (ø 840 MW)
- Sites of converter platforms, collector platforms and, as far as possible, substations
- Routes or route corridors for offshore connection lines
- Gates for cables crossing the border between EEZ and the territorial sea
- Corridors for interconnectors
- Corridors for possible cross-connections
- Standardized technology and planning principles
- new • Available grid connection capacities for pilot offshore wind energy installations

Site Development Plan (FEP)

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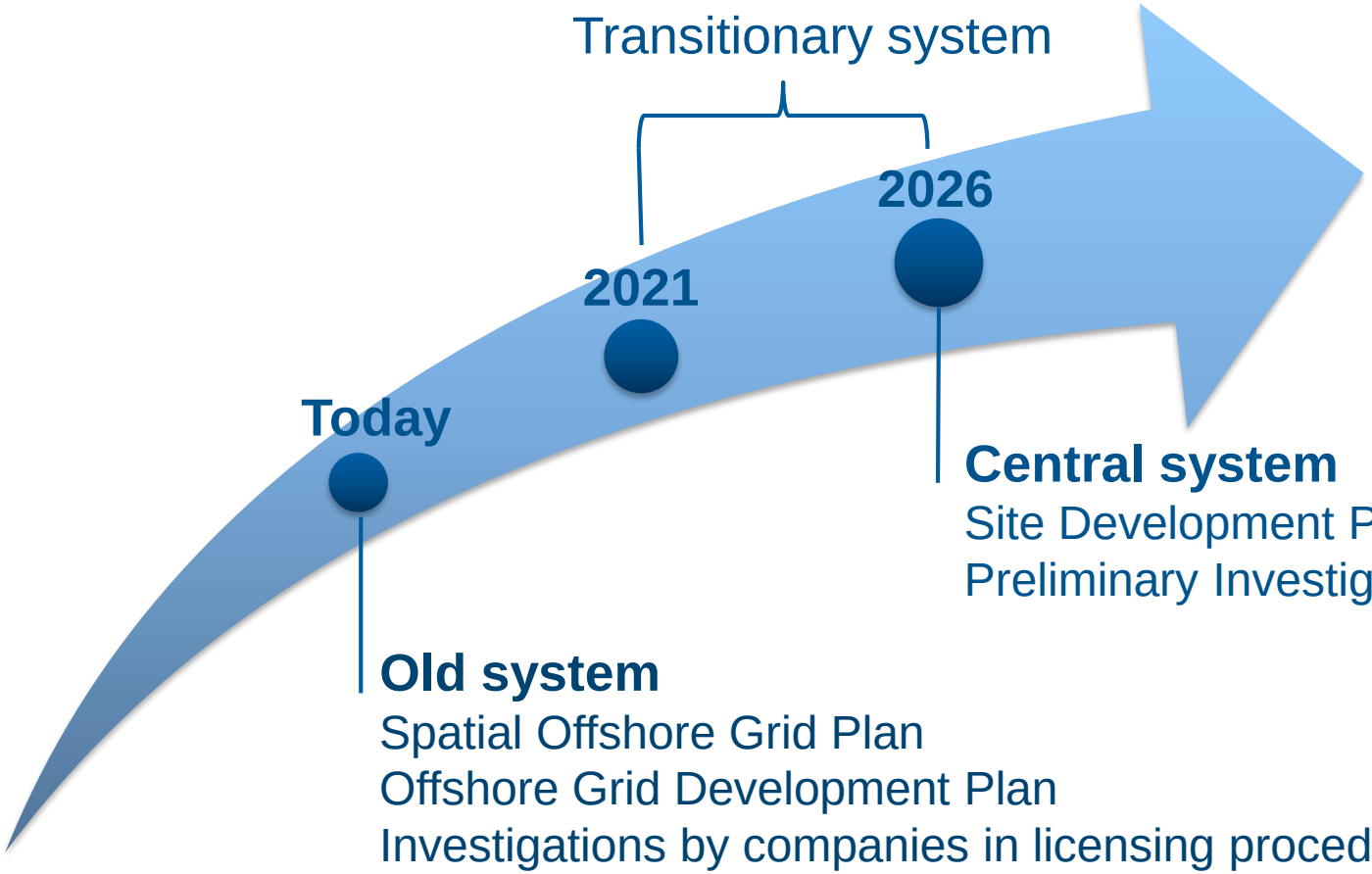
Spatial Offshore Grid Plan

Offshore Grid Development Plan

- Central planning instument for offshore grid connections and offshore wind farms from 2026.
- Merging of Spatial Offshore Grid Plan and Offshore Grid Development Plan
- Public Participation (written comments and hearing)
- Publication at the latest **30. June 2019**

Transitionary Phase for „existing projects“



Time Schedule Site Development Plan (FEP)

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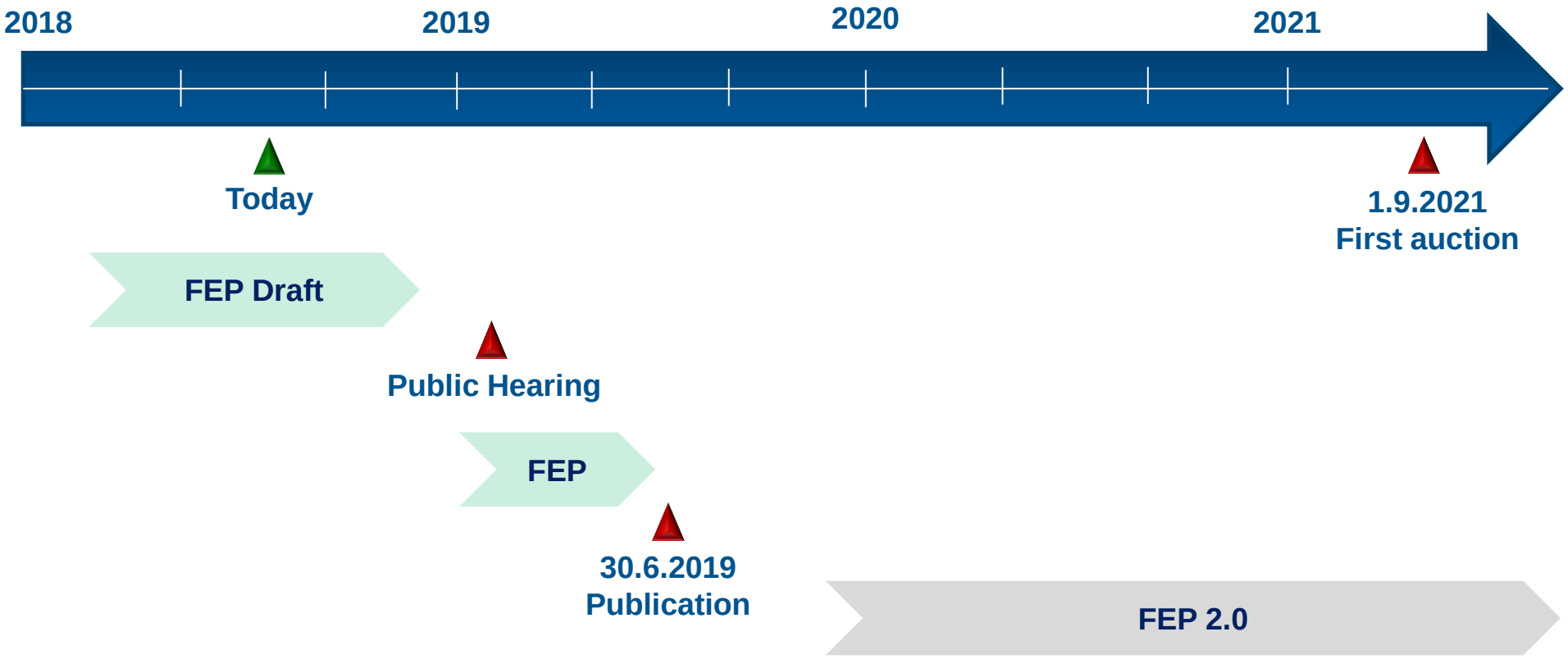

Preliminary draft of the Site Development Plan – North Sea

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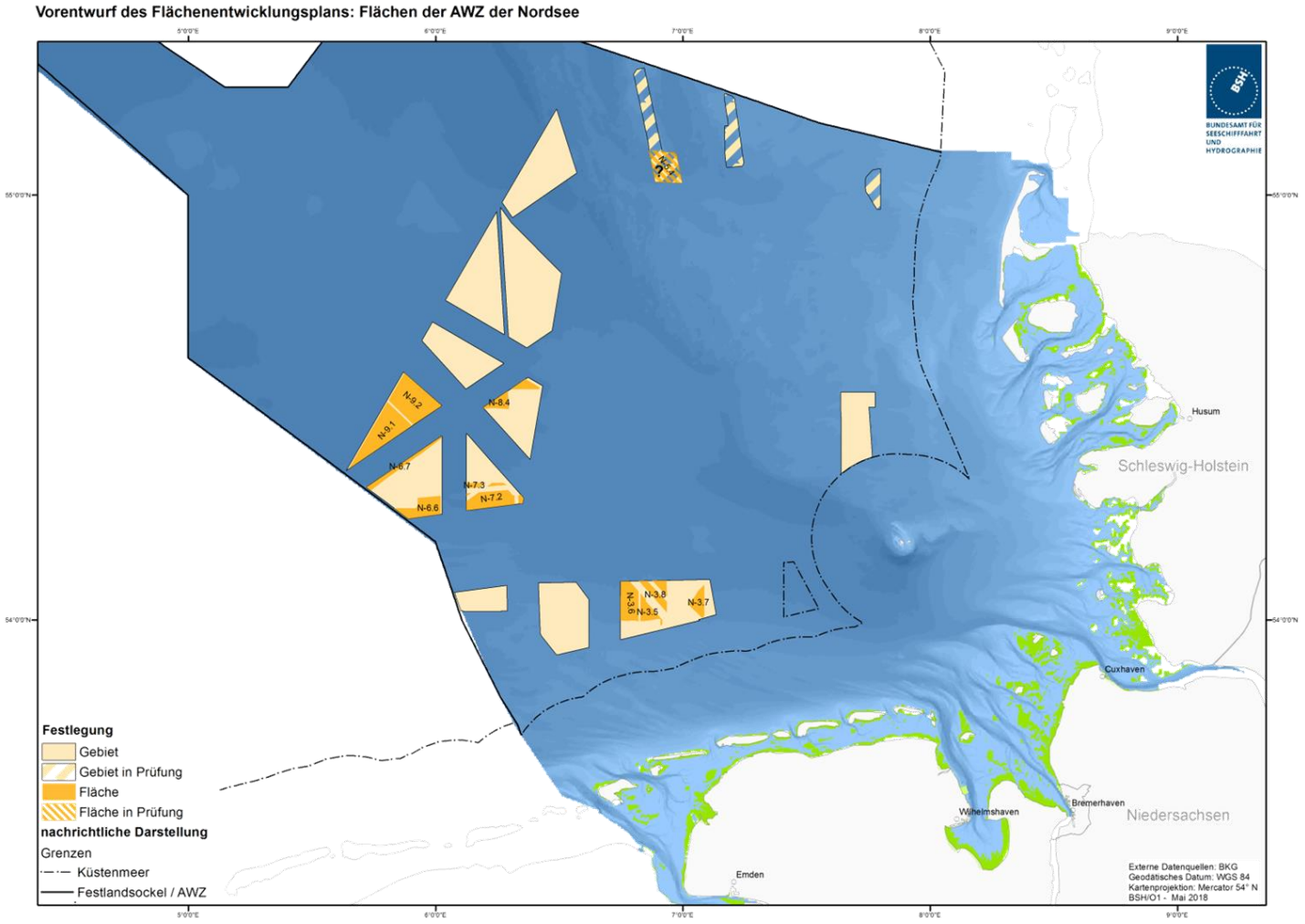

- former clusters of Spatial Offshore Grid Plan as basis for areas in Site Development Plan
- pre-draft includes stipulations only for areas and sites
- sites for platforms and routes for grid connections to be added in draft

Preliminary draft of the Site Development Plan – Baltic Sea

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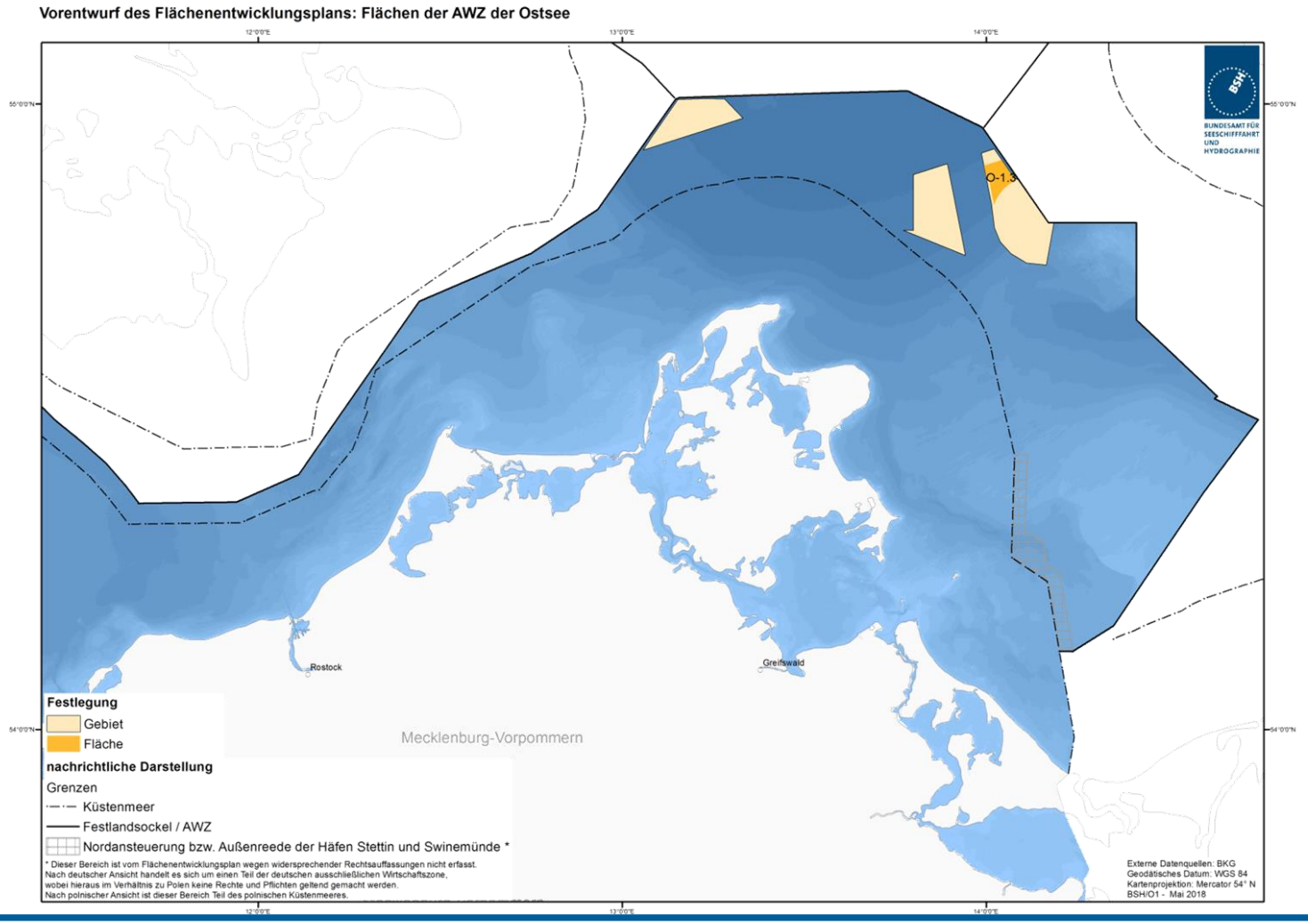

- former clusters of Spatial Offshore Grid Plan as basis for areas in Site Development Plan
- pre-draft includes stipulations only for areas and sites
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Preliminary draft of the Site Development Plan – Sites

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Calender year of auction	Calender year of commissioning	Site	Exp. capacity to be installed [MW]	Sum of exp. Capacity per year [MW]
2021	2026	O-1.3	ca. 300	ca. 900
		N-3.8	ca. 375	
		N-3.7	ca. 225	
2022	2027	N-7.2	ca. 830	ca. 830
2023	2028	N-3.6	ca. 780	ca. 881
		N-7.3	ca. 102	
2024	2029	N-3.5	ca. 300	ca. 760
		N-6.7	ca. 460	
2025	2030	N-6.6	ca. 740	ca. 740

Vorentwurf des Flächenentwicklungsplans: Flächen der Gebiete 6-9 der AWZ der Nordsee

Preliminary draft of the Site Development Plan – Grid connection systems

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Baltic Sea:

- AC grid connection systems with a voltage of 220 kV and a capacity of 300 MW
- large-scale DC systems seem unfitting due to limited potential sites for offshore wind energy

North Sea:

- Spatial Offshore Grid Plan determined standard of 900 MW DC systems
- Continuation of DC systems in Site Development Plan with increased capacity
- 66 kV direct connection of offshore wind turbines to the converter platform as new standard concept
- Spatial restrictions (esp. in coastal areas) lead to the aim of increased transmission capacity and thus a reduced number of connection systems
- Are 525 kV DC systems an option for offshore grid connection systems?

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Thank you for your attention!

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