

A wide-angle photograph of an offshore wind farm at dusk or dawn. Several wind turbines are visible, their silhouettes and reflections on the calm water. The sky is a mix of soft orange and blue. In the background, a small boat is visible on the water.

Regulatory Framework & Environmental Examinations for Offshore Wind Farms in Germany


Workshop Internacional sobre Avaliação de Impactos Ambientais de Complexos Eólicos Offshore
do Ibama em Brasília/DF, 2 e 3 de julho de 2019

1. Energy & Project Management
2. Offshore Wind Energy in Germany
3. Market Design in Germany
4. The Central Planning Model Procedure
5. Standards

Expertise

- Project Development
 - Planning of Wind Farms & Grid Connections
 - Project Approval
 - Ground Surveys & Environmental Impact Studies
- Business & Portfolio Development
- Management Systems
- Due Diligences & Project Transfers
- Tendering (Purchasing)
 - International Contract Design & Management
- Production & Construction
 - Project Set-Up & Management
 - Package & Construction Management
 - Trouble Shooting & Claim Management

Offshore Projects (selection)

- Sky 2000/BetaBaltic/GEOFRReE
 - 1st offshore drillings for a Baltic Sea wind farm
 - 1st Offshore Measuring Mast Baltic Sea (2002)
- DanTysk
- Vattenfall Europe's Offsh.-Strategy
- Alpha Ventus
- Grid Connection Baltic 1
- Trianel Windpark Borkum I
- Trianel Windpark Borkum II
- Energy Transition Brazil 
 - Lecturing (EUREM, GENRE)
 - Missão Técnica Eólica Offshore 2019

2000

2005

2010

2015

2019

- Since 2000 actively involved in the Offshore-Wind-Sector
- Since 2005 running the consultancy office Energy & Project Management (Germany)

Offshore Wind Energy in Germany - Map

Status: 31.12.2018

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NORTH SEA

BALTIC SEA



© German Offshore Wind Energy Foundation: https://www.offshore-stiftung.de/sites/offshorelink.de/files/mediaimages/Grafik%20C3%9Cbersicht%20Offshore%20Windparks_2018.jpg; 18.04.18, modified

Offshore Wind Energy in Germany - Figures

as of end of 2018 from Deutsche WindGuard

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		North Sea		Baltic Sea	
		Capacity [MW]	Number [OWEC]	Capacity [MW]	Number [OWEC]
OWEC installed in 2018	Grid connected	585	76	384	60
	Without grid	276	46	0	0
OWEC cumulate d as of end of 2018	Grid connected	5.306	1.073	1.076	232
	Without grid	276	46	0	0
	Total Capacity	6.382 MW with grid connection			
	Total Number	1305 OWEC with grid connection			

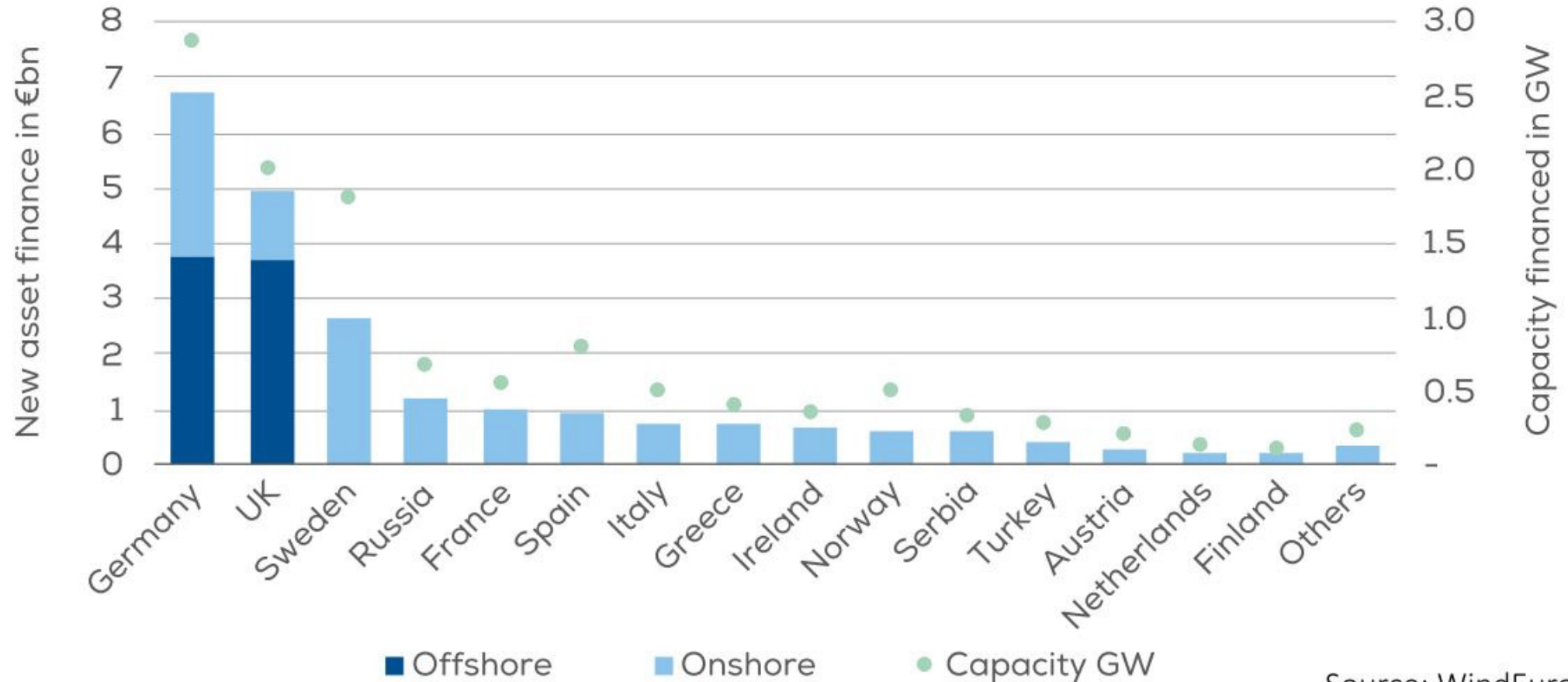
MW: Megawatt, OWEC: Offshore Wind Energy Converter

Offshore Wind Energy in Germany - Investments

Asset Investments

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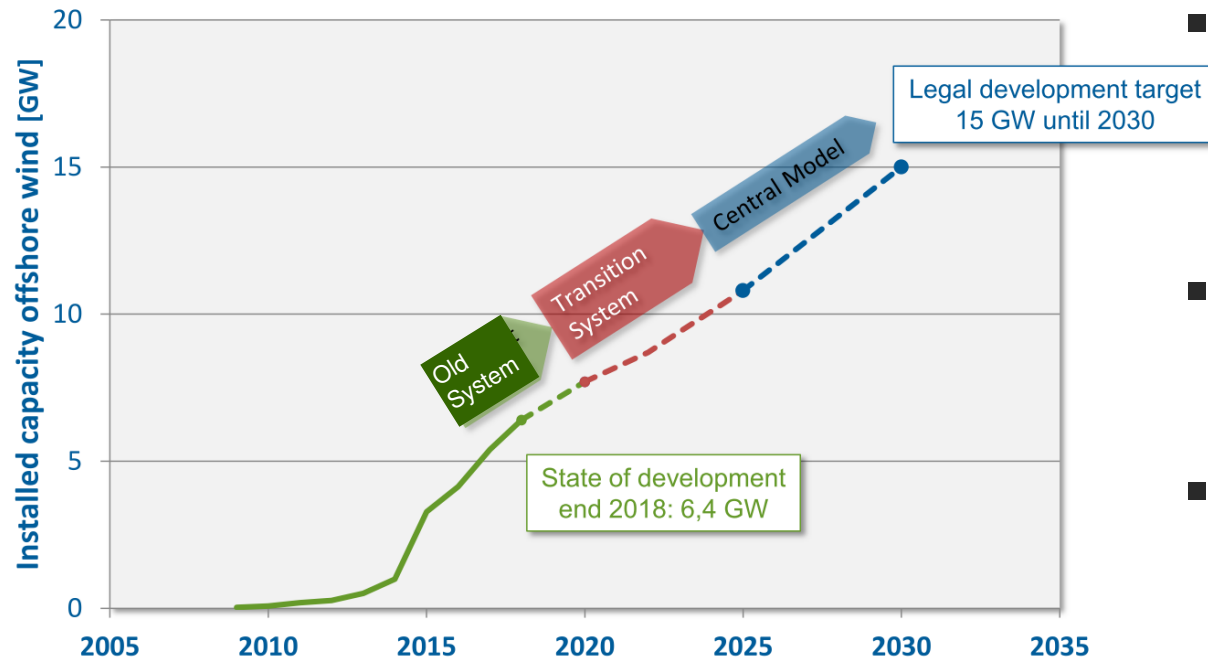
New asset finance in wind energy per country, 2017 (€bn and GW)



Source: WindEurope

WindEurope (2018): Financing and investment trends - The European wind industry in 2017, <https://windeurope.org/wp-content/uploads/files/about-wind/reports/Financing-and-Investment-Trends-2017.pdf>, 10.02.2019.

Development Path



Market Designs

- **Old System (Fixed Feed-In Tariffs)**
Commissioning Date up to 2020
 - Self-Developed Sites
 - Governmental target: 20-25 GW by 2030
- **Transition System (Auctions)**
Commissioning Date 2021 - 2025
 - Two auction rounds for “old” projects
- **Central Model (Auctions)**
Commissioning Date 2026 onwards
 - Governmental Pre-Developed sites
 - Governmental target: 15 GW by 2030

Figure left: Federal Maritime and Hydrographic Agency (BSH) (2018): Presentation for the Missão Técnica Eólica Offshore 2019 (20.05.2019 in Hamburg), modified

Auction Results



Awarded German offshore projects in the North Sea and Baltic Sea (by WindGuard)

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Project	Auction Round	Actor	Contracted Capacity	Planned Date of Commissioning	Awarded price
North Sea					
Kaskasi II	2018	Innogy	325,00 MW	2022	unknown
OWP West	2017	Ørsted	240,00 MW	2024	0,00 ct/kWh
Borkum Riffgrund West 2	2017	Ørsted	240,00 MW	2024	0,00 ct/kWh
Gode Wind 3	2017	Ørsted	110,00 MW	2024	6,00 ct/kWh
Borkum Riffgrund West 1	2018	Ørsted	420,00 MW	2024/25	0,00 ct/kWh
Gode Wind 4	2018	Ørsted	131,75 MW	2024/25	9,83 ct/kWh
EnBW He Dreiht	2017	EnBW	900,00 MW	2025	0,00 ct/kWh
Baltic Sea					
Arcadis Ost 1	2018	Parkwind NV	247,25 MW	2021	unknown
Wikinger Süd	2018	Iberdrola	10,00 MW	2022	0,00 ct/kWh
Baltic Eagle	2018	Iberdrola	476,00 MW	2022/23	6,46 ct/kWh

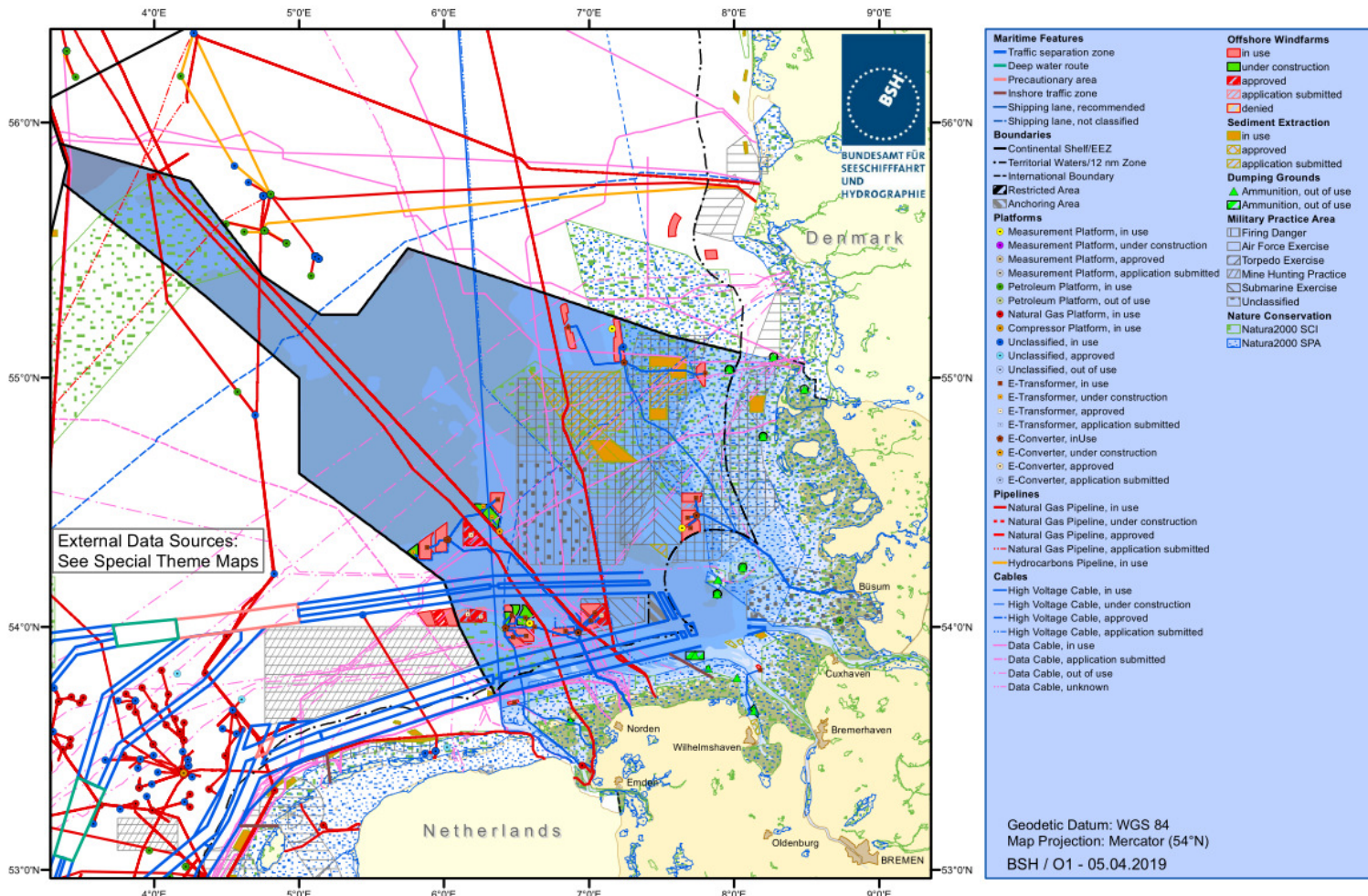
WindGuard (2019): Status des Offshore-Windenergieausbaus in Deutschland Jahr 2018.-

https://www.windguard.de/jahr-2018.html?file=files/cto_layout/img/unternehmen/windenergiestatistik/2018/Status%20des%20Offshore-Windenergieausbaus%20in%20Deutschland%2C%20Gesamtjahr%202018.pdf, 10.02.2019. (database: BNetzA, BSH, further search) - modified

Utilization North Sea

North Sea: Existing and Perspective Uses and Nature Conservation

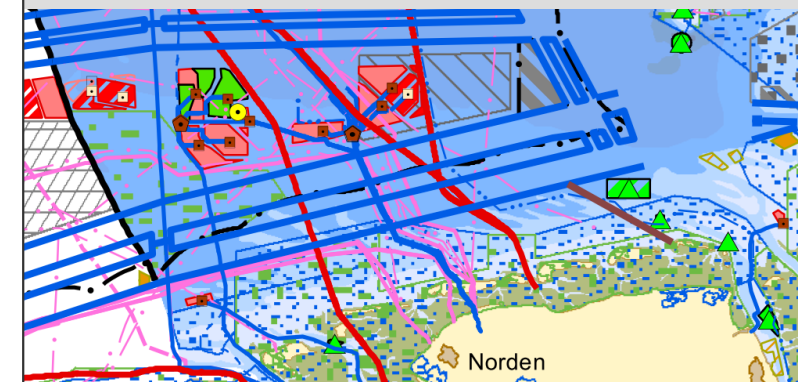
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Utilization (examples)

- Navigation (export nation)
- Nature Protection Areas
- Fishery
- Science
- Military
- Tourism
- Commodities (gravel, sand, etc.)
- Energy (Wind Energy)
- Pipelines & Cable Routes
- etc.

Detail

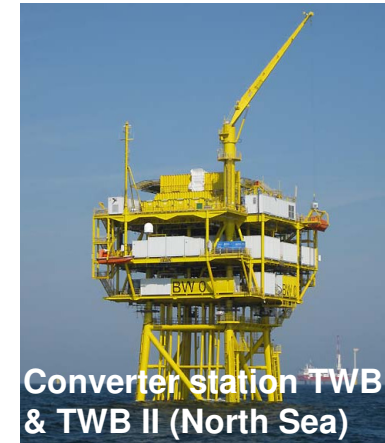
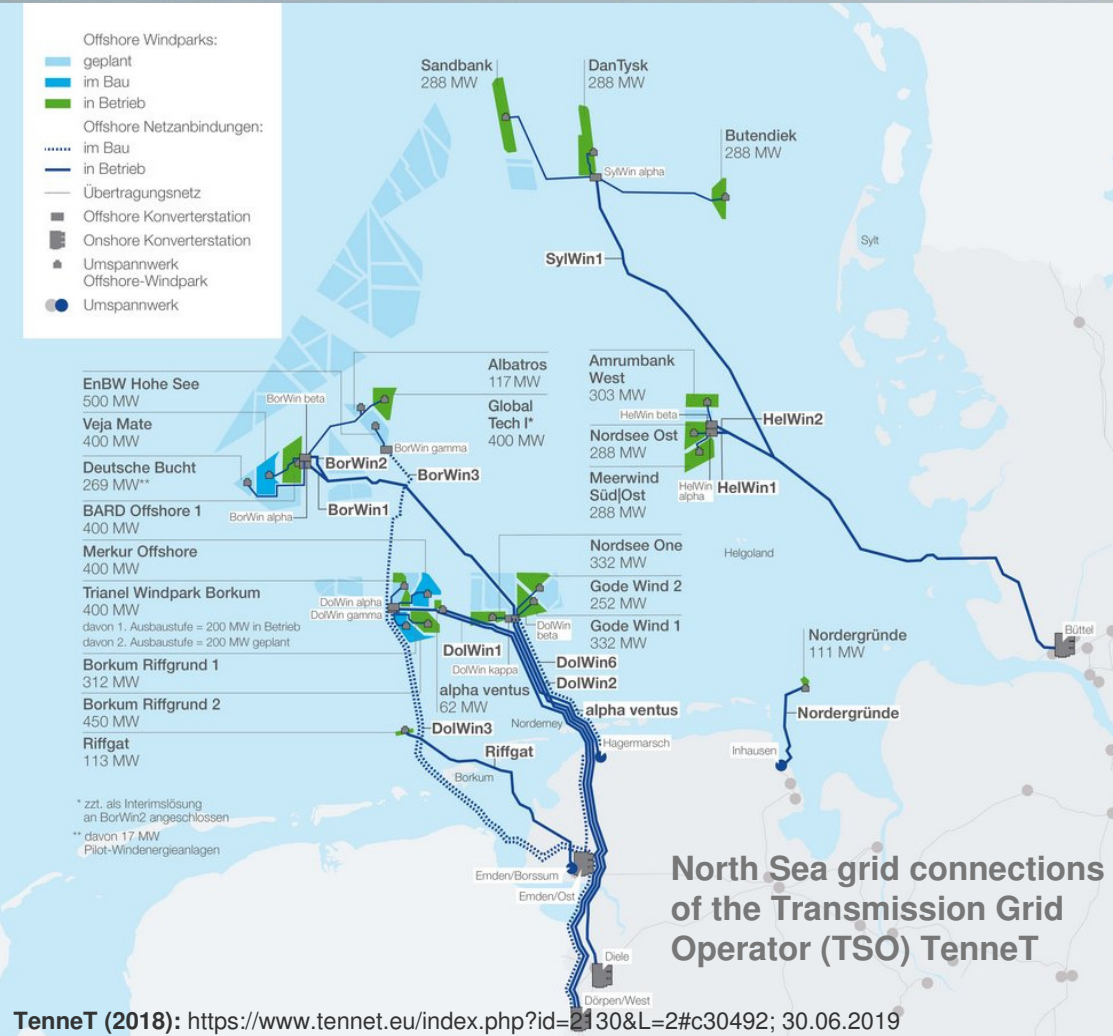


Federal Maritime and Hydrographic Agency (BSH) (2019): https://www.bsh.de/EN/TOPICS/Offshore/Maps/_Anlagen/Downloads/NorthSea_Uses_NatureConservation.pdf?__blob=publicationFile&v=2; 29.06.2019

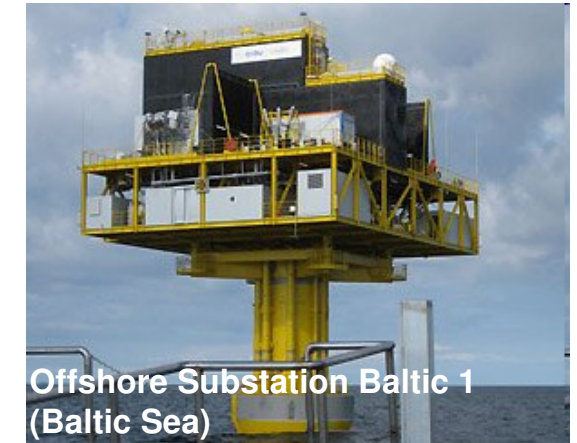
Offshore Wind Energy in Germany - Grid Connection

Bottleneck grid connections

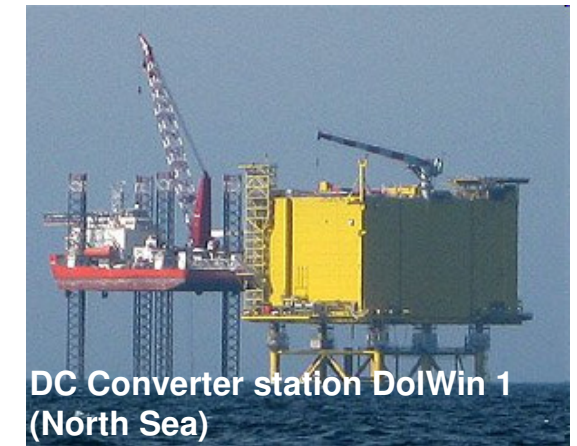
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Operator: OWEC Owners



Operator: TSO 50 Herz & OWEC Owner



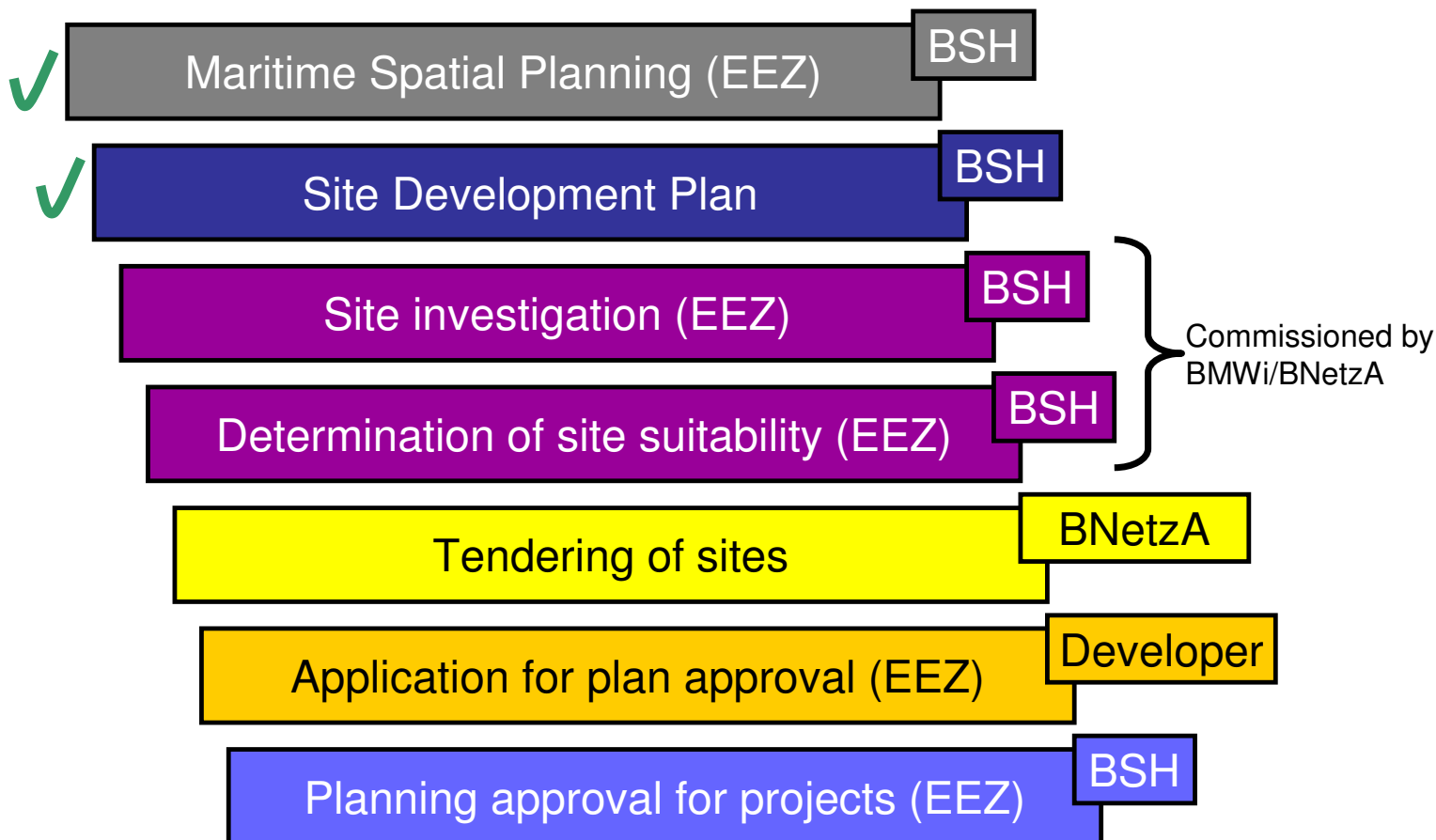
Operator: TSO TenneT

Photos © Johannes Dimas

The Central Planning Model Procedure

According the Offshore Wind Energy Act 2017 - Top-Down Planning Approach

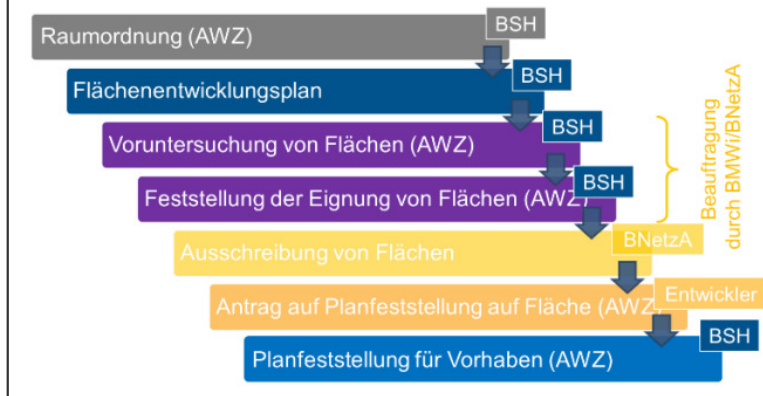
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Abbreviations

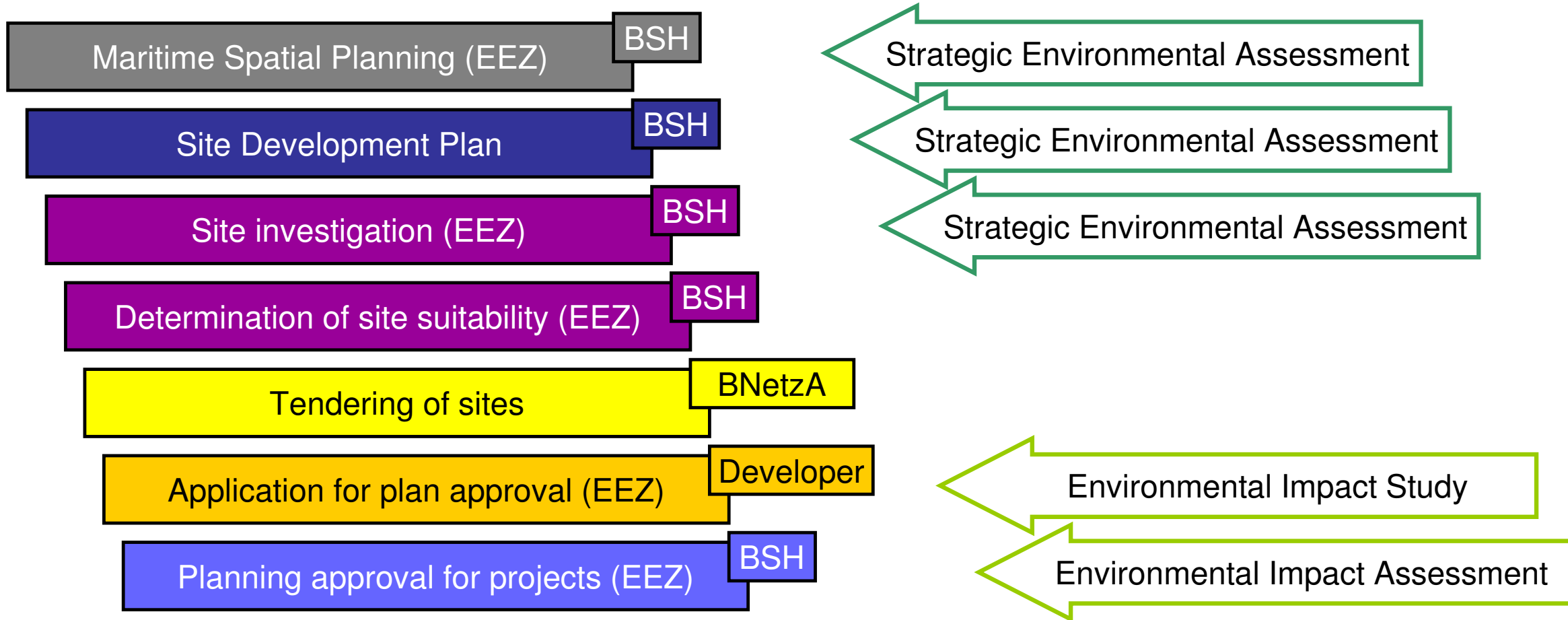
BSH: Federal Maritime and Hydrographic Agency
BNetzA: Bundesnetzagentur (Federal Grid Agency)
BMWi: Federal Ministry for Economic Affairs and Energy
EEZ: Exclusive Economic Zone
WindSeeG: The Offshore Wind Energy Act (WindSeeG) entered into force on 1 January 2017 as part of the 2017 Renewable Energy Sources Act.

Terms in German



Modified from:
BSH 28. Juni 2019: https://www.bsh.de/DE/THEMEN/Offshore/Meeresfachplanung/Flaechenentwicklungsplan/_Anlagen/Downloads/FEP/Flaechenentwicklungsplan_2019.pdf?__blob=publicationFile&v=4; 29.06.2019
Federal Maritime and Hydrographic Agency (BSH) (2018): Presentation for the Missão Técnica Eólica Offshore 2019 (20.05.2019 in Hamburg), modified

The Central Planning Model Procedure



Modified from: Umweltbericht zum Flächenentwicklungsplan 2019 für die deutsche Nordsee (28. Juni 2019):

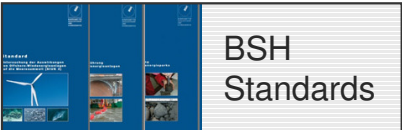
https://www.bsh.de/DE/THEMEN/Offshore/Meeresfachplanung/Flaechenentwicklungsplan/_Anlagen/Downloads/FEP/Flaechenentwicklungsplan_2019_Umweltbericht_Nordsee.pdf?__blob=publicationFile&v=6;
29.06.2019

Details of the Central Planning Model Procedure



Subject of planning and approval procedures / environmental assessments

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Maritime Spatial Planning (BSH)	Site Development Plan (BSH)	Site investigation (BSH)	Application for plan approval (Developer)	Planning approval for projects (BSH)
<p>Priority & Reservation Areas, Targets & Principles</p> <ul style="list-style-type: none"> ▪ Safety and freedom of navigation ▪ Economic utilization ▪ Scientific utilization ▪ Protection & improvement of the maritime environment <p>Strategic Environmental Assessment</p> <ul style="list-style-type: none"> ▪ Cumulative impact ▪ EEZ & 12 SM Zone & neighbouring counties 	<p>Technical & Planning Principles</p> <ul style="list-style-type: none"> ▪ Regions & Areas for OWEC vs capacity ▪ Grid connections: Sites & routes ▪ Pilot OWEC (capacity) ▪ Transboundary cable routes <p>Strategic Environmental Assessment</p> <ul style="list-style-type: none"> ▪ Cumulative impacts ▪ EEZ & 12 SM Zone & neighbouring counties 	<p>Ascertainment of suitability for QOWEC and assignment of capacity</p> <ul style="list-style-type: none"> ▪ Basic information for the tendering of the site – suitable to develop a bid <p>Strategic Environmental Assessment</p> <ul style="list-style-type: none"> ▪ Local, site specific assessment on basis of a “model wind farm” in the AWZ 	<p>Project specific application</p> <ul style="list-style-type: none"> ▪ According minimum standards of the BSH <p>Environmental Impact Study</p> <ul style="list-style-type: none"> ▪ According minimum standards of the BSH and further determinations after the participation procedures (hearings) 	<p>Ascertainment of suitability for QOWEC and assignment of capacity</p> <p>Environmental Impact Assessment</p> <ul style="list-style-type: none"> ▪ Local and site assessment on basis of the project specific key data & basic parameters

Modified from: Umweltbericht zum Flächenentwicklungsplan 2019 für die deutsche Nordsee (28. Juni 2019):

https://www.bsh.de/DE/THEMEN/Offshore/Meeresfachplanung/Flaechenentwicklungsplan/_Anlagen/Downloads/FEP/Flaechenentwicklungsplan_2019_Umweltbericht_Nordsee.pdf?__blob=publicationFile&v=6; 29.06.2019

Site Development Plan 2019



Development Process

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Site Development Plan

BSH

The Site Development Plan (FEP) is the central planning instrument for the realisation of Offshore Wind Farms and Grid Connections from 2026 onwards

Brand-new but no surprise due to participation procedures (hearings)

Public notification of procedures and expected completion



Preliminary draft Plan/drafts scope of environmental reports



Consultation and statement Transmission System Operators



Early hearing/Scoping June 27, 2018



Draft Plan and draft environmental reports



National and international consultation



Hearing January 31, 2019



Additional short consultation



Final version of Plan and environmental reports



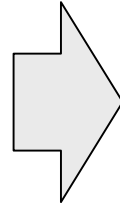
Public notification by June 28, 2019



Update (at least every 4 years)

Modified from: BSH 28. Juni 2019: https://www.bsh.de/EN/TOPICS/Offshore/Sectoral_planning/_Anlagen/Downloads/InternationalAnnouncement_english.pdf?__blob=publicationFile&v=3; 29.06.2019

- The Federal Maritime and Hydrographic Agency (BSH) carries out the application procedure for wind farms in the German Exclusive Economic Zone (EEZ)
- Since 2017, the BSH is responsible for the Site Development Plan according the wind energy-on-sea-law (WindSeeG) → Tenders



Standards of the German Federal Maritime and Hydrographic Agency (BSH):

- Investigation of the impacts of offshore wind turbines on the marine environment (StUK 4)
- Ground investigations for offshore wind energy
- Design



BSH Standard - Marine environment (StUK 4)

Investigation of the impacts of offshore wind turbines on the marine environment

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Application for the erection of offshore wind turbines: Request for briefing in line with § 5 UVPG

Presentation of the following documentation:

- Literature study to characterise the planning area
- Proposal of an investigation programme in accordance with the StUK.

Environmental Impact Assessment – baseline study:

- Characterisation of the planning area regarding environmental features and species communities as a basis for the EIA as well as for the species, habitat and biotope protection law reports.
- Characterisation of the planning area in order to determine the survey area, monitoring programme and reference area (of the individual project/the cluster) for the individual features of conservation interest.
- Investigations prior to the start of construction to characterise the environmental features of the project and reference area (of the individual project/the cluster), particularly with a view to species communities.

Environmental Impact Assessment – monitoring of construction phase

- Investigations in the project and reference area (of the individual project/the cluster) to assess impacts of the construction phase on the marine environment.

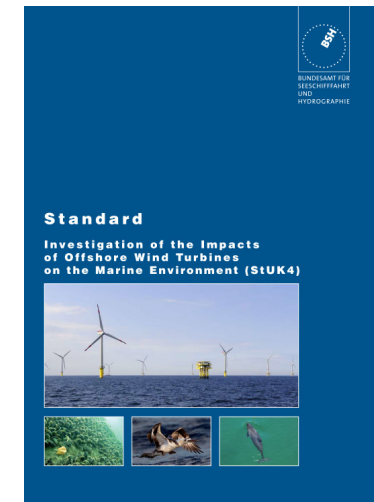
Environmental Impact Assessment – monitoring of operation phase

- Investigations in the project and reference area (of the individual project/the cluster) to assess impacts of the operational phase on the marine environment.

Objectives

Investigation of impacts on features of conservation interest, i. e. fish, benthos, birds, and marine mammals in order to:

- determine their spatial distribution and temporal variability in the pre-construction phase (baseline survey)
- monitor the effects of construction, operation and decommissioning
- establish a basis for evaluating the monitoring results



BSH (2013): https://www.bsh.de/DE/PUBLIKATIONEN/_Anlagen/Downloads/Offshore/Standards-EN/Standard-Investigation-impacts-offshore-wind-turbines-marine-environment.html; 08.08.2018 - modified

BSH Standard - Marine environment (StUK 4)

Technical instructions

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Features of conservation interest
<ul style="list-style-type: none"> ▪ Benthos ▪ Fish ▪ Avifauna ▪ Resting birds ▪ Migratory birds ▪ Marine mammals ▪ Bats ▪ Landscape

Approach			
	Baseline study	Construction phase	Operation phase
Objectives			
Scope			
Timing			
Method			
Presentation of results			

Example: Side scan sonar (SSS) survey of sediment and habitat structure and its dynamics

	Baseline study	Construction phase	Operation phase
Objectives	Investigation of ground morphology and type of substratum for benthos programme planning, for determining a suitable reference area, for interpretation of benthos data and for demarcation of habitat types protected by § 30 BNatSchG. Verification of images by grab sampling (ground truthing).		Investigation of ground morphology and substratum for small and medium scale detection of relevant impacts caused by wind turbines.
Scope	SSS studies and ground truthing at seabed surface shall be conducted in juncture with the geological investigations for a geotechnical survey of wind turbine and cable route sites. The investigations shall be carried out in both the project and the reference area and have to take into consideration the scope of the Geotechnical Site Investigation Standard (see Table 4 and Table 10, BSH 2013). The survey results collected in the context of geological monitoring must be used for the ecological evaluation of the sediment and habitat structure and its dynamics.		SSS studies and ground truthing at seabed surface shall be conducted in juncture with the geological monitoring of wind turbines and cable routes. The investigations have to take into consideration the scope of the Geotechnical Site Investigation Standard (see Table 4 and Table 10, BSH 2013). The survey results collected in the context of geological monitoring must be used for the ecological evaluation of the sediment and habitat structure and its dynamics.
Timing	Once (see Geotechnical Site Investigation Standard, Table 4 and Table 10, BSH 2013).		In the third and fifth year of operation phase, in co-ordination with the annual geological monitoring (see Geotechnical Site Investigation Standard, Table 4 and Table 10, BSH 2013).
Method	Carrying out of SSS studies and grab sampling (ground truthing) according to Geotechnical Site Investigation Standard (see Table 4 and Table 10, BSH 2013).		Carrying out of SSS studies and grab sampling (ground truthing) according to Geotechnical Site Investigation Standard (see Table 4 and Table 10, BSH 2013).
Presentation of results	Compilation of ground morphology and substratum type maps: <ul style="list-style-type: none"> • GIS or CAD format (the data must be provided compatible with the xy standard). • Geodetic reference system: Lat/ Long (WGS 84). • Illustration of ground truthing stations. The station grid for the subsequent infauna programme shall be determined on the basis of the SSS results (see Table 1.3). Figure 1, p. 42 provides an assessment regarding the occurrence of homogeneous and heterogeneous sediments in the EEZ of the North Sea.		



BSH (2013): https://www.bsh.de/DE/PUBLIKATIONEN/_Anlagen/Downloads/Offshore/Standards-EN/Standard-Investigation-impacts-offshore-wind-turbines-marine-environment.html; 08.08.2018 - modified

BSH Standard – Design: Timescale

Minimum requirements concerning the constructive design of offshore structures within the Exclusive Economic Zone (EEZ)

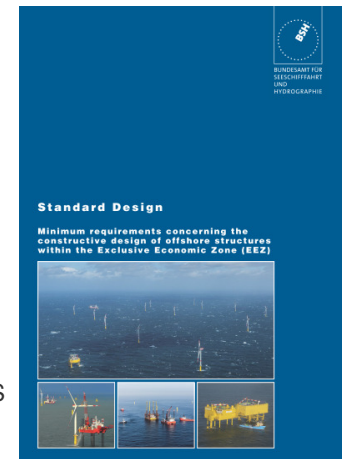
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Phase	Objectives	Approval authority
Development	Compilation of the site-specific data	Plausibility check*
	Determination of the design basis	Preliminary design approval
	Preliminary design	(1 st release, poss. incl. special measures)
Design	Final specification of the subsoil model for each offshore wind turbine site and the off-shore station	Plausibility check*
	More detailed specification of the design basis	Design approval
	Final design of the primary and secondary support structures	(2 nd release, poss. incl. special measures)
	Installation, operation and decommissioning planning	Plausibility check*
		Implementation approval (3 rd release, poss. incl. special measures)

Phase	Objectives	Approval authority
Implementation	Production	Plausibility check*
	Transport	
	Erection / installation	
	Commissioning	
	As-built drawing,	
	Operations manual,	
	Test and inspection plan for periodic inspections	Operating release (poss. incl. special measures)

Phase	Objectives	Approval authority
Operation	Operation, maintenance and monitoring	Plausibility check* Maintenance or temporary revocation of the operating permit
Decommissioning	Decommissioning planning	Plausibility check* Decommissioning release (poss. subject to specific requirements)
	Carrying out decommissioning	Plausibility check* and declaration stating that the measures have been completed

BSH (2015):
https://www.bsh.de/DE/PUBLIKATIONEN/_Anlagen/Downloads/Offshore/Standards-EN/Standard-Design.html;
 08.08.2018 - modified



Thank You!



Energy & Project Management



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With more than 15 years of experience in the wind energy field, Johannes Dimas has been extensively involved in the German offshore wind energy development since the year 2000.

He has coordinated environmental impact assessments and coauthored approval applications for the first German offshore wind farm projects, e.g. the DanTysk project. As well as this, he has also planned and supervised the first drillings for a wind farm development in the Baltic Sea, and was involved in the construction of the first German offshore wind research platform in 2002.

In 2005, Johannes Dimas founded the advisory services Johannes Dimas - Energy & Project Management. Between then and now, he supported international transactions in the offshore industry as well as the development and construction of several on- and offshore wind farms.

At Vattenfall Europe, he was responsible for the onshore wind energy installations. Commencing in 2005, he designed jointly with the headquarters the Vattenfall Europe's Offshore Strategy. Hence, he paved the way for the successful offshore market entry, associated with several offshore project transactions (Borkum Riffgrund 1, DanTysk, and alpha ventus). In a joint venture with E-on and EWE AG, he led the Vattenfall team of alpha ventus, the first German deep water wind farm – producing since 2009.

In a long line of achievements, he was Project Director of the high-voltage grid connection for the Baltic 1 offshore wind farm, Technical-Commercial Project Coordinator of the Trianel Borkum I, and the Project Director of Trianel Borkum II offshore wind farm.

By the end of 2017, Johannes Dimas gave special attention to the business and portfolio development of the offshore division of Trianel GmbH in Hamburg. Since several years he is engaged in international business and project development with a focus on Brazil.

Please refer to <http://johannesdimas.com/en> for a comprehensive publication list and for a collection of project descriptions.