

Offshore Grid Development in Germany

Hamburg, 26 September 2017

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Federal Maritime and Hydrographic Agency



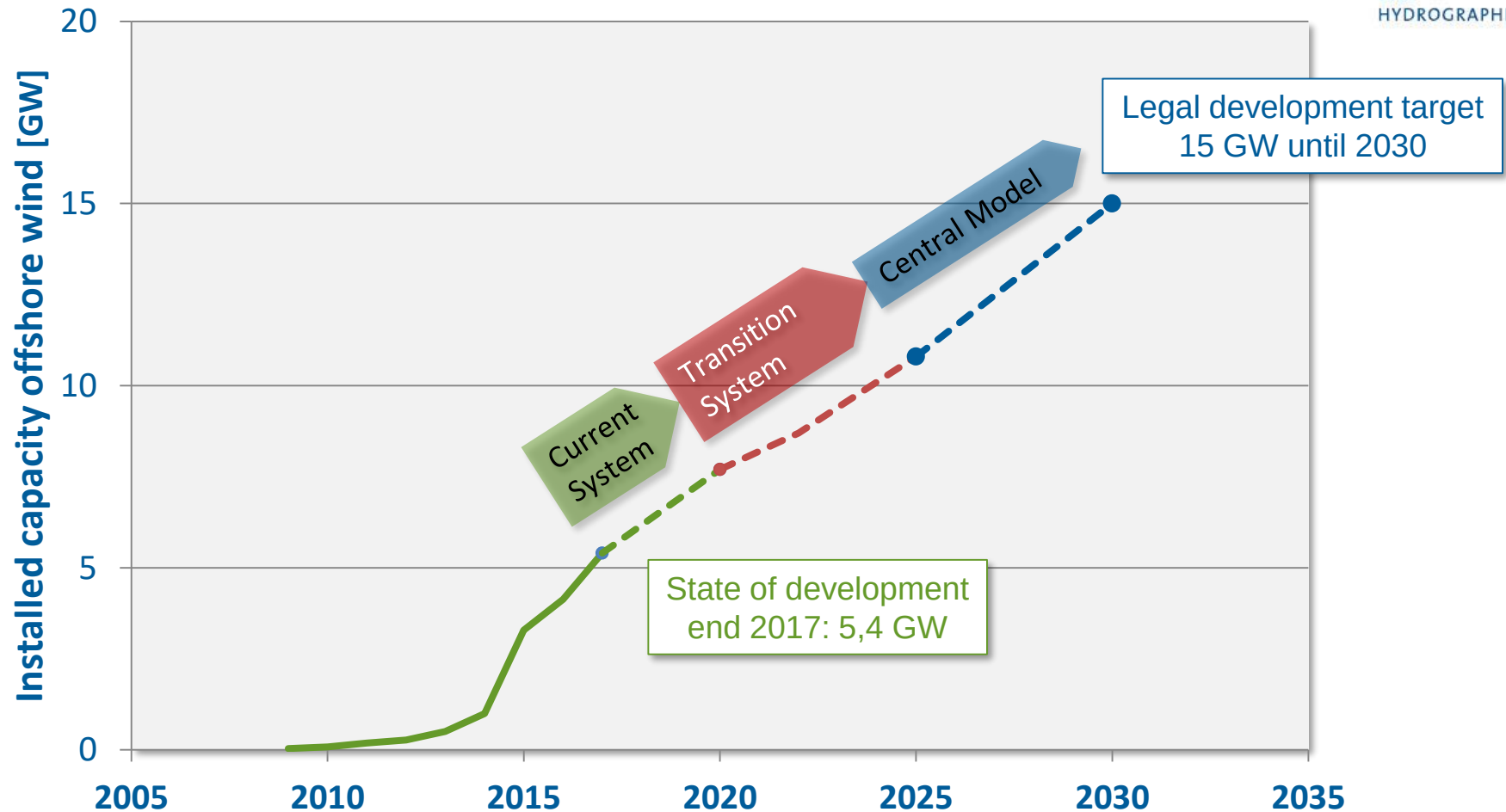
- I. Current status of offshore wind energy in the German North and Baltic Sea**
- II. Spatial planning for offshore wind energy**
 - **Background: Maritime Spatial Plan**
 - **Spatial Offshore Grid Plan for the North and Baltic Sea**
- III. Site Development Plan (FEP)**

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Main Driver: Renewables Policy

- **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

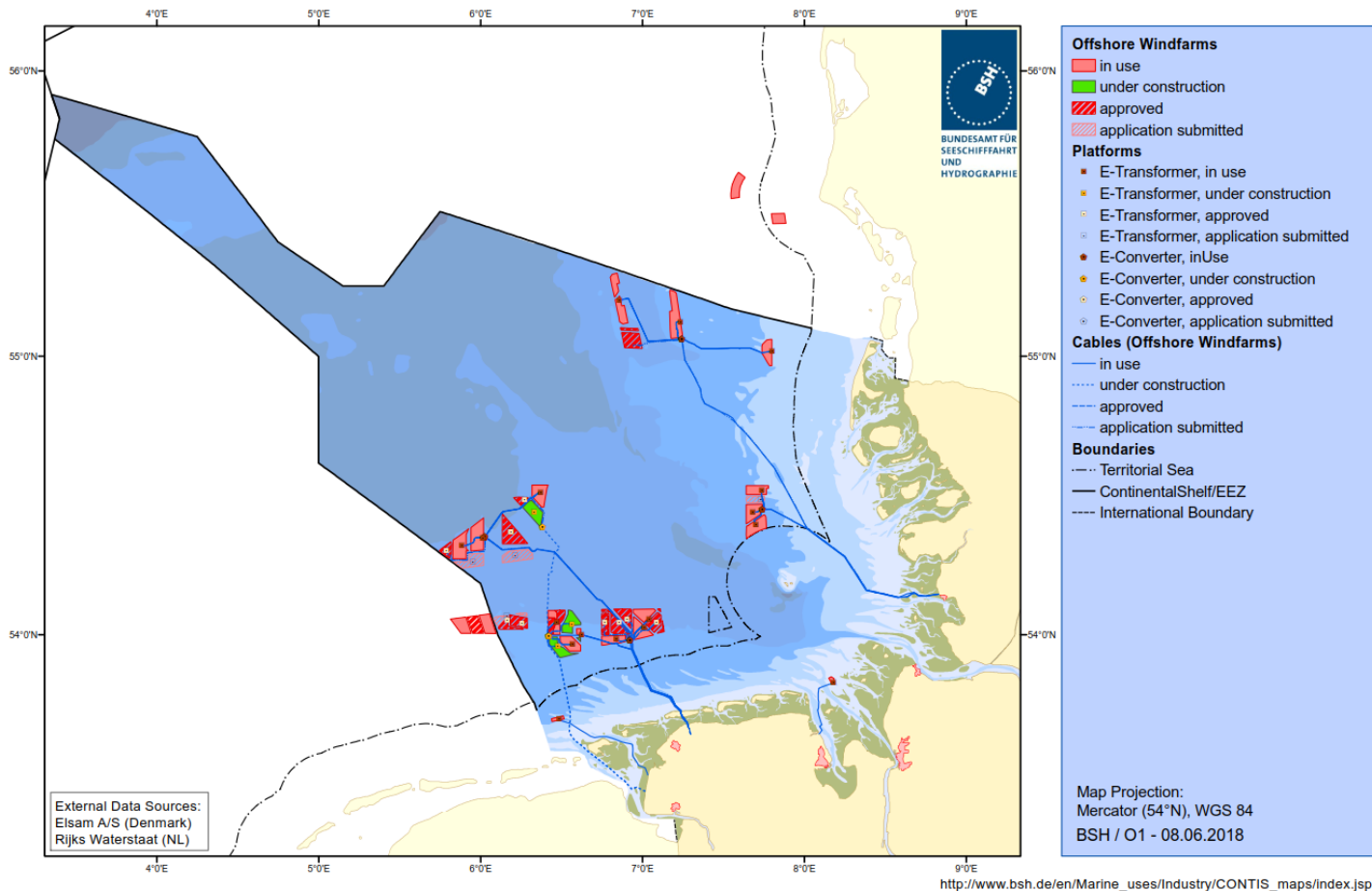
Development of Offshore Wind Energy



Development of Offshore Wind Energy

North Sea EEZ: State of offshore wind energy 2018

North Sea: Offshore Windfarms



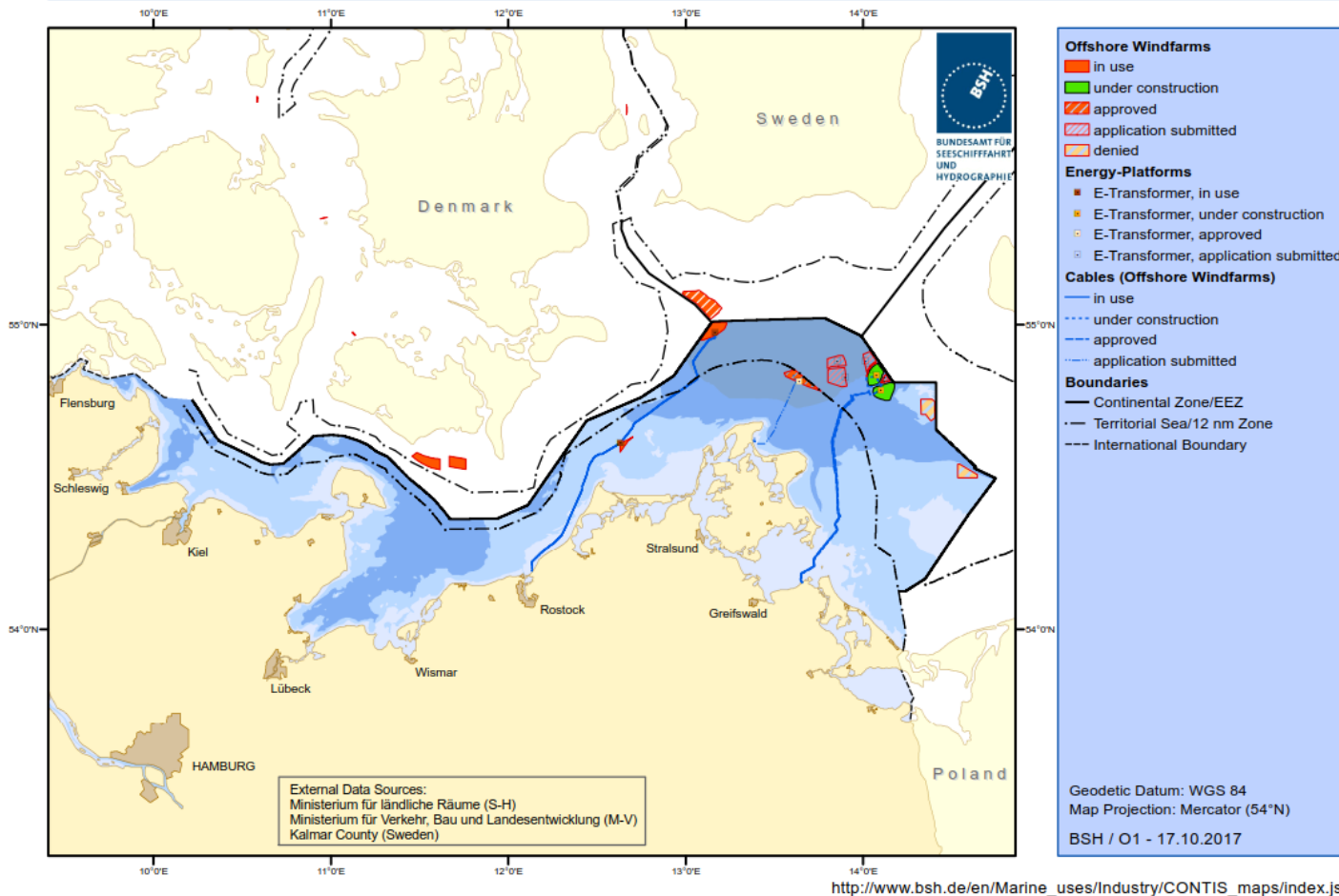
Status offshore wind farms 2018:

- 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

Baltic Sea: Offshore Windfarms



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



- 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

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.

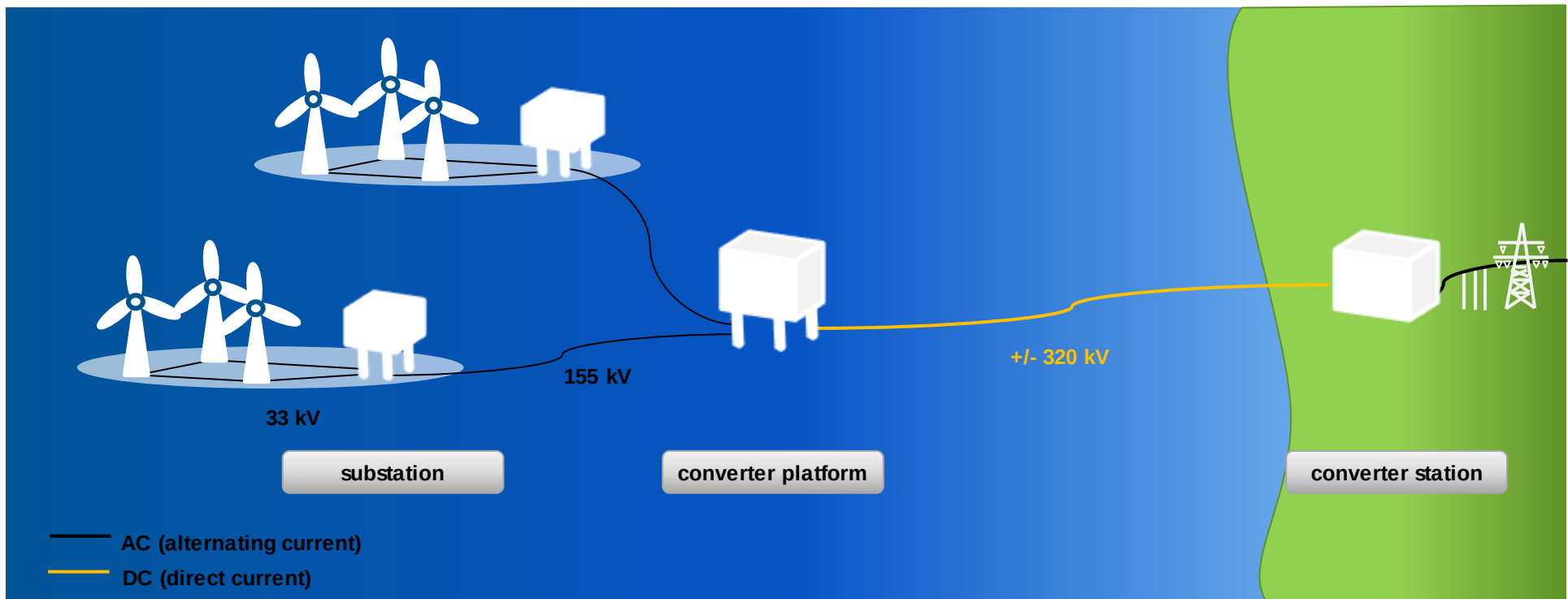
Legal Requirements

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.

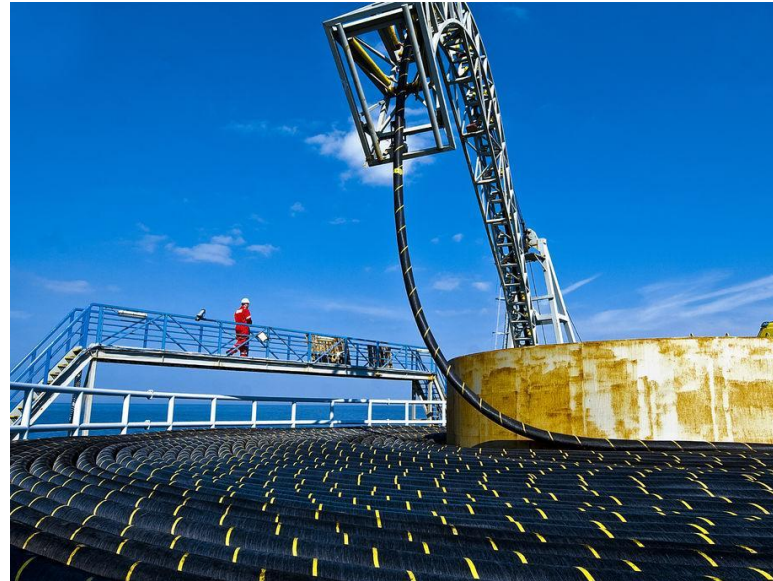
North Sea: Spatial Offshore Grid Plan – Technical Concept



North Sea: Spatial Offshore Grid Plan – Technical Concept

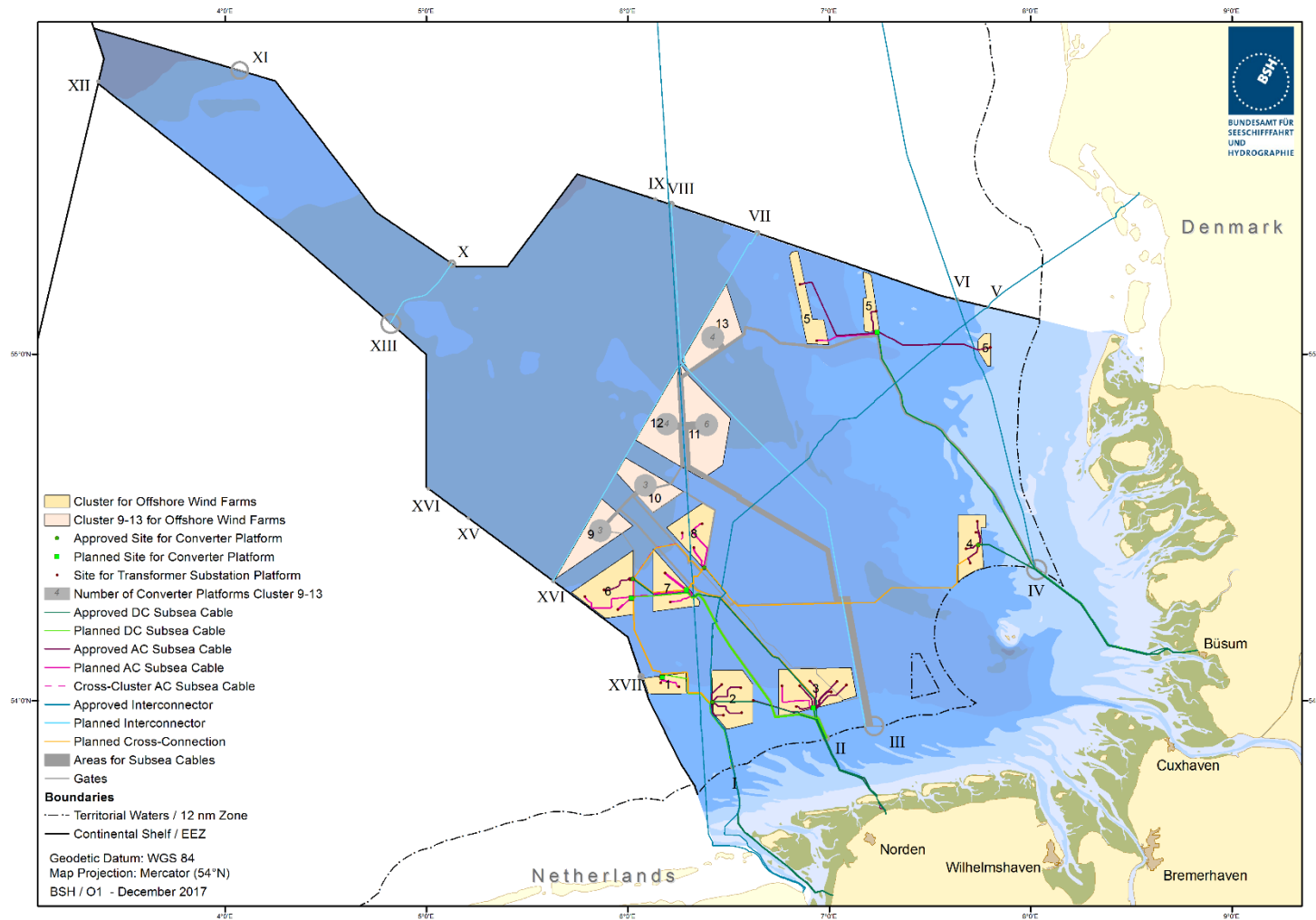


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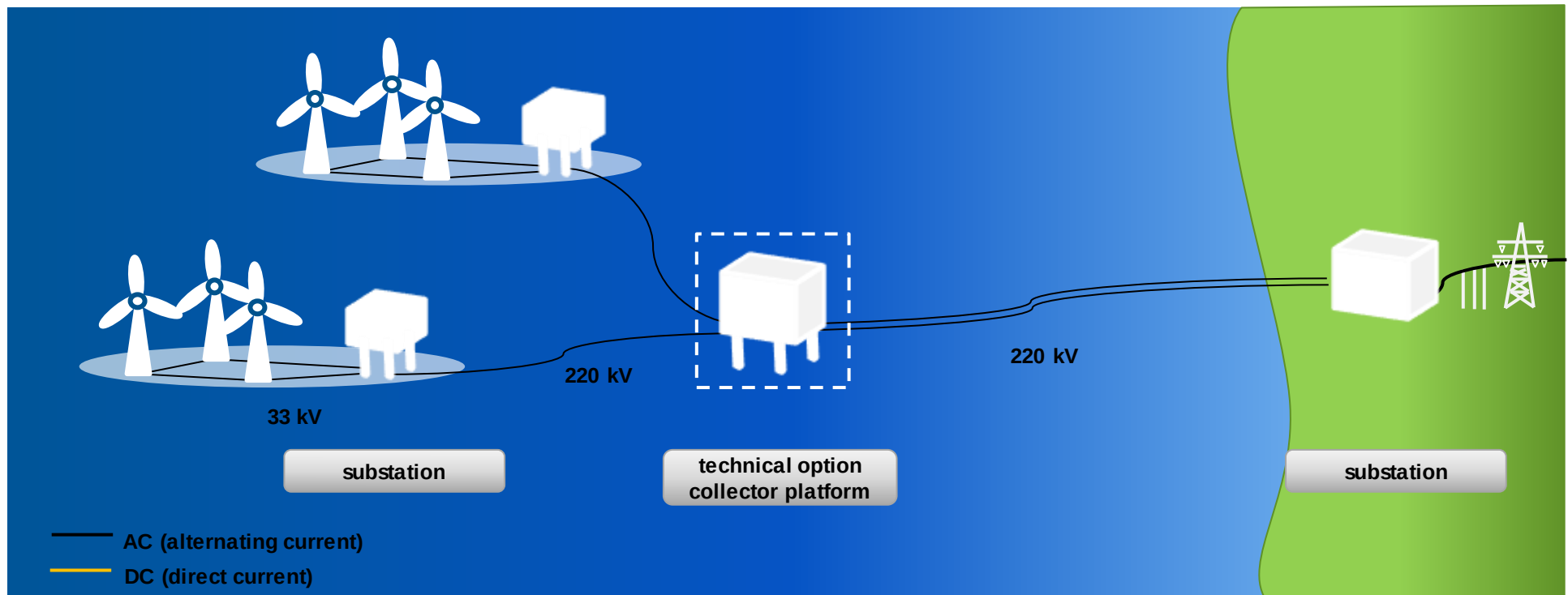


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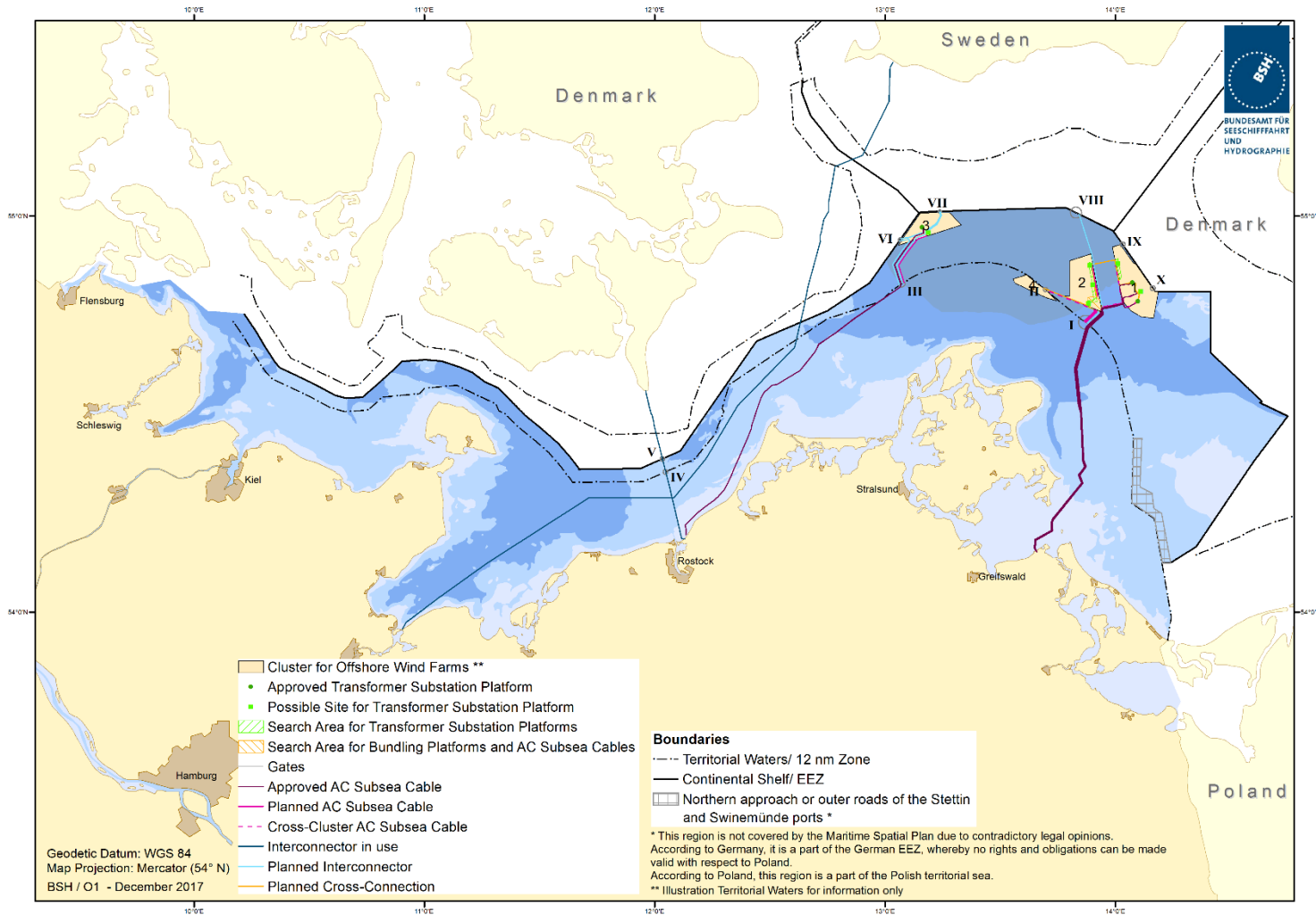
North Sea – EEZ: Spatial Offshore Grid Plan 2016/2017



Baltic Sea: Spatial Offshore Grid Plan – Technical Concept



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



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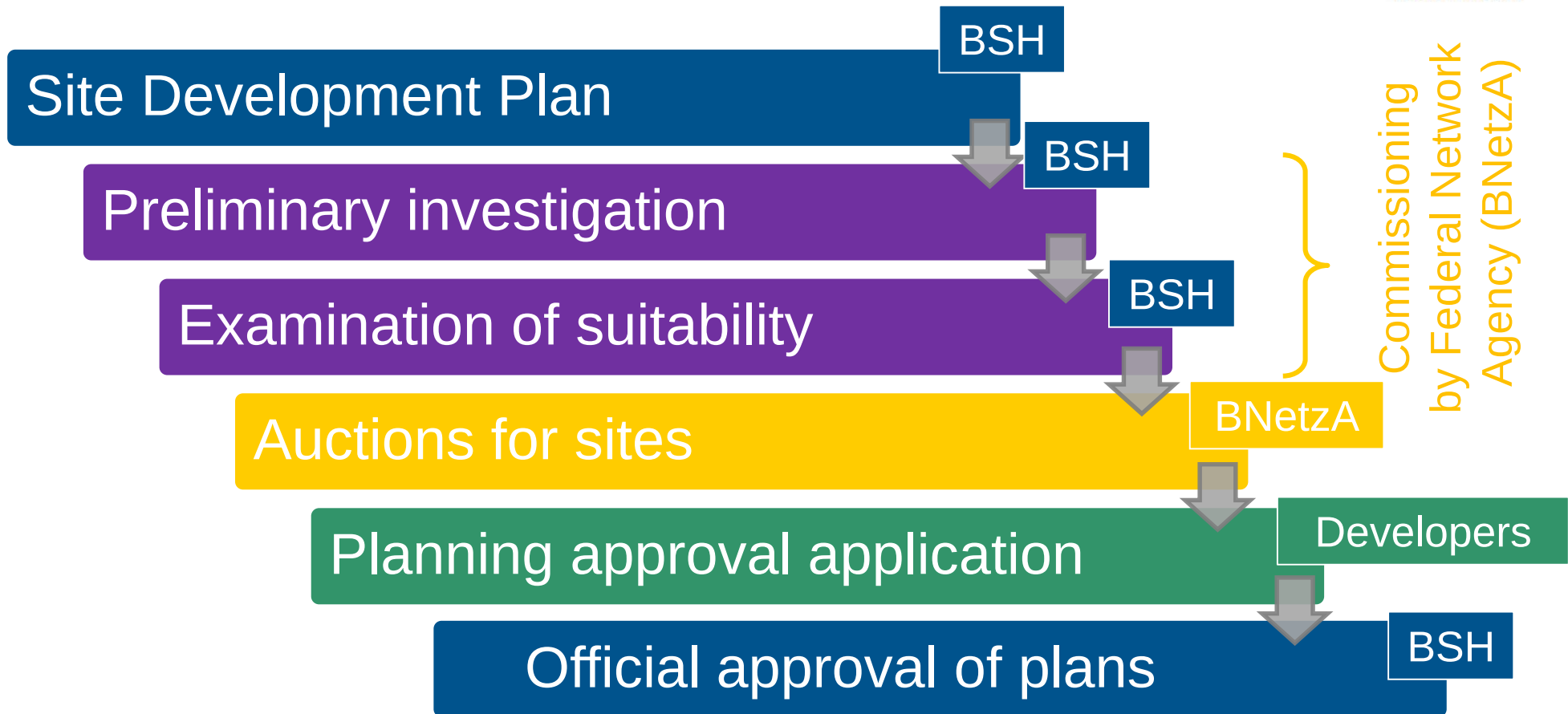
Fundamental Change in Legal Framework

- 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



Definitions of the Site Development Plan

- 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)

Spatial Offshore Grid Plan



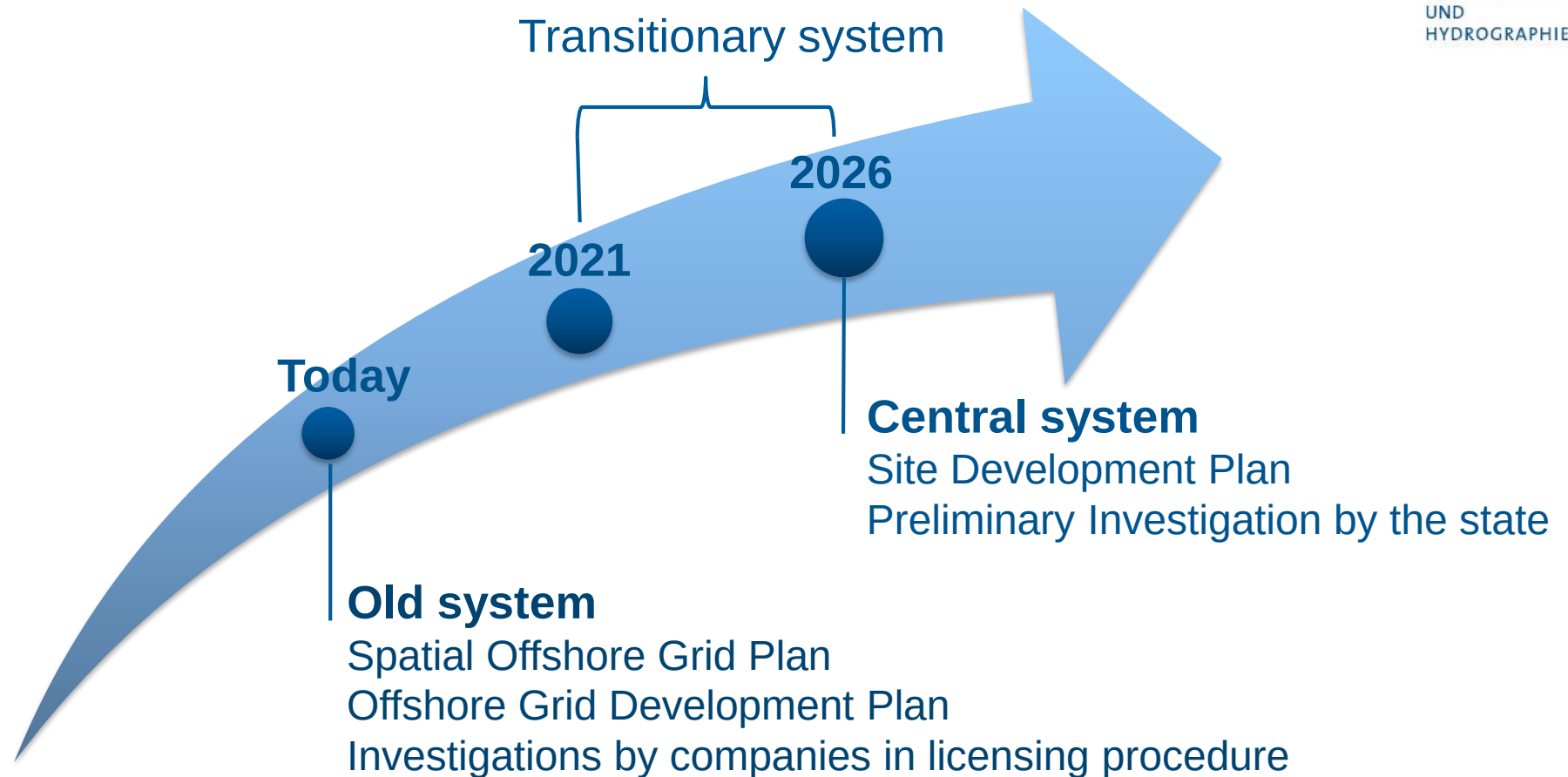
Offshore Grid Development Plan

Site Development Plan

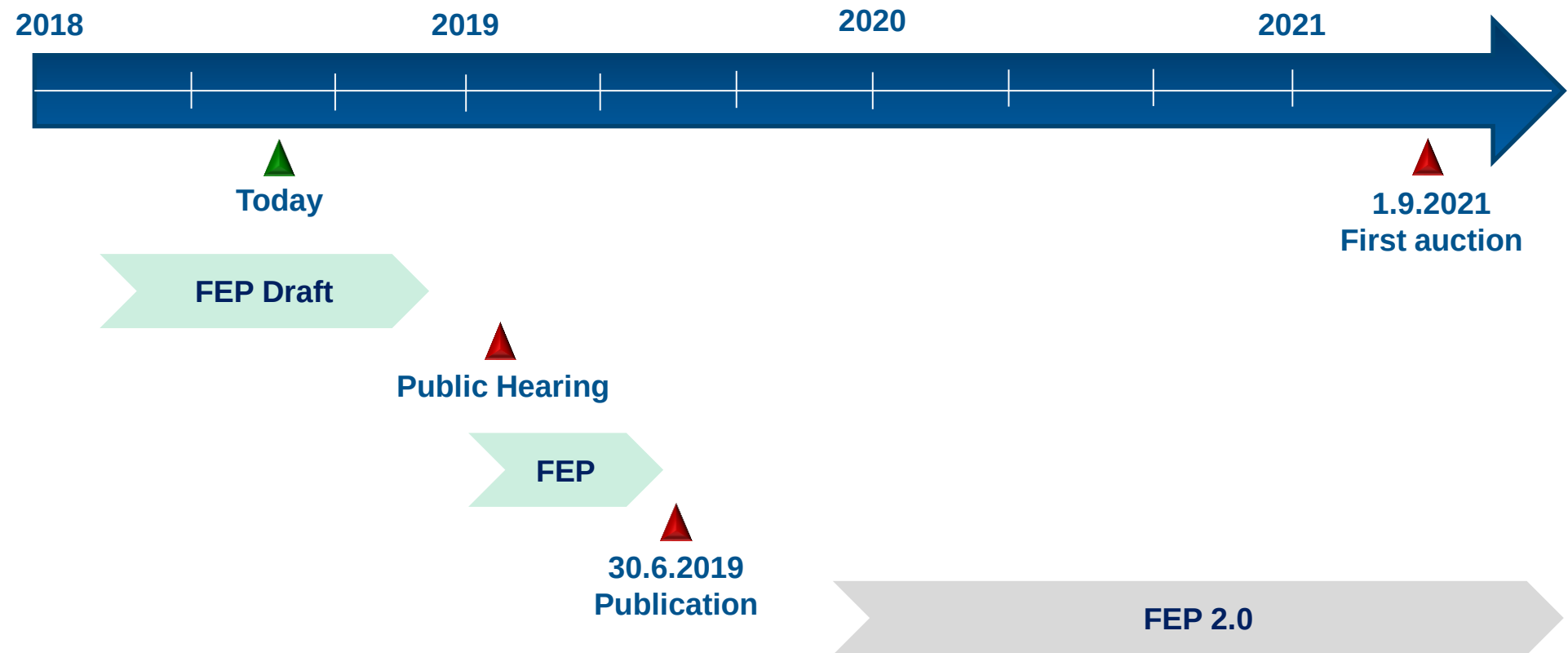


- Central planning instrument for offshore grid connections and offshore wind farms from 2026.
- Merging of Spatial Offshore Grid Plan and Offshore Grid Development Plan
- Public Participation (written comments and hearing)
- Publication at the latest **30. June 2019**

Transitional Phase for „existing projects“

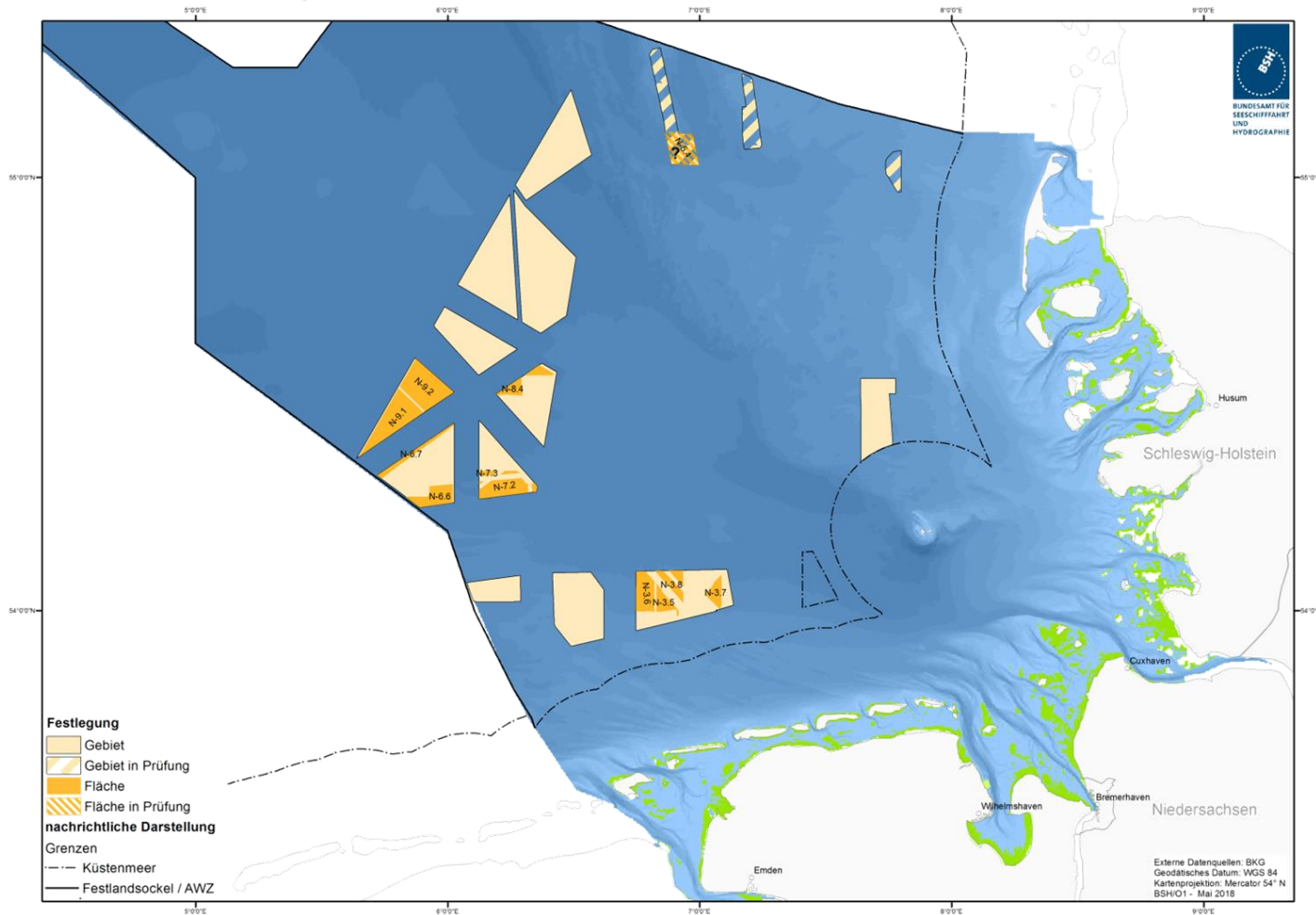


Time Schedule Site Development Plan (FEP)



Preliminary draft of the Site Development Plan – North Sea

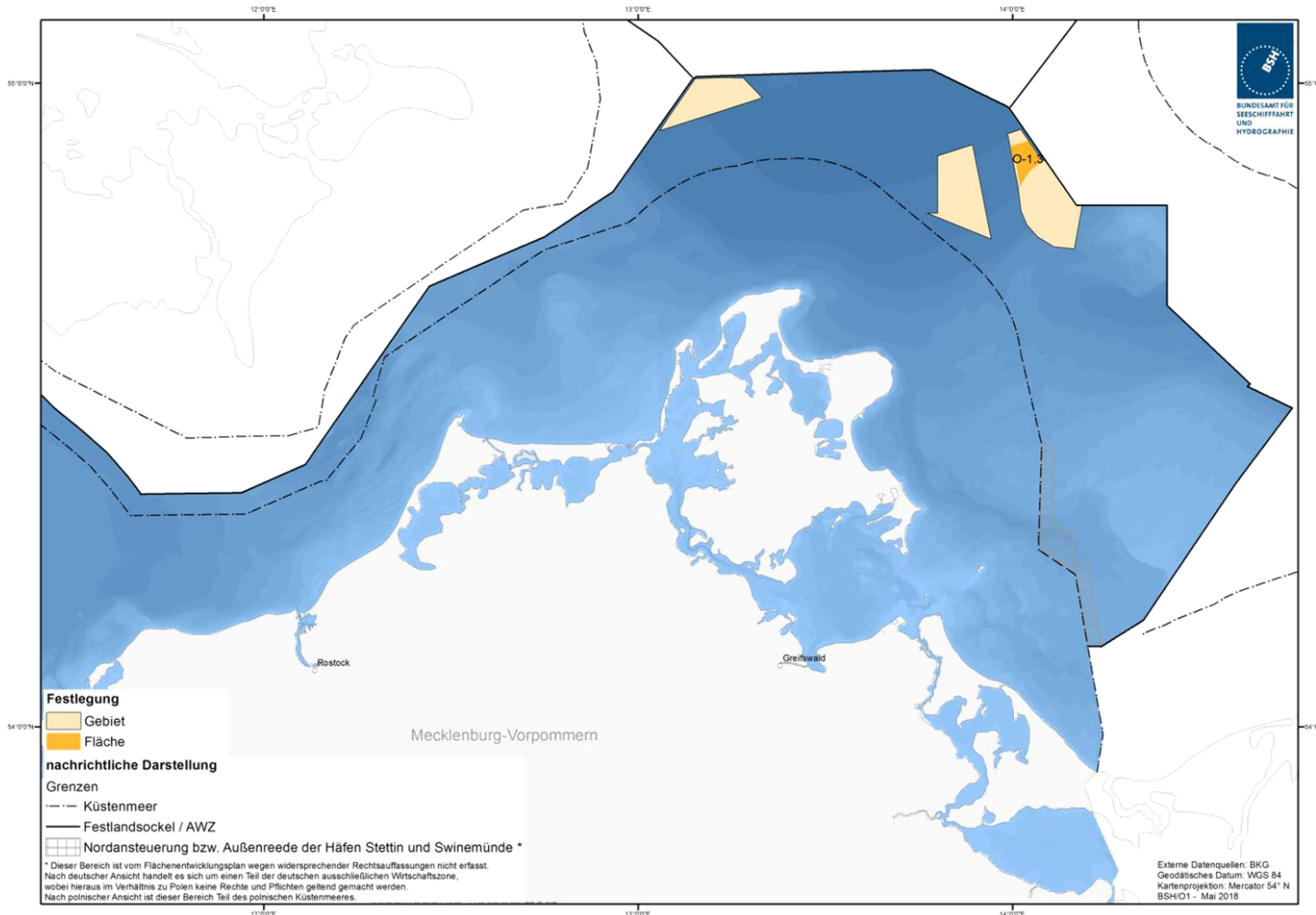
Vorentwurf des Flächenentwicklungsplans: Flächen der AWZ der Nordsee



- 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

Vorentwurf des Flächenentwicklungsplans: Flächen der AWZ der Ostsee



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Preliminary draft of the Site Development Plan – Sites



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Calendar year of auction	Calendar 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

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?

Thank you for your attention!

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<http://www.bsh.de>

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