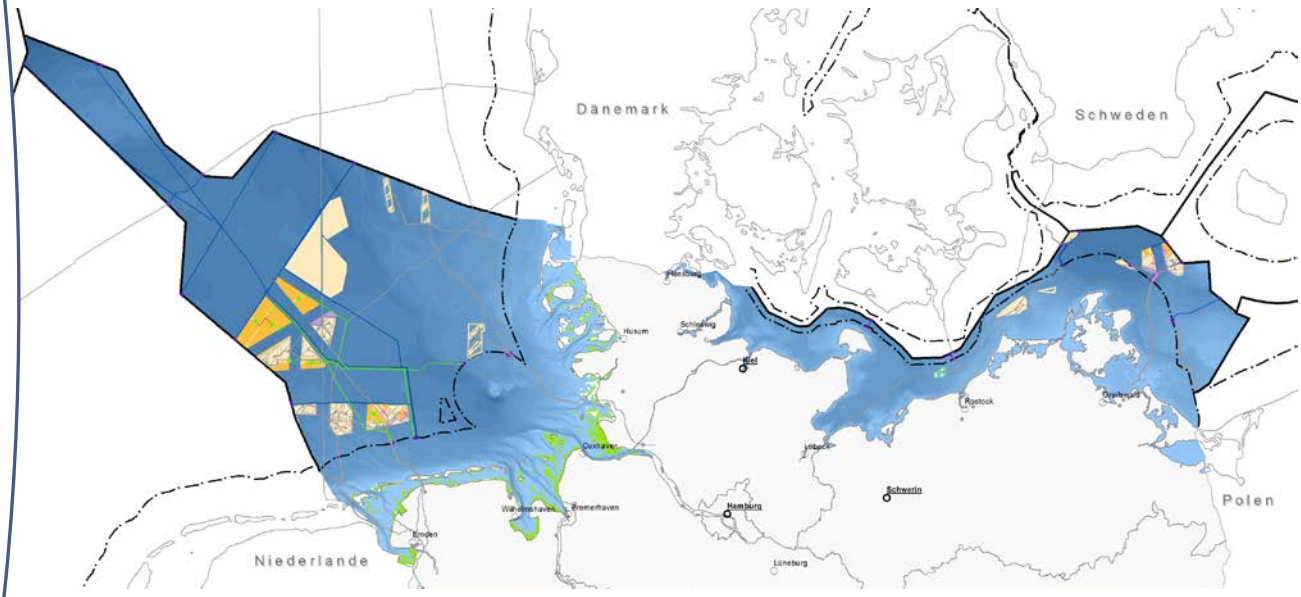
BUNDESAMT FÜR SEESCHIFFFAHRT UND HYDROGRAPHIE

Site development plan 2020 for the German North Sea and Baltic Sea



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BAW	Federal Waterways Engineering and Research Institute
BfN	Federal Agency for Nature Conservation
BFO	Federal Offshore Grid Plan
BFO-N	Federal Offshore Grid Plan North Sea
BFO-O	Federal Offshore Grid Plan Baltic Sea
BGBl	Bundesgesetzblatt [Federal Law Gazette]
BKG	Federal Agency for Cartography and Geodesy
BMI	Federal Ministry of the Interior
BMU	Bundesministerium für Umwelt, Naturschutz und nukleare Sicherheit (Federal Ministry for the Environment, Nature Conservation, and Nuclear Safety)
BMVBS	Federal Ministry of Transport, Building and Urban Affairs
BMVI	Federal Ministry of Transport, Building and Urban Development
BMWi	Bundesministerium für Wirtschaft und Energie (Federal Ministry of Economics and Energy)
BNatSchG	Act concerning nature conservation and landscape management (Federal Nature Conservation Act)
BSH	Federal Maritime and Hydrographic Agency
CCP	Cathodic corrosion protection
DIN	Deutsche Institut für Normung [German Institute for Standardisation]
DIN EN	German Institute for Standardisation, European Standard
EEA	European Environment Agency
EEG	Erneuerbare-Energien-Gesetz (Renewable Energies Act)
EEZ	Exclusive Economic Zone
EIS	Environmental impact study
exp.	expected
FFH	Flora Fauna Habitat
FNA	Federal Network Agency for Electricity, Gas, Telecommunications, Post and Railway
GCP	Grid connection point
GDP	Grid development plan
GDWS	Directorate-General for Waterways and Shipping
GW	Gigawatt
HVDC	High-voltage DC transmission
IMO	International Maritime Organization
kV	Kilovolt
MARPOL	International Convention for the Prevention of Pollution from Ships International Convention for the Prevention of Marine Pollution from Ships, also MARPOL (from marine pollution)
MSFD	Directive 2008/56/EC of the European Parliament and the Council dated 17 June 2008 for the establishment of a Framework for Community Action in the field of Marine Environment (Marine Strategy Framework Directive)
O-GDP	Offshore grid development plan

OSPAR	Oslo-Paris Convention, Convention for the Protection of the Marine Environment of the North-East Atlantic
PlanSiG	Act to ensure proper planning and approval procedures during the COVID 19 pandemic
POD	Porpoise click detectors
PtJ	Project Management Organisation Jülich
R&D	Research and development
ROG	Spatial Planning Act
ROP 2009	Spatial plans for the German EEZ of the North Sea and Baltic Sea
ROP-E 2021	Draft Spatial Plan for the German Exclusive Economic Zone in the North Sea and Baltic Sea 2021
SDP	Site development plan
StUK	Standard
UNCLOS	United Nations Convention on the Law of the Sea
UVPG	Environmental Impact Assessment Act
VGB	Vereinigung der Großkesselbesitzer e.V. (international association of companies from the electricity and heat supply industry)
VSC	Voltage source converter
WHG	Act on the Regulation of the Water System (Federal Water Act)

1 Introduction

Following the publication of the Site Development Plan 2019 (SDP 2019) on 28 June 2019 according to the provisions of the Offshore Wind Energy Act (WindSeeG), an update and amendment has become necessary because of changes in the law and in particular because of the amendment of the WindSeeG[1], which provides for an increased expansion path of 20 gigawatts for offshore wind energy by 2030. The amendment also provides for a long-term target of 40 GW by 2040.

The increase in the expansion target to 20 GW by 2030 is based on the detailed Climate Protection Programme 2030 of the federal government.

The agreement signed on 11 May 2020 between the federal government, the coastal federal states, and the transmission system operators 50Hertz, Amprion, and TenneT on the implementation of 20 GW of offshore wind energy by 2030 also provides for the SDP to be updated by the end of 2020 (Federal Ministry for Economic Affairs and Energy, 2020). This is to be done taking into consideration the spatial plans for the exclusive economic zone, which are currently being updated as well as the spatial plans of the coastal states. This update therefore designates sites for the implementation of 20 GW by 2030.

1.1 The central model

The year 2017 marked a system change in the field of offshore wind energy. On the basis of the Offshore Wind Energy Act (WindSeeG), the Federal Maritime and Hydrographic Agency (BSH) became responsible for the task of central development, and, commissioned by the Federal Network Agency (FNA), for the site investigation into sites suitable for the construction and operation of offshore wind turbines (WT).

The central model describes a tiered planning and tendering process. In the first step, spatial and temporal provisions for offshore wind energy sites are specified in the Site Development Plan (SDP). The next step is the site investigation of the sites designated in the SDP. After the site investigation has been completed, the sites will be auctioned off in a competitive procedure in which the information from the site investigation will be made available to the bidders.

The successful bidder will be able to install wind turbines on the site after the approval procedure, is entitled to the market premium, and may use the corresponding capacity on the grid connection.

The central model applies to the commissioning of offshore wind energy from 2026 onwards.

In the central model, the SDP is thus the controlling planning instrument for the synchronous expansion of wind energy and its offshore grid connections.

The previous Federal Spatial Offshore Grid Plan (BFO) of the BSH for the Exclusive Economic Zone (EEZ) of the North Sea and Baltic Sea and parts of the previous Offshore Grid Development Plan (O-GDP) confirmed by the FNA are incorporated into the SDP. The need for offshore connecting cables will be determined on the basis of the designations of the SDP in the onshore grid development plan (GDP).

[1] Act of 13 October 2016, BGBl I p. 2258, 2310, last amended by Article 1 G to Amendment of the WindSeeG and other regulation of 3 December 2020, BGBl 2682.

1.2 Legal basis of the Site Development Plan

According to Sections 4 et seqq. WindSeeG, the BSH draws up a SDP in consultation with the Federal Network Agency (FNA) and in agreement with the Federal Agency for Nature Conservation (BfN), the Directorate-General for Waterways and Shipping (GDWS) and the coastal states of Germany.

In addition, the provisions of the Renewable Energies Act (EEG 2017[2]) and the Environmental Impact Assessment Act (UVPG[3]) apply.

1.3 Purpose and objectives of the Site Development Plan

According to Section 4, paragraph 1 WindSeeG, the purpose of the SDP is to make offshore grid planning designations for the EEZ of the Federal Republic of Germany. In accordance with an administrative agreement between the Federal Government, represented by the BSH, and the coastal state, the SDP may also make planning designations for the territorial waters.

Section 4, paragraph 2 WindSeeG stipulates that for the expansion of offshore wind installations and the offshore connecting cables required for this purpose, the SDP shall make designations with the objective of

- achieving the expansion targets according to Section 1, paragraph 2, sentence 1 WindSeeG-E, whereby the installed capacity may exceed 20 gigawatts by 2030 (Section 4, paragraph 2, No. 1 WindSeeG-E),
- expanding electricity generation from offshore wind turbines in a spatially ordered and space-saving manner, and
- ensuring the orderly and efficient use and capacity utilisation of the offshore connecting cables and to plan, erect, commission and use offshore connecting cables in parallel with the expansion of electricity generation from offshore wind turbines.

According to Section 4, paragraph 3 WindSeeG, the SDP can make designations for offshore wind turbines and areas for other forms of energy generation that are not connected to the grid with the objective of enabling the practical testing and implementation of innovative concepts for areas for other forms of energy generation not connected to the grid in a spatially ordered and space-saving manner.

The SDP primarily serves to implement the objectives of the WindSeeG.

With regard to the expansion of offshore wind energy, the objective according to Section 1, paragraph 2 WindSeeG-E is to increase the installed capacity of offshore WT connected to the grid to a total of 20 gigawatts by 2030 and to a total of 40 gigawatts by 2040, whereby the capacity installed by 2030 may exceed 20 gigawatts.

1.4 Object of the Site Development Plan

According to the legal mandate of Section 5, paragraph 1 WindSeeG, the SDP contains provisions for the period from 2026 to at least 2030 for the German EEZ and according to the following designations for the territorial waters:

1. areas; in the territorial waters, areas may be designated only if the competent country has designated the areas as a possible subject of the SDP,

[2] Act of 21 July 2014, BGBl. I p. 1066, last amended by Article 6 Coal phase-out Act of 8 August 2020, BGBl. 1818.

[3] In the version of the announcement of 24 February 2010, BGBl. I p. 94, last amended by Article 117 Eleventh Jurisdiction Adjustment Ordinance 19 June 2020 BGBl. 1328.

2. sites in the areas designated according to Number 1; in the territorial waters, sites can be designated only if the competent state has identified the sites as a possible subject of the site development plan,
3. the chronological order in which the designated sites are to be put up for tender according to Part 3 Section 2 WindSeeG, including the designation of the respective calendar years,
4. the calendar years including the quarter in the respective calendar year in which the offshore wind turbines and the corresponding offshore connecting cable are to be commissioned on the specified sites as well as the quarters in the respective calendar year in which the cable of the inner park cabling of the subsidised offshore wind turbines is to be connected to the converter or transformer platform,[4]
5. the expected capacity of offshore WTGs to be installed in the designated areas and on the designated sites,
6. locations of converter platforms, collector platforms and, where possible, substations,
7. routes or route corridors for offshore connecting cables,
8. locations at which the offshore connecting cables cross the boundary between the exclusive economic zone and the territorial waters
9. Routes or route corridors for cross-border power cables,
10. routes or route corridors for possible connections between the installations, routes, or route corridors mentioned in Numbers 1, 2, 6, 7, and 9, and
11. Standardised technology principles and planning principles

The SDP may also determine the following according to Section 5, paragraph 2 WindSeeG:

- testing grounds close to the coast and outside stipulated areas up to a total of no more than 40 square kilometres; testing grounds can only be designated in the territorial waters if the federal state has designated the area as a possible subject of the SDP and at least partially for test purposes; if a testing ground is actually not used or is only used to an insignificant extent, a subsequent SDP may lift the designation of the testing ground and designate areas and sites instead,
- the calendar years in which pilot offshore wind turbines and the corresponding test field connecting cable are to be commissioned for the first time on the designated test fields, and
- the capacity of the corresponding test field connecting cable;
- for areas in the exclusive economic zone and in the territorial waters, identify available grid connection capacities on existing offshore connecting cables or on offshore connecting cables to be completed in the following years; these may be allocated to pilot offshore wind turbines according to Section 70, paragraph 2.

In addition, according to Section 5, paragraph 2a, sentence 1 WindSeeG, areas for other forms

[4] In addition, the SDP may specify essential intermediate steps for the joint implementation schedule according to Section 17d, paragraph 2 EnWG in accordance with Section 5, paragraph 1, No. 4, sentence 2 WindSeeG.

of energy generation outside areas may be defined for a total of 25 to 70 square kilometres and spatial as well as technical specifications for installations for other forms of energy generation installations may be made for lines or cables that discharge energy or energy carriers from them or, in the event of a shortage of routes, exclude such lines or cables.

According to Section 4, paragraph 1, sentence 2 WindSeeG, offshore grid planning designations for the territorial waters may be made for areas, for sites, the chronological order of calls for tenders for the sites, the calendar years of commissioning and the expected output to be installed as well as for testing grounds and areas for other forms of energy generation. In accordance with an administrative agreement between the Federal Government, represented by the Federal Maritime and Hydrographic Agency, and the responsible federal state, the individual designations for the territorial waters are defined in more detail.

2 Process for the expansion of offshore wind energy

Under WindSeeG, a new procedure for the expansion of offshore wind energy has been introduced for offshore wind turbines that will be commissioned from 2026. Various planning cascades have to be passed through, from the overall development of the sites through to the approval procedure for the wind turbines and connecting cables.

First of all, the SDP makes sectoral planning designations for the development of offshore wind turbines and offshore connecting cables in the EEZ according to Section 4 et seqq. WindSeeG.

The objective of designating the chronological order of realisation of the sites is that from 2026 onwards, offshore wind turbines will be commissioned in these areas and at the same time the offshore connecting cables required to connect these sites will be completed so that the existing offshore connecting cables are used efficiently and at full capacity.

In the next stage, the sites according to Sections 9 et seqq. WindSeeG will be preliminarily investigated. This relates to investigations of the marine environment, preliminary exploration of the subsoil and the wind and oceanographic conditions for the site under investigation.

This is intended to speed up the subsequent planning approval procedure for offshore wind turbines on these sites.

Based on the results of the site investigation, the suitability of the sites for the tender will then be examined.

Once the suitability has been determined, the information including the results of the investigation and the designation of the capacity to be installed will be determined by statutory order and forwarded to the FNA.

The FNA will then invite tenders for the sites, for the competitive determination of the market premium and publish the results of the investigations and information determined in the course of the site investigations (cf Sections 14 et seqq. WindSeeG). Only the successful bidder can later submit an application for planning approval for the construction and operation of offshore wind farms on the respective site. The acceptance of the bid is also associated with a claim for the connection of the wind turbines to the offshore connecting cable specified in the SDP and the allocated grid connection capacity on the connecting cable.

After the contract has been awarded in the tender procedure, the successful bidder or the correspondingly entitled party can submit an application for planning approval according to Sections 44 et seqq. WindSeeG. At this level of the planning cascade, the BSH examines whether a specific project is eligible for approval. If all prerequisites are met and the result of the assessment is positive, the procedure concludes with issuing of the planning approval decision.

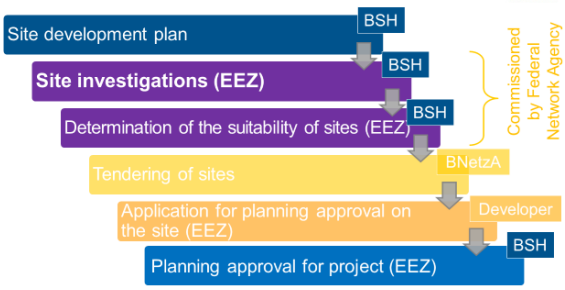


Figure 1: The site development plan in the overall system of the central model for the area of the German EEZ of the North Sea and Baltic Sea

With regard to the territorial waters, please refer to Chapter 5.4.

2.1 Site development plan

Section 6 WindSeeG regulates the procedure for setting up the SDP from the announcement of the initiation of the procedure to the announcement of the completed plan.

2.1.1 Competence

According to Section 6 WindSeeG, the BSH is responsible for preparing the SDP.

2.1.2 Initial installation

In 2018 and 2019, the BSH established the SDP for the first time and carried out a Strategic Environmental Assessment. The SDP 2019 was publicly announced on 28 June 2019.

2.1.3 Update/amendment

In accordance with Section 8, paragraph 1 WindSeeG, the SDP may be amended or updated on the basis of a proposal by the BSH or the FNA, whereby the decision on the time and scope of a procedure for amendment or update shall be taken by mutual agreement between the BSH and the FNA.

The SDP shall be amended or updated in accordance with Section 5 WindSeeG if the objectives according to Section 4 WindSeeG require the designation of other or additional areas and sites or a change in the chronological order of the site investigation of the sites, for example because the investigated sites were found to be unsuitable.

Irrespective of this, it is to be updated at least every four years (cf Section 8, paragraph 2, sentence 1 WindSeeG).

This update/amendment of the SDP consisted of the following procedural steps:

As a first step in this process, the BSH, in agreement with the FNA, publicly announced the initiation of the update and amendment of the SDP (SDP 2020) and the expected scope of the update and amendment on 19 June 2020. In addition, a preliminary draft for the SDP 2020 and the drafts for the scope of investigation (North Sea and Baltic Sea) were prepared as part of the Strategic Environmental Assessment.

There was an opportunity for authorities and the public to comment on the consultation documents until 20 July 2020.

In addition, a public hearing on the preliminary draft of the Site Development Plan 2020, the drafts of the scope of investigation, and the comment of the transmission system operator took place on 11 August 2020.

On 1 September 2020, the scope of investigation for the environmental reports were determined as part of the Strategic Environmental Assessment.

Based on the results of the consultation and the hearing date, the draft of SDP 2020 and the draft environmental reports were prepared and published on 4 September 2020.

Authorities whose remit is affected had the opportunity to comment on the draft documents until 8 October 2020; the public had the opportunity to comment on them until 5 November 2020.

A hearing on the draft documents, comments, and remarks was held on 18 November 2020.

The North Sea and Baltic Sea littoral states were informed of the start, process, and expected conclusion of the procedure in a letter dated 18 September 2020.

In particular, they had the opportunity to comment on the draft documents or the summary in the respective required official language during the period from 13 October 2020 to 10 December 2020.

Coordination according to Sections 8, paragraph 4, 6 paragraph 7 WindSeeG with the coastal federal states, the BfN, and the GDWS has taken place.

In a letter dated 16 December 2020, the FNA granted the consent to the SDP required according to Sections 8, paragraph 4, 6 paragraph 7 WindSeeG.

The SDP 2020 and the environmental reports for the North Sea and Baltic Sea in the context of the Strategic Environmental Assessment were published on 18 December 2020.

The following summary presents the individual procedural steps in the update of the SDP.

Overview of the procedural steps

- Announcement of the initiation, the expected scope, and the expected conclusion of the process
- Preparation of the preliminary draft and draft of the scope of investigation
- Opportunity for authorities and the public to comment on the draft
- Notification of the North and Baltic Sea littoral states
- Delivery of the joint comment of the TSO
- Hearing date, if applicable in accordance with Section 5, paragraph 6 PlanSiG
- Designation of the scope of investigation
- Preparation of the draft SDP and draft environmental report (SEA)
- Participation of authorities and public (national and international)
- hearing, if necessary in accordance with Section 5, paragraph 1 PlanSiG
- Review of the environmental report taking into consideration national and international comments
- Consideration of the review in the draft SDP
- Coordination with the BfN, the GDWS, and the coastal states
- Establishing agreement with the FNA
- Announcement of the SDP and the environmental reports by the end of 2020
- Sending of a summary statement to those North and Baltic Sea littoral states involved

2.1.4 Coordination requirements

In accordance with Sections 8, paragraph 4, sentence 2, 6, paragraph 7 WindSeeG, the update of the SDP takes place in consultation with the BfN, the GDWS and the coastal states.

2.1.5 Requirement for agreement

The SDP shall be updated in agreement with the FNA in accordance with Sections 8, paragraph 4, sentence 2, 6 paragraph 7 WindSeeG.

2.2 Offshore site investigations

In detail, the following steps are provided for by law:

Summary of the procedural steps

- Notification of the opening of the procedure
- Consultation meeting
- Designation of the scope of investigation
- Preparation of information on the marine environment, preliminary exploration of the subsoil and wind and oceanographic conditions
- Suitability assessment and determination of the power to be installed
- Determination of suitability by a statutory instrument
- Interpretation of the documents according to Section 44, paragraph 2 UVPG
- Transmission of information to the FNA

2.3 Tender of sites

For sites that have been determined to be suitable, the FNA determines the value to be applied for the market premium and the respective beneficiary for this in a tender. The FNA is responsible for this according to Sections 16 et seqq. WindSeeG.

2.4 Planning approval of offshore wind turbines connected to the grid

Once the FNA has awarded the contract from the calls for tenders, applications for planning approval can be submitted for the site to which the plan relates in accordance with Section 46, paragraph 1 WindSeeG. According to Section 45, paragraph 2 WindSeeG, the BSH is the competent authority for the hearing, planning approval and planning authorisation procedure.

2.5 Interfaces with other network planning instruments

In the following, the interfaces with the other network planning instruments of are presented with reference to the SDP.

2.5.1 Scenario framework

2.5.2 Grid development plan

2.5.3 Federal requirements plan

2.5.4 Ten-Year Network Development Plan

2.5.5 Federal Spatial Offshore Grid Plan (BFO)

2.5.6 Further interfaces with network planning instruments

2.6 Existing maritime spatial planning and offshore grid planning

2.6.1 Exclusive economic zone

Since 2004, there has been a legal basis for the preparation of maritime spatial plans for the German EEZ (see Chapter 2.6.1.2).

In the course of the resolutions on the energy system transformation in June 2011 and the associated changes in legislation, the BSH was given the task of drawing up and regularly updating a sectoral plan for offshore power grids in the German EEZ, the Federal Spatial Offshore Grid Plan (see Chapter 2.6.1.1).

2.6.1.1 Federal Spatial Offshore Grid Plans

The task of spatial offshore grid planning is now performed by the SDP with additional tasks, particularly with regard to the designation of the chronological order of realisation of sites for offshore WT and offshore connecting cables. Please refer to Chapters 2.1 and 2.5.

The first Federal Spatial Offshore Grid Plan for the EEZ of the North Sea 2012 was published on 22 February 2013. The first Federal Offshore Grid Plan for the EEZ of the Baltic Sea 2013 followed on 7 March 2014. Both plans were last updated for the years 2016/2017. The designations of both plans apply to projects in the transitional system. These are projects with WT that will be in operation until 2026 and which, in accordance with the provisions of the WindSeeG, have been awarded a contract in the framework of tenders for existing projects.

2.6.1.2 Maritime Spatial Plans

For sustainable spatial development in the German EEZ of the North Sea and Baltic Sea, the BSH is carrying out the preparatory steps for the update of the maritime spatial plans on behalf of the BMI. As early as 2009, the BSH drew up the spatial plans (ROP 2009) for the German EEZ of the North Sea and Baltic Sea on behalf of the then Federal Ministry of Transport, Building and Urban Affairs (BMVBS).

The Ordinance of the BMVBS on maritime spatial planning in the German EEZ in the North Sea

of 21 September 2009 (BGBl. I p. 3107) entered into force on 26 September 2009. On 19 December 2009, the Ordinance of the BMVBS on Spatial Planning in the German EEZ in the Baltic Sea of 10 December 2009 (BGBl p. 3861) came into force.

Where maritime spatial planning is concerned, the international provisions of the United Nations Convention on the Law of the Sea (UNCLOS), in particular, must be observed. In addition to the scientific and economic use of the oceans, the interests of shipping and nature conservation are particularly relevant. With regard to offshore wind energy, both spatial plans include objectives and principles of spatial planning for offshore wind energy (3.5) and submarine cables (3.3).

In the process of preparing the maritime spatial plans, a Strategic Environmental Assessment was also carried out to identify, describe and evaluate the various significant environmental impacts on the protected assets.

The existing plans are currently in the process of being updated (see background information below).

Background information: Status of the update procedure of the spatial plans for the German EEZ in the North Sea and Baltic Sea

The Federal Ministry of the Interior began updating the maritime spatial plans for the German EEZ in the North Sea and Baltic Sea in summer 2019 when it informed the public and the public bodies affected in their interests of the update to the spatial plans according to Section 9, paragraph 1 ROG. Public bodies had the opportunity to provide information on the plans and measures they intend to implement or have already implemented as well as on their timing and to make relevant information available.

Technical discussions and workshops on relevant sectors and protection interests followed in autumn 2019. In January 2020, the concept for the further development of the Spatial Plans was published, which set out conceivable solutions through three planning options with different priorities. This was intended to facilitate early participation and exchange on requirements, possible conflicts, but also synergies and approaches to solutions - as a basis for the preparation of a comprehensive draft plan. The first draft plan was published on 25 September 2020 (ROP-E 2021). The relevant public bodies and the public were given the opportunity to comment on the draft documents up to and including 5 November 2020. The draft documents were discussed on 24 and 25 November 2020. Completion of the revision process is planned for 2021.

Because of the parallel processes of the spatial plans and the SDP, they are interlinked in order to ensure the consistency of the designations of the respective plan within the framework set in each case. An essential topic of the draft spatial plan is the adaptation of the priority area as well as the original reservation area for shipping (shipping route 10) to real shipping traffic because this allows for an extension of Areas N-9 to N-13 in a north-westerly direction by about 7.5 km to about 8.5 km.

Further information can be found on the website[5] of the BSH.

[5] cf https://www.bsh.de/DE/THEMEN/Offshore/Meeresraumplanung/Fortschreibung/fortschreibung-raumordnung_node.html

2.6.2 Lower Saxony

2.6.3 Schleswig-Holstein

2.6.4 Mecklenburg-Western Pomerania

3 Starting position

3.1 Current expansion status

Since 2009, OWF along with the associated connecting cables have been constructed and operated in the German territorial waters and in the German exclusive economic zone of the North Sea and Baltic Sea.

By the end of 2020, **offshore wind turbines** with a total capacity of about 7.7 GW had been erected and commissioned.

Table 1: Overview of offshore connecting cables until the end of 2025 and connected offshore wind farm projects

Connecting cables by the end of 2025	Transmission capacity	Offshore wind farm projects connected by the end of 2025
North Sea		
NOR-0-1 (Riffgat)	113 MW	Riffgat
NOR-0-2 (Nordergründe)	111 MW	Nordergründe
NOR-1-1 (DolWin5/epsilon)	900 MW	Borkum Riffgrund West II, OWF West, Borkum Riffgrund West I
NOR-2-1 (alpha ventus)	62 MW	alpha ventus
NOR-2-2 (DolWin1/alpha)	800 MW	Borkum Riffgrund 1, Trianel wind farm Borkum
NOR-2-3 (DolWin3/gamma)	900 MW	Borkum Riffgrund 2, Merkur Offshore
NOR-3-1 (DolWin2/beta)	916 MW	Gode Wind 01, Gode Wind 02, Nordsee One
NOR-3-3 (DolWin6/kappa)	900 MW	Gode Wind III, Gode Wind 04
NOR-4-1 (HelWin1/alpha)	576 MW	Meerwind South/East, North Sea East
NOR-4-2 (HelWin2/beta)	690 MW	Amrumbank West, KASKASI II
NOR-5-1 (SylWin1/alpha)	864 MW	Butendiek, Dan Tysk, Sandbank
NOR-6-1 (BorWin1/alpha)	400 MW	BARD Offshore 1
NOR-6-2 (BorWin2/beta)	800 MW	Albatros, Deutsche Bucht, Veja Mate
NOR-7-1 (BorWin5/epsilon)	900 MW	EnBW He Dreiht
NOR-8-1 (BorWin3/gamma)	900 MW	EnBW Hohe See, Global Tech I
Baltic Sea		
OST-3-1 (Baltic1)[6]	51 MW	EnBW Baltic1, EnBW Baltic 2, GICON-SOF
OST-3-2 (Baltic2)[11]	339 MW	
OST-1-1 (Ostwind 1)	250 MW	Arkona-Becken Südost, Wikinger, Wikinger Süd
OST-1-2 (Ostwind 1)	250 MW	
OST-1-3 (Ostwind 1)	250 MW	
OST-2-1 (Ostwind 2)	250 MW	ARCADIS Ost I
OST-2-2 (Ostwind 2)	250 MW	Baltic Eagle
OST-2-3 (Ostwind 2)	250 MW	

[6] Connection system OST-3-2 is based on connection system OST-3-1 so that the specified transmission capacity of 339 MW comprises the total transmission capacity of both connection systems (see O-GDP 2030, version 2017, p. 30, footnote 16).

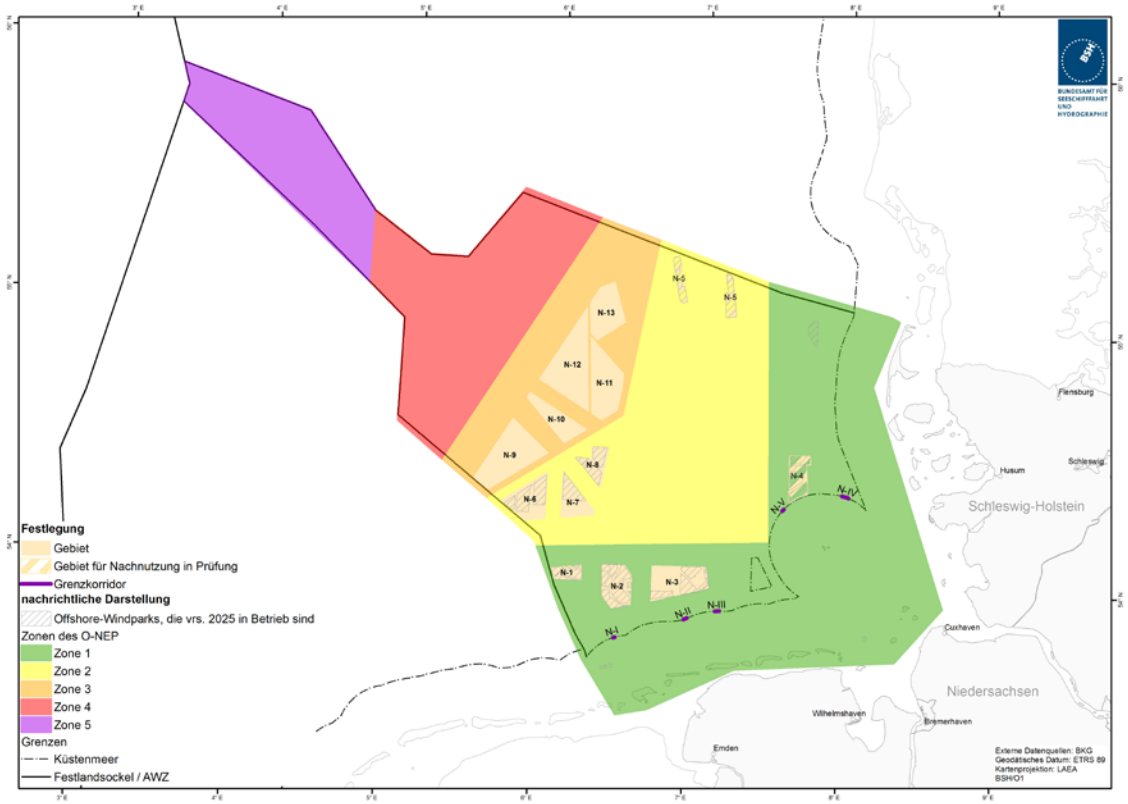


Figure 2: Offshore wind farms in the German EEZ of the North Sea expected to be operational by the end of 2025 as well as gates to the territorial waters and the zoning of the O-GDP for the North Sea.

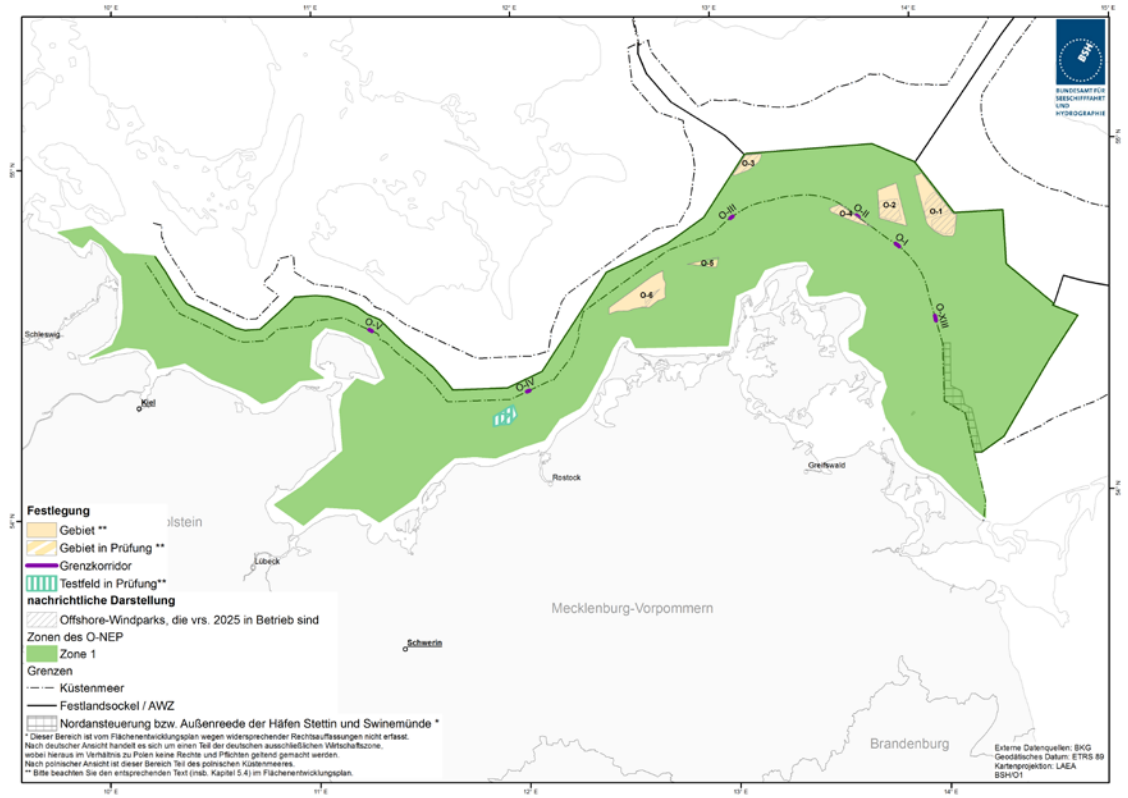


Figure 3: Offshore wind farms in the German EEZ of the Baltic Sea, which are expected to be in operation by the end of 2025 as well as gates to the territorial waters and the zoning of the O-GDP for the Baltic Sea

3.2 Statutory expansion path for offshore wind energy

Offshore wind energy was already of particular importance after the German government's climate protection strategy for the expansion of offshore wind energy use in 2002.

According to the most recent reform of the WindSeeG, the objective is to increase the installed capacity of offshore wind turbines connected to the grid to a total of 20 gigawatts by 2030 and to a total of 40 gigawatts by 2040 according to Section 1, paragraph 2 WindSeeG.

4 Guidelines and basic principles

4.1 Introduction

The designation of planning principles and standardised technology principles for the EEZ of the North Sea and Baltic Sea is a mandatory prerequisite for the concrete determination of the space requirements of the entire grid topology within the SDP. The objective of designating standardised technology principles and planning principles is to create a basis for systematic and coordinated overall planning. Otherwise, it would not be possible to determine the required space requirement with the necessary precision for the most space-saving planning possible. In addition to determining the space requirement as precisely as possible, standardised technical principles also help to ensure cost efficiency and the demand-oriented expansion of connecting cables, which is in the interests of the national economy.

4.2 Connection concepts

With regard to the technical connection concepts, the SDP distinguishes between the North Sea and the Baltic Sea.

4.2.1 Standard concept North Sea: DC system

The standard concept in the North Sea is a DC system. Please refer to Chapter 4.3.1.

In principle, the length of the line connecting a site or an area to the grid connection point (GCP) onshore appears to be the decisive factor in the selection of the appropriate transmission technology for the grid connection of OWF. For route lengths of more than 100 km, additional installations for power factor correction must regularly be provided for AC connections. The transmission losses also increase with the length of the cable system. With HVDC transmission, these losses are significantly lower. For the EEZ of the North Sea, route lengths of more than 100 km are to be expected in the future with increasing distance from the coast also significantly more.

When using HVDC transmission, several OWF can in principle be connected because of the relatively high system performance of the collective connection with an HVDC grid connection system – consisting of a converter platform and a DC submarine cable system. Compared to a connection using AC technology, a significantly smaller number of cable systems is required and the space required for the cable systems is thus reduced.

The grid connections of OWF in the EEZ of the North Sea are thus carried out in HVDC as standard; reference is made to the summary presentation of the connection concept in Figure 4.

4.2.1.1 DC system: connection between converter platform and offshore wind farms: Standard concept 66 kV

In the 66 kV direct connection concept, the lines connecting the converter platform to the offshore wind turbines (farm-internal cabling) are designed on the basis of AC technology with a voltage of 66 kV. This eliminates the transformer platform and the 155 kV or 220 kV intermediate voltage level between the transformer and converter platform. From the converter platform, a connection to the onshore GCP is made by means of DC transmission. However, despite the possible omission of a transformer platform, a separate platform may be required for maintenance and accommodation purposes of the OWF.

In view of the areas to be considered from 2026 (see Chapter 5.1) and the close proximity of sites in these areas, the 66 kV direct connection concept appears to be advantageous compared with the connection concept with a transformer platform from a spatial as well as environmental and nature conservation point of view. In addition, a

study commissioned by the TSO showed that the 66 kV direct connection concept is more cost-efficient as an overall concept than the connection concept with a transformer platform (at a voltage of 155 kV).

4.2.1.2 DC system: connection between converter platform and offshore wind farms: Alternative concept 220 kV

If at least two sites to be connected are located far away from each other in an area, the connection concept with transformer platform of the BFO-N 16/17 can be advantageous because a smaller number of submarine cable systems is required, and the increased voltage results in fewer transmission losses than with the 66 kV direct connection concept. However, in order to further reduce transmission losses and the number of submarine cables required, a connection using the 220 kV voltage level is specified as an alternative to the 66 kV direct connection concept.

4.2.1.3 DC system: interface between TSO and OWF project developer

The responsibility for connecting the WT to the converter platform lies with the OWF project developer. The primary interface or ownership boundary between TSO and OWF project developer is the inlet of the 66 kV submarine cable systems on the converter platform (cable termination of the 66 kV submarine cables).

The 66 kV submarine cable systems on the platform are pulled in according to the direct pull-in concept[7], according to which the submarine cable systems are routed by the OWF project developer to the gas-insulated switchgear (GIS).

For the connection of the 66 kV submarine cable, the OWF project developer shall ensure a free usable length (from cable hang-off) of the submarine cable after direct pull-in on the platform of a maximum of 15 m. The dimensioning of the free usable length of the submarine cable required in individual cases shall be carried out according to the requirements of the TSO.

Summary

- Designation of the 66 kV connection concept as the standard for the EEZ of the North Sea
- Deviation from the standard concept is possible in the event of spatial requirements in an area
- If deviation is necessary, designation of the connection concept of BFO-N 16/17 with a transmission voltage of 220 kV
- Cable termination of the 66 kV submarine cable systems serves as an interface between the transmission system operator and the OWF project developer

4.2.2 Standard concept Baltic Sea: AC system

The TSO, which is obliged to connect the OWF in the Baltic Sea to the grid, has so far pursued a connection concept based on AC technology. When AC technology is used, OWF are connected to the grid by combining the electricity generated by the individual wind turbines of one or more farms at a transformer platform. From there, it is fed directly to shore and on to the GCP via an AC submarine cable system. In contrast to the standard concept in the North Sea

[7] *The direct feed procedure is defined as direct feed of the cable onto the platform up to the GIS or pre-installed connector.*

(HVDC), this means that no separate converter platform is required for the grid connection itself. However, in order to dissipate a given power output, a higher number of cable systems is necessary when using AC technology because of the lower transmission capacity of AC submarine cable systems. Because of the low wind farm capacity in the German EEZ of the Baltic Sea expected for commissioning from 2026 onwards compared to the capacity of an HVDC transmission system, a connection by means of a DC system would probably lead to permanent vacancies. Thus, offshore connecting cables in the Baltic Sea will be designed according to the connection concept known from the BFO-O 16/17 on the basis of AC technology. Please refer to the summary of the connection concept in Figure 5.

4.2.2.1 AC system: Connection between transformer platform and offshore wind farms: Standard concept 66 kV

In the AC connection concept in the Baltic Sea, the lines connecting the transformer platform to the offshore wind turbines (park-internal cabling) are designed on the basis of AC technology with a voltage of 66 kV. From the transformer platform, a connection to the onshore GCP is made by means of AC transmission.

4.2.2.2 AC system: interface between TSO and OWF project developer

The responsibility for connecting the WT to the transformer platform lies with the OWF project developer. The primary interface or ownership boundary between TSO and OWF project developer is the inlet of the 66 kV submarine cable systems on the transformer platform (cable termination of the 66 kV submarine cables).

The 66 kV submarine cable systems on the platform will be pulled in according to the direct pull-in concept[8] according to which the submarine cable systems will be routed by the OWF project developer to the gas-insulated switchgear (GIS).

For the connection of the 66 kV submarine cable, the OWF project developer shall ensure a free usable length (from cable hang-off) of the submarine cable after direct pull-in on the platform of a maximum of 15 m. The dimensioning of the free usable length of the submarine cable required in individual cases shall be carried out according to the requirements of the TSO.

Summary

- Designation of the AC connection concept as standard for the EEZ of the Baltic Sea
- Responsibility for planning, construction and operation of the transformer platform and submarine cable system of the transmission system operator
- Cable termination of the 66 kV submarine cable systems serves as interface between transmission system operator and OWF project developer; voltage level of the park-internal submarine cable systems is 66 kV

[8] *The direct feed procedure is defined as direct feed of the cable onto the platform up to the GIS or pre-installed connector.*

4.3 Standardised technology principles

4.3.1 DC system North Sea

For the grid connection of the OWF in the North Sea for the EEZ area, a connection concept based on HVDC is used analogous to the previous grid connections (please refer to chapter 5.2.1).

4.3.1.1 DC system: Self-guided technology

The existing grid connection systems in the North Sea and those planned within the framework of the SDP will be constructed using self-guided (VSC - voltage sourced converter) technology.

4.3.1.2 DC system: Transmission voltage ± 320 kV for Zones 1 and 2; transmission voltage ± 525 kV for Zone 3

The existing grid connection systems in Zones 1 and 2 of the North Sea and those planned as part of the SDP are designed with a transmission voltage of ± 320 kV. For future grid connection systems for the offshore sites in Zone 3, a transmission voltage of ± 525 kV is specified starting with Area N-9.

4.3.1.3 DC system: Standard capacity of 900 MW for Zones 1 and 2; standard capacity 2,000 MW for Zone 3

A standard transmission capacity of 900 MW is set for HVDC systems in Zones 1 and 2 of the EEZ of the North Sea. In Zone 3 of the EEZ of the North Sea, a standard transmission capacity of 2,000 MW is set for the offshore connection systems.

4.3.1.4 DC system ± 525 kV: Version with metallic return conductor

HVDC systems with a transmission voltage of ± 525 kV and a transmission power of 2,000 MW are to be designed as a bipole with a metallic return conductor in order to increase reliability and improve controllability.

4.3.1.5 DC system ± 320 kV: Connection on the converter platform/switch bays to be provided

For a connected load of 900 MW to 1,000 MW, 14 switch bays and J-Tubes each are to be provided and made available by the transmission system operator.

4.3.1.6 DC system ± 525 kV: Connection on the converter platform/switch bays to be provided

For a connected load of 1,000 MW, 14 switch bays and J-Tubes each are to be provided and made available by the transmission system operator.

4.3.1.7 DC system ± 525 kV: Prerequisites for interconnections/switch bays to be provided

In order to ensure a possible AC connection between platforms, two switch bays with the transmission voltage ± 525 kV must always be provided on each converter platform.

4.3.1.8 DC system: 66 kV direct connection concept

As explained in Chapter 4.2.1.1 the 66 kV direct connection concept is defined as the standard connection concept for connecting offshore wind turbines to the converter platform. The connections are made in AC technology with a transmission voltage of 66 kV.

Summary

- Design of the HVDC transmission systems in self-commutated VSC technology
- Standard transmission voltage: ± 320 kV in Zone 1 and 2; ± 525 kV in Zone 3
- Standard transmission capacity: 900 MW in Zones 1 and 2; 2,000 MW in Zone 3

- Design of the DC systems ± 525 kV with metallic return conductor
- DC system: Provision of 14 switch bays and J-tubes for each 900 MW to 1,000 MW OWF connection capacity
- DC system ± 525 kV: Create conditions for interconnections by providing two switch bays per platform
- Connection of offshore wind turbines to the converter platform in 66 kV AC technology

4.3.2 AC system Baltic Sea

For the grid connection of the OWF in the Baltic Sea for the EEZ area, a connection concept based on AC technology will be used analogous to the design of the previous grid connections (please refer to Chapter 4.2.2).

4.3.2.1 AC system: Transmission voltage 220 kV

The existing grid connection systems in the Baltic Sea and those planned as part of the SDP will be designed with a transmission voltage of 220 kV using AC technology.

4.3.2.2 AC system: Standard output 300 MW

A standard capacity of 300 MW is specified for the AC systems in the Baltic Sea.

AC systems currently in operation and under construction in the Baltic Sea have a transmission power of 250 MW at a transmission voltage of 220 kV. During the consultations on the preliminary draft and draft of SDP 2019, it was argued that projects with transmission powers of 350 MW to 400 MW at the same transmission voltage were already being implemented internationally. On the other hand, the TSO responsible for the Baltic Sea points out that no operational experience is available for these power ranges and that, in addition, restrictions under planning law such as the 2 K criterion (cf planning principle 4.4.4.8) have to be taken into account, especially in view of the heterogeneous soil conditions prevailing in the Baltic Sea.

4.3.2.3 AC system: Connection on the transformer platform/switch bays to be provided

For a connection capacity of 300 MW, five switch bays and J-tubes each (which serve to connect offshore wind farms) are to be provided and made available by the transmission system operator.

Summary

- Standard transmission voltage 220 kV
- Standard transmission capacity 300 MW
- Provision of five switch bays and J-tubes for each 300 MW OWF connection capacity

4.3.3 Cross-border submarine cable systems

4.3.3.1 Bundled DC submarine cable system

Cross-border submarine cable systems are to be realised in HVDC. Because of the limited space available, cross-border submarine cable systems must also be designed with the highest possible transmission capacity. The connections are to be made with outgoing and return conductors, which are laid in bundles so that the magnetic fields of the conductors largely compensate each other.

4.3.3.2 Consideration of overall system

The planning and installation of cross-border submarine cable systems shall take into consideration the various designations of this plan, in particular for the grid connection of OWF.

Table 2: Overview of the standardised engineering principles

Standardised technology principles	North Sea		Baltic Sea
	Zone 1 and 2	Zone 3	Zone 1
Network connection system			
Standard connection concept	Direct current (DC)	Direct current (DC)	AC alternating current (AC)
Converter technology	Self-guided (VSC converter)	Self-guided (VSC converter)	–
Standard transmission voltage	± 320 kV DC	± 525 kV DC	220kV AC
Standard transmission capacity	900 MW	2,000 MW	300 MW
Execution of the DC system	*Not applicable*[1)]	with metallic return conductor	*Not applicable*[1)]
Number of switch bays and J-Tubes to be provided according to OWF connection capacity	per 900 MW to 1,000 MW: 14	per 2,000 MW: 28	per 300 MW: 5
Number of switch bays to be provided per connection	*Not applicable*[1)]	2	*Not applicable*[1)]
Cable laying	*Bundled cable laying*	*Bundled cable laying*	*Bundled cable laying*
Connection to offshore wind farm			
Standard connection concept	Direct connection without transformer platform (AC)	Direct connection without transformer platform (AC)	Direct connection (AC)
Standard transmission voltage	66 kV	66 kV	66 kV
Alternative concept	Connection via transformer platform	Connection via transformer platform	*Not applicable*
Transmission voltage Alternative concept	220 kV	220 kV	*Not applicable*
Cross-border submarine cable systems			
Transmission technology	Direct current (DC)		
Cable laying	Bundled cable laying		

[1)] Because the designation in question relates only to the ± 525 kV DC system, it is not applicable in zones 1 and 2 of the North Sea and in the Baltic Sea.

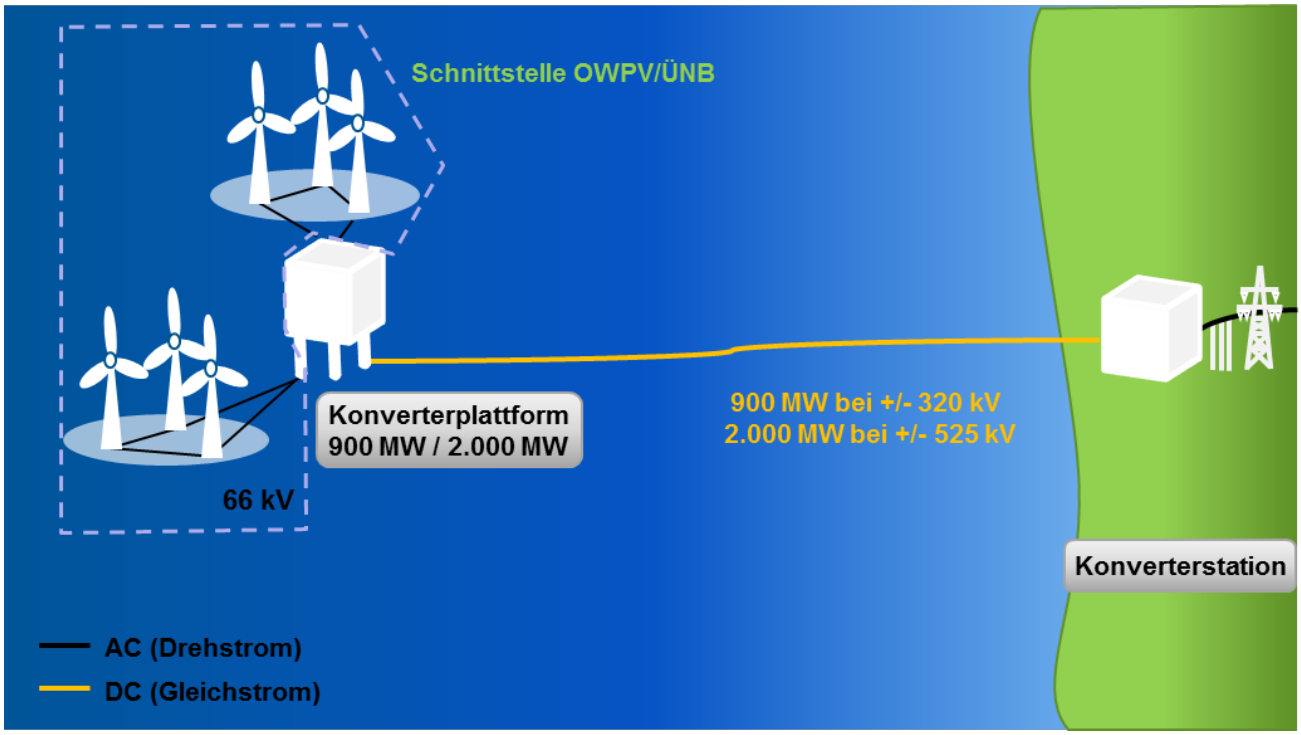


Figure 4: Schematic representation of the connection concept for the North Sea.

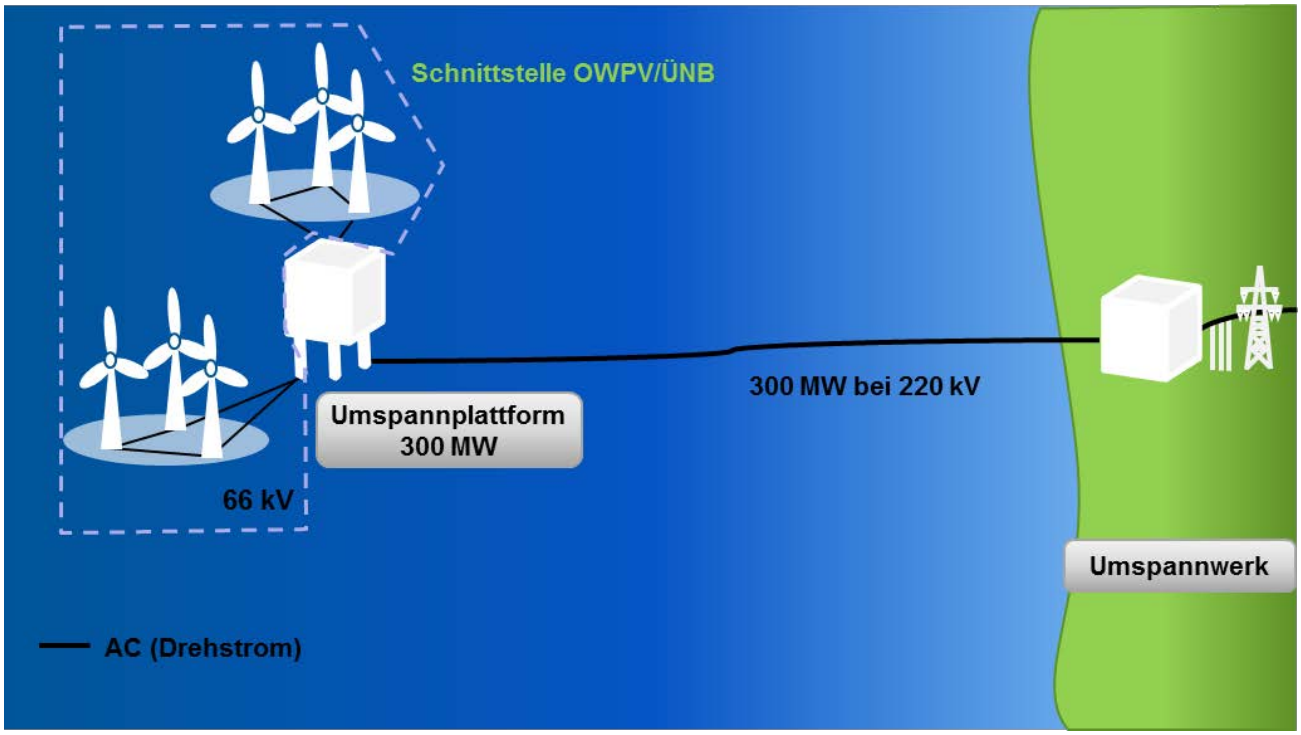


Figure 5: Schematic representation of the connection concept for the Baltic Sea.

4.4 Planning principles

In accordance with Section 5, paragraph 1, No. 11 WindSeeG, the SDP contains designations on planning principles.

The planning principles apply to the German EEZ and are based on the objectives and principles of the spatial plans for the German EEZ. These are currently being updated. The designations made within this framework will be observed and taken into account in the update of the SDP. For the current status of the update of the spatial plans for the German EEZ, please refer to Chapter 2.6.

4.4.1 General principles

The following are planning principles for offshore wind turbines, platforms, submarine cable systems, and installations for other forms of energy generation.

Summary

- Overall temporal coordination of the construction and installation work
- The safety and efficiency of shipping traffic must not be adversely affected
- The safety and ease of air transport must not be adversely affected
- Security and national and NATO defence must not be adversely affected
- Dismantling obligation and security deposit
- Consideration of all existing, authorised and specified uses
- Consideration of cultural assets
- Noise mitigation
- Minimisation of scour and cable protection
- Consideration of regulatory standards, specifications and concepts
- Emission mitigation
- Consideration of explosive ordnance sites
- Installation of sonar transponders

4.4.1.1 Overall time coordination of the construction and installation work

To avoid or mitigate cumulative impacts, overall time coordination of the construction and installation work is to be planned, taking into consideration the project-specific framework conditions.

For laying cable systems that are in spatial proximity to each other, the aim is to achieve overall coordination in terms of time. In this way, the number of interventions can be reduced, and possible cumulative impacts avoided or mitigated.

In order to reduce the impacts on the marine environment, the construction of wind turbines, platforms, submarine cable systems, and installations for other forms of energy generation in close proximity to each other should be coordinated in the same way.

This also includes the reduction of shipping traffic for construction and operation and the associated adverse acoustic and visual effects to a minimum through optimal construction and time planning.

4.4.1.2 No adverse effect of the safety and ease of shipping traffic

The construction and operation of offshore wind turbines, platforms, submarine cables, and installations for other forms of energy generation may not adversely affect the safety and ease of shipping traffic.

In order to ensure the safety of shipping as well as the integrity of the installations, safety zones

are established around the installations according to Section 53 WindSeeG - in particular in the case of adjacent priority or reservation areas for shipping. These are usually 500 m around the wind turbine, platform, or installation for other forms of energy generation. Within the defined areas, the safety zone shall be defined in such a way that it is contiguous and gaps are avoided. The safety zone is to be established outside the priority and reservation areas for shipping (spatial plan for the Baltic and North Sea EEZ).

The safety zone has the effect that commercial shipping does not take place in these areas and that proper shipping operated according to the rules of good seamanship continues to be generally possible without danger. The respective safety zone of the offshore WT and platforms is regularly established jointly. Please refer to the responsibility of the GDWS in this respect for the installation of safety zones as well as for the establishment of any navigation rules. This also corresponds to the assessment of requirement 2.2.2 (4) of the ROP-E 2021 currently being drawn up.

In addition, in the course of conflict minimisation, shipping concerns are taken into account when choosing the routing of submarine cable systems (especially with regard to priority and reservation areas). The routes run as far as possible away from the main shipping routes. However, if the installation depth is sufficient, planning on the edge of those reservation areas adjacent to the OWF projects to be connected will also be considered provided that no negative impact on the routes is to be expected as a result of the laying of the submarine cable systems.

During the installation and operation phase, appropriate measures shall be taken to ensure the safety of shipping traffic; these include:

- Safety measures during the construction phase, including temporary marking, buoyage and optical-mobile traffic safety (traffic safety ship)
- Visual and radio identification including professional implementation
- Maritime observation
- Provision of additional towing capacity if necessary

Reference is made to planning principles 4.4.1.6, 4.4.1.10, and 4.4.3.1.

4.4.1.3 No adverse effect of the safety and ease of air traffic

The construction, operation, and deconstruction of offshore wind turbines, platforms, submarine cables, and installations for other forms of energy generation may not adversely affect the safety and ease of air traffic.

At least two independent means of ingress and egress suitable for the purpose of escape and rescue shall be provided for an offshore platform, which shall use different transport systems (ship and helicopter).

On offshore platforms, winch operation areas can be set up for emergencies (rescue areas). Their use is restricted exclusively to the prevention of danger to life and limb of persons; regular access by personnel by means of helicopter winch operation is not permitted. Please refer to planning principle 4.4.1.13.

The project developer shall prevent existing and/or planned helicopter landing decks on offshore platforms in the wind farm area of the project or areas for other forms of energy generation from becoming unusable as a result of the construction of aviation obstacles and related measures.

For this purpose, approach and departure corridors[9] are to be established. As a matter of principle, these should not be built on along their entire length above the water surface.

When planning approach and departure corridors, the project developer shall ensure that EEZ boundaries are not touched and that foreign corridors are not crossed. In addition, these must be aligned in such a way that safe take-off is ensured and crosswind influences are minimised and tailwind conditions are avoided.

Along the flight corridors of an offshore platform with HSLD, it shall be ensured that sufficient open space is available for the execution of a flight manoeuvre required in an emergency. Ensuring this open space may lead to restrictions on shipping. Within the safety zone of an OWF, appropriate measures or regulations are therefore necessary to prevent collisions between shipping and air traffic. The same applies to the safety zone of an offshore platform with HSLD outside an OWF. This does not apply to ships used for the construction, supply, operation, and deconstruction of the platform or the OWF, official vehicles and, in the event of an emergency or exercise, the equipment used by search and rescue forces.

The WT along the flight corridors shall be marked with a tower marking by the OWF project developer in accordance with TF11 of the WSV framework for marking offshore installations in the currently applicable version of 1 July 2019.

4.4.1.4 No adverse effect on the security of national and NATO defence

The construction and operation of offshore wind turbines, platforms, submarine cable systems, and installations for other forms of energy generation may not adversely affect the security of national and alliance defence.

4.4.1.5 Dismantling obligation and security deposit

After permanent cessation of use, offshore wind turbines, platforms, submarine cable systems, and installations for other forms of energy generation shall be dismantled. During deconstruction, the components are where possible to be reused in preference to recycling and this in turn in preference to energy recovery or, as a last resort, their certified proper disposal onshore. To ensure that the dismantling obligation is fulfilled, a security deposit is to be provided prior to the start of construction up until the final deconstruction of the installations.

According to the spatial planning guideline that fixed uses must be reversible (i.e. may take place only temporarily and for a limited period of time) offshore wind turbines, platforms, submarine cable systems, and installations for other forms of energy generation must also be deconstructed after use has ceased insofar as this is technically possible.

Whether a complete removal of the foundations has to take place must be checked at the time of deconstruction. In doing so, the then applicable state of the art shall be taken into account and, in particular, the extent to which removal is necessary or advisable for reasons of safety and ease of traffic and with regard to the impacts on the marine environment. However, as a rule, the

[9] Are the primary flight paths to and from an HSLD to be used within an OWF, especially at night, to ensure safe approach and departure. This shall also apply mutatis mutandis to offshore platforms that have only one life-saving area.

deconstruction must be carried out at least to such an extent that the upper edge of the remaining foundation is permanently below the movable lower edge of the sediment and below the area of interference by fishing gear. This is to be checked for an appropriate time depending on the location so that it is ensured that there is no obstacle to shipping and fishing. The excavation pits created during deconstruction are to be backfilled with the material naturally occurring on site; stone packing is to be avoided. With regard to submarine cable systems, deconstruction is also required if toxic substances of an impact-relevant nature or quantity would remain in the marine environment with the submarine cable systems. In the case of a continuation, the operator should also ensure by means of suitable monitoring measures that no threats to other uses are to be expected from the remaining submarine cable systems in the future. For example, the location and sufficient coverage should be checked regularly. This designation is consistent with international and national regulations such as, in particular, Article 79, paragraph 4 UNCLOS, which allows the coastal state to impose conditions on cables or pipelines entering its territory or territorial waters.

The obligation to deconstruct is intended to keep long-term options for sea use open because subsequent uses are made possible and thus a contribution is made to sustainability.

It also serves to protect the marine environment. The exact designations for deconstruction are reserved for the individual procedure in order to adapt the requirements to the respective location, among other things.

The security deposit serves to secure the dismantling obligation according to Section 58, paragraph 1 WindSeeG. The requirements for the security deposits are set out in the Annex to the WindSeeG.

4.4.1.6 Consideration of all existing, authorised and specified uses

Due regard shall be given to existing and approved pipelines and existing, approved submarine cables, offshore wind farms, offshore platforms, and approved other structures identified within this plan by regularly maintaining a distance of 500 m unless subsoil conditions require greater distances. In the specific selection of locations for offshore wind turbines and platforms and the routing of submarine cable systems and installations for other forms of energy generation, consideration shall be given to existing and approved uses, rights of use, and other interests worthy of protection.

The planning, installation, and operation of offshore wind turbines, platforms, and submarine cable systems are to be carried out with close coordination between the transmission system operator and the offshore wind farm developer(s).

4.4.1.7 Consideration of cultural assets

Known sites where cultural assets have been found should be taken into consideration when selecting a location or route. If previously unknown cultural assets are discovered in the seabed during the planning or construction of the wind turbines, platforms, or submarine cable systems and installations for other forms of energy generation, appropriate measures must be taken to safeguard the cultural assets.

4.4.1.8 Noise mitigation

For noise mitigation, the use of alternative, low-noise forms of foundation should be considered. If wind turbines or platforms and installations for other forms of energy generation are installed with pile foundations, the use of effective technical noise mitigation according to the state of the art in science and

technology shall be provided during the laying of the foundations. The noise abatement concept of a planned project must be integrated at an early stage in the design of the foundation structure. The North Sea noise abatement concept of the BMU has to be taken into consideration.

During pile driving for the foundations of WT, platforms, and installations for other forms of energy generation, the use of effective technical noise mitigation systems shall be provided for in order to safeguard species and site protection concerns. In the planning approval, a maximum sound event level of 160 dB re 1µPa² s and a maximum peak noise pressure level of 190 dB re 1µPa² at a distance of 750 m from the pile driving site are regularly specified. In the case of pile driving, the duration of the pile driving operation, including the entanglement, shall be kept to a minimum. Blasting for foundations is not permitted. Noise abatement measures, which include technical noise mitigation, deterrence, and monitoring of effectiveness, are specified on a location-specific basis and in relation to the foundation design used in each individual case. This is done on a project-specific basis as part of the approval procedure. The best available method or a combination of the best available methods according to the state of the art for mitigation of the input of underwater noise to comply with applicable noise protection values during the installation of foundation piles (e.g. large bubble curtain, cladding tube, or hydro silencer) shall be used. When designing suitable noise mitigation systems, the respective subsoil conditions must be taken into account. In addition to the actual noise mitigation system, the use of further extensive noise abatement measures and monitoring measures, in particular by recording the underwater noise input during the installation of foundations, is required.

If blasting is unavoidable for the removal of ammunition that cannot be transported, a noise abatement concept must be submitted to the BSH in good time beforehand.

In order to mitigate potential significant impacts on the marine environment from ships during construction and operation and the associated acoustic adverse effects, their use shall be minimised through optimal construction and scheduling. Please refer to planning principle 4.4.1.1.

The Strategic Environmental Assessment comes to the conclusion that, according to the current state of knowledge, it can only be ensured with the necessary certainty that the requirements for species protection will be met and that nature conservation areas will not be significantly adversely affected in their components relevant to the purpose of protection if applicable noise protection values are complied with and the requirements of the North Sea Noise Abatement Concept of the BMU are implemented.

4.4.1.9 Minimisation of scour and cable protection

Scour and cable protection measures must be reduced to a minimum.

In certain areas, measures to prevent scour are necessary to ensure the long-term stability and positional safety of structures on the seabed.

In any scour protection measures, the introduction of hard substrate shall be kept to a minimum in order to minimise the impact on the marine environment.

Only stone packing made of natural stones or inert and natural materials are to be used as scour protection. The use of alternatives based on plastic or plastic-like materials (e.g. geotextile sand containers, (recycled) plastic nets filled with natural stones, concrete mats covered with plastic) is to be avoided.

As a rule, stone packing made of natural stones or inert and natural materials are to be used as cable protection. The use of cable protection systems containing plastic shall be kept to a minimum if technically possible.

4.4.1.10 Consideration of regulatory standards, specifications and concepts

Official standards, specifications, and concepts in their currently valid versions shall be taken into account in the planning, construction, and operation of wind turbines, platforms, submarine cable systems, and installations for other forms of energy generation.

This includes in particular

- the Standard Investigation of the Impacts of Offshore Wind Turbines on the Marine Environment (StUK),
- the standard subsoil investigations, minimum requirements for subsoil investigation and investigation for offshore wind turbines, offshore stations and power cables,
- the standard construction, minimum requirements for the structural design of offshore structures in the EEZ,
- Parts 1 to 3 of the VGB/BAW- standard, corrosion protection of offshore structures for the utilisation of wind energy,
- the "WSV Framework Specifications Marking Offshore Installations",
- the Implementing Directive on Maritime Spatial Observation of the BMVI,
- the directive "Offshore Installations to Ensure the Safety and Ease of Shipping traffic",
- Recommendations O-139 and A-126 of the International Association of Marine Aids to Navigation and Lighthouse Authorities,
- the Offshore Wind Energy Safety Framework Concept,
- the framework concept for waste and operating materials for OWF and their grid connection systems in the German EEZ,
- the German regulations on occupational health and safety,
- the concept for the protection of harbour porpoises from noise pollution during the construction of OWF in the German North Sea and
- the BfN mapping instructions for legally protected biotopes.

4.4.1.11 Emission mitigation

Emissions shall be avoided as far as possible or, where unavoidable, reduced.

The avoidance and mitigation requirement ensures that the construction and operation of offshore installations does not lead to "pollution of the marine environment" within the meaning of Article 1, paragraph 1, number 4 of the Convention on the Law of the Sea and threat of the marine environment in accordance with Section 5, paragraph 3, sentence 2, No. 2, 48, paragraph 4, sentence 1, Number 1 letter a WindSeeG. In addition, the requirements of the Ordinance on Environmentally Sound Practices in Maritime Shipping must be complied with.

The installation shall be designed in such a way that

- no avoidable emissions of pollutants, noise, and light into the marine environment occur during construction nor during operation or – insofar as these are required and unavoidable by the safety requirements of shipping and air traffic – as few adverse effects as possible are caused; this includes vehicles used during construction and operation;
- no electromagnetic waves capable of interfering with the functionality of common navigation and communication systems and frequency ranges of the correction signals are generated.

In order to prevent pollution of and threats to the marine environment, the permanent approval practice for OWF projects and installations for the transmission of electricity from these projects in the EEZ includes the binding regulation that,

as a matter of principle, no substances may be discharged into the sea during the construction, operation, and maintenance of the installations. In particular, no waste water containing pollutants may be discharged untreated into the sea unless this is compatible with safety-related requirements. Should installation-specific emissions to the marine environment be unavoidable for technical reasons, this shall be applied for and justified to the BSH, submitting an environmental estimate. Installation-specific examination of reasonable alternatives to be carried out in this context.

The preparation of an emission study to record the emissions arising from the respective design and equipment variant or their avoidance is mandatory. A preliminary study on this is already to be submitted as part of the application documents. In the preliminary study, the TdV shall address emissions that are as specific and project-related as possible, the possible and applied avoidance and mitigation measures, and the cumulative effects of the installation(s). The emissions study, which is substantiated in the enforcement procedure, forms the basis for the waste and operating materials concept to be drawn up as part of the protection and safety concept. For the preparation of the waste and operating materials concept, the minimum requirements of the "Waste and Operating Materials Framework Concept for OWF and their Grid Connection Systems in the German EEZ" published by the BSH in its currently valid version shall be taken into consideration. Contingency plans shall be established, inter alia, for accidents involving substances hazardous to water during the construction and operation phases and other unexpected events giving rise to concerns about pollution of the marine environment.

Environmental impact of fuels

The environmental impact of the operating materials used on the installations must be ensured by comprehensive examination of reasonable alternatives. Biodegradable operating materials (e.g. oils, greases) are to be used if available.

Structural/operational precautions and safety measures

All technical equipment installed on the WT, platforms, and installations for other forms of energy generation shall be secured and monitored by state-of-the-art structural safety systems and measures in such a way that pollutant accidents and environmental discharges are prevented (e.g. enclosures, double-wall construction, room/door seals, catch basins, drainage systems, collection tanks, leakage and remote monitoring). This applies in particular to installations that contain or carry larger quantities of operating materials and/or substances hazardous to water (e.g. diesel tanks, pipelines). False activations of the fire protection systems on helicopter landing decks must be avoided at all costs.

Because there is an increased potential of threat in the offshore area from changes of operating materials and refuelling measures, special organisational and technical precautionary measures must be taken for these activities (e.g. preparation of method statements, precautionary measures during crane work, self-sealing breakaway couplings (emergency breakaway couplings), dry couplings, drip pans, overfill protections, and spill kits).

Handling of waste

The dumping and discharge of waste into the marine environment is prohibited. It must be taken ashore and disposed of there according to the applicable waste disposal regulations.

Cathodic corrosion protection (CCP), coatings

The corrosion protection must be as pollutant-free and low-emission as possible.

External power systems are to be aimed for as CCP on foundation structures. The use of galvanic anodes (sacrificial anodes), typically con-

sisting of alloys of aluminium-zinc-indium, is permissible only in combination with coatings suitable for CCP (cf BSH standard construction).

When selecting galvanic anodes, only alloys for which production-related contents of particularly environmentally critical secondary components (especially cadmium, lead, copper, mercury) are reduced to a minimum may be used. The zinc content required for the functionality of the anodes must also be limited to a technically necessary minimum.
The CCP system must be dimensioned in such a way that the use of galvanic anodes is limited to a necessary minimum.
The use of zinc anodes (in the sense of zinc being the main component of the anodes) is prohibited. If necessary, external current systems should be used as CCP systems in the inner areas of the foundation structures.

The minimum requirements for the corrosion protection in the construction standard must be observed. The VGB/BAW Standard Corrosion Protection has been introduced as a technical supplement to the BSH Standard Construction with regard to Parts 1-3 and is to be taken into account in enforcement. The use of TBT (tributyltin) and other anti-fouling agents or biocides is prohibited. The (underwater) structure must be provided with oil-repellent coatings in the area of the splash zone; regular removal of marine growth is not required in this context. The solvent-free nature of coating materials should be strived for.

The exterior coating shall be as glare-free as possible without prejudice to the regulation on air and navigation marking.

(Seawater) cooling systems

For installation cooling, closed cooling systems (e.g. for the cooling of transformers on platforms) for which there are no discharges of cooling water and/or other substances (anti-fouling agents or biocides) are to be preferred. Seawater cooling systems with discharges in regular operation are permissible only in justified exceptional cases (e.g. if it can be demonstrated that the required cooling capacity cannot be achieved with closed systems/system variants). The use of anti-fouling agents or biocides in seawater cooling systems to ensure continuous operation must be kept to a minimum and requires a comprehensive environmental assessment in advance.

Grey and black water, waste water treatment plants

The professional collection of wastewater (grey and black water), including removal onshore and proper disposal, are to be preferred over treatment on platforms. Wastewater treatment plants on unmanned platforms or platforms that are only manned during maintenance work are generally not eligible for approval. For these cases, appropriately sized collection tanks must be provided or other solutions can be used (e.g. incineration toilets). The project developer shall provide evidence that a waste water treatment plant is mandatory. For permanently manned platforms, only a state-of-the-art waste water treatment plant, including reduction of nitrogen and phosphorus compounds (e.g. at least according to MARPOL MEPC.227(64)) is permissible. If these types of plants are not available on the market because of too low projected waste water volumes, certified installations without elimination of nitrogen and phosphorus compounds can be used (e.g. MARPOL MEPC.227(64)). Proof of non-availability shall be provided by the applicant. Chlorination of wastewater (e.g. by sodium hypochlorite) to achieve the MEPC “coliform standard” cannot be approved because chlorination processes produce secondary compounds that are harmful to the environment. Therefore, other techniques must be used that are demonstrably more environmentally friendly (e.g. UV systems).

Suitable sampling points shall be provided at the inlet and outlet of the waste water treatment plants of platforms so that sampling and subsequent analysis of the waste water can be carried out to ensure proper operation/verification of the discharge values and treatment performance during the operating phase.

Drainage systems and oil separators

Oil separators installed and operated on platforms must ensure that the oil content of the drainage water does not exceed a limit value of 5 ppm. Therefore, sensors for monitoring the oil content in the drain are mandatory (including remote monitoring) in order to be able to ensure proper operation. If the limit value of 5 ppm is exceeded, appropriate valves must be used to ensure that the drainage water is not discharged into the sea (e.g. via collection tanks, recirculation). Drainage systems/oil separators connected to helicopter landing decks must also have appropriate by-pass systems so that the environmentally hazardous extinguishing foam produced when the fire-fighting system is activated is discharged directly (i.e. without passing through the oil separator) into a collection tank.

Firefighting foams on helicopter landing decks

Because of the environmentally critical properties of perfluorinated and polyfluorinated substances (PFC), only “fluorine-free” (i.e. PFC-free) extinguishing foams may be used on helicopter landing decks. When selecting products, fire protection and aviation-related specifications (suitability for offshore use, alcohol and frost resistance, minimum performance level ICAO B) must be observed and complied with. Fire extinguishing exercises are to be carried out with water only.

Fluorinated greenhouse gases in switchgear, cooling and air-conditioning systems, and fire protection systems

The requirements of Ordinance 517/2014 of the European Parliament and of the Council of 16 April 2014 on fluorinated greenhouse gases shall be complied with. In accordance with Article 3 of the Ordinance, these measures are basically the prevention and limitation of emissions of fluorinated greenhouse gases. In addition, the requirements regarding leakage checks of technical installations, if necessary by means of leakage detection systems, must be observed, carried out, or documented by the operator (Articles 4-6).

Mains backup systems, diesel generators, diesel fuel

Diesel generators used on structural installations must be certified with regard to emission values according to MARPOL Appendix VI, Tier III or at least an equivalent emission standard. The emission values of the respective diesel generator type are decisive. If the relevant IMO rules of Appendix VI are not applicable because of insufficient power of the generators (e.g. for temporary diesel generators on wind turbines), otherwise applicable emission standards must be used (e.g. EU standard 97/68/EC and its amendments, there: stage III/IV). The installation of permanent diesel generators for emergency operation of individual wind turbines is not permissible because this would result in extensive refuelling measures and thus a greater environmental threat through possible oil spills. Therefore, the diesel generators (emergency power systems) of the respective transformer platform or other safety systems should be used to temporarily supply the WT as part of ensuring general operational safety.

In order to reduce SO_2 emissions to a minimum, low-sulphur fuel must be used as far as possible, taking into consideration the storage capacity of the respective product (e.g. low-sulphur heating oil according to DIN 51603-1 or diesel according to DIN EN 590 (“land diesel”)). This applies to temporary generators during installation work on WT and platforms as well as to permanent diesel generators (grid backup systems) on platforms.

When selecting the appropriate diesel generators, ensure suitability for the respective fuel type in good time.

Grouting method and grouting material

If grouting methods are to be used, the grouting material must be as free of pollutants as possible. Appropriate techniques and devices for the grouting process (installation phase) shall be used to prevent the discharge of grout material into the marine environment as far as possible.

Light emissions

Lighting that is as compatible as possible with nature during operation of the WT and converter platforms in order to reduce attraction as far as possible, taking into consideration the requirements of safe shipping and air traffic and occupational safety (e.g. switching obstruction lights on and off as required, selection of suitable lighting intensities and spectra or lighting intervals)

4.4.1.12 Consideration of explosive ordnance sites

Known sites where explosive ordnance has been found shall be taken into consideration when selecting the location or route. Should previously unknown explosive ordnance be found in the seabed during the planning or construction of the wind turbines, platforms, submarine cable systems, and installations for other forms of energy generation, appropriate protective measures must be taken.

4.4.1.13 Installation of sonar transponders

Sonar transponders shall be installed at suitable corner positions of wind farms, platforms, and installations for other forms of energy generation.

4.4.2 Sites and offshore wind turbines as well as areas and installations for other forms of energy generation

The following are planning principles for sites, primarily for the construction and operation of offshore wind turbines and areas and installations for other forms of energy generation.

Summary

- Consideration of nature conservation areas and consideration of legally protected biotopes
- Economical area use
- Distances between sites relative to each other and to WTGs
- Deviation of the actually installed capacity from the allocated grid connection capacity

4.4.2.1 Consideration of nature conservation areas and consideration of legally protected biotopes

Known occurrences of legally protected biotopes according to Section 30 BNatSchG are to be avoided when erecting wind turbines and installations for other forms of energy generation.

Reference is made to Article 45a of the Water Resources Act (WHG)[10]; the best environmental practice according to the Helsinki and OSPAR Conventions as well as the respective state of the art are to be taken into account and specified in the individual procedure.

Project-specific avoidance and mitigation measures may be required for the planning and construction of WT and other offshore energy generation installations in the vicinity of nature

[10] Act of 31 July 2009, BGBl. I p. 2585, last amended by Article 1 of the Act of 19 June 2020 BGBl. I p. 1408.

conservation areas in order to ensure compliance with site protection requirements. These measures (e.g. noise mitigation measures to protect noise-sensitive marine mammals, are determined on a project-by-project basis at project level, taking into consideration the specifics of the project area and the circumstances of the individual case.

Depending on the location and foundation design of the offshore wind turbine and installations for other forms of energy generation as well as on the protective purpose of the nature conservation area, further considerations may lead to greater distances in individual cases; in particular, additional protective measures may be required. The impact assessment carried out as part of the strategic environmental assessment comes to the conclusion that the construction of the WT and installations for other forms of energy generation will not, as things stand at present, lead to any significant adverse effects on the conservation purposes of the nature conservation areas in the EEZ provided that the avoidance and mitigation measures to be ordered as part of the specific approval procedures are strictly adhered to.

Should occurrences of structures listed in Section 30 BNatSchG be found during closer investigations in the specific approval procedure, these must be analysed and taken into consideration in the decision-making process. However, at this point in time, no concrete spatial allocation of the structures mentioned is possible.

4.4.2.2 Economical area use

The individual wind turbines and installations for other forms of energy generation are to be arranged in a way that saves as much space as possible.

According to Section 4, paragraph 2, No. 2 WindSeeG, the objective of orderly and space-saving electricity generation from offshore wind turbines is primarily relevant for the pre-development of sites central to the SDP. This target should not refer only to the large-scale designations as a whole but rather should also be reflected in the planning within the sites.

4.4.2.3 Distances between sites relative to each other and to wind turbines

Wind turbines and installations for other forms of energy generation shall maintain a distance of at least five times the rotor diameter from wind turbines in neighbouring sites.

4.4.2.4 Deviation of the actually installed capacity from the allocated grid connection capacity

In the event of a deviation of the actually installed power from the allocated grid connection capacity, the maximum permissible warming of the sediment by submarine cable systems must not be exceeded. Provided that the extent of the increase in installed capacity does not exceed 10% of the allocated grid connection capacity, no additional proof of compliance with the 2 K criterion for the area of the connecting cable of the TSO is required from the successful bidder.

4.4.3 Platforms

Planning principles for platforms are listed below. Platforms usually include converter platforms, collection platforms, transformer platforms, accommodation platforms, and other platforms located in areas or areas for other forms of energy generation.

Summary

- Consideration of nature conservation areas and consideration of legally protected biotopes
- Space requirements and additional manoeuvring space

- Design of platforms to take into account the need for temporary accommodation; no use beyond three years

4.4.3.1 Consideration of nature conservation areas and consideration of legally protected biotopes

Known occurrences of legally protected biotopes according to Section 30 BNatSchG must be avoided when erecting platforms.

Reference is made to Section 45a of the Federal Water Act (WHG) that best environmental practice in accordance with the Helsinki and OSPAR Conventions and the respective state of the art must be taken into account and specified in the individual procedure.

The designation is based on Section 5, paragraph 3, sentence 2, No. 5 WindSeeG. The installation of platforms is not permitted in the nature conservation areas. This serves to safeguard the conservation purposes of the nature conservation areas, especially with regard to potential adverse impacts on the protected habitat or protected species.

Project-specific avoidance and mitigation measures may be required when planning and erecting platforms in the vicinity of nature conservation areas in order to ensure compliance with site protection requirements. These measures (e.g. noise mitigation measures to protect noise-sensitive marine mammals, are determined on a project-by-project basis at project level, taking into consideration the specifics of the project area and the circumstances of the individual case.

Depending on the location and foundation design of the platforms as well as on the protective purpose of the nature conservation area, further considerations may lead to greater distances in individual cases; in particular, additional protective measures may be required. The impact assessment carried out as part of the strategic environmental assessment concludes that the construction of the planned platforms (subject to strict compliance with the avoidance and mitigation measures to be ordered as part of the specific approval procedures) will not, as things stand, lead to any significant impacts on the conservation purposes of the nature conservation areas in the EEZ.

Should occurrences of structures listed in Section 30 BNatSchG be found during closer investigations in the specific approval procedure, these must be analysed and taken into consideration in the decision-making process. However, at this point in time, no concrete spatial allocation of the structures mentioned is possible.

In accordance with Section 2, paragraph 2, No. 6 ROG, the area is to be developed, safeguarded or, where necessary, possible, and appropriate, restored in terms of its importance for the functional capacity of soils, the water balance, fauna and flora, and the climate, including the respective interrelationships. The significance of the area for the functionality of the soils, the water balance, the fauna and flora, and the climate, including the respective interrelationships with the requirements of the biotope network system, must be preserved. This is to ensure that the dispersal processes and long-range ecological interrelationships of the species and their habitats are taken into account.

4.4.3.2 Space requirements

An area of 100 m × 200 m shall be provided for a converter platform of the voltage level 320 kV, and an area of 150 m × 250 m for platforms of the voltage level 525 kV. An area of 100 m × 100 m shall be provided for the transformer platform. Additional manoeuvring space must be provided for platforms arranged side by side. Sufficient space must be provided around the platforms for the leading in and retraction of the cable systems.

4.4.3.3 Accommodation on platforms

The accommodation of personnel on platforms shall take place in accommodation already provided for this purpose during the planning of the platform: When planning and designing the platform, particular consideration shall be given to structural safety, supply, and disposal, including the provision of drinking water, waste water treatment, and occupational health and safety concerns, including escape routes and means of rescue.

4.4.4 Submarine cable systems

The following are planning principles for submarine cable systems. For the purposes of this plan, this means power cable systems such as offshore connecting cables, cross-border submarine cable systems, interconnections, and submarine cable systems for installations for other forms of energy generation. Planning principles 4.4.4.5, 4.4.4.6, 4.4.4.8 and 4.4.4.9apply to submarine cable systems for cabling within the park, including areas for other forms of energy generation.

Summary

- Highest possible bundling in the sense of parallel guidance
- Distance for parallel installation: 100 m; after every second cable system, 200 m
- Routing through gates
- Perpendicular crossing of shipping priority and shipping reservation areas
- Avoid crossings, if absolutely necessary, then at right angles;
- Minimally disruptive cable laying procedure
- Covering
- Mitigation of sediment warming (compliance with 2 K criterion)
- Consideration of nature conservation areas and legally protected biotopes

4.4.4.1 Bundling

When laying submarine cable systems, the aim is to achieve the greatest possible bundling in the sense of parallel routing. In addition, the routing should be as parallel as possible to existing structures.

In order to minimise impacts on other uses and the need for coordination with each other and with other uses as well as to create as few constraint points as possible for future uses, submarine cable systems should be bundled as far as possible. Bundling in the sense of parallel routing also reduces fragmentation effects. These can be further reduced if cable routing is chosen parallel to existing structures and building installations.

4.4.4.2 Distance for parallel laying

When laying submarine cable systems in parallel, a distance of 100 m must be maintained between the individual systems. A distance of 200 m must be maintained after every second cable system. Here, especially in the Baltic Sea, the concrete ground conditions must be taken into account.

4.4.4.3 Routing through gates

Submarine cable systems that land in Germany must in principle pass through the gates N-I to N-V and O-I to O-V, which are designated at the border of the EEZ and the 12 mile territorial waters zone.

Cross-border submarine cable systems must also pass through the gates N-VI to N-XV and O-I to O-XIII designated at the border to the EEZ and the 12 mile territorial waters zone.

Cross-border submarine cable systems that do not land in Germany should not be routed through the gates N-I to N-V because of the

very limited available routes in the territorial waters.

The gates envisaged here are derived from the target corridors defined in the spatial plan and the needs that have been identified in the meantime. Because of the significantly higher demand for power transmission lines, additional corridors to the territorial waters have been included in the planning compared with the spatial plan. The existing corridors have also been extended. Gates have also been defined at the external borders of the EEZ with neighbouring countries from which a routing within the German EEZ appears possible. In some cases, these make use of existing infrastructures such as already laid submarine cable systems or pipelines. The designation was made in consultation with the neighbouring countries.

4.4.4.4 Crossing of shipping priority and reservation areas

Priority and reservation areas designated for shipping in the EEZ Spatial Plan should be crossed by submarine cable systems by the shortest possible route, if routing in parallel to existing installations is not possible.

4.4.4.5 Crossings

Crossings of submarine cable systems should be avoided as far as possible, both among themselves and with other existing pipelines and submarine cables existing or specified under this plan. If crossings cannot be avoided, they shall be constructed in accordance with the state of the art and as perpendicular as possible.

4.4.4.6 Minimally disruptive cable laying procedure

In order to protect the marine environment, a minimally disruptive cable laying procedure should be selected for the submarine cable systems.

In order to minimise possible negative impacts on the marine environment from the laying of submarine cable systems, a cable laying procedure that can be expected to have the least interference with and impact on the marine environment yet safely achieve the specified overburden should be selected in the individual procedure, in particular depending on the geological conditions.

Any anchor positions are to be chosen outside the occurrence of legally protected biotopes.

When clearing stone, avoid clearing over large areas. The removal of individual stones must take place within a 20 m wide impact zone (10 m to the right and left of the route) or 30 m in curved areas. The stones shall be deposited as close as possible to their salvage site, avoiding uplift from the water body, and no more than 20 m outside the working strip within the biotopes. Area clearance and clearance outside the impact zone must be applied for separately and approved by the BSH.

In the case of reef occurrences, a distance of 50 m shall be maintained where technically possible. Particularly sensitive areas (Section 30 biotopes) are to be avoided as far as possible as part of the fine routing.

4.4.4.7 Covering

In designating the permanent coverage of submarine cable systems, particular attention shall be paid to the protection of the marine environment, shipping, defence, fisheries and system security.

4.4.4.8 Sediment warming

When laying submarine cable systems, potential adverse effects on the marine environment caused by cable-induced sediment warming are to be reduced as far as possible. The “2 K criterion”, which defines a maximum tolerable temperature increase of the sediment by 2 degrees (Kelvin) at a sediment

depth of 20 cm, is to be observed as a precautionary value for nature conservation.

For this purpose, the cable system must be laid at a depth that ensures compliance with the 2 K criterion. Please refer to planning principle 4.4.4.7 .

During operation of the submarine cable systems, there is significant warming of the surrounding sediment radially around the cable systems. The heat emission results from the thermal losses of the cable during energy transmission. The conductor temperature can be a maximum of 70°C for DC conductors and 90°C for AC conductors.

The “2 K criterion” (i.e. a maximum temperature increase of 2 degrees (Kelvin) 20 cm below the seabed surface) has become established as a precautionary value for nature conservation in current official approval practice for all submarine cable systems laid in the EEZ area. The 2 K criterion represents a precautionary value that, according to the assessment of the Federal Agency for Nature Conservation (BfN), ensures with sufficient probability, based on the current state of knowledge, that significant negative impacts of cable warming on the marine environment or the benthic community are avoided. Increased warming of the uppermost sediment layer of the seabed may lead to a change in the benthic communities in the area of the submarine cable route. In the process, coldestothermic species, which are bound to a low temperature range and are sensitive to temperature fluctuations, can be displaced from the area of the cable routes, especially in lower areas. In addition, there is the possibility that sediment warming could lead to the establishment of new, non-native species. Furthermore, an increase in soil temperature could change the physico-chemical properties of the sediment, which in turn could result in a change in oxygen or nutrient profiles.

In addition to the ambient temperature in the area of the submarine cable systems and the thermal resistance of the sediment, the type of cable and the transmission power have a significant influence on the extent of sediment warming. Compliance with the 2 K criterion must accordingly be ensured when dimensioning the cable systems. For the temperature development in the near-surface sediment layer, the depth position or overburden of the cable systems is also decisive.

Proof of the expected maximum sediment warming or compliance with the 2 K criterion must be provided as part of the planning approval. The calculation of sediment warming must be carried out in accordance with the requirements of the supplement to the StUK4 on the benthos as a protected asset, Table 1.7. For cross-border submarine cable systems, a permanent full load of the cable shall be applied for verification because of the different operating mode.

As part of the SDP establishment procedure, a working group was set up at the BSH to address the question of whether the verification procedure mentioned is suitable for mapping the maximum temperature development at the reference point.

It has been shown that the detection method is basically suitable for mapping the maximum temperature increase over a period of several years. Furthermore, it can be stated that there are three input parameters of the calculation that have a strong influence on the results. These are the depth (or the overburden) of the cable system as well as the assumptions on the thermal resistance of the sediment, the load profile of the cable system, and – here in particular – the time average value of the current (pre-load). Sensitivity studies on these parameters have shown that the values usually assumed for these parameters in the procedures so far represent a conservative yet conclusive assumption with regard to the maximum values.

The depth of submarine cable systems is largely based on the requirements of the planning principle 4.4.4.7 for overburdening. In view of the temperature development in the reference point, a greater depth would be advantageous. At the same time, a depth of more than 1.5 m may result in technical restrictions (e.g. in maintaining the maximum conductor temperature because of the poorer temperature dissipation in deeper sediment). In addition, the cost of laying the submarine cable systems increases significantly with increasing depth. For these reasons, a blanket specification of a greater depth does not appear to make sense.

With regard to the thermal resistance of the sediment, it became clear from specific measured values from the Baltic Sea that the value of 0.7 Km/W mentioned in the supplement to the StUK4 on the protected asset benthos (Table 1.7) represents a reasonable value for various types of sediment typically occurring along the route. However, if measured values for thermal resistance (which were measured individually on the route) are available, a deviation from the standard value mentioned is also possible for the verification.

As a reference load profile for mapping the maximum transmission losses occurring in connection systems of offshore wind turbines, a profile is assumed in the verification procedure based on the supplement to the StUK4 on the protected asset benthos (Table 1.7). Starting from a stationary pre-load, this is overlaid by a transient maximum load over a period of seven days before the pre-load is again applied for a period of 45 days. Such a step load profile is well suited to depict rarely occurring cable loads during high wind phases. In addition, a step load profile based on a long-term strong wind case simplifies the verification in that no historical time series over a period of, for example, 25 years with concrete assumptions about the OWF and submarine cable system under consideration has to be evaluated. In past approval procedures, this step load profile was formed and applied on the basis of long-term wind measurement data from the FINO1 platform in the EEZ of the North Sea with the values 77%/99%/77%. In principle, this order of magnitude can be transferred to the Baltic Sea, albeit with slightly different values. This conclusion has been confirmed on the basis of current investigations both within the framework of the aforementioned working group and by expert reports commissioned separately by the BSH.

It has been shown that this load profile is also suitable for future wind farms. It is true that the installation of additional capacity beyond the allocated capacity (see planning principle 4.4.2.4) can change the feed-in characteristics of an OWF. At the same time, this increases the availability of an OWF so that a closer approximation of the actual feed-in to the assumed load profile can be assumed. Current evaluations based on real feed-in time series confirm this conclusion.

Compliance with the 2 K criterion during operation is to be verified by the TSO using model-based procedures such as TCM II.

In addition to demonstrating compliance with the 2 K criterion using the calculation method described above, it is also theoretically possible to demonstrate compliance with the 2 K criterion using permanent temperature measurements. For this purpose, temperature measurements over the entire route can be used directly at the submarine cable. From this, the temperature at the receptor point can be inferred with the help of a suitable soil model. The temperature measurement directly on the submarine cable is not yet widely used and has so far mainly been used for fire or fault detection in the cable. However, the result of the working group is that permanent temperature measurements for the purpose of proving compliance with the 2 K criterion is not yet state of the art. In this regard, reference is made to possible future adaptations as soon as there is secure knowledge on the meaningful applicability of the measurement.

4.4.4.9 Consideration of nature conservation areas and legally protected biotopes

When laying submarine cable systems, possible adverse effects on the marine environment should be minimised. To this end, the submarine cable systems should be laid outside nature conservation areas wherever possible.

Known occurrences of legally protected biotopes according to Section 30 BNatSchG are to be avoided when laying submarine cable systems.

The laying of submarine cables in sensitive habitats and the adverse impacts on the marine environment caused by laying, operating, maintaining and, if necessary, leaving them in place after they have ceased operation or have been deconstructed should be avoided.

The laying of submarine cable systems as well as their operation, maintenance, and eventual fate after abandonment or deconstruction can lead to adverse effects on sensitive habitats. In order to limit potential negative impacts on sensitive habitats and to preserve the protective purposes of nature conservation areas, submarine cable systems within the EEZ should be routed primarily outside of nature conservation areas. If this is not possible, impacts on the protection and conservation objectives of the nature conservation areasmust be examined in the planning approval.

The best environmental practice in accordance with the Helsinki and OSPAR Conventionsas well as the respective state of the art shall be taken into account and specified in the individual procedure.

Should occurrences of structures listed in Section 30 BNatSchG be found during closer investigations in the specific approval procedure of the submarine cable systems, these must be analysed and taken into consideration in the decision-making process. If necessary, a spatial alternative in the vicinity that is better able to protect the relevant protected assets must be identified. For submarine cable systems, the route must be optimised as part of the fine routing in order to prevent known occurrences of particularly sensitive biotopes according to Section 30 BNatSchG as far as possible and not to adversely affect them. However, at this point in time, no concrete spatial allocation of the structures mentioned is possible.

4.5 Deviation possibilities

4.5.1 Standardised technology principles

Deviation from the standardised technical principles is in principle not possible in order to achieve the objectives associated with the designation. This is possible only if a deviation is necessary in a specific individual case or makes sense because of new findings. In particular, because of the possible impacts of a deviation on interfaces between TSO and OWF but also because of the different planning and realisation progress, deviations must be submitted very early – before the announcement of the tender for the sites(s) concerned or before the award of the offshore connecting cable.

4.5.2 Planning principles

The possibility of deviating from planning principles depends, among other things, on whether the planning principles are based on binding regulations from sectoral law. Deviation from the objectives according to Section 4, paragraph 1 ROG and thus from the obligation to observe them in spatially significant planning via the spatial plan is possible only under the conditions specified therein.

Furthermore, in justified cases, it is possible to deviate from planning principles that are not based on mandatory sectoral law or which do not represent spatial planning objectives. This concerns cases in which compliance cannot or can no longer be guaranteed because of special

framework conditions. Furthermore, some situations in which not all principles are implemented at the same time are conceivable because they sometimes serve conflicting interests and must therefore be brought into balance.

Deviations from non-variable planning principles must be applied for in the respective planning approval. Each deviation must be justified in the planning approval for each planning principle in a comprehensible and plausible manner. Compliance with the legal requirements in the planning approval must be demonstrated. In particular, the following shall be presented and submitted for review:

- Justification of each deviation for each planning principle and demonstration of compliance with the legal requirements
- Presentation of possible implications for public and private interests and concerns
- Consideration of the economical and sparing use of the site within the meaning of Section 4, paragraph 2 WindSeeG

4.6 Planning horizon

For the expansion of offshore WT and the offshore connecting cables required for this, the SDP makes sectoral planning designations from 2026 until at least 2030

WindSeeG: 20 GW by 2030

The planning horizon is based on the objective of the WindSeeG, which provides for an expansion path of 20 gigawatts for offshore wind energy by 2030. In addition, the WindSeeG provides for a long-term target of 40 GW by 2040.

In the context of this update/amendment of the SDP, areas up to and including Zone 3 of the exclusive economic zone are designated. It is planned to designate sites for the implementation of 20 GW by 2030. The designation of areas and sites ensures a sufficient, plannable expansion path until around 2035.

Scenario framework 2021–2035

4.7 Determination of the expected generation capacity

4.7.1 Objective of the generation capacity determination

For sites in Zones 1 and 2, the methodology described in Chapter 4.7.2 corresponds to the procedure already presented in SDP 2019. Against the background of the special conditions and the current knowledge on long-range delayed effects in Zone 3, a deviating procedure is proposed for sites located there (see Chapter 4.7.3).

4.7.2 Methodology of generation capacity determination for Zone 1 and 2

The power density of a wind farm (expressed in MW/km²) results from the ratio of the nominal power of the WTG to its base area, which is spanned by the outlying WTGs. The power density is therefore the determining parameter for determining the generation capacity in advance on any given site. The distance of the individual WT from each other is the main factor influencing the power density. In Figure 6, the methodology of the generation capacity determination, which is described further below, is schematically shown. The methodology is equally applicable to the EEZ of the North Sea and Baltic Sea.

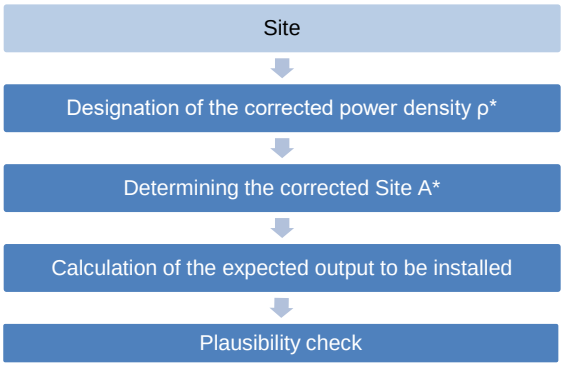


Figure 6: Schematic representation of the methodology for generation capacity determination

4.7.2.1 Designation of the corrected power density

Figure 7 shows an example of the nominal site (blue border) covered by the specific installation locations in relation to the corrected site (red border).

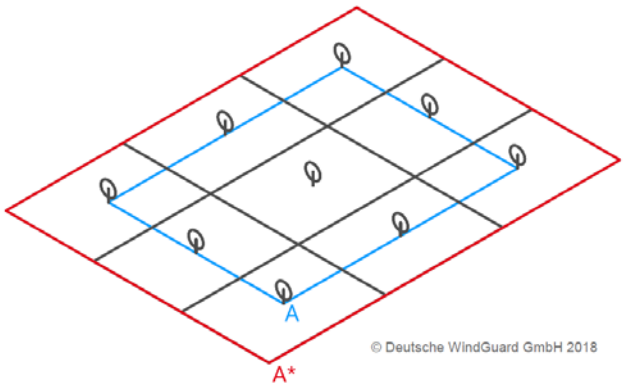


Figure 7: Representation of the corrected area A* in relation to the nominal area A (Prognos, 2019)

4.7.2.2 Power density in Zones 1 and 2

4.7.2.3 Calculation of the corrected site

The buffer distance is thus calculated as follows:

Calculation of the buffer distance x

$$x = \frac{1}{4} \cdot d_{Rotor} \cdot \sqrt{\pi \cdot \frac{p_{WT}}{p^*}}$$

d_{Rotor}	Rotor diameter in m
p_{WT}	specific output of the WTG in Watt/m² rotor area
p^*	corrected power density in MW/km²

The assumptions for the calculation of the corrected area are summarised in the following table:

Table 3: Input parameters for calculating the corrected area

Parameters	Value
Corrected power density	site-specific
Rotor diameter	220 m
Specific power of the WTG	400 W/m²

4.7.2.4 Plausibility check of the expected power to be installed

In a next step, a plausibility check of the expected power to be installed determined according to the procedure described above takes place. This test is carried out in three steps:

Available grid connection capacity

Review of possible wind farm layouts

4.7.3 Method for generation capacity determination in Zone 3

Areas N-9 to N-13, located in Zone 3 of the EEZ of the North Sea, will be fully developed under the target system.

Compared to the representation in SDP 2019, Areas N-9 to N-13 have been significantly enlarged in a north-westerly direction. Please refer to Chapter 5.1. These are therefore very large areas with a large number of wind turbines, which are mostly developed in one piece with comparable turbine technology. Compared with the areas in Zones 1 and 2, the losses resulting from the wake effects of the installations are thus much more significant.

The methodology for generation capacity determination for the sites in Zone 3 has been the subject of extensive consultation as part of this update of the SDP. It turned out that the areas in Zone 3 are very different from those in Zones 1 and 2 in terms of determining the power likely to be installed in areas. Thus, transferring a universal approach to generation capacity determination as for sites in Zones 1 and 2 is not appropriate. Rather, an individual designation of the power likely to be installed should be made, taking into account the objectives mentioned in 4.7.1.

Achievement of objectives

Efficient grid connection

Cost efficiency

Compared to the sites in Zones 1 and 2, the power density in Areas N-9 and N-10 is reduced in order to compensate for the increased losses as a result of shading. With the designation of 4 GW in Area N-9 and 2 GW in Area N-10, the corrected power density is approx. 8 MW/km².

4.8 Criteria for designating the sites and the chronological order of their tender

For designation of the sites in the SDP and the chronological order of their tender, WindSeeG specifies criteria to be applied in Section 5, paragraph 4. The overall objective of the designations is to ensure that the expansion of offshore wind turbines and the associated connection systems on these sites is carried out in parallel and that the existing connecting cables are used efficiently and at full capacity.

4.8.1 Methodology for applying the criteria

In principle, the application of the criteria mentioned below is done step by step: First to designate sites and then the chronological order of their tender. Single or multiple criteria can thus lead to areas within areas not being designated as sites in Chapter 5.2. Please also refer to Chapter 5.2.

With regard to the basic objectives mentioned in Section 4.8, criterion no. 1 is defined as overriding when applied to designate the chronological ranking of the sites. This follows from Section 5, paragraph 4, sentence 1 WindSeeG, which, before listing the criteria, accentuates the completion of the connecting cables required to connect the sites and the efficient use and utilisation of the existing offshore connecting cables as the overriding objective. The criterion in Section 5, paragraph 4, sentence 2, No. 1 forms the central basis for this because it entails using the existing connecting cables to avoid vacancies as far as possible and to ensure as efficient a procedure as possible. As a rule, the primary aim is to fully utilise existing lines.[11]

Thus, when applying the criteria to designate the chronological order, the sites are first sorted according to this criterion. In the following, the order of the sites is specified on the basis of Criteria 2 to 8 for further ranking.

4.8.2 Description of the criteria to be applied

4.8.2.1 Criterion 1: Efficient use and utilisation of offshore connecting cables with commissioning by the end of 2025

4.8.2.2 Criterion 2: Orderly and efficient planning, construction, commissioning, use, and utilisation of the offshore connecting cables with commissioning starting in 2026

4.8.2.3 Criterion 3: Spatial proximity to the coast

4.8.2.4 Criterion 4: Conflicts of use on one site

4.8.2.5 Criterion 5: Expected actual buildability of a site

4.8.2.6 Criterion 6: Expected generation capacity

4.8.2.7 Criterion 7: Balanced distribution between North Sea and Baltic Sea

[11] BT-DrS. 18/8860 of 21 June 2016, Bill of the CDU/CSU and SPD parliamentary groups, Draft Act on the Introduction of Tenders for Electricity from Renewable Energy Sources and on Further Amendments to Renewable Energy Law, p. 275.

4.8.2.8 Supplementary criterion territorial waters: Actual availability of the site

5 Designations

5.1 Areas for the construction and operation of offshore wind turbines

A total of 13 areas in the EEZ of the North Sea and three areas in the EEZ of the Baltic Sea for offshore WTGs are currently identified in this plan with Areas N-4 and N-5 under review for possible subsequent use. For a better overview, the areas are numbered with the letter N or O for the North Sea or Baltic Sea and the digits 1 to 13.

The designation and delimitation of the areas is based in particular on the designations of spatial planning and the consideration of other public and private interests. With regard to spatial planning, ROP-E 2021 was taken into account in the consideration in addition to the valid 2009 spatial plan, in particular in order to achieve a planning regime for the EEZ that is as free of contradictions as possible. More information can be found in Chapter 2.6.1.2.

The designation of the areas was largely taken over from the O-GDP or the BFO. Areas N-1 to N-4 and all areas of the Baltic Sea are located in zone 1 of the O-GDP. Areas N-5 to N-8 are in Zone 2; Areas N-9 to N-13 are in Zone 3 of the O-GDP. All areas were adapted to the requirements of the 2009 spatial plan in that a distance of 500 m is maintained from the EEZ boundary as well as from the designated shipping routes in order to ensure the installation of a safety zone around the future OWF within the German EEZ. For Shipping routes SN10 and SN15, their modified layout was taken into account in the draft update of the spatial plans. As a result, some areas are slightly reduced in size compared to the previous designation in SDP 2019. Please refer to Chapter 2.6.1.2.

An extension of Areas N-9, N-10, N-12, and N-13 into the reservation area for shipping of the ROP 2009 requires special justification: Current traffic analyses based on AIS data show that the assumptions on traffic flows in the EEZ underlying the ROP 2009 do not (or no longer) fully correspond to the actual conditions. In particular, traffic on SN 10 is characterised by transit traffic extending from the Dutch East Friesland traffic separation area to the entrance to the Danish traffic separation areas north of Skagen. Three main traffic flows can be identified; these are located mainly in the priority area for shipping of the ROP 2009 and further west. The reservation areas of the ROP 2009 to the east of priority area 10 has significantly less traffic. Its use is in line ROP-E 2021 the circumstances and requirements of which the SDP is to fit after the completion of the update. The GDWS, as the competent authority, also raises no objections here. Initial results from a survey commissioned from DNV-GL and Nautitec to determine the risk and the nautical situation in SN 10 confirm the assessment that Sites N-9 to N-13 can be partially extended to the west into the reservation area for shipping from the 2009 ROP.

Table 4: Overview of areas for offshore wind energy

Area	Size [km²]	Zone classification of the O-GDP
North Sea		
N-1	approx. 79	1
N-2	approx. 223	1
N-3	approx. 308	1
N-4	approx. 148	1
N-5	approx. 124	2
N-6	approx. 249	2
N-7	approx. 163	2
N-8	approx. 124	2
N-9	approx. 453	3
N-10	approx. 195	3
N-11	approx. 355	3
N-12	approx. 494	3
N-13	approx. 270	3
Baltic Sea		
O-1	approx. 129	1
O-2	approx. 82	1
O-3	approx. 28	1

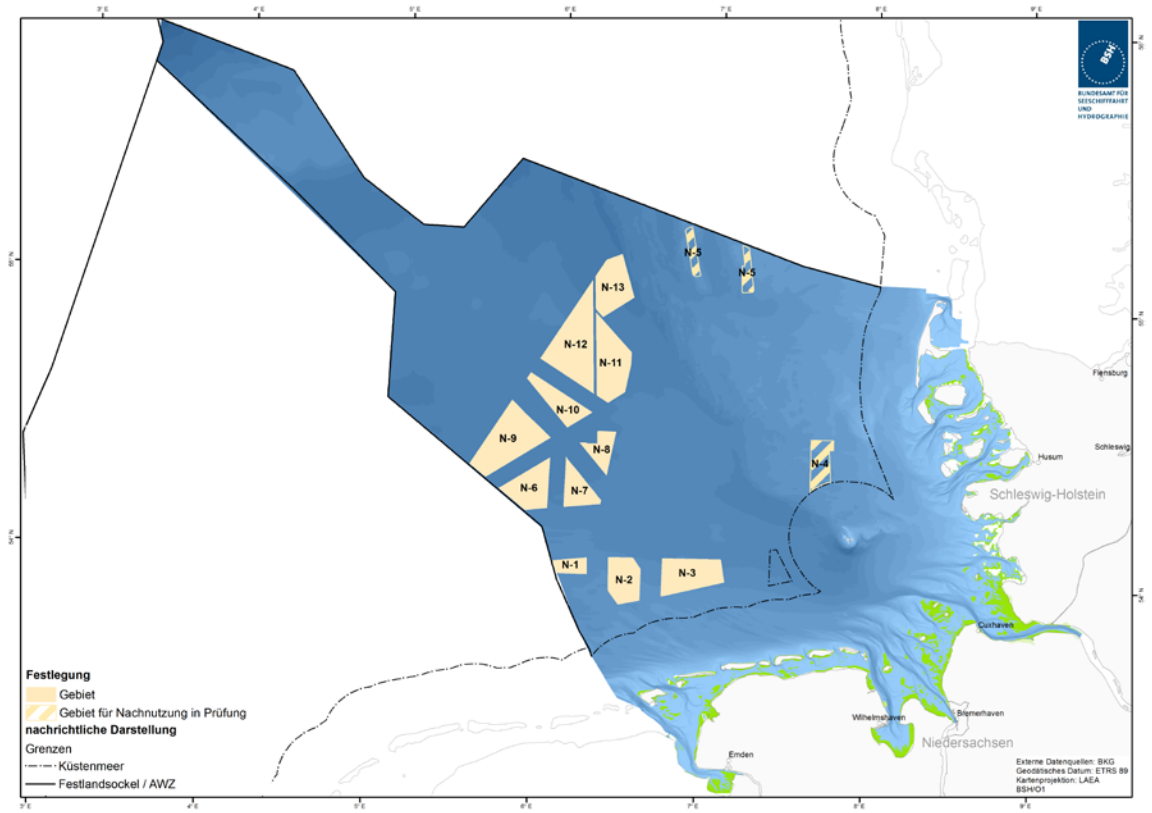


Figure 8: Areas in the German EEZ of the North Sea

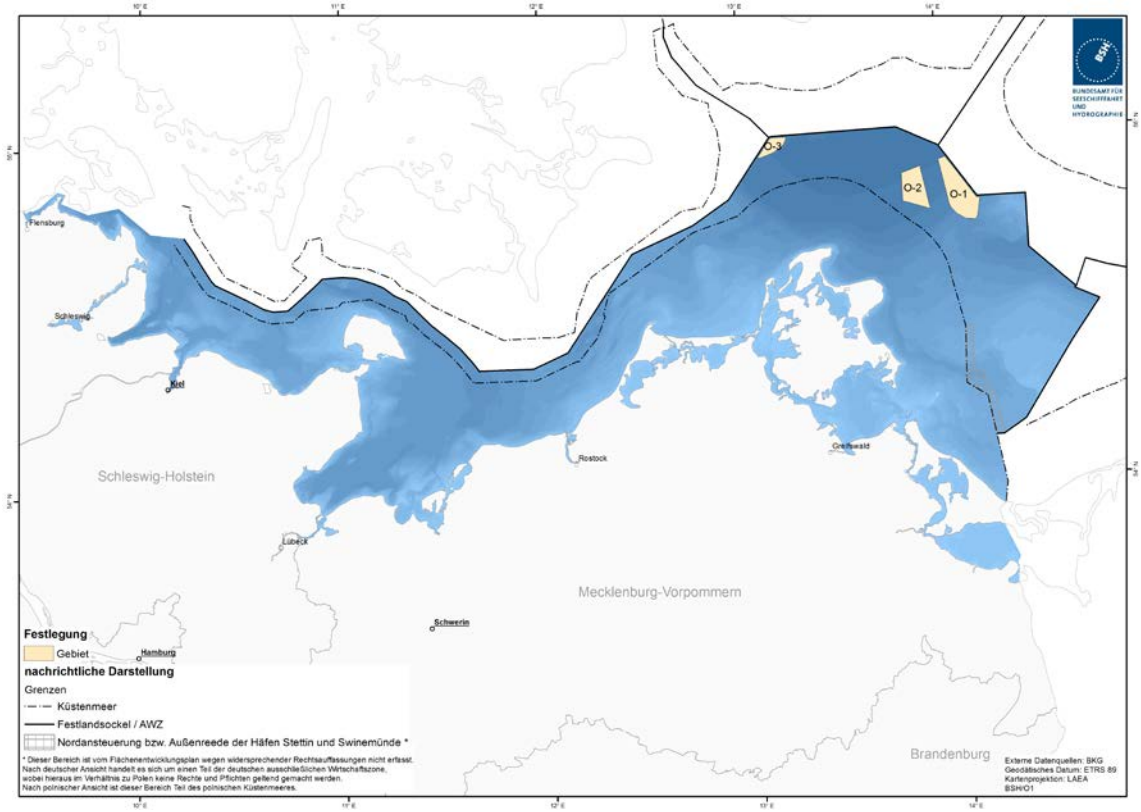


Figure 9: Areas in the German EEZ of the Baltic Sea

5.1.1 Designation of areas and offshore grid planning framework

In principle, the existing spatial plans for the EEZ set the framework mainly for the designation of areas. The priority and reservation areas for shipping, lines, research projects and wind energy production were taken into account in the selection and designation of the 13 areas in the EEZ of the North Sea and the three areas in the EEZ of the Baltic Sea According to the approach taken in the 2009 spatial plan, no areas for wind energy have been identified in nature conservation areas or naval training areas (see Figure 39 and Figure 40). In addition to the valid 2009 spatial plan, the changes resulting from the draft update of the spatial plans (ROP-E 2021) published and consulted on in September 2020 were also taken as a basis. More information can be found in Chapter 2.6.1.2.

Furthermore, the designations of the areas are based on the clusters designated in the Federal Offshore Grid Plan, which essentially continue to apply.[12] The Federal Offshore Grid Plan North Sea 2012 has already identified 13 clusters for offshore wind energy and described the reasons why other areas are not eligible for offshore wind energy use (cf Chapter 4.2 BFO-N 2012). This was further elaborated in BFO-N 13/14. Reference is made in this context to the explanations in Chapter 4.2 BFO-N 13/14.

In addition to the spatial planning framework conditions, the statutory objectives according to Section 4, paragraph 2 WindSeeG-E also play a decisive role in the location and selection of the areas. Accordingly, the objective is to achieve the expansion targets according to Section 1, paragraph 2, sentence 1 WindSeeG (20 GW by 2030 and 40 GW by 2040), to expand electricity generation from offshore wind farms in a spatially ordered and land-saving manner, to ensure the orderly and efficient use and utilisation of offshore connecting cables and to plan, erect, commission, and use offshore connecting cables in parallel with the expansion of electricity generation from offshore wind farms.

According to Section 5, paragraph 3, sentence 3 WindSeeG, the permissibility of the designations of an area is initially assumed in principle insofar as the area is located in a cluster designated by the Federal Spatial Offshore Grid Plan according to Section 17a EnWG or in a priority, reserved, or suitability area of a spatial plan according to Section 17, paragraph 1 , sentence 1 of the ROG.

In the course of the designation and assessment of the areas, the following comments on the individual areas have essentially either revealed no new knowledge compared with the clusters identified in the BFO, so that there is nothing to prevent their designation in the SDP on the basis of the information currently available, or additional significant identifiable aspects or updates and more detailed assessments have confirmed the identification of the clusters in the BFO. Only Areas N-9 to N-13 were adjusted according to the designations of ROP-E 2021 according to current knowledge. Please refer to Chapter 8.3.

Although the criteria set out in Section 5, paragraph 4, sentence 2, Nos. 1 to 7 WindSeeG such as the orderly and efficient planning, construction, commissioning, use, and capacity utilisation of the offshore connecting cables still to be completed, the spatial proximity to the coast and conflicts of use according to the wording of the Act are to be applied to the designation of sites and the order in which they are put out to tender. However, because the sites are located within

[12] Available at https://www.bsh.de/DE/THEMEN/Offshore/Meeresfachplanung/Bundesfachplaene_Offshore/bundesfachplaene-offshore_node.html.

the area, the areas are designated in terms of the criteria to be applied to sites or are examined not only for additional or other significant identifiable aspects and for updates and elaboration but rather also in particular with regard to the spatial proximity to the coast (Criterion 3) as well as the existence of conflicts of use (Criterion 4).

In terms of a cost-efficient development of wind energy, the development of areas close to the coast should be started, and the distance to the coast should be successively increased.

5.1.2 The areas in detail

Area N-1 is located between the traffic separation areas “German Bight Western Approach” and “Terschelling German Bight”. Adjacent to the area to the south is the “Borkum Riffgrund” nature conservation area and to the east, Priority area 3 for shipping of the ROP 2009 and SN3 of the ROP-E 2021. On the western side of the area runs the EEZ border with the Netherlands. The area is located in the priority area for wind energy “Nördlich Borkum” defined in the 2009 ROP and in priority area EN1 of ROP-E 2021. It is expected that the area will be fully developed by the end of 2025.

Area N-2 is located directly north-east of the nature conservation area “Borkum Riffgrund” and is bordered in the north-eastern area by the pipeline “Norpipe”. To the south and north, it is bounded by the ROP 2009 reservation areas and the ROP-E 2021 priority areas for shipping; these lie parallel to the traffic separation areas. The same applies to the eastern side. The area is located in the priority area for wind energy “Nördlich Borkum” defined in the 2009 ROP and in priority area EN2 of ROP-E 2021. It is expected that the area will be fully developed by the end of 2025.

Area N-3 is also located between the two traffic separation areas to the west of the priority area for pipelines “Europipe 2” of ROP 2009 and the reservation area LN2 of ROP-E 2021. The western half of the area is located in the priority area for wind energy “Nördlich Borkum” of ROP 2009; the entire area is located in the priority area for wind energy EN3 of ROP-E 2021. The “Europipe 1” pipeline runs through the area in a north-easterly direction; this is secured by corresponding priority and reservation areas for pipelines in ROP 2009 or the reservation area for pipelines LN3 of ROP-E 2021. The area is expected to be partially built up by the end of 2025 (please refer to Figure 11).

Area N-4 is located north of Helgoland. On the eastern side, it borders on the bird conservation area “Östliche Deutsche Bucht” and on Area II of the “Sylter Außenriff – Östliche Deutsche Bucht” nature conservation area. The area lies within the priority area for wind energy “Südlich Amrumbank” defined in the ROP 2009 and the reservation area for wind energy EN4 defined in ROP-E 2021. Much of the area lies within the main concentration area for divers and the main distribution area for harbour porpoises. It is expected that the area will be fully developed by the end of 2025.

According to the current state of knowledge, Area N-4 is seasonally important for divers. Area N-4 will therefore not be designated, and it will be put under review for a subsequent use.

Area N-5 is located west of Sylt in or at the edge of the “Sylter Außenriff – Östliche Deutsche Bucht” nature conservation area. The area lies entirely within the main concentration area for divers and the main distribution area for harbour porpoises. The area lies within the reservation area for wind energy EN5 defined in ROP-E 2021.

The need to examine the area with regard to a possible subsequent use is because, according to Section 8, paragraph 3 WindSeeG, designations on a subsequent use can be made in the context of an update of the SDP beyond 2030.

Area N-6 is located north of the traffic separation area “German Bight Western Approach”. In an easterly direction, the area is bounded by the

reservation area for shipping 12 of ROP 2009 or the priority area SN12 of ROP-E 2021 and in a northerly direction by shipping route 6 or SN6. The EEZ border with the Netherlands runs west of the area. The area lies completely within priority area wind energy EN6 of the ROP-E 2021 and is expected to be partially developed by the end of 2025; please refer to Figure 11 .

Area N-7 is located north of the traffic separation area "German Bight Western Approach". It is bounded to the west by the reservation area for shipping 12 (ROP 2009) or priority area for shipping SN12 (ROP-E 2021) and to the north-east by the reservation area for pipelines "Norpipe" in accordance with ROP 2009 or LN1 in accordance with ROP-E 2021. The area corresponds to priority area wind energy EN7 of the ROP-E 2021 and is expected to be partially developed by the end of 2025; please refer to Figure 11 .

Area N-8 Lies within the priority area for wind energy "Östlich Austerngrund" of ROP 2009 or the priority area for wind energy EN8 of ROP-E 2021 as defined in the spatial plan. To the southwest, the area is bounded by the reservation area for pipelines ("Europipe 1") of ROP 2009 or LN1 of ROP-E 2021 and to the east by shipping route 5 (ROP 2009) or SN5 (ROP-E 2021). To the north the area is bounded by existing wind farms. In the northern part of the area, the area is bounded to the west along the NorNed interconnector. The area is completely built up; please refer to Figure 11.

Area N-9 is delimited by shipping routes 6 and 10 of ROP 2009 or SN6 and SN10 of ROP-E 2021 as well as the reservation area for pipelines ("Norpipe") or LN1 and corresponds to priority area wind energy EN9 of ROP-E 2021. For the shipping route SN10 (see background information in Chapter 2.6.1.2), the location from the published and consulted draft for the update of the spatial plans is used as a basis.

Area N-10 is located between shipping routes 4, 6, and 10 of ROP 2009 or SN4, SN6 and SN10 of ROP-E 2021 as well as the reservation area pipeline ("Europipe 1") of ROP 2009 or LN1 of ROP-E 2021. The area corresponds to the priority area for wind energy LN10 of the ROP-E 2021. For the shipping route SN10 (see background information in Chapter 2.6.1.2), the location from the published and consulted draft for the update of the spatial plans is used as a basis.

Area N-11 is bounded by shipping routes 4, 5, and 6 of ROP 2009 and SN4, SN5, and SN6 of ROP-E 2021, the cross-border submarine cable system "NorNed" and "Sylter Außenriff – Östliche Deutsche Bucht" nature conservation area. The area corresponds to the priority area for wind energy EN 11 of the ROP-E 2021.

Area N-12 is delimited by shipping routes 4 and 10 of the ROP 2009 and SN4 and SN 10 of the ROP-E 2021, respectively as well as the cross-border submarine cable system "NorNed". The area corresponds to the priority area for wind energy EN 12 of the ROP-E 2021. For the shipping route SN10 (see background information in Chapter 2.6.1.2), the location from the published and consulted draft for the update of the spatial plans is used as a basis.

Area N-13 is bounded by shipping route 10 (ROP 2009) or SN10 (ROP-E 2021) and the "Sylter Außenriff – Östliche Deutsche Bucht" nature conservation area as well as the main concentration area for divers[13] and lies largely within the main distribution area for harbour porpoises. The area corresponds to the priority area for wind energy EN 13 of the ROP-E 2021. For the shipping route SN10 (see background information in Chapter 2.6.1.2), the location from the

[13] To protect the divers, the distance to the main concentration area corresponds to the deterrence-induced habitat loss of 5.5 km. Please refer to Chapter 8.3

published and consulted draft for the update of the spatial plans is used as a basis.

Area O-1 (“Westlich Adlergrund”) is located northeast of the island of Rügen on the border with the Danish EEZ. The area is located north of the “Pommersche Bucht – Rönnebank” nature conservation area and north of priority area 21 for shipping in accordance with ROP 2009 and SO1 in accordance with ROP-E 2021. To the west of the area lies priority area shipping 20 of the ROP 2009 or SO2 of the ROP-E 2021; on the eastern side is the EEZ border with Denmark. The area includes the “Westlich Adlergund” priority area of 2009 ROP and lies within the EO1 priority area for wind energy of ROP-E 2021. The impacts on bird migration between Rügen and Skåne is to be assessed in the further course. The area is expected to be partially built up by the end of 2025 (please refer to Figure 3 and Figure 12).

Area O-2 (“ArkonaSee”) is located north-east of the island of Rügen. The area is bounded to the north and east by priority areas shipping 19 and 20 of the ROP 2009 and SO1 and SO2 of the ROP-E 2021, respectively. The southern boundary of the area is designated by the route of the data cable “Baltica Segment 3”. In the west, the area borders on a priority area for research (FoO3 of ROP-E 2021). The impacts on bird migration between Rügen and Skåne is to be assessed in the further course. There is also a MARNET station in the northern part of the area. The area lies completely within reservation area wind energy EO2 of the ROP-E 2021 and is expected to be partially developed by the end of 2025; please refer to Figure 3 and Figure 12. For the rest, please refer to Chapter 5.2.2.

Area O-3 (“Kriegers Flak”) is located north-west of the island of Rügen. The area is bounded to the north by the Swedish EEZ boundary and to the west by the Danish EEZ boundary; to each of these, a distance of 500 m is maintained. In the south, the area is bordered by the priority area Shipping 19 of ROP 2009 and SO1 of ROP-E 2021 and in the east by NATO submarine search areas, which already partly overlap with the wind farm “EnBW Baltic 2”. The impacts on bird migration between Rügen and Skåne is to be assessed in the further course. This area surrounds the “Kriegers Flak” priority area for wind energy of 2009 ROP and lies within the EO3 priority area of ROP-E 2021 and is fully developed. For further information, please refer to the admissibility check in Chapter 8.3 .

Table 5: Summary overview of the areas

Area	Cluster designation in the BFO	Currently, additional significant discernible aspects compared with the designation of the clusters in the BFO (Section 5, paragraph 3, sentence 3 WindSeeG) and ROP Current identifiable conflicts of use
North Sea		
N-1	Yes	No
N-2	Yes	No
N-3	Yes	No
N-4 (re-use under review)	Yes	Location in the main concentration area of divers. Location in the main distribution area of harbour porpoises.
N-5 (re-use under review)	Yes	Reduction of the designated Cluster 5 to the operating OWF “Dan Tysk” and “Sandbank”. The “Butendiek” project is presented for information purposes as a wind farm because of its location within the protected area. Location in the main concentration area of divers. Location in the main distribution area of harbour porpoises.
N-6	Yes	No
N-7	Yes	No
N-8	Yes	No
N-9**	Yes	No
N-10**	Yes	No
N-11	Yes	No
N-12**	Yes	No
N-13**	Yes	Location in the main distribution area of harbour porpoises. Reduction in eastern direction to the main concentration area of divers
Baltic Sea		
O-1	Yes	Assessment of the impact of bird migration.
O-2	Yes	Assessment of the impact of bird migration. Conflicts of use with research areas.
O-3	Yes	Area has been reduced in the SDP 2019 compared with the designated cluster. Assessment of the impact of bird migration.

* The spatial plan is currently being revised. The ROP-E 2021 defines the above-mentioned areas as priority and reservation areas; see also 5.1.2 and 2.6.1.2.

** The areas have been enlarged to the north-west compared with the designated clusters.

5.2 Sites for the installation and construction of offshore wind turbines

According to Section 5, paragraph 1, No. 2 WindSeeG, the SDP shall designate areas in the sites defined in Chapter 5.1 for the installation and operation of offshore WT. Section 5, paragraph 4 does not conclusively regulate criteria for designating the sites (see Chapter 4.8).

For a better overview, the sites are numbered consecutively with the numbers 1 to 8 after the letter N or O for the North Sea or Baltic Sea, respectively and the numbers 1 to 13 for the respective area (example: N-9.1 for Site 1 in Area N-9 in the North Sea).

5.2.1 Designations of sites

Within the SDP, taking into consideration the OWF projects that will be commissioned by 2025 and the planning horizon until 2030, only sites in the N-3, N-6, N-7, N-9, N-10 and O-1 areas are initially identified. Please refer to Chapter 4.6. Assuming that the wind farm projects in Areas N-1, N-2, and N-4 as well as O-3, which are already in operation or which have been awarded a contract within the framework of the transitional tenders, continue to be in operation or will be in operation by 2025 if the prerequisites are met, no sites are designated in these areas.

Table 6: Overview of sites for offshore wind energy

Area	Site	Size of site [km²]	Connection concept
North Sea			
N-1	–	–	–
N-2	–	–	–
N-3	N-3.5	approx. 29	66 kV
	N-3.6	approx. 33	66 kV
	N-3.7	approx. 17	155 kV[1)]
	N-3.8	approx. 23	155 kV[1)]
N-4[2)]	–	–	–
N-5[2)]	–	–	–
N-6	N-6.6	approx. 44	66 kV
	N-6.7	approx. 16	66 kV
N-7	N-7.2	approx. 58	66 kV
N-8	–	–	–
N-9	N-9.1	approx. 100	66 kV
	N-9.2	approx. 104	66 kV
	N-9.3	approx. 105	66 kV
	N-9.4	approx. 99	66 kV
N-10	N-10.1	approx. 95	66 kV
	N-10.2[3)]	approx. 93	66 kV
Baltic Sea			
O-1	O-1.3	approx. 25	66 kV
O-2	O-2.2[4)]	approx. 20	–
O-3	–	–	–

[1)] Sites N-3.7 and N-3.8 will be connected to the NOR-3-3 connection system, which will go into operation as early as 2023 and will therefore be connected using the 155 kV connection concept.
[2)] Areas N-4 and N-5 are under review for possible subsequent use. Please refer to Chapter 5.1.
[3)] Site N-10.2 is not fully required to achieve 20 GW.
[4)] The designation of Site O-2.2 is under review. Please refer to Chapters 5.1.2, 5.2.2, and 8 .

North Sea

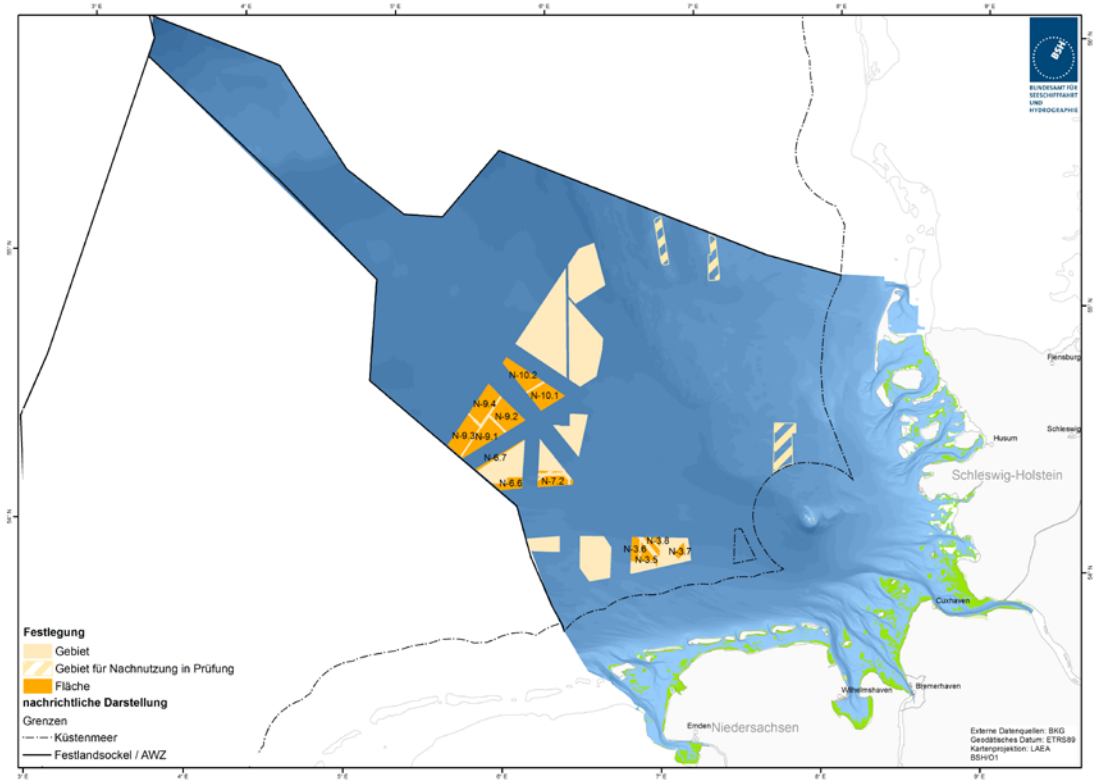


Figure 10: Sites in the German EEZ of the North Sea

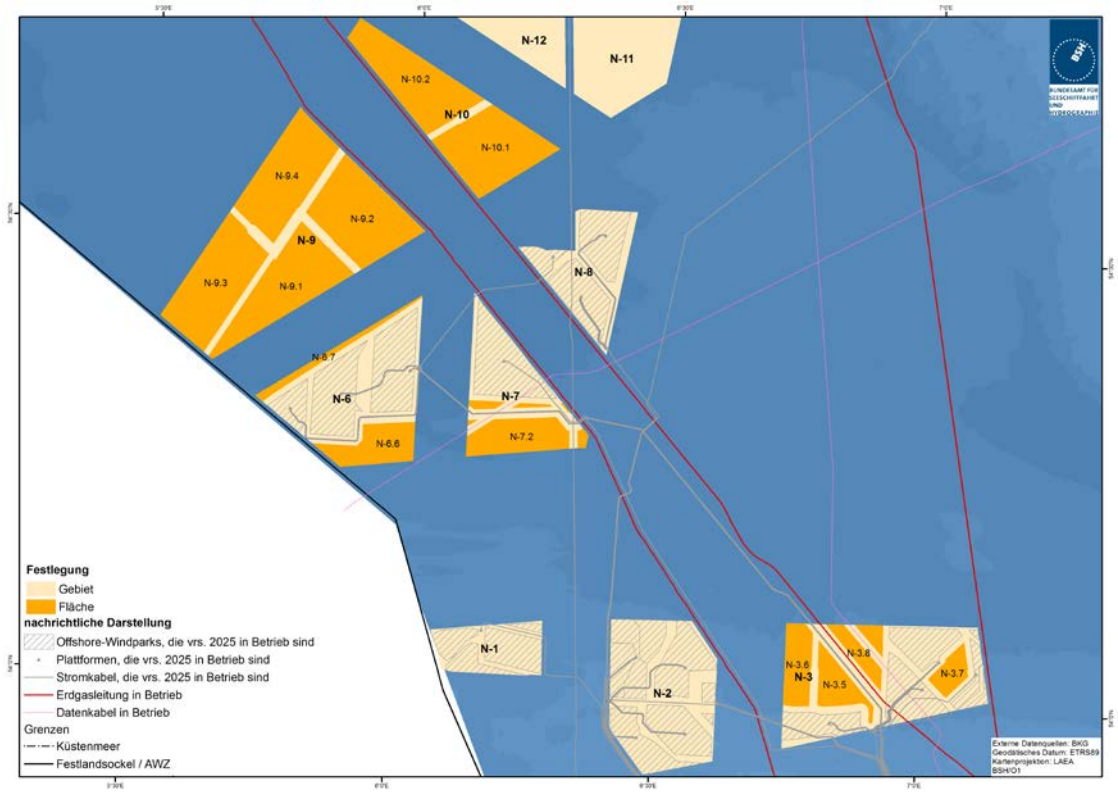


Figure 11: Sites in Areas N-3, N-6, N-7, N-9, and N10 in the German EEZ of the North Sea

Four sites are specified in Area N-3. Area N-3.6 is bounded by the reservation areas for shipping No. 2 and 11 of ROP 2009 and priority areas for shipping SN2 and SN11 of ROP-E 2021, the constructed wind farm “Nordsee One”, and Site N-3.5. In addition, Site N-3.5 is located to the west of “Europipe 1” and the connection systems “BorWin1” and “BorWin2” (or the reservation area LN3 of the ROP-E 2021). The approach and departure corridor of platform NOR-3-2 is expected to run between Sites N-3.5 and N-3.6 because of the other corridors existing in Area N-3. These must be taken into account in the planning of the sites by the respective OWF project developer. Please refer to planning principle 4.4.1.3. In addition, for N-3.5, reference is made to the future approach and departure corridor of the N-3.8 transformer platform. Site N-3.8 is located to the east of “Europipe 1” and the reservation area LN3 of the ROP-E 2021. This is cut into two sections by the active data cable “TAT 14N”. In addition, Site N-3.7 is defined in Area N-3, which is enclosed by the wind farms “Gode Wind 01”, “Gode Wind 02”, “Gode Wind III” and “Gode Wind 04”. With regard to Site N-3.7, reference is made to the existing approach and departure corridors of “Gode Wind 01” and “Gode Wind 02”, which must be taken into consideration. Please refer to planning principle 4.4.1.3.

In Area N-6, this plan provides for the designation of two sites. Site N-6.6 is located in the southern part of the area and is bordered to the south and east by the ROP 2009 reservation areas for shipping and the ROP-E 2021 priority areas for shipping. To the north are the three wind farms already built: “Deutsche Bucht”, “Veja Mate”, and “BARD Offshore 1”. Because of the existing infrastructures and installations in the area, an approach and departure corridor of the platform NOR-6-3 is expected to run only south of the OWF “BARD Offshore 1”. The approach and departure corridors of NOR-6-3 shall be taken into consideration in the planning of the site by the OWF project developer of Site N-6.6. Please refer to planning principle 4.4.1.3. In the northern part of the area, to the north of the wind farms already built, bordered by reservation areas for shipping of the ROP 2009, and priority areas for shipping of ROP-E 2021, Site N-6.7 is defined.

Site N-7.2 is defined in the southern area of Area N-7. To the north of the site is the “EnBW He Dreiht” wind farm; to the west, east, and south, the sites are bounded by shipping routes. The connecting cables BorWin1, BorWin2, and NOR-6-3 run between the sub-sites; the sites are also cut by the data cable “Atlantic Crossing 2” and the cross-border submarine cable system “NorNed”. The approach and departure corridors of Platforms NOR-6-3 and NOR-7-2 shall be taken into account in the planning of Site N-7.2. Please refer to planning principle 4.4.1.3.

In Area N-9, four sites of approximately equal size are designated under this plan. Site N-9.1 is located in the south-western part of Area N-9 and is bordered to the south by shipping route 6 of the ROP 2009 or SN6 of the ROP-E 2021. To the north of this is Site N-9.2, which extends as far as the “Norpipe” reservation area in accordance with ROP 2009 and LN1 of ROP-E 2021. Sites N-9.3 and N-9.4 are bounded to the south by Siteds N-9.1 and N-9.2, to the north west by the SN10 shipping route, which has been shifted in ROP-E 2021 compared with ROP 2009, and to the north by the “Norpipe”. The future approach and departure corridors of the NOR-9-1 and NOR-9-2 converter platforms shall be taken into account by the respective OWF project developer when planning the sites in Area N-9. Please refer to planning principle 4.4.1.3.

For Area N-10, two sites have also been designated in this plan. The area is thereby divided into two roughly equal sites. N-10.1 is located in the southern part of the area and is bordered by “Europipe 1” and Shipping routes 4 and 6 of the ROP 2009 or SN4 and SN9 and LN1 of the ROP-E 2021. N-10.2 is bounded to the west by the “Europipe 1” or reservation area pipelines LN1 of ROP-E 2021, to the north west by the shifted

shipping route SN10 of ROP-E 2021, and to the north by shipping route 4 of ROP 2009 or SN4 of ROP-2021. The future approach and departure corridors of the NOR-10-1 converter platform are to be taken into consideration in the planning of the sites in Area N-10. Please refer to planning principle 4.4.1.3. It is noted that Site N-10.2 is not fully required to achieve 20 GW.

Baltic Sea

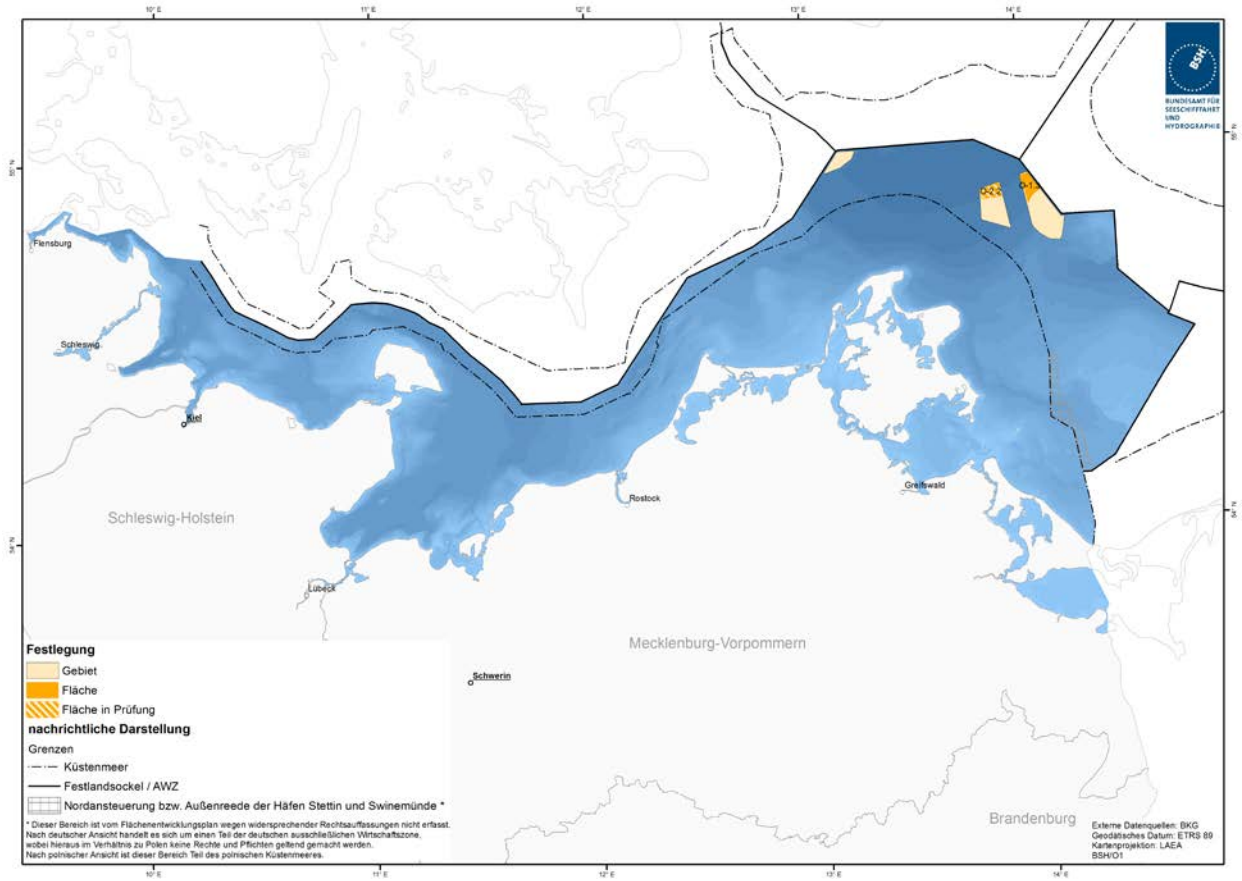


Figure 12: Sites in the German EEZ of the Baltic Sea

In Area O-1, Site O-1.3 is defined in the northern area. This is bounded by the EEZ border with Denmark, shipping routes, and the “Wikinger” wind farm. A NATO submarine search area also borders the site to the north. The existing, surrounding approach and departure corridors as well as the approach and departure corridor of the transformer platform of OST-1-4 shall be taken into consideration by the OWF project developer in the planning of Site O-1.3. Please refer to planning principle 4.4.1.3.

In Area O-2, the designation of Site O-2.2 in the northern area is under review. Please refer to Chapters 5.1.2, 5.2.2, and 8 . This site is also bordered by shipping routes and the “Baltic Eagle” wind farm. In addition, the site is bordered to the west by a reservation area for research (FoO3 of ROP-E 2021).

5.2.2 Relevant criteria for deciding against the designation of a site

In order to designate the sites in the SDP, the WindSeeG specifies criteria to be applied in a non-conclusive manner in Section 5, paragraph 4. Single or multiple criteria can lead to areas within areas not being designated as sites. Please refer to Chapter 8.

Please refer to the comparison of sites from a nature conservation perspective as part of the

examination of reasonable alternatives in the draft environmental reports (Chapter 9.3.2) and the environmental reports (Chapter 9.3.2) of SDP 2019. Reference is made to the draft environmental reports in the context of the update and amendment of the SDP.

Sites in Area N-5

The designation of Site N-5.4 designated in the preliminary draft of SDP 2019 and the draft of SDP 2019 is not considered because of nature conservation and environmental concerns.

Sites in Area O-1

In the southern part of Area O-1, no site is designated because of conflicts of use (criterion 4, see chapter 4.8.2.4) and the expected power to be installed (criterion 6, see chapter 4.8.2.6). The southern part of the area is largely built up. Reef structures can also be found there. Because of the small size of the possible sites, (economic) operation of an independent wind farm does not seem possible.

The suitability of Site O-1.3 was determined by the 1st WindSeeV of 15 December 2020. Please refer to these.

Sites in Area O-2

For Area O-2, because of conflicts of use (criterion 4, see Chapter 4.8.2.4), it is being examined whether Site O-2.2 should be designated. In addition, it is being examined whether and under what conditions a relocation of the MARNET station located within the site is technically possible.

With regard to the actual buildability (criterion 5, see chapter 4.8.2.5), serious and permanent obstacles to approval have not yet become apparent. However, the information available so far for the area of the Arkona Basin indicates that in this area there are partly more than 10 m thick soft to mushy silts. These are underlain by sediments up to about 30 m thick. These consist of soft to stiff clays, silts, and fine sands as well as stiff to firm boulder clay. The base of the glacial and postglacial deposits is again formed by thick chalk deposits. In this context, it should be noted that state-of-the-art foundations for wind turbines and connecting cables have not yet been tested in the affected area.

In addition, there is a need for discussion and clarification of issues that cannot yet be conclusively assessed, such as bird migration (cf Chapter 4.2.2, BFO-O 16/17 and BFO-O 2013). The designation of Site O-2.2 will thus be further examined in the context of the update of the SDP.

Area O-2 is home to one project that was awarded a contract in the second transitional tender. Any knowledge gained from the planning approval procedure to be conducted in Area O-2 will be taken into consideration in the context of the update of the SDP. Among other things, the procedure will examine whether it is necessary to designate measures to avoid a possible significantly increased risk of collision for migratory birds (such as a temporary shut-down of offshore wind turbines during events with very high migration intensity).

The same applies to the areas for other forms of energy generation SEO-1.

5.3 Expected generation capacity

Table 7: Overview of the expected capacity to be installed on the sites for offshore wind turbines

Area	Site	Expected installed power [MW]
North Sea		
N-3	N-3.5	420
	N-3.6	480
	N-3.7	225[2)]
	N-3.8	433[2)]
N-6	N-6.6	630
	N-6.7	270
N-7	N-7.2	930
N-9	N-9.1	1,000
	N-9.2	1,000
	N-9.3	1,000
	N-9.4	1,000
N-10	N-10.1	1,000
	N-10.2[1)]	1,000[1)]
Baltic Sea		
O-1	O-1.3	300[2)]

[1)] Site N-10.2 is not fully required to achieve 20 GW.

[2)] Reference is made to the 1. WindSeeV of 15 December 2020.

5.3.2 Plausibility check of the expected power to be installed

Table 8: Plausibility check of the determined performance

Site designation	Corrected power density [MW/km²]	Determined power in accordance with chapter 4.7 [MW]	Adjustment of performance because of plausibility check
North Sea			
N-3.5	9.5	approx. 420	–
N-3.6	10	approx. 480	–
N-3.7	9.5	approx. 280	Reduction to 225 MW (max. capacity of the AC connecting cable and the DC connecting cable) [1)]
N-3.8	9.5	approx. 440	Reduction to 433 MW (max. capacity of the DC connecting cable) [1)]
N-6.6	10	approx. 630	–
N-6.7	10	approx. 470	Reduction to 270 MW (plausibility check of the layout)
N-7.2	10	approx. 1,050	Reduction to 930 MW (max. capacity of the DC connecting cable or GCP Büttel)
N-9.1	approx. 8	1,000	–
N-9.2	approx. 8	1,000	–
N-9.3	approx. 8	1,000	–
N-9.4	approx. 8	1,000	–
N-10.1	approx. 8	1,000	–
N-10.2	approx. 8	1,000	–
Baltic Sea			
O-1.3	10	approx. 420	Reduction to 300 MW (max. capacity of the connection system) [1)]

[1)] Reference is made to the 1. WindSeeV of 15 December 2020.

5.4 Designations for the territorial waters

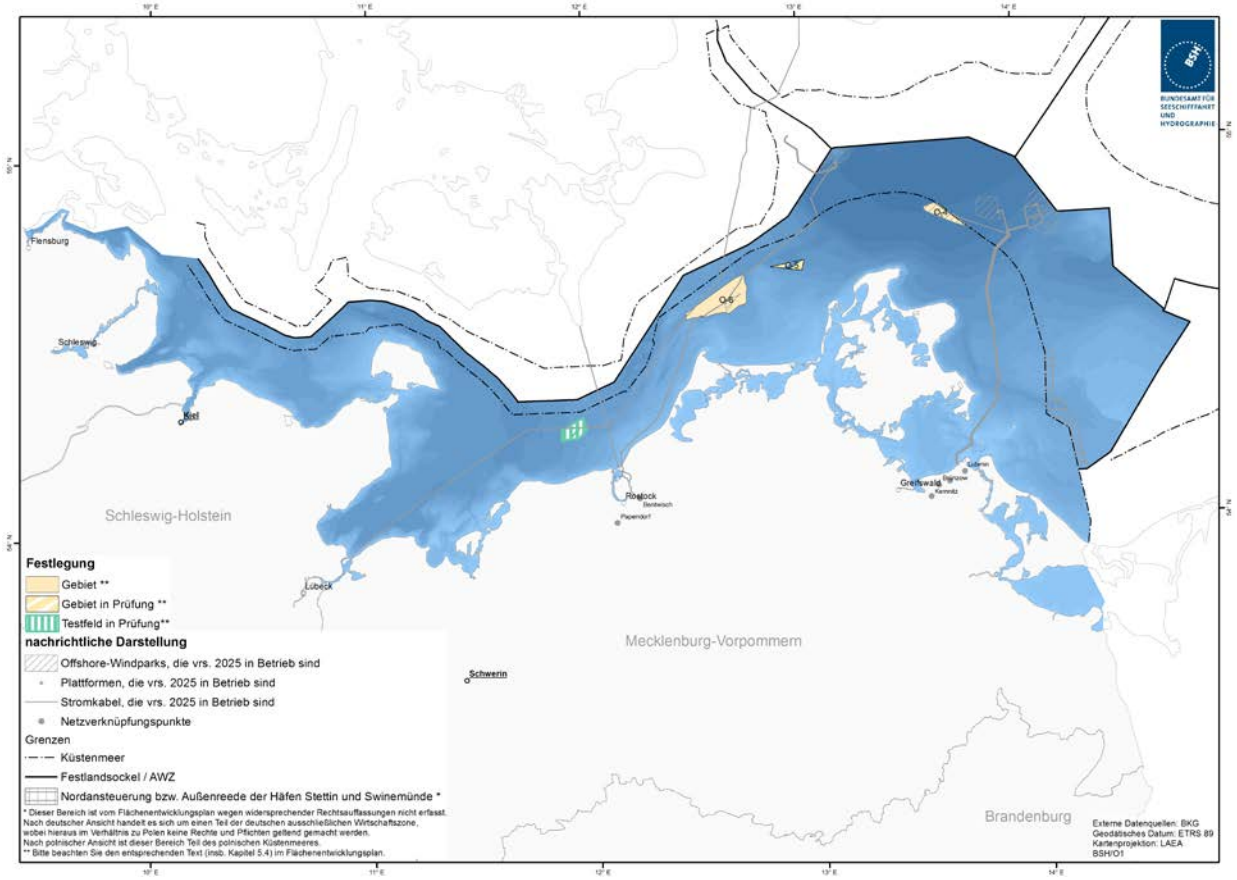


Figure 13: Areas submitted by Mecklenburg-Western Pomerania for designation and the test site in the territorial waters

5.4.1 Need for an administrative agreement

In accordance with Section 4, paragraph 1, sentence 2 WindSeeG, the SDP may also make sectoral planning designations for areas, sites, the chronological order in which the sites are put out to tender, the calendar years of commissioning, and the expected capacity to be installed as well as for test fields and areas for other forms of energy generation for the territorial waters. According to an administrative agreement between the Federal Government, represented by the BSH, and the competent state, the individual designations for the territorial waters are determined in more detail.

An administrative agreement was already concluded between the federal government, represented by the BSH, and the state of Mecklenburg-Western Pomerania as part of the process of drawing up SDP 2019.

5.4.2 Areas for the construction and operation of offshore wind turbines

The marine priority areas for wind turbines designated by the state of Mecklenburg-Western Pomerania in the LEP M-V 2016 are adopted. For the designation of the test field, please refer to Chapter 5.4.5.

The marine reservation area for wind turbines is adopted with the status “under review” because of a required regional planning procedure.

5.4.4 Sites for the installation and construction of offshore wind turbines

At present, the designation of sites within the meaning of Section 5, paragraph 1, No. 2 WindSeeG is out of the question because of the lack of actual availability of sites (which also includes the freedom of rights). Please refer to Chapter 4.8.2.8

5.4.5 Designations for the test field

According to Section 5, paragraph 2, sentence 1 WindSeeG, the SDP may define coastal test sites outside areas for a total of up to 40 square kilometres for the period from 2021.

According to Section 3, No. 9 WindSeeG, test fields are areas in the EEZ and in the territorial waters in which exclusively pilot offshore wind turbines that are connected to the grid are to be erected in a spatial context and which are to be jointly connected via a test field connecting cable.

According to section 3, no. 10 WindSeeG, a "test field connecting cable" is an offshore connecting cable required for a connection of test fields within the meaning of Section 3, No. 9 WindSeeG and which is determined in the GDP according to section 12b, paragraph 1, sentence 4, Number 7 EnWG.

Test field

The area north west of Warnemünde is designated as a test field in the western part according to information from the state of M-V.

Test field connecting cable

In addition, from 2021 onwards, the SDP may, according to Section 5, paragraph 2, No. 1b) WindSeeG, determine the calendar years in which pilot offshore wind turbines and the corresponding test site connecting cable are to be commissioned for the first time on the defined test site and, according to Section 5, paragraph 2, No. 1c) WindSeeG, determine the capacity of the corresponding test site connecting cable.

Because of the aforementioned open questions on the subject of shipping, no test field connecting cable is designated in SDP 2020.

The technical conditions of the test field connecting cable would correspond to those of standard connecting cables in the Baltic Sea. Therefore, full reference is made to Chapters 4.2.2 and 4.3.2.

5.5 Chronological sequence of tendered sites

According to Section 5, paragraph 1, No. 3 WindSeeG, the SDP shall designate the chronological order in which the designated sites are to be put out to tender according to Part 3 Section 2 WindSeeG.

Chronological sequence of tendered sites

Applying Criteria 1 to 8 and taking into consideration the guidance presented in Chapter 5.5.1, the chronological order of the sites to be tendered as presented in Table 1 is determined.

Table 9: Overview of the chronological order of the sites to be tendered using Criteria 1 to 8

Tender calendar year	Calendar year of commissioning3)	Site designation	Network connection system	Expected installed power [MW]	Total expected installed power [MW]
2021	2026	N-3.7	NOR-3-3[1)]	225 [4)]	958
		N-3.8	NOR-3-3[1)]	433 [4)]	
		O-1.3	OST-1-4[1)]	300 [4)]	
2022	2027	N-7.2	NOR-7-2[1)]	930	930
2023	2028	N-3.5	NOR-3-2[1)]	420	900
		N-3.6	NOR-3-2[1)]	480	
2024	2029	N-6.6	NOR-6-3[1)]	630	2,900
		N-6.7	NOR-6-3[1)]	270	
		N-9.1	NOR-9-1[1)]	1,000	
		N-9.2	NOR-9-1[1)]	1,000	
2025	2030	N-9.3	NOR-9-2[1)]	1,000	4,000
		N-9.4	NOR-9-2[1)]	1,000	
		N-10.1	NOR-10-1[1)]	1,000	
		N-10.2[2)]	NOR-10-1[1)]	1,000	
Total target system					9,688
Projected park 2025					10,800
Projected park 2030					20,488

[1)] Please refer to the confirmation of the grid development plan 2019–2030 as well as to the preparation, assessment, and confirmation of the grid development plan 2021–2035

[2)] Site N-10.2 is not fully required to achieve 20 GW.

[3)] Please refer to Chapter 5.6 regarding the designation of the calendar year, including the quarter in the respective calendar year in which the corresponding offshore connecting cable is to be commissioned.

[4)] Reference is made to 1. WindSeeV of 15 December 2020.

5.5.2 Representation of the review of the chronological order based on references to offshore connecting cables, grid connection points and grid expansion onshore

2. Die nachfolgenden Offshore-Anbindungssysteme werden einschließlich dem geplanten Zeitpunkt ihrer Fertigstellung und ihres Netzverknüpfungspunktes wie folgt **bestätigt**:

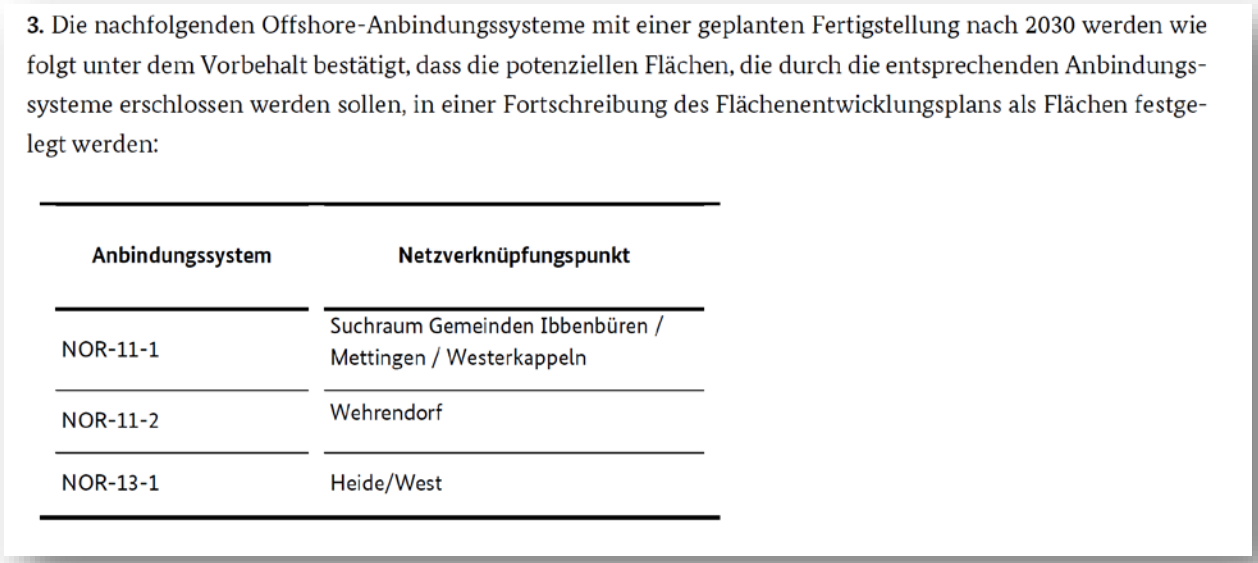
Anbindungssystem	geplanter Zeitpunkt der Fertigstellung	Netzverknüpfungspunkt
OST-7-1 (Testfeldanbindung)	2024	Gemeinde Papendorf
OST-1-4	2026	Suchraum Gemeinden Lubmin/Brünzow/Wusterhusen/Kemnitz
NOR-7-2 (BorWin6)	2027	Büttel
NOR-3-2 (DolWin4)	2028	Hanekenfähr
NOR-6-3 (BorWin4)	2029	Hanekenfähr
NOR-9-1	2029	Unterweser
NOR-10-1	2030	Unterweser
NOR-12-1	2030	Wilhelmshaven 2

Die Bestätigung der Offshore-Anbindungssysteme NOR-10-1 und NOR-12-1 steht unter dem Vorbehalt, dass die potenziellen Flächen, die durch die entsprechenden Anbindungssysteme erschlossen werden sollen, in einer Fortschreibung des Flächenentwicklungsplans als Flächen festgelegt werden.

Die Beauftragung des Testfeldanbindung OST-7-1 steht unter dem Vorbehalt, dass in einer Fortschreibung des Flächenentwicklungsplans der räumliche Umriss des Testfelds festgelegt wird.

Das Anbindungssystem NOR-9-1 ist mit einer Übertragungskapazität in Höhe von 2 GW zu realisieren unter dem Vorbehalt, dass in einer Fortschreibung des Flächenentwicklungsplans für das Anbindungssystem NOR-9-1 eine entsprechende Übertragungskapazität festgelegt wird.

Figure 14: Excerpt of the confirmation of the GDP 2019–2030, page 13



3. Die nachfolgenden Offshore-Anbindungssysteme mit einer geplanten Fertigstellung nach 2030 werden wie folgt unter dem Vorbehalt bestätigt, dass die potenziellen Flächen, die durch die entsprechenden Anbindungssysteme erschlossen werden sollen, in einer Fortschreibung des Flächenentwicklungsplans als Flächen festgelegt werden:

Anbindungssystem	Netzverknüpfungspunkt
NOR-11-1	Suchraum Gemeinden Ibbenbüren / Mettingen / Westerkappeln
NOR-11-2	Wehrendorf
NOR-13-1	Heide/West

Figure 15: Excerpt of the confirmation of the GDP 2019–2030, page 13

5.6 Calendar year of commissioning for offshore wind turbines and connecting cables

5.6.1 Designation of the calendar years, including the quarter in the respective calendar year

As part of the consultation of SDP 2020, the interaction of the commissioning of the connecting cable and the commissioning of the offshore wind turbines was consulted on.

The process simplified in Figure 16 was identified. On this basis, the following designations were made.

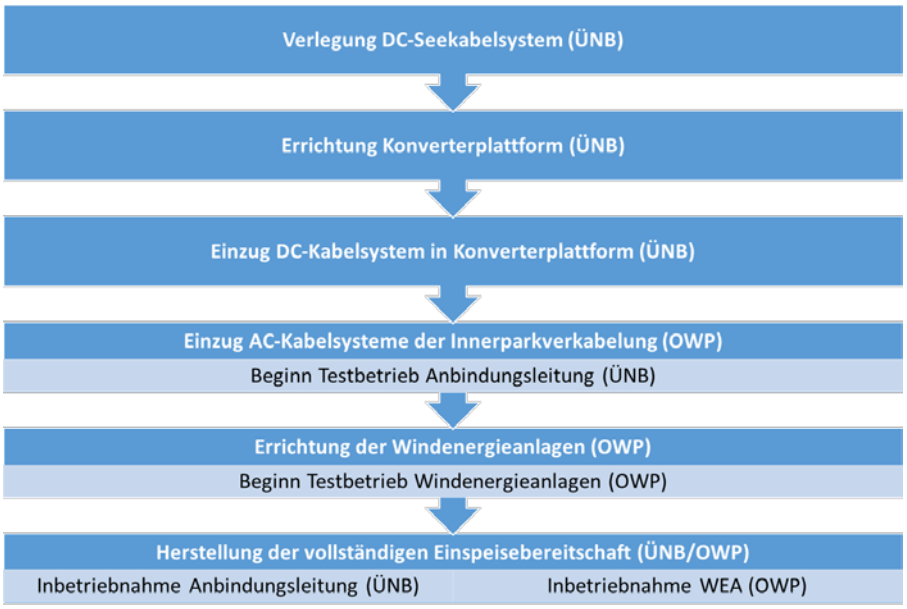


Figure 16: Simplified illustration of the process of erecting and commissioning the connection system and OWF

Table 10: Overview of calendar years, including the quarter in the respective calendar year of commissioning for offshore wind turbines and offshore connecting cables

Network connection system	Transmission capacity [MW]	Commissioning of grid connection	Site designation	Installation of inner park cabling of the subsidised WT in platform	Commissioning of the subsidised WT on the respective sites
NOR-3-3	900	n/a	N-3.7	n/a	3rd quarter 2026
			N-3.8	n/a	3rd quarter 2026
OST-1-4	300	3rd quarter 2026	O-1.3	2nd quarter 2026	3rd quarter 2026
NOR-7-2	930	4th quarter 2027	N-7.2	3rd quarter 2027	4th quarter 2027
NOR-3-2	900	3rd quarter 2028	N-3.5	1st quarter 2028	3rd quarter 2028
			N-3.6	2nd quarter 2028	3rd quarter 2028
NOR-6-3	900	3rd quarter 2029	N-6.6	1st quarter 2029	3rd quarter 2029
			N-6.7	2nd quarter 2029	3rd quarter 2029
NOR-9-1	2,000	3rd quarter 2029	N-9.1	1st quarter 2029	3rd quarter 2029
			N-9.2	2nd quarter 2029	3rd quarter 2029
NOR-9-2	2,000	3rd quarter 2030	N-9.3	1st quarter 2030	3rd quarter 2030
			N-9.4	2nd quarter 2030	3rd quarter 2030
NOR-10-1	2,000	3rd quarter 2030	N-10.1	1st quarter 2030	3rd quarter 2030
			N-10.2	2nd quarter 2030	3rd quarter 2030

[1)] It is noted that the GDP 2019–2030 has confirmed two connecting cables (NOR-10-1 and NOR-12-1) for the German EEZ of the North Sea for the calendar year of commissioning 2030 subject to future consideration of the sites to be developed in an update of the SDP. However, because sites in the extended Areas N-9 and N-10 are to be designated, the connecting cables NOR-9-2 and NOR-10-1 would be necessary. Please refer to the preparation, assessment, and confirmation of the GDP 2021-2035.

5.6.2 Designation of switch bay and J-tubes for platforms and sites

Table 11: Overview of the designation of switch bays and J-tubes for platforms and sites to be connected to them or subsidised WT

Network connection system	Transmission capacity [MW]	Switch bays/J-tubes for connecting the subsidised WT installed on the sites	Site designation	Expected power to be installed	Switch bays/J-tubes for connecting the subsidised WT installed on the sites
NOR-3-3	900	n/a	N-3.7	225 MW	n/a
			N-3.8	433 MW	n/a
OST-1-4	300	5	O-1.3	300 MW	5
NOR-7-2	930	12/14[1)]	N-7.2	930 MW	12/14[1)]
NOR-3-2	900	14	N-3.5	420 MW	7
			N-3.6	480 MW	7
NOR-6-3	900	14	N-6.6	630 MW	11
			N-6.7	270 MW	3
NOR-9-1	2,000	28	N-9.1	1,000 MW	14
			N-9.2	1,000 MW	14
NOR-9-2	2,000	28	N-9.3	1,000 MW	14
			N-9.4	1,000 MW	14
NOR-10-1	2,000	28	N-10.1	1,000 MW	14
			N-10.2	1,000 MW	14

[1)] 14 J-Tubes and 12 switch bays will be installed by the TSO on the NOR-7-2 converter platform for the connection of subsidised WT installed on the respective sites. If necessary, two of these switch bays allow two cable systems to be pulled into one switch bay (three-leg concept).

5.7 Locations of converter platforms, collector platforms and substations

According to Section 5, paragraph 1, No. 6 WindSeeG, the SDP shall designate the locations of converter platforms, collection platforms and, as far as possible, transformer stations.

Converter or transformer platforms are identified only in those areas in which sites are also designated. Transformer platforms are specified only to the extent that they are required for the connection concept. In the 66 kV direct connection concept in the North Sea, no transformer platforms are therefore specified.

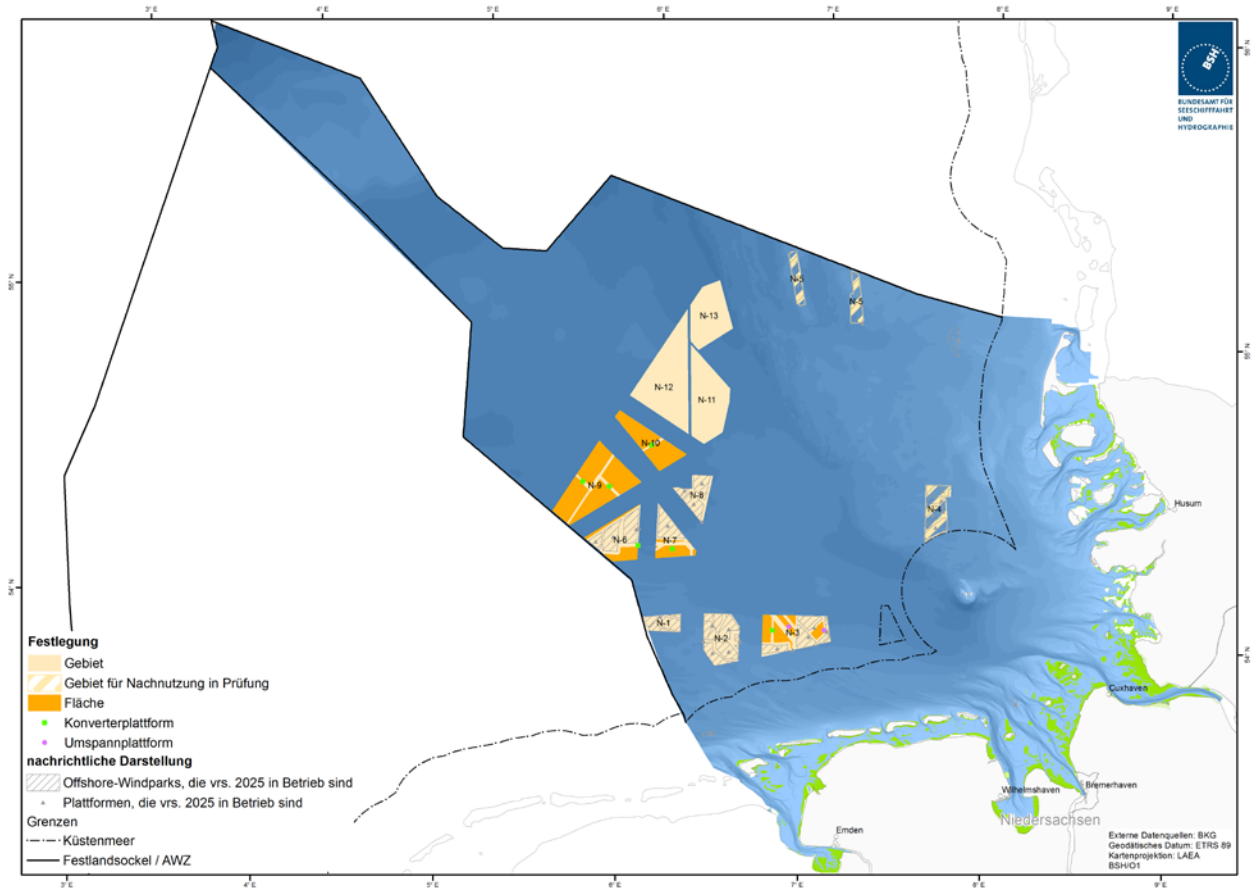


Figure 17: Platform locations in the German EEZ of the North Sea

In Area N-3, two transformer platforms and one converter platform are specified. The transformer platforms will be designated in Sites N-3.8 and N-3.7, which will be connected to the existing converter platform NOR-3-3/DolWin kappa at that time. In Site N-3.8, the transformer platform location is planned in the western sub-site. For Site N-3.7, together with the development of the wind farms “Gode Wind III” and “Gode Wind 04”, only two AC connection systems are available because of spatial constraints. Accordingly, a separate connection is made for Site N-3.7 as well as another connection for the wind farms “Gode Wind III” and “Gode Wind 04”.

For the two sites west of “Europipe 1”, N-3.6 and N-3.5, a connection with the 66 kV direct connection concept is planned. Accordingly, the NOR-3-2 converter platform is set centrally between these two sites. Compared with SDP 2019, a shift of the platform by approx. 1.3 km to the north took place in order to define a location outside of a glacial gully running there.

In Area N-6, in deviation from the SDP 2019, a connection with the 66 kV connection concept is also planned for Sites N-6.6 and N-6.7. The NOR-6-3 converter platform is planned for the eastern edge of the area between the “BARD Offshore 1” wind farm and Site N-6.6.

In Area N-7, a connection with the 66 kV direct connection concept is planned. The corresponding converter platform NOR-7-2 is designated approximately centrally between the 6 sub-sites. The northern sub-sites can be connected only by crossing the NOR-6-1/BorWin1, NOR-6-2/BorWin2, and NOR-6-3 connection systems.

Development with 66 kV is also planned for Area N-9. Converter platform NOR-9-1 is planned

centrally between Sites N-9.1 and N-9.2. Converter platform NOR-9-2 is planned centrally between Sites N-9.3 and N-9.4.

In Area N-10, a converter platform, NOR-10-1, is planned centrally between the two sites of the area.

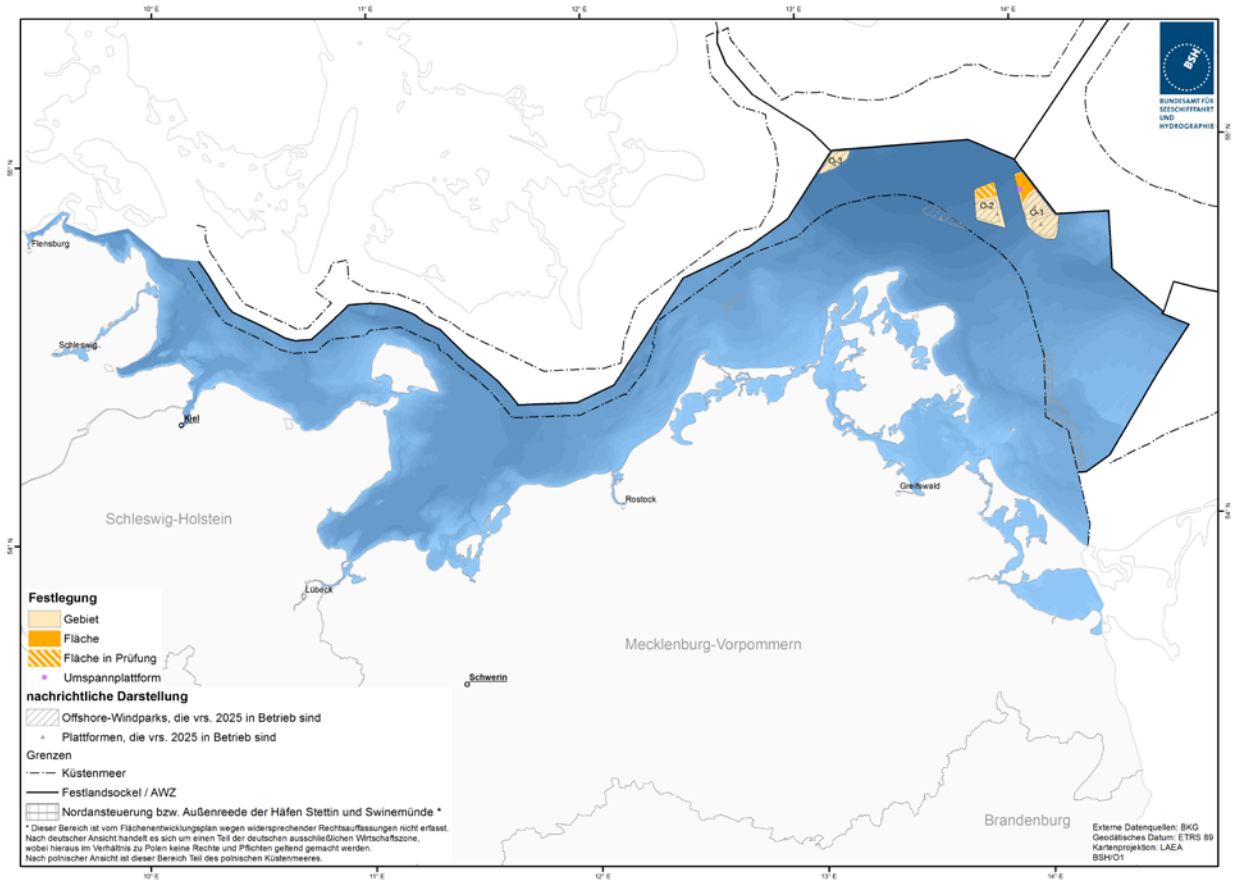


Figure 18: Platform locations in the German EEZ of the Baltic Sea

In the Baltic Sea, a connection with the AC connection concept is planned for Site O-1.3. The corresponding transformer platform to connect OST-1-4 is planned at the western edge of the site.

Site O-2.2 is designated only under review; a possible platform location will be designated here only when the assessment reservation is lifted.

5.8 Routes or route corridors for offshore connecting cables

According to Section 5, paragraph 1, No. 7 WindSeeG, the SDP shall designate routes or route corridors for offshore connecting cables.

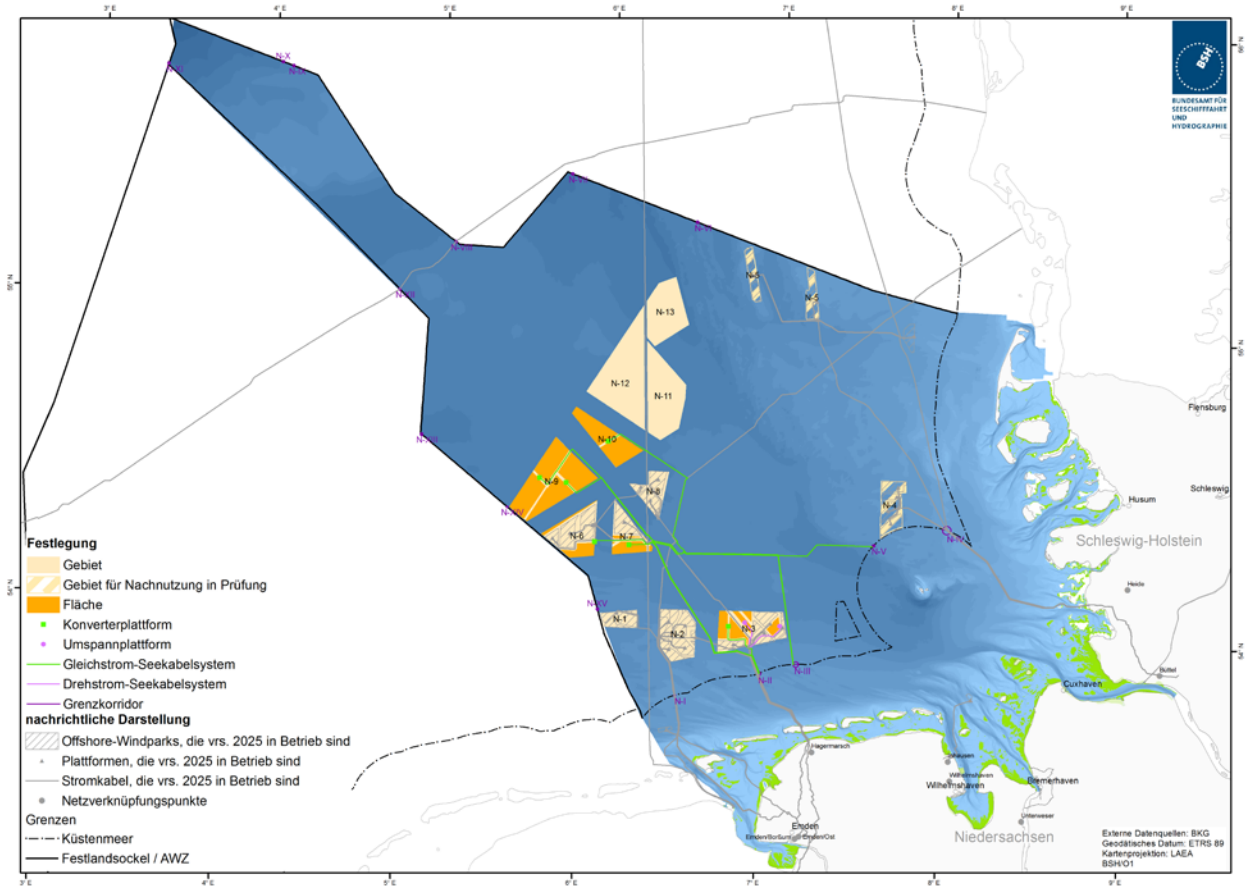


Figure 19: Grid connection systems in the German EEZ of the North Sea

In Area N-3, four sites are to be connected. The eastern Sites N-3.7 and N-3.8 are intended for connection to DolWin kappa/NOR-3-3. The AC current routes defined in the plan largely correspond to the routes already approved in DolWin2/beta/NOR-3-1, especially where third parties are affected. Site N-3.7 will be connected to DolWin kappa/NOR-3-3 with a separate transformer platform and a separate AC submarine cable system. For details on the connection of the “Gode Wind III” and “Gode Wind 04” projects, please refer to Chapter 5.8 of SDP 2019.
The DC route NOR-3-2 for connecting Sites N-3.6 and N-3.5 runs between the planned areas or along the edge of the existing wind farm “Nordsee One” to the converter sites NOR-3-1/DolWin beta and NOR-3-3/DolWin kappa and from there parallel to these connections to Gate N-II.

The DC connecting cable NOR-6-3 runs from the converter in Area N-6 starting on the shortest route through Shipping route 12 of the ROP 2009 or SN12 of the ROP-E 2021. In Area N-7, the route runs parallel to the existing NOR-6-1/BorWin1 and NOR-6-2/BorWin2 systems. After crossing the “Norpipe” pipeline, there is a parallel routing to NOR-7-1/BorWin5 to the N-II gate.

The DC connecting cable NOR-7-2 runs from the converter platform through Site N-7.2 and from there runs parallel to the existing NOR-6-1/BorWin1 and NOR-6-2/BorWin2 systems. In the

area of the pipeline “Europipe 1”, the existing connecting cables and the pipeline are crossed; the route now runs parallel to shipping route 2 of ROP 2009 or SN2 of ROP-E 2021 to Gate N-V.

The DC connection NOR-9-1 of Sites N-9.1 and N-9.2 leads from the converter platform in a straight line to shipping route 6 of ROP 2009 or SN6 of ROP-E 2021 and from there parallel to Area N-9 to the pipeline “Norpipe”. From there, the route runs parallel to it on the east side until it reaches shipping route 2 or SN2. There, NOR-9-1 runs parallel to NOR-7-2 until it reaches “Europipe 2” and then runs parallel to it to Gate N-III.

The NOR-9-2 DC connection system opens up Sites N-9.3 and N-9.4. Starting from the converter platform, it first runs parallel with the connection between platforms NOR-9-1 and NOR-9-2 to the south and then between Sites N-9.2 and N-9.4 to the east. After crossing the “Norpipe” pipeline, the system runs on the eastern side of the pipeline parallel to the NOR-7-1 and NOR-6-3 systems to shipping route 1 or SN1 and from there east to Gate N-II.

In Area N-10, a DC connection system is planned for the development of Sites N-10.1 and N-10.2. This NOR-10-1 system leads from the planned converter platform eastwards to the edge of the area. From there, it runs parallel to Shipping route 4 of the ROP 2009 or SN4 of the ROP-E 2021 to the “Cobra Cable” and then parallel to this to “Europipe 1”. From there, NOR-10-1 runs parallel to NOR-9-1 to gate N-III.

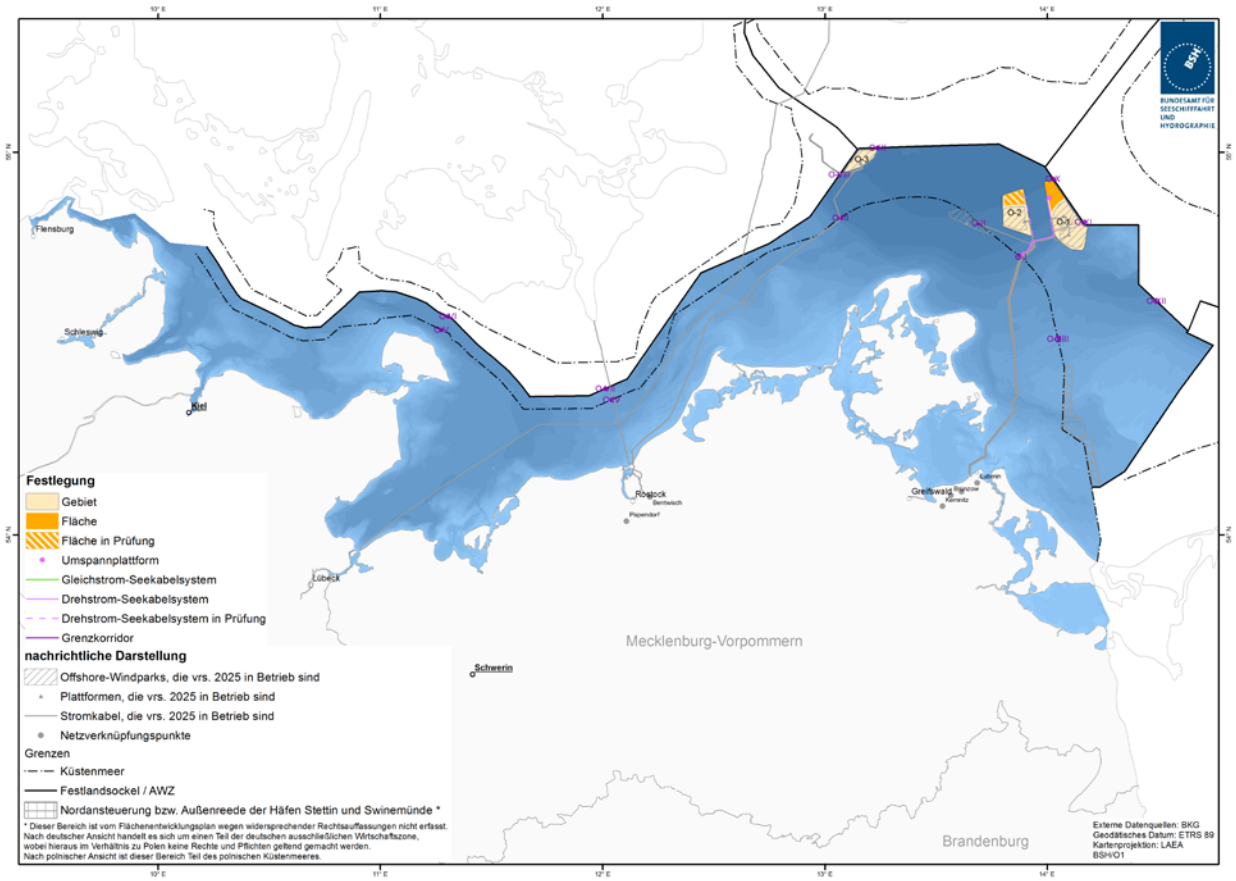


Figure 20: Grid connection systems in the German EEZ of the Baltic Sea

In the Baltic Sea, only the connection of Site O-1.3 with the AC system OST-1-4 is planned. This leads from the transformer platform of the site to the south and crosses Shipping route 20 of ROP 2009 or SO2 of ROP-E 2021 together with the already constructed connection systems of the

wind farms “Wikinger” and “Arkona-Becken Südost”. It then also runs parallel to these connection systems up to Gate O-I.

For Site O-2.2, which is under review, an AC system is also planned; this runs parallel to the systems already existing there to Gate O-I at the eastern edge of the area.

5.9 Gates to the territorial waters

5.9.1 Current status

North Sea

Baltic Sea

5.9.2 Designations of gates to the territorial waters

North Sea

In the North Sea, gates N-I, N-II, and N-III are specified at the transition to the territorial waters of Lower Saxony. At the transition to the territorial waters of Schleswig-Holstein, the gates N-IV and N-V are designated.

No systems can be provided through Gate N-I (Ems route) within the framework of the SDP because this will already be fully occupied after the completion of the transitional system.

In gate N-II (Norderney route), seven of the twelve available routes will be occupied in 2026. Under this plan, the required connecting cables NOR-3-2, NOR-6-3, and NOR-9-2 will be routed to this gate.

In order to achieve the expansion target of 20 GW by 2030, it is also necessary to route the NOR-9-1 and NOR-10-1 connection systems to Gate N-III because of time restrictions on the island crossing. With regard to the permissibility of this planning, please refer to Chapters 5.9.1 and 0 . In the area of gate N-III, three cross-border submarine cable systems are also planned within the framework of this plan (see Chapter 5.10). In the overall planning, up to 14 systems are currently planned via the N-III gate. Please refer to the comments under 5.9.1.

To the North Sea territorial waters of Schleswig-Holstein, gate N-V is specified south-west of Area N-4. Gate N-V specified in the SDP is needed to connect NOR-7-2 to the Büttel grid connection point.

Baltic Sea

In the Baltic Sea, gates O-I, O-II, O-III, O-IV, and O-XIII are defined at the transition to the territorial waters of Mecklenburg-Western Pomerania. At the transition to the territorial waters of Schleswig-Holstein, the O-V gate is defined.

In the area of Gate O-I, two additional connecting cables and two cross-border submarine cable systems are planned within the framework of this plan in addition to the existing systems (see Chapter 5.10). In addition, a possible route for the areas for other forms of energy generation SEO-1 is also shown.

Gate O-II is not a corridor for connecting OWF through the territorial waters to the grid connection point as defined in this plan. This corridor serves exclusively to connect the “ARCADIS East I” wind farm planned in the territorial waters (Cluster 4 of the O-GDP).

Gate O-III is specified by the existing systems to the wind farm “EnBW Windpark Baltic 2”. Three cross-border systems are planned for this corridor within the framework of the SDP (see chapter 5.10).

Gates O-IV, O-V, and O-XIII are also used exclusively for the routing of cross-border submarine cable systems within the framework of this plan (see Chapter 5.10).

Table 12: Overview of the use of gates

Gate	Submarine cable systems
N-I	(1) NOR-1-1/DolWin5 (2) NOR-8-1/BorWin3 (3) NOR-2-3/DolWin3 (4) COBRAcable
N-II	(1) NOR-7-1/BorWin5 (2) NOR-3-1/DolWin2 (3) NOR-2-2/DolWin1 (4) NOR-2-1 (alpha ventus) (5) NOR-6-1/BorWin1 (6) NOR-6-2/BorWin2 (7) NOR-3-3/DolWin6 (8) NOR-3-2 (9) NOR-6-3 (10) NOR-9-2
N-III	(1) NOR-9-1 (2) NOR-10-1 (1) Submarine cable system to Norway (2) Submarine cable system to Great Britain (3) Submarine cable system to Great Britain
N-V	(1) NOR-7-2
N-IV	(1) NOR-4-2/HelWin2 (2) NOR-4-1/HelWin1 (3) NOR-5-1/SylWin1 (4) NordLink
O-I	(1) OST-1-1/Ostwind 1 (2) OST-1-2/Ostwind 1 (3) OST-1-3/Ostwind 1 (4) OST-2-1/Ostwind 2 (5) OST-2-2/Ostwind 2 (6) OST-2-3/Ostwind 2 (7) OST-1-4 (8) OST-2-4 (under review) (9) Submarine cable system to Denmark (10) Submarine cable system to Denmark (11) Submarine cable system for the development of the area for other forms of energy generation SEO-1
O-II	(1) OST-2-1
O-III	(1) OST-3-1 (2) OST-3-2 (3) Submarine cable system Sweden (4) Submarine cable system to Sweden (5) Submarine cable system to Denmark
O-IV	(1) Kontek (2) Submarine cable system to Denmark
O-V	(1) Submarine cable system to Denmark
O-XIII	(1) Submarine cable system to Denmark

5.10 Routes and route corridors for cross-border power cables

For the purposes of this plan, cross-border power cables are submarine cable systems that run through at least two North Sea or Baltic Sea littoral states.

5.10.1 Current status

5.10.2 Designations of routes and route corridors for cross-border power cables

This plan is intended to spatially secure routes or route corridors for possible cross-border power cables in order to be able to ensure that the existing and planned cross-border submarine cable systems are spatially integrated into a coordinated overall system (i.e. in particular with regard to the connecting cables for OWF).

On the basis of the TYNDP 2018 (cf Chapter 2.5.4) and the ENTSO-E System Needs Report on the TYNDP 2018 (ENTSO-E AISBL, 2018) routes or route corridors for the following possible cross-border power cables are to be spatially secured.

Under this plan, nine additional cross-border power cables will be identified in the EEZ of the North Sea. Three of them are planned to connect to a landing in Germany. All three of them start on the gate N-III in Lower Saxony.

The cross-border submarine cable system to Norway, which starts at gate N-III, runs parallel to “Europipe 2”, shipping route 4 to shipping route 10 and from there, at the border of Areas N12 and N13, to Gate N-VI.

The other two cross-border submarine cable systems arriving in Germany lead to Great Britain. Both routes start at gate N-III and then run parallel to “Europipe 2” in a northerly direction to the southern edge of shipping route 2. The two routes separate here. From there, one route runs west to the crossing of “Europipe 1” and then parallel to the “Norpipe” pipeline or along the western EEZ border to gate N-XI. The other route runs north of Areas N-1, N-2, and N-3 and continues west to gate N-XV.

A cross-border system is planned to connect the converter platform in Area N-1 with neighbouring OWF in the Netherlands. This leads from the converter platform in Area N-1 westwards through gate N-XV.

In addition, four other cross-border submarine cable systems are planned; these will only cross the German EEZ and are intended to connect the Netherlands with Denmark or Norway. Three routes run on both sides of shipping route 10 and connect the gates N-VI and N-XIV as well as N-VII and N-XIII. One system is planned to run parallel to the “Viking Link”. Another system connects the N-X and N-XIII gates. This runs largely parallel to the “Norpipe” and then runs along the EEZ boundary to gate N-XIII.

In the EEZ of the Baltic Sea, eight routes for cross-border submarine cable systems will be specified, connecting the German territorial waters with the Danish and Swedish EEZ. One system each is planned in the area of the Fehmarn Belt crossing (O-V to O-VI) and parallel to “Kontek” (O-IV to O-VII). Another system to Denmark leads from gate O-III to gate O-VIII. Likewise, two systems start at gate O-III, and travel towards Sweden, running towards gate O-IX parallel to the “EnBW Windpark Baltic 2” wind farm. These are planned in the area of the “EnBW Windpark Baltic 2” wind farm with a reduced distance of 350 m and 450 m respectively to the wind farm, in order to minimise interference with the overlaying submarine diving area. From gate O-I, two cross-border submarine cable systems are also planned in the direction of Bornholm, which will run parallel to the existing connecting cables to gates O-X and O-XI. With regard to gate O-X, it is pointed out that it is located on the edge of a submarine diving area and that, for reasons of national and NATO defence security, a route must also be followed in the Danish area that is outside this NATO exercise area.

A further system is planned parallel to “Nord-Stream 1” or between “NordStream 1” and “Nord-Stream 2” and connects the gates O-XII and O-XIII.

A routing from Poland to Denmark does not seem possible at the moment because of existing restrictions within the German EEZ.

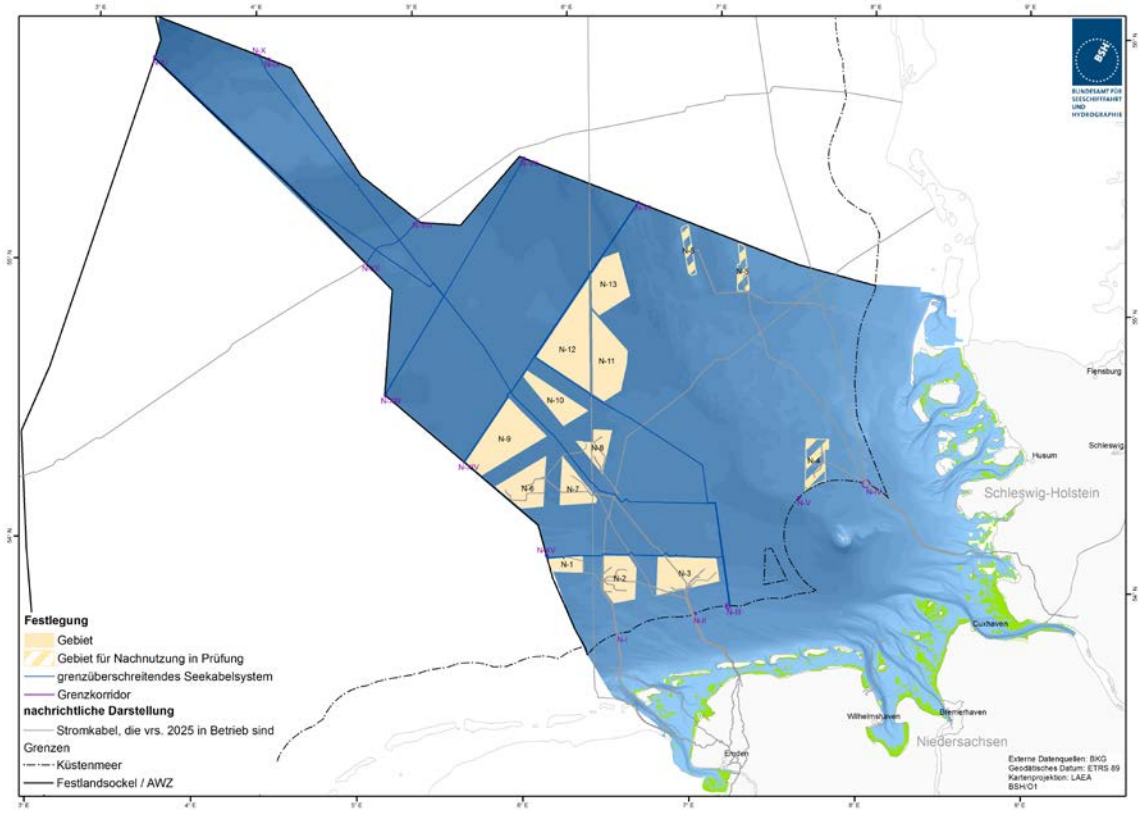


Figure 21: Cross-border submarine cable systems in the German EEZ of the North Sea

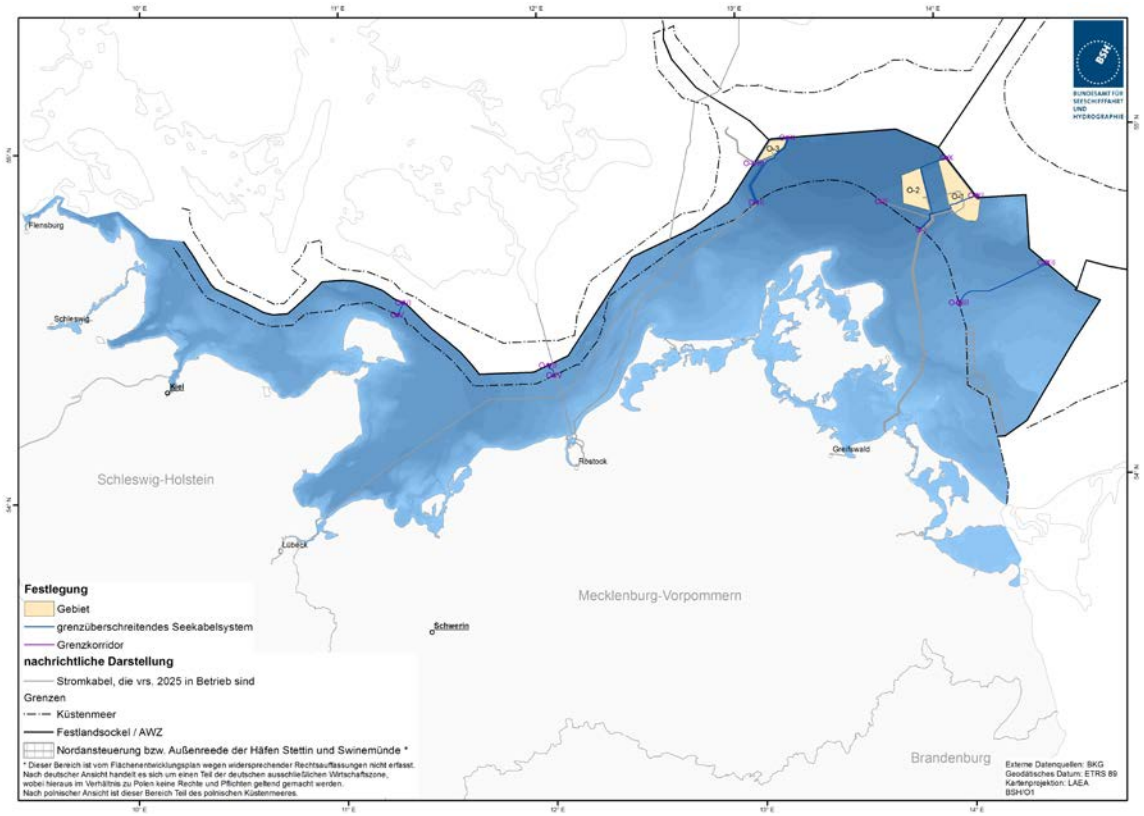


Figure 22: Cross-border submarine cable systems in the German EEZ of the Baltic Sea

5.10.3 Designations of gates for cross-border power cables

The gates in this plan are specified in close consultation with the coastal states and neighbouring countries. In those areas in which it is possible, based on the current state of knowledge, gates are designated in the transition area to the territorial waters for the bundling of submarine cable systems, through which all submarine cable systems landing in Germany are to be routed. In this way, the cable systems are to be concentrated at these points as far as possible and bundled for further routing towards the GCP. With regard to the designation of the gates to the territorial waters, reference is made to Chapter 5.9. Please refer to planning principle 4.4.4.3.

The gates N-VI to N-XV and O-VI to O-XIII at the outer border of the EEZ serve the purpose of bundling possible cross-border submarine cable systems that are not yet known in terms of their specific routing in or through the German EEZ. The gates are based on existing plans for cross-border submarine cable systems and wind farms as well as on the pipelines and data cables already laid. In designating the gates, the known plans for OWF in neighbouring countries were also taken into consideration in order to enable the development of a sea-wide network. Gate N-XV was extended to the extent that submarine cables north of the Dutch wind farms can be routed to the gate.

In gates O-IX and O-X, an adverse effect on the NATO submarine diving areas Bravo 2-5, must be reduced as far as possible. A routing outside these areas is to be aimed for.

Further co-ordination of the gates N-VI to N-XV and O-VI to O-XIII for cross-border submarine cable systems with the littoral states is to take place within the framework of updates of the SDP, the respective spatial plans or the respective approval procedures.

Please refer to Figure 21 and Figure 22.

Table 13: Overview of the gates and routes for cross-border power cables identified in the SDP

Gate A	Gate B	Country A	Country B
North Sea			
N-III	N-VI	Germany	Norway
N-III	N-XI	Germany	UK
N-III	N-XV	Germany	UK
N-VI	N-XIV	Denmark/Norway	Netherlands
N-VII	N-XIII	Denmark/Norway	Netherlands
N-VIII	N-XII	Denmark	UK
N-X	N-XIII	Norway	Netherlands
NOR-1-1	N-XV	Germany, Area N-1	Netherlands
Baltic Sea			
O-V	O-VI	Germany	Denmark
O-IV	O-VII	Germany	Denmark
O-III	O-VIII	Germany	Denmark
O-III	O-IX	Germany	Sweden
O-III	O-IX	Germany	Sweden
O-I	O-X	Germany	Denmark
O-I	O-XI	Germany	Denmark
O-XIII	O-XII	Germany	n.n.

5.11 Routes and route corridors for connections between installations

According to Section 5, paragraph 1, No. 10 WindSeeG, the SDP shall contain routes or route corridors for possible interconnections of offshore installations, connecting cables, and cross-border power cables as well as locations of converter platforms.

Table 14: Overview of the routes defined in the SDP for connections between installations

Platform A	Platform B
North Sea	
NOR-9-1	NOR-9-2
Baltic Sea	
–	–

6 Designations for pilot wind turbines

6.1 Available grid connection capacities

The grid connection capacities available for pilot wind turbines in according to Section 70, paragraph 2 WindSeeG are shown in

Table 15 .

Table 15: Grid connection capacities available for pilot wind turbines

Connecting cable	Available grid connection capacities for pilot wind turbines
North Sea	
NOR-2-2 /DolWin1/alpha	88 MW
NOR-2-3 /DolWin3/gamma	50 MW
NOR-4-2 /HelWin2/beta	15 MW[1)]
NOR-6-2 /BorWin2/beta	14.4 MW
Baltic Sea	
OST-1-3	5 MW
OST-2-1	3 MW
OST-2-3	23.75 MW

[1)] Because the 45 MW capacity available on the NOR-4-2 connection system (HelWin2/beta) is partly released for the NOR-7-2 connection system to be built at the Büttel grid connection point, the grid connection capacity available for pilot wind turbines in Area N-4 is reduced to 15 MW.

6.2 Spatial requirements

Summary

- construction of pilot offshore wind turbines only in areas defined in 5.1
- Compliance with the planning principles in 4.4

6.3 Technical conditions and requirements for the grid connection

Summary

- Agreement or consent with or from third parties concerned such as
  - OWF projects for the use of the transformer platform and for the spatial and technical integration in its projects
  - Neighbouring OWF projects
  - Competent TSO, for example, to check the operation of the connecting cable in compliance with the approval (e.g. compliance with temperature criteria) and to distribute the power in the case of several AC submarine cable systems
- Interface agreement with the OWF project developer or TSO for connection to the platform

7 Areas for other forms of energy generation

In accordance with Section 5, paragraph 2a WindSeeG, the SDP may designate areas and installations for other forms of energy generation outside of areas.

In accordance with Section 3, No. 8 WindSeeG, an area for other forms of energy generation is an area outside of areas on which offshore wind turbines and installations for other forms of energy generation, each of which is not connected to the grid, can be installed in spatial coherence and which is subject to the approval procedure. According to Section 4, paragraph 3 WindSeeG, the objective of the designation is to enable the practical testing and implementation of innovative concepts for energy generation not connected to the grid in a spatially ordered and space-saving manner.

Section 5, paragraph 2a WindSeeG provides that areas for other forms of energy generation may be designated for a total of 25 to 70 square kilometres. In addition, spatial as well as technical specifications can be made for installations for other forms of energy generation or for lines or cables that discharge energy or energy carriers from them. In the event of a shortage of routes, such lines or cables can be excluded.

7.1 Call for tenders for areas for other forms of energy generation

Section 67a WindSeeG provides that within areas for other forms of energy generation in the EEZ defined in the SDP, the BSH shall determine the person entitled to apply for the respective areas by means of a call for tenders in accordance with the specifications in the statutory instrument to be issued according to Section 71, No. 5 WindSeeG.

7.2 Planning approval for installations in areas for other forms of energy generation

According to section 46, paragraph 1, sentence 2 WindSeeG, an application authorisation according to Section 67a WindSeeG is required for the application to implement the planning approval procedure for the construction and operation of offshore wind turbines and installations for other forms of energy generation not connected to the grid in each case.

The plan may be adopted only under certain conditions listed in Section 48, paragraph 4 WindSeeG.

7.3 Designation of areas for other forms of energy generation

Two other areas are designated under this plan to be areas for other forms of energy generation. These are areas that are too small to have their own separate grid connection.

SEO-1 is designated as an area for other forms of energy generation. The bird migration issues that cannot be conclusively assessed at present are to be clarified in the planning approval. If wind turbines were to be erected in the area, it is likely that (extensive measures) could be required to avoid and mitigate the impacts on bird migration. Please refer to the comments on Area O-2 and Site O-2.2 (under review) in chapter 5.2.2 and chapter 8.4 . The clarification of these questions in the planning approval seems appropriate.

Table 16: Overview - Designation of areas for other forms of energy generation

Name	Position	Size	Distance to shore
SEN-1	North Sea EEZ	approx. 27.5 km²	Zone 2
SEO-1	Baltic Sea EEZ	approx. 7.6 km²	Zone 1

North Sea

Figure 23: Area for other forms of energy generation in the EEZ of the North Sea

SEN-1 borders at its northeast on the offshore wind farms “EnBW Hohe See”, “Albatros” and “Global Tech 1”. The “NorNed” interconnector also runs roughly through the middle of the area. To the west, north and east, the area is also bordered by shipping routes. The approach and departure corridor of the “Albatros” wind farm runs along the eastern corner of the south-western area and must be taken into consideration. Please refer to planning principle 4.4.1.3.

The construction of its own cables and pipelines to transport energy or energy sources from an areas for other forms of energy generation in the German EEZ of the North Sea is excluded for the area for other forms of energy generation SEN-1 designated here.

Baltic Sea

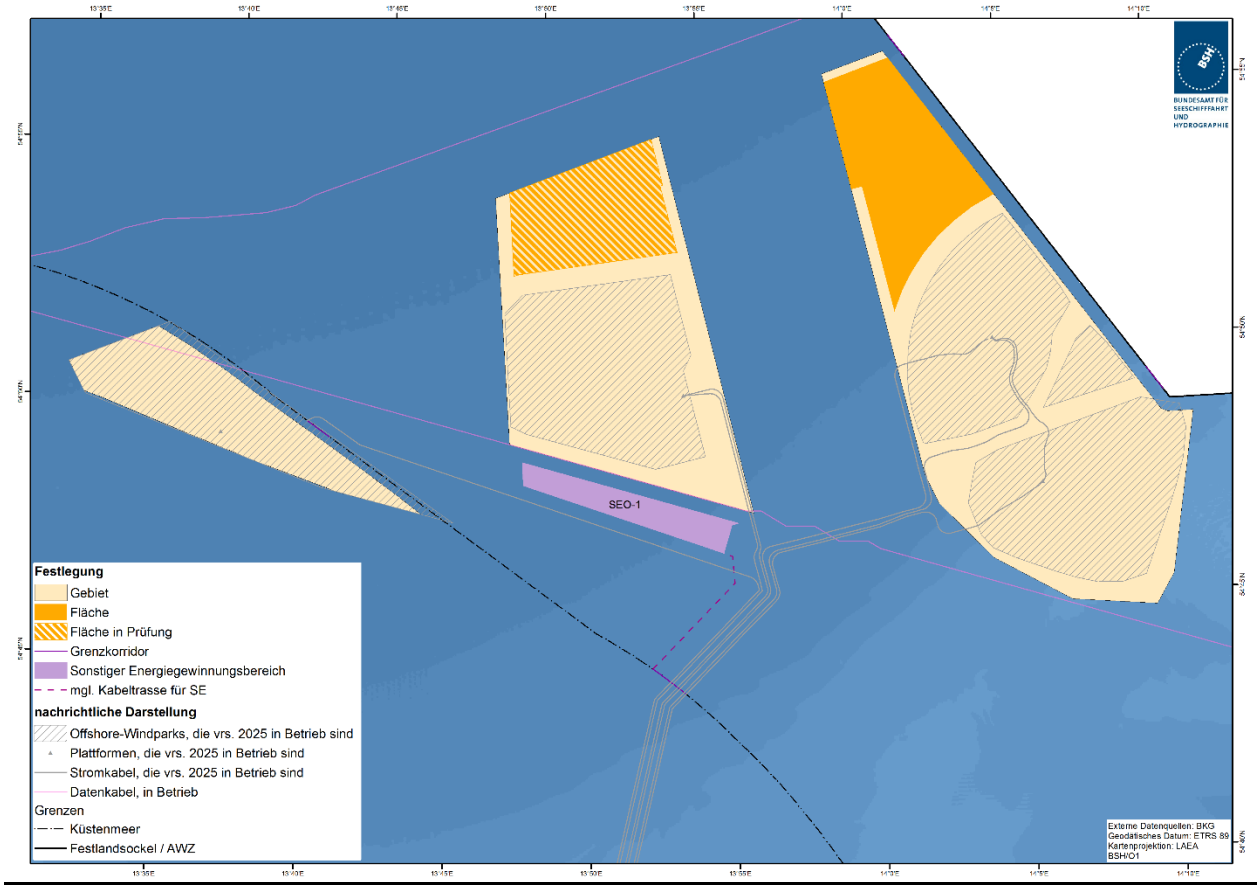


Figure 24: Area for other forms of energy generation in the EEZ of the Baltic Sea

SEO-1 is bounded to the north by the “Baltica Segment 3” data cable, to the east by the OST-2-4 connection system under review, to the south by a shipping route, and to the west by a research reservation area. In the north-eastern area, an overlap with an approach and departure corridor of “Baltic Eagle” is possible. Please refer to planning principle 4.4.1.3.

In the event that area SEO-1 is to be connected with a submarine cable system, a possible route for the development of the area is spatially secured. This would have to be constructed and operated in accordance with the legal requirements by the operator of the energy generation area.

8 Conformity of the designations with private and public concerns

According to Section 5, paragraph 3 WindSeeG, spatial designations are inadmissible if there are overriding opposing public or private interests. A catalogue lists the particular concerns involved. Individual concerns must be weighed against each other where they contradict each other.

For the designation of sites and areas according to Section 5, paragraph 1, No. 1 and 2 WindSeeG that are located in a cluster designated by the Spatial Offshore Grid Plan according to Section 17a EnWG, or in a priority, reserved or designated area of a Spatial Plan according to Section 17, paragraph 3, sentence 1 ROG, the admissibility of the designation need to be examined only if additional or other significant aspects are discernible or if updates and in-depth assessments are required (cf Section 5, paragraph 3, sentence 3 WindSeeG).

The admissibility of the designations was examined by the state of Mecklenburg-Western Pomerania for the territorial waters of Mecklenburg-Western Pomerania. With regard to the threat to the marine environment, reference is made to the environmental report of the LEP M-V.

8.1 Legal grounds for exclusion

8.1.1 Compliance with spatial planning requirements

Any designations that fail to comply with spatial planning requirements according to Section 17, paragraph 3 ROG are inadmissible.

The designations were checked to ensure that they comply with the spatial planning objectives and take account of the principles and other requirements.

The Spatial Plans for the exclusive economic zone are being updated. The first draft plan was published on 25 September 2020. The designations made in this framework will be observed and taken into consideration in the update of the SDP (see also Chapter 2.6.1.2 on the update).

8.1.2 No threat to the marine environment

According to Section 5, paragraph 3, sentence 2, No. 2 WindSeeG, designations that threaten the marine environment are inadmissible.

In this context, the technical assessment criterion “threat to the marine environment” constitutes a separate assessment standard. In addition, the existing provisions of sectoral law apply (i.e. in this case, above all, on species and territorial protection as well as the assessments of expected significant environmental impacts within the framework of the strategic environmental assessment).

Reference is made to the maps in Chapter 2 for the representation of the area.

The corresponding assessments were carried out as part of the Strategic Environmental Assessment and presented in the environmental reports.

8.1.3 No adverse effect on safety or ease of traffic

Designations that affect the safety and ease of traffic are also inadmissible impaired Section 5, paragraph 3, sentence 2, No. 3 WindSeeG.

Because concerns related to shipping and air traffic have otherwise already been examined within the framework of the preparation and update of the BFO, a renewed assessment of the areas and sites according to Section 5, paragraph 3, sentence 3 WindSeeG is generally not necessary except for the designation of Areas N-9 to N-13 and isolated designations or is necessary according to the following statements.

8.1.4 No adverse effect on the security of national and NATO defence

According to Section 5, paragraph 3, No. 4 WindSeeG, the security of national and NATO defence may not be adversely affected by any designations.

Issues related to national and NATO defence have already been examined within the framework of the preparation and update of the BFO, so that a renewed assessment of the areas and sites according to Section 5, paragraph 3, sentence 3 WindSeeG will probably not be necessary for the time being, except for isolated designations.

8.1.5 No location in a legally designated protected area

Section 5, paragraph 3, sentence 2, No. 5 WindSeeG stipulates that designations of areas or sites in protected areas designated according to Section 57 BNatSchG are inadmissible. The designations of the areas in the North Sea and Baltic Sea were largely taken from the clusters already designated in the BFO for the North Sea and Baltic Sea. Therefore, areas and sites are not designated in nature conservation areas.

8.2 Other public and private interests

These include, among others, other uses such as planned and existing data cables, pipelines and mining activities, the concerns of the fishing industry, health and safety at work, cultural heritage, disaster control, the economic costs of constructing and operating wind farms, and the economic costs of the installation and operation of offshore connecting cables.

Essentially, planning principles were introduced in order to prevent threats to the marine environment, adverse effects to safety and the smooth flow of shipping, and adverse effects national and NATO defence, and to mitigate these to such an extent that there are no adverse effect or threat.

8.3 Admissibility of the designation of areas

The designations of areas in the North Sea and Baltic Sea were largely taken from the clusters already designated in the Federal Offshore Grid Plan for the North Sea and Baltic Sea. Because related issues have already been examined within the framework of the preparation and update of the BFO, re-assessment according to Section 5, paragraph 3, sentence 3 WindSeeG is generally not required.

For Area N-4, there are data available, in particular from the monitoring results of the operating OWF and from research projects. These call into question the designation of Area N-4 for possible subsequent use. The area is thus under review in this respect.

For details, please refer to Chapter 5.1.2.

In Area N-5, the existing wind farm “Butendiek” is presented for information. A designation as an area or site would be inadmissible according to Section 5, paragraph 3, sentence 2, No. 5 WindSeeG with regard to a possible subsequent use because this area is located in the “Sylter Außenriff – Östliche Deutsche Bucht” nature conservation area.

For reasons of nature conservation and environmental law, the Area N-5 is under review with regard to a possible subsequent use for offshore wind energy. For details, please refer to Chapters 5.1.2 and 8.4.

For Areas N-9 to N-13, changes compared to the clusters defined in the BFO according to ROP 2009 result mainly from the published and consulted concept for the update of the spatial plans as well as the published and consulted draft of the spatial plan for the German EEZ of the North Sea and Baltic Sea with regard to the change of shipping route 10 (cf Chapter 2.6.1.2).

The areas defined by the SDP extend into the reservation area for shipping 10 defined by the

ROP 2009. The designation at that time corresponded to the best available data and knowledge in 2009. However, new insights have emerged in this area following recent observations of shipping traffic based on AIS data. These have been confirmed by the initial findings of a specialist marine police report. Please refer to the explanations in Chapter 5.1.

The aforementioned evaluations of shipping traffic as well as the results of the expert opinion of the shipping police also show that the designation does not adverse effect the safety and ease of shipping traffic according to Section 5, paragraph 3, sentence 2, No. 3 WindSeeG.

Because the development of the areas in Zone 3 will be necessary to implement the expansion path, this was taken into account within the framework of the designations in the update/amendment of the SDP by initially designating sites only for Areas N-9 and N-10. The N-13 area has been adjusted compared to the SDP 2019 in such a way that the distance to the main concentration area of divers corresponds to 5.5 km of habitat loss because of deterrence effects in order to protect divers. The appropriateness of this distance will be further assessed as part of the monitoring. No threat to the marine environment is assumed (see Environmental Report Chapters 4.5.1, 4.6.1, 4.12.4, 5.1.2, 5.2.2, and 6). Part of Area N-13 lies within the reservation area for harbour porpoises identified in the draft spatial plan for the EEZ dated 25 September 2020.

In 4.4.1.1, in order to avoid or mitigate cumulative impacts, the overall coordination of construction and installation work over time is established as a planning principle. This also includes reducing shipping traffic for construction and operation to a minimum through optimal construction and time planning.

In addition, the planning principle of noise mitigation (cf 4.4.1.8) ensures the implementation of noise abatement measures according to the state of the art in science and technology and application of the noise abatement concept for the North Sea (Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit, 2013).

Particularly during the sensitive season, additional preventative and mitigation measures can be taken, especially with regard to impulsive noise inputs during construction work. This also corresponds to the current approval practice at the BSH. Therefore, no threat to the marine environment can be assumed from the designation of Area N-13 (cf also Chapter 4.5.1 of the Environmental Report for the North Sea).

8.4 Admissibility of the designation of sites

The specified sites are outside the priority and reservation areas for shipping and outside nature conservation areas.

An expansion of Area N-5 for the use of offshore wind energy beyond the OWF Butendiek", "Dan Tysk", and "Sandbank", which are in operation at the time of this assessment, and specifically in relation to Site N-5.4 shown in the drafts of SDP 2019 under review is not possible on the basis of nature conservation considerations according to the current state of knowledge

The exclusion of Site N-5.4 is based on the extent of the cumulative adverse impacts of OWF already identified from the area of the main concentration area of divers in the German EEZ of the North Sea. The identified loss of 19% of the feeding and resting habitat within the main concentration area, which is valuable for the conservation of the local population of divers, in conjunction with the statistically significant decrease in the abundance of divers prohibits any increase in the area of intervention for reasons of ensuring species protection for the species group of divers.

According to the precautionary principle according to Section 3 UVPG and in order to exclude a significant disturbance within the meaning of

Section 44, paragraph 1, No. 2 BNatSchG with the necessary certainty, further cumulative effects from the construction of further offshore wind turbines in Area N-5 are to be avoided.

Site N-5.4, which was still under review in the draft SDP 2019, is excluded from further planning for offshore wind turbines with commissioning from 2026 onwards because of the results of the assessment of cumulative adverse impacts on the conservation status of the local population of divers.

The BSH concludes that significant disturbance within the meaning of Section 44, paragraph 1, No. 2 BNatSchG as a result of implementation of the plan can be ruled out with the necessary certainty if it is ensured that no additional habitat loss will occur in the main concentration area.

Because of the considerable cumulative effects on the diver population that cannot be ruled out as a result of the realisation of further wind farm projects in the main concentration area, there is already – irrespective of the question of species protection law admissibility – a threat to the marine environment within the meaning of Section 5, paragraph 3, sentence 2, No. 2 WindSeeG. One of the reasons for this is that the main concentration area is an important functional component of the marine environment with regard to seabirds and resting birds. For this reason, a designation beyond the OWF “Butendiek”, “Dan Tysk”, and “Sandbank” in operation at the time of this assessment and specifically in relation to Site N-5.4 shown in the drafts of SDP 2019 under review is not permissible.

With regard to Site O-1.3, concerns were raised by GDWS in their comment on SDP 2019 and the preliminary draft of the SDP 2020 regarding a potential threat to shipping. These could be clarified through further investigations. This was presented and assessed during the suitability assessment. Consequently, there is no threat to shipping.

The designation of Site O-2.2 is currently still being examined. Here, clarification of questions on bird migration that cannot yet be conclusively assessed is required (see Chapter 5.2.2 and Environmental Report for the Baltic Sea Chapters 4.12.5 and 5.2.2.1).

With regard to bird migration, additional monitoring of diurnal land birds beyond StUK 4 with a focus on cranes, birds of prey, and geese was commissioned as part of the site investigation of Site O-1.3. Based on the knowledge gained from these investigations and the further knowledge available, the BfN, as the competent federal authority, came to the conclusion that a realisation of the prohibition of killing and injury in accordance with Section 44, paragraph 1, No. 1 for individual species or groups of species could not be ruled out with the necessary certainty. In the determination of suitability of Site O-1.3, a requirement was therefore included for individual species or species groups; according to this, the project developer must take suitable measures to observe bird migration in the vicinity of the site and to avoid the occurrence of a significant risk of collision.

For Site O-2.2, the knowledge gained from the investigations on Site O-1.3 and the determination of suitability provide valuable information. Because of the location of Site O-2.2 further west and thus closer to the central area of the crane migration corridor between Rügen and Skåne, the knowledge from the planning approval procedure for the neighbouring project “Baltic Eagle” is essential. Site O-2.2 therefore remains under review. With regard to the area for other forms of energy generation SEO-1, please refer to the explanations at 7.3 .

8.5 Admissibility of further designations

According to BfN reports, the grid connections leading through gate N-I run on a sandbank, which is a legally protected biotope according to Section 30 BNatSchG. This does not cause any significant adverse effect of the biotope.

Two cross-border submarine cable systems cross the “Doggerbank” nature conservation area from gate N-XI to gate N-XIV and from gate N-XII to N-III. In the Baltic Sea, cross-border submarine cable systems run from gate O-XII to gate O-XIII through the “Pommersche Bucht – Rönnebank” nature conservation area and from gate O-V to gate O-VI through the “Fehmarnbelt” nature conservation area. The Strategic Environmental Assessment has shown that this is not likely to have any significant environmental impacts (Chapter 6.5.1 of the Environmental Report for the North Sea and Baltic Sea).

9 Summary consideration

9.1 International comments

The country of Poland was involved as agreed (Agreement of 10 October 2018 between the Government of the Federal Republic of Germany and the Government of the Republic of Poland on Environmental Impact Assessments and Strategic Environmental Assessments in a Transboundary Context) and submitted a comment explaining that the documents were not sufficient for participation because not all chapters had been translated and the documents therefore did not meet the requirements of Article 7, paragraph 2 and Appendix 4 of the Espoo Convention. Moreover, the impacts of the designations on Poland had not been sufficiently explained. There would be deficiencies in the description of the expected impacts of the SDP so that there would be no possibility to examine them.

In accordance with Section 60, paragraph 2, sentence 2 UVPG and the Espoo Convention, the competent German authority shall communicate the contents of the announcement, the non-technical summary of the environmental report, and those parts of the draft plan or programme and the environmental report that enable the authorities involved and the public of the other state to assess the likely significant adverse transboundary environmental impacts of the project and to comment or make observations thereon. Nevertheless, a complete translation of the SDP as well as the Environmental Report of the Baltic Sea was provided.

Furthermore, Poland demands an analysis of the cumulative environmental impacts of the SDP as well as of the Polish spatial plan and the plans of the neighbouring countries, also taking into consideration the protected assets in the Polish FFH areas as well as a cumulative consideration of Natura2000 areas at a distance of a good 100 km from the German EEZ. A corresponding review of the spatial plan is carried out at the level of German spatial planning. No significant impacts are expected because of the distance of the Natura2000 areas from designations.

Poland also asked to receive all current results from the accompanying research of the OWPs as well as the plans and all available information on noise abatement, preferably in Polish. Insofar as the research is conducted using state funds, the results of these research projects are published and are publicly accessible.

In addition, Poland expressed concerns about the threat to the accessibility of the ports of Szczecin and Świnoujście with vessels with a draught of 15 m as envisaged in the expansion plans for the ports. The SDP 2020 plans mainly concern the Ystad – Swinoujscie route. The required safeguarding of the ease and safety of shipping traffic is already prescribed by law. Areas O-1 and O-2 do not restrict the navigability of the designated shipping route in relation to the spatial planning requirements. An adverse effect on the route caused by submarine cables can also be ruled out because these will be buried in accordance with the specifications of the plan.

Estonia regretted that there was no full translation of all documents and asked for stronger specifications regarding noise abatement and bird and bat migration in the subsequent procedures in order to protect biodiversity.

Sweden has requested that monitoring of Natura 2000 areas be significantly extended and also carried out separately according to seasons and weather conditions in order to safeguard the conservation objectives of the sites. With regard to the Baltic Sea harbour porpoise population, its importance was pointed out, especially in the winter months. Construction work and blasting of unexploded ordnance should be carried out only with appropriate effective noise abatement and in a coordinated manner in all countries. In addition, seismic work should be coordinated to rule out cumulative impacts on harbour porpoises be-

cause disturbances could lead to altered movement patterns. Extensive specifications are made for noise abatement within the framework of the plan. Coordination of construction work is also enshrined as a planning principle.

With regard to bird and bat migration, the high importance of the areas is also pointed out. Particularly with regard to bat migration, there would still be large gaps in our knowledge; this would require many years of investigations. The comments on the areas should be supplemented with regard to their importance for bat migration. Furthermore, there is a lack of mitigation measures for bat migration analogous to the proposed measures for bird migration. Knowledge from ongoing and future research will be incorporated into the review and assessment of areas when the plan is updated. So far, there is no reliable knowledge on migration behaviour. However, the measures taken for bird migration should also avoid negative impacts for bats.

With regard to fish as a protected asset, the importance of the eastern and western Baltic Sea as spawning grounds for cod is pointed out. It is proposed to avoid pile driving between May and August in spawning grounds or at least to allow it only with noise abatement measures. Noise abatement measures are specified via the planning principles regardless of the time of year. With regard to fisheries, Sweden pointed out the importance of the areas for passive fishing and fishing with bottom trawls and pelagic trawls. The impact of the designation of wind farms and cables on fisheries must be taken into consideration in the context of spatial planning and subsequent approval procedures. No impacts are seen with regard to Swedish shipping routes and infrastructure.

The countries of Scotland, Finland, and Lithuania see no threat to their marine environment from the designations of the plan.

Denmark, referring to its comment on N-3.7 and N-3.8, argues that the knowledge gaps on seabirds make it difficult to adequately analyse the impacts. It was therefore difficult to come to a conclusion with regard to the existence of a disturbance.

10 Summary environmental statement and monitoring measures

10.1 Summary environmental statement according to Section 44 UVPG

according to Sections 4 et seqq. WindSeeG, the BSH prepares an SDP as a sectoral plan for the use of offshore wind energy by designating areas and sites as well as locations, routes, and route corridors for grid connections or for cross-border submarine cable systems and, if applicable, areas for other forms of energy generation and test sites. The SDP was prepared for the first time and published as of 30 June 2019 in accordance with section 6, paragraph 8 WindSeeG. Because changes in the law and in particular because of the increased expansion target of 20 gigawatts for offshore wind energy by 2030 contained in the WindSeeG, the update and amendment of SDP 2019 is necessary. A strategic environmental assessment (SEA) has been carried out in an accompanying or integrated manner for the update and amendment of the SDP within the meaning of the Environmental Impact Assessment Act (UVPG)[14] .

The implementation of a Strategic Environmental Assessment with the preparation of an environmental report is based on Section 8, paragraph 4, Sentence 3 WindSeeG, Section 35, paragraph 1, No. 1 UVPG in conjunction with No. 1.17 of Appendix 5 UVPG because the SDP is subject to the SEA obligation according to Section 5 WindSeeG.

According to Article 1 SEA Directive 2001/42/EC, the objective of strategic environmental assessment is to ensure a high level of environmental protection in order to promote sustainable development, and thereby to contribute to ensuring that environmental considerations are taken into consideration in an appropriate manner well in advance of concrete project planning, when the plans are compiled and adopted. The Strategic Environmental Assessment has the task of identifying, describing, and evaluating the likely significant environmental impacts of the implementation of the plan. It serves as an effective environmental precaution according to the applicable laws and is implemented according to consistent principles, and with public participation.

The scope and level of detail of the two environmental reports for the German North Sea and Baltic Sea (scope of investigation) were discussed with representatives of authorities, associations, and private parties at a scoping meeting on 11 August 2020. The scope of investigation was specified on 1 September 2020. Based on the consultation, a separate environmental report has been prepared for each of the two marine areas in accordance with Section 40 UVPG and the criteria of Appendix I of the SEA Directive. As far as possible, the area of investigation have been differentiated into further sub-areas according to the natural and geological conditions.

The environmental reports focus in particular on the description and assessment of the expected significant impacts of the implementation of the SDP on the marine environment according to the principles of environmental assessment based on the description and assessment of the state of the marine environment. According to Section 39, paragraph 2, sentence 2 UVPG, the environmental report shall contain the information that can be determined with reasonable effort, taking

[14] In the version of the announcement of 24 February 2010, BGBl. I p. 94, last amended by Article 2 of the Act of 30 November 2016 BGBl. I p. 2749.

into consideration the current state of knowledge and generally accepted assessment methods.

At the same time, both environmental reports present the measures to prevent, reduce, and as far as possible compensate for significant negative impacts on the marine environment caused by the implementation of the SDP. In addition to a brief description of the reasons for the selection of the alternatives that were seriously considered, the planned measures for monitoring the expected significant impacts of the implementation of the SDP on the environment are named, and the results of the species protection law assessment and the impact assessments with regard to the nature conservation areas are presented.

With the legal ordinances of 22 September 2017, the existing bird protection and FFHareas were declared nature conservation areas and partly regrouped within this framework. Thus, in the EEZ of the North Sea, there are now the nature reserves “Sylter Außenriff – Östliche Deutsche Bucht”, “Borkum Riffgrund”, and “Doggerbank”; in the EEZ of the Baltic Sea, the “Fehmarnbelt”, “Kadetrinne”, and “Pommersche Bucht – Rönnebank” nature conservation areas.

On the basis of an administrative agreement with the state of Mecklenburg-Western Pomerania, areas and a test site are defined in the M-V territorial waters. Designations in the territorial waters are assessed in the SEA of the SDP with regard to cumulative impacts. Otherwise, for the territorial waters, reference is made to the assessment of the environmental impacts and representations in the environmental report as part of the preparation of the LEP M-V 2016.

SDP 2020 is the result of this previous comprehensive strategic environmental assessment. The environmental concerns and the knowledge obtained in the preparation of the environmental reports have been incorporated in the preparation of the designations of the plan. The results of the strategic environmental assessment with regard to the importance of individual spatial sub-areas for protected biological resources have been used as a basis for decision-making when designating areas and sites, locations for platforms, routes for submarine cable systems. and areas for other forms of energy generation. At the same time, the environmental impacts of the designations of the SDP were continuously examined and adjusted during the preparation of the plan.

The expected significant negative impacts of the areas and sites for offshore wind turbines, platforms, and submarine cable systems discussed in the environmental reports led to general as well as source-related designations in the SDP to avoid and mitigate these impacts. In addition to taking into consideration the importance of individual spatial sub-areas for protected biological resources, these designations for the prevention and mitigation of significant negative impacts ensure that the implementation of the SDP does not cause any significant adverse effects but rather – compared with the depicted development of the marine environment in the case of non-implementation of the plan – avoids or mitigates negative impacts. This concerns, among other things, planning principles for noise and emission reduction and for avoiding the use of nature conservation areas and known occurrences of legally protected biotopes according to Section 30 BNatSchG as well as the sparing area use.

The SDP defines only areas that, according to the impact assessment in the environmental report and on the basis of current knowledge, do not have significant impacts on the nature conservation areas in terms of their components relevant to the conservation objectives and the purpose of protection as defined in Section 34, paragraph 2 BNatSchG and which do not give rise to the expectation of the fulfilment of species protection prohibitions in accordance with Section 44 BNatSchG. Insofar as the expected signifi-

cant environmental impacts cannot be determined and assessed with the necessary certainty at the level of these sectoral plans on the basis of the existing data and information, a more detailed assessment of the concerns of site and species protection is reserved either for the site investigation of the designated sites or for the planning approval after the project-specific framework conditions become known.

The available environmental reports for the North Sea and the Baltic Sea as well as the results of the national and international consultation have been taken into consideration in the amendment and update of the SDP in accordance with Section 43 UVPG (cf in detail the summarised consideration in Chapter 9).

As part of the participation process, the draft SDP and the draft environmental reports were consulted nationally and internationally. The hearing took place on 18 November 2020.

The focal points of the consultation were essentially

- adjustment of the audit content compared with the SEA from 2019,
- for the North Sea Environmental Report, new knowledge regarding the avoidance behaviour of divers,
- for the North Sea Environmental Report, the avoidance effects of guillemots

The Strategic Environmental Assessment for the update of the SDP is based on the environmental reports from 2019 and closely follows the existing SEA in terms of methodology and content. In particular, the enlargement of Areas N-9 to N-13 and the designation of areas for other forms of energy generation are new additions.

North Sea Environmental Report

The current results from the operational monitoring of OWF and from research projects, some of which used study methods independent of the standardised monitoring according to the standard study concept (StUK) (e.g. telemetry study within the framework of the DIVER project), consistently show that the avoidance behaviour of divers towards OWF is far more pronounced than had been anticipated in the original approval decisions for the wind farm projects (cf North Sea Environmental Report Chapter 4.6.). The cumulative consideration of the avoidance behaviour of divers compared with OWF resulted in a calculated complete habitat loss of 5.5 km and a statistically significant decrease in abundance up to a distance of 10 km, starting from the periphery of a wind farm (Garthe, et al., 2018). The study on divers in the German North Sea commissioned by the German Offshore Wind Energy Association (BIOCONSULT SH et al., 2020) confirms the knowledge from research and monitoring for SDP 2019 on the extent of the avoidance effects and the habitat loss for divers resulting from offshore wind farm projects, particularly in the area of the main concentration area, and the changed spatial distribution of divers in the main concentration area since the construction of the wind farms. In addition, the calculated stock figures and developments are qualitatively and quantitatively comparable to the stock calculations of the FTZ (SCHWEMMER H, 2019). For the quantification of habitat loss, a shooing distance of 2 km (defined as a complete avoidance of the wind farm area, including a buffer zone of 2 km) for divers was still taken as a basis in early decisions on planning approval. The assumption of a habitat loss of 2 km was based on data from the monitoring of the Danish wind farm “Horns Rev” (Petersen, Christensen, Kahlert, Desholm, & Fox, 2006). The recent study by Garthe et al. (2018) shows more than a doubling of the shooing distance to an average of 5.5 km (Garthe, et al., 2018). The calculated complete habitat loss is subject to the purely statistical assumption that no divers occur up to a distance of 5.5 km from an OWF.

The main concentration area represents a particularly important component of the marine environment in terms of seabirds and resting birds, in particular the group of divers. The delineation of the main concentration area of divers in spring in the German North Sea includes all areas of very high diver density and most of the areas of high density of divers (BMU 2009). Based on the calculated complete habitat loss of now 5.5 km, it results that through the wind farm projects already realised and taken into account in the position paper, approx. 19% of the 7,036 km^2 main concentration area is no longer available for divers because of avoidance behaviour. Based on the assumptions made in the position paper (BMU 2009) of a 2-km shooing distance, a 9 % loss of area in the main concentration area was anticipated. Thus, already at this point in time, the area-related adverse effect in this important diver habitat is greater than was originally assumed. Taking into consideration the new knowledge, further cumulative effects on the stock of divers can be expected from the implementation of further wind farm projects in the main concentration area. In addition to the question of admissibility under species protection law, the cumulative effects that have already occurred pose a threat to the marine environment in accordance with Section 5, paragraph 3, sentence 2, No. 2 WindSeeG. For this reason, a designation of Site N-5.4 is not permissible, also against the background of the diver study now available on behalf of the BWO. Areas N-5 as well as N-4 have been placed under review for possible subsequent use (see Chapters 5.1.1 and 5.2.2 of the SDP).

During the consultation, concerns were raised about the designations of Areas N-9 to N-13 because they are particularly important for guillemots. In addition, significant avoidance effects up to a distance of 9 km have been demonstrated for guillemots (similar to those for divers). In this context, the BSH reiterates the statements made at the hearing on the draft SDP 2020 on 18 November 2020, namely that, unlike divers, guillemot isa species with an extensive and highly individual occurrence in the Deutschen Bucht. Comparable spatial focal points as for divers west of Sylt are not available for guillemots. Current findings on the avoidance behaviour of guillemots show a locally varying expression, which is associated with local conditions in scientific publications (DIERSCHKE et al. 2016). In addition, there is evidence that there are also seasonal differences in the avoidance behaviour of guillemots. The 9 km listed in the comment result, for example, from studies by MENDEL et al. (2018) and PESCHKO et al. (2020) in the Helgoland area in which seasonal differences between spring and summer were found and attributed to behaviour during the breeding season. From a technical point of view, the findings from the aforementioned studies are therefore not suitable for an EEZ-wide and cross-seasonal consideration regardless of the spatial occurrence of the species. There are no findings that call into question the designation of Areas N-9 to N-13 with regard to guillemots.

The impact assessment of the SDP with regard to areas, sites, platforms, submarine cable systems and areas for other forms of energy generation has shown that a significant adverse effect on the conservation purposes of the nature conservation areas “Borkum Riffgrund”, “Sylter Außenriff – Östliche Deutsche Bucht”, and “Doggerbank” can be ruled out with the necessary certainty, taking into consideration avoidance and mitigation measures. In the adjacent protected areas of the neighbouring countries and the territorial waters, no significant impacts on the respective nature conservation areas and their components relevant to the conservation objectives or the conservation purpose within the meaning of Section 34, paragraph 2 BNatSchG are discernible. There is no in-depth assessment of possible routings outside the German EEZ; only the remote effects of the designations are considered.

It should be noted that because of the lack of an area-wide biotope mapping, a significant adverse effect with regard to FFH habitat types cannot currently be determined with reasonable effort and thus cannot be excluded with the necessary certainty.

The assessment of cumulative effects of the construction and operation of OWF on protected species, in particular harbour porpoises and divers, has shown that measures are required at the level of the SDP as well as in the context of subordinate approval and enforcement procedures in order to exclude with certainty any significant adverse effect on the conservation objectives of the protected areas.

To protect the harbour porpoise, noise abatement measures have been implemented and monitored during pile driving since 2011. Since 2014, the development of technical noise mitigation systems has progressed to the point where the mandatory limits for pile driving noise are continuously complied with. In addition, regulations for the avoidance and mitigation of significant cumulative impacts or disturbances of the harbour porpoise population that may be caused by impulsive noise inputs are made in the subordinate approval procedures. The regulations are derived from the concept of the BMU for the protection of harbour porpoises in the German EEZ of the North Sea. The results from the monitoring of the operational phase have not revealed any indications of disturbance to the population of harbour porpoise. The monitoring also includes the investigation of the operational input of underwater noise.

According to the current state of knowledge, a significant adverse effect on the conservation objectives of the nature conservation areas with regard to protected species of marine mammals can therefore be ruled out through the implementation of the designations made in the SDP.

The SDP lays down various measures to protect divers. In addition to the preventive measure of BMU (2009) by restricting offshore wind energy within the main concentration area of divers, the SDP provides a prevention measure by excluding Site N-5.4 designated in the (preliminary) drafts of the SDP. The exclusion of the “Butendiek” offshore wind farm for any subsequent use also constitutes a significant mitigation measure resulting from Section 5, paragraph 3, sentence 2, No. 5 WindSeeG. According to this, the realisation of OWF in nature conservation areas is not permitted. Finally, the requirement to examine the possible subsequent use of Areas N-4 and N-5 is a further monitoring measure.

Taking into consideration the measures included in the SDP, which ensure the protection of the divers inside but also outside the “Sylter Außenriff – Östliche Deutsche Bucht” nature conservation area, any significant adverse effect of the conservation objectives can be ruled out with the necessary certainty.

Baltic Sea Environmental Report

With regard to bird migration, additional monitoring of diurnal land birds beyond StUK 4 via rangefinder with a focus on cranes, birds of prey, and geese was commissioned as part of the site investigation of Site O-1.3. Based on the knowledge gained from these investigations and the further knowledge available, the BfN, as the competent federal authority, came to the conclusion that a realisation of the prohibition of killing and injury in accordance with Section 44, paragraph 1, No. 1 for individual species or groups of species could not be ruled out with the necessary certainty. In the determination of suitability of Site O-1.3, a requirement was therefore included for individual species or species groups; according to this, the project developer must take suitable measures to observe bird migration in the vicinity of the site and to avoid the occurrence of a significant risk of collision.

For Site O-2.2, the knowledge gained from the investigations on Site O-1.3 and the determination of suitability provide valuable information.

Because of the location of Site O-2.2 further west and thus closer to the central area of the crane migration corridor between Rügen and Skåne, the knowledge from the planning approval procedure for the neighbouring project “Baltic Eagle”, among others, is essential. Site O-2.2 therefore remains under review.

In order to minimise the risk, the installations shall also be designed in such a way that light emissions are avoided as far as possible during installation and operation unless such emissions are required and unavoidable by safety requirements of shipping and air traffic as well as requirements of occupational safety. Lighting that is as compatible as possible during the operation of the transformer or collection platforms in order to reduce attraction effects as far as possible includes measures such as switching the obstruction light on and off as needed as well as the selection of suitable lighting intensities and light spectra or lighting intervals.

The overall result is that the coordinating and concentrating effects of the designations in the SDP, taking into consideration compliance with effective avoidance and mitigation measures, are not expected to have any significant impacts on the protected assets under consideration as things stand. Rather, compared with non-implementation the plan, negative impacts on the marine environment will be avoided or reduced.

10.2 Monitoring measures according to Section 45 UVPG

The potential significant impacts on the environment resulting from the implementation of the plan are to be monitored in accordance with Section 45 UVPG. This is intended to enable unforeseen negative impacts to be identified at an early stage and suitable remedial measures to be taken.

Therefore, in accordance with Section 40, paragraph 2, No. 9 UVPG, the environmental report is to specify the measures envisaged for monitoring the significant environmental impacts of implementation of the plan. Monitoring is the responsibility of the BSH because it is the competent authority for the strategic environmental assessment (see Section 45, paragraph 2 UVPG). In this context, as intended by Article 10, paragraph 2 SEA Directive and Section 45, paragraph 5 UVPG, existing monitoring mechanisms can be used to avoid duplication of monitoring work. In accordance with Section 45, paragraph 4 UVPG, the results of the monitoring are to be taken into account in the update of the SDP.

With regard to the planned monitoring measures, it should be noted that the actual monitoring of the potential impacts on the marine environment can begin only when the SDP is implemented (i.e. when the designations made within the framework of the plan are implemented. Nevertheless, the natural development of the marine environment, including climate change, should not be disregarded when assessing the results of the monitoring measures. However, general research cannot be carried out within the framework of monitoring. Project-related monitoring of the impacts of the uses regulated in the plan is therefore of particular importance.

The main function of plan monitoring is to bring together and evaluate the results of different phases of monitoring at the level of individual projects or clusters of projects developed in a spatial and temporal context. The assessment will also cover the unforeseen significant impacts of the implementation of the plan, the marine environment and the review of the forecasts in the environmental report. In this context, according to Section 45, paragraph 3 UVPG, the BSH will ask the competent authorities for the monitoring results available there; these are required for implementation of the monitoring measures.

In addition, results from existing national and international monitoring programmes must be taken into consideration – also to avoid multiple

testing. The monitoring of the conservation status of certain species and habitats required according to Article 11 of the Habitats Directive must also be included, as must the investigations to be carried out in the course of the management plans for the “Sylter Außenriff – Östliche Deutsche Bucht” and “Borkum Riffgrund” nature conservation areas. There will also be links to the measures provided for in the Marine Strategy Framework Directive and the Water Framework Directive.

In summary, the planned measures for monitoring the potential impacts of the plan can be summarised as follows:

- Collection of data and information that can be used to describe and assess the status of areas, protected assets and potential impacts from the development of individual projects,
- Development of suitable procedures and criteria for assessing the results from monitoring the impacts of individual projects,
- Development of procedures and criteria for the assessment of cumulative effects,
- Development of procedures and criteria for forecasting possible impacts of the plan in a spatial and temporal context,
- Development of procedures and criteria for evaluating the plan and adapting or, where appropriate, optimising it as part of the update,
- Evaluation of measures to prevent and mitigate significant impacts on the marine environment,
- Development of norms and standards.

The following data and information are required in order to assess the possible impacts of the plan:

1. Data and information available to the BSH within the scope of its responsibility, in particular data resources from previous EIS and monitoring of offshore projects, which are available to the BSH for the purpose of review (according to SeeAnlV),
2. Data and information from the areas of responsibility of other federal and state authorities (on request), including data from the monitoring of Natura2000 areas
    - Data and information from federal and state research projects, e.g. HELBIRD/DIVER and sediment EEZ
3. Data and information from assessments within the framework of international bodies and conventions such as OSPAR, HELCOM, ASCOBANS, and BirdLife International.

For reasons of practicability and the appropriate implementation of requirements from the Strategic Environmental Assessment, the BSH will pursue an ecosystem-oriented approach as far as possible when carrying out the monitoring of the potential impacts of the plan, which focuses on the interdisciplinary pooling of marine environmental information. To be able to assess the causes of planned changes in parts or individual elements of an ecosystem, the anthropogenic variables from spatial observation (e.g. technical information on shipping traffic from AIS data resources) must also be considered and included in the assessment.

When combining and evaluating the results from monitoring at project level and from other national and international monitoring programmes, and from the accompanying research, it will be necessary to review the gaps in knowledge and uncertain forecasts presented in the environmental report. This concerns, in particular, forecasts regarding the assessment of significant impacts of the uses regulated in the SDP on the marine environment. The cumulative effects of defined uses are to be assessed regionally and supraregionally.

10.2.1 Monitoring of the potential impacts of areas and sites for offshore wind turbines, platforms, and areas for other forms of energy generation

The investigation of the potential environmental impacts of areas and sites for offshore wind energy as well as areas for other forms of energy generation is to be carried out at the secondary project level, on the basis of the standard “Investigation of impacts of offshore wind turbines (StUK4)” and in coordination with the BSH. The assessment of the location with regard to the protected biological resources must be based on the results of the investigations of the future OWF projects. Monitoring during the installation of foundations by means of pile driving involves measuring underwater noise and acoustic recordings of the impacts of pile driving noise on marine mammals using POD measuring devices. Additional monitoring measures are also planned in order to assess the impacts of the stratification of the water under certain hydrographic conditions on the propagation of pile-driving noise in the Baltic Sea, and to allow further measures to be implemented if necessary. These measures may include additional noise measurements coupled with CTD measurements at different water depths in order to detect possible changes in noise propagation attenuation as a result of the stratification of the water body.

For the entire duration of the construction phase and for a period of between three and five years, investigations are required for all protected assets in accordance with the requirements of StUK4. A continuation of the operational monitoring beyond the time period specified in accordance with StUK 4 may be technically necessary with regard to project-related or area-specific conditions to a targeted and appropriate extent. BSH, as the competent enforcement and supervisory authority, expressly reserves the decision-making right as to the necessity and scope of such continued operational monitoring.

The BSH is carrying out many projects as part of the accompanying research into the possible impacts of offshore WT on the marine environment.

The research projects of the BSH directly related to the possible impacts on the protected assets and the development of norms and standards include the following:

- ANKER project “Approaches to cost reduction in the collection of monitoring data for offshore wind farms”, FKZ 0325921 with funding from the BMWi/PtJ,
- R&D study BeMo “Evaluation approaches for underwater noise monitoring in connection with offshore approval procedures, spatial planning and MSFD” with funding from the BMVI/BSH,
- R&D project “Sound mapping” with funding from the BMVI/BSH,
- R&D network NavES (Nature-friendly offshore developments) with funding from the departmental research plan of the BMU; several sub-projects belong to NavES; these include MultiBird (investigation of the risk of collision of migratory birds), ProBird (prognosis of migratory bird occurrence), ERa (experience report on pile driving noise), Schall I u. II (development of a specialist information system for underwater noise), Schall I u. II (evaluation of underwater noise measurements).

The measures implemented to date include development of measurement regulations for measuring underwater noise (2011), development of measurement regulations for determining the effectiveness of noise mitigation systems (2013), and cooperation on the development of ISO 18406:17 and DIN SPEC 45653.

The results of the current projects of the BSH will be directly incorporated into the further development of standards and norms (e.g. the development of the StUK5).

10.2.2 Monitoring of potential impacts of submarine cables

The potential impacts of submarine cable systems on the marine environment can only be assessed on the basis of the given specific projects. For the first time, StUK4 also contains minimum requirements for investigating submarine cable routes with regard to benthos, biotope structure and biotopes during the baseline survey and the operating phase of submarine cable systems. For example, during the baseline survey, each biotope structure identified by sediment surveys along the cable route must be covered by at least three cross-transects for the benthos investigations. In addition, one cross-transect each must be placed at the start and end points of the route. Each cross-transect in turn consists of five stations. Identified suspected areas of biotopes protected according to Section 30 BNatSchG must also be investigated in accordance with the current mapping instructions of the BfN.

After the cable system has been laid, its location must be verified annually to the licensing authority in accordance with current approval practice in the first five years of operation by conducting at least one survey per year. The number of surveys in the subsequent years is determined by the licensing authority on a case-by-case basis. The investigations with regard to the marine environment are to be performed in coordination with the licensing authority on a project-specific basis. The investigation methods are to be presented, as far as possible, as described in the "Standard – Investigation of the impacts of offshore wind turbines on the marine environment (StUK4)" One year after commissioning of the submarine cable systems, investigations of the benthic biotic communities on the same transects as in the baseline survey are to be carried out to verify possible impacts of the construction and operating phases.

To monitor the implementation of the plan, measures are also planned; these will help to verify the forecasts made with regard to significant impacts of offshore wind energy and, if necessary, to adjust utilisation strategies and planned prevention and mitigation measures or to review assessment criteria, in particular with regard to cumulative effects.

New knowledge from the environmental impact studies and the joint evaluation of research and EIS data will be used as part of the strategic environmental assessment for the plan. Joint evaluation of research and EIS data also produces products that provide a better overview of the distribution of protected biological resources in the EEZ. The consolidation of information is leading to an increasingly solid basis for impact forecasting.

The general intention is to keep data from research, projects and monitoring consistent and to make these data available for competent evaluation. In particular, attempts should be made to create common overview products in order to review the impacts of the plan. The existing geodata infrastructure at the BSH, which includes data from physics, chemistry, geology, biology and uses of the sea, will be used as a basis for consolidating and evaluating ecologically relevant data, and will be further developed accordingly.

With regard to the consolidation and archiving of ecologically relevant data from project-related monitoring activities and accompanying research, it is specifically provided that data collected within the scope of accompanying ecological research will also be consolidated at the BSH and archived on a long-term basis. The BSH is already collecting and archiving the data on protected biological resources from the baseline surveys of offshore wind energy projects and the monitoring of construction and operating phases in the MARLIN (MarineLife Investigator), a specialist information network for environmental assessments.

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12 Appendix: Maps (for information)

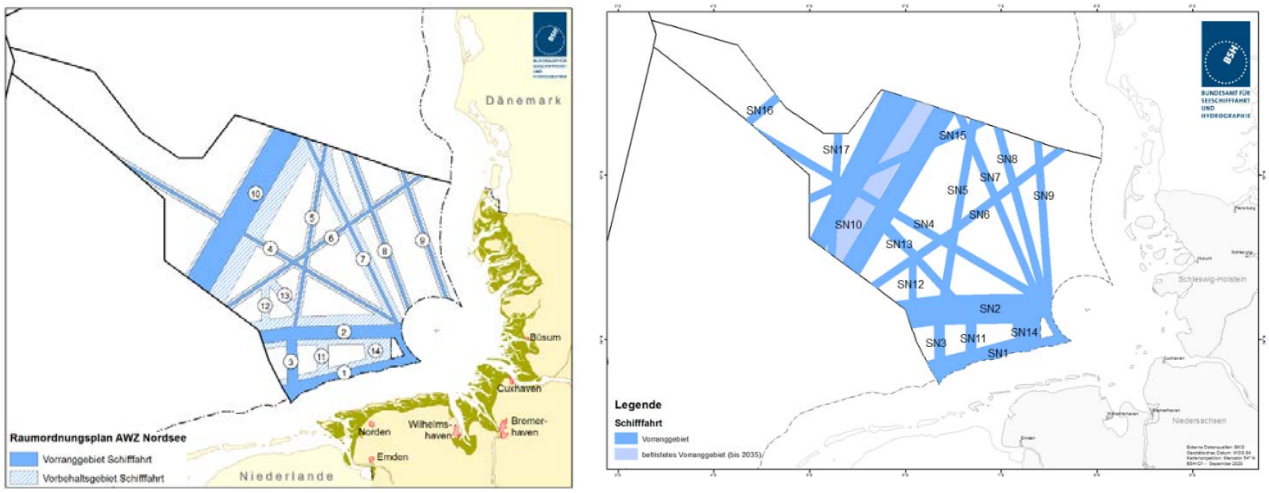

Figure 25: Shipping routes of the 2009 North Sea EEZ spatial plan (left) and of the draft spatial plan (right)

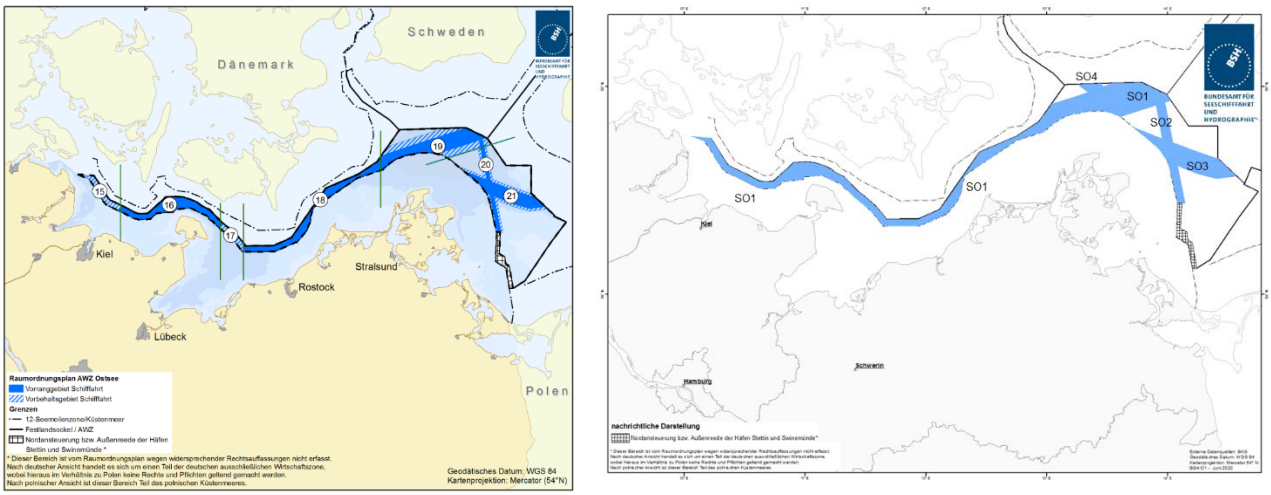

Figure 26: Shipping routes of the 2009 Baltic Sea EEZ spatial plan (left) and of the draft spatial plan (right)

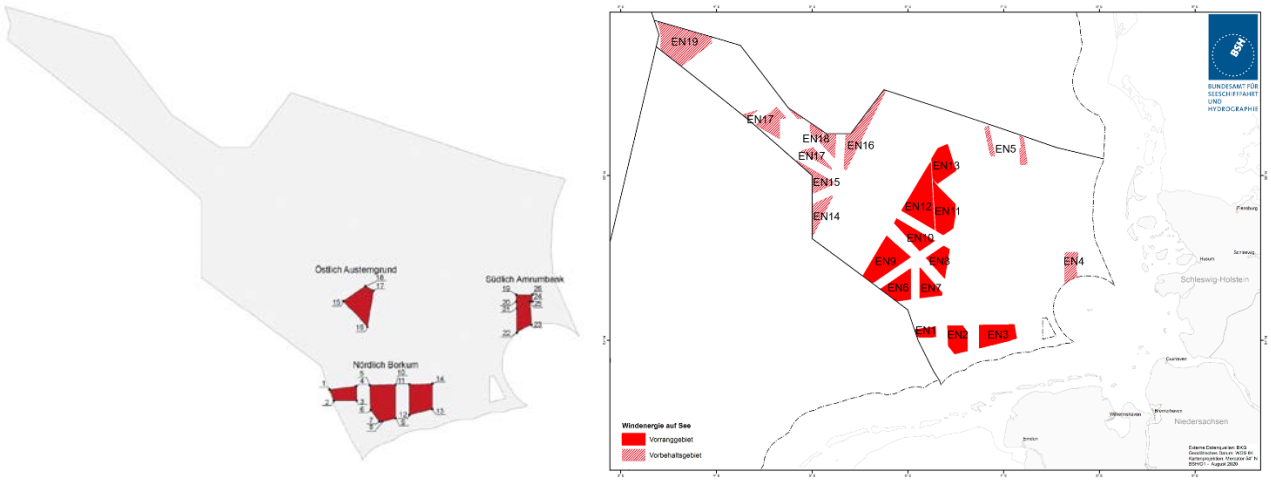

Figure 27: Wind energy areas of the 2009 North Sea EEZ spatial plan (left) and the draft spatial plan (right)

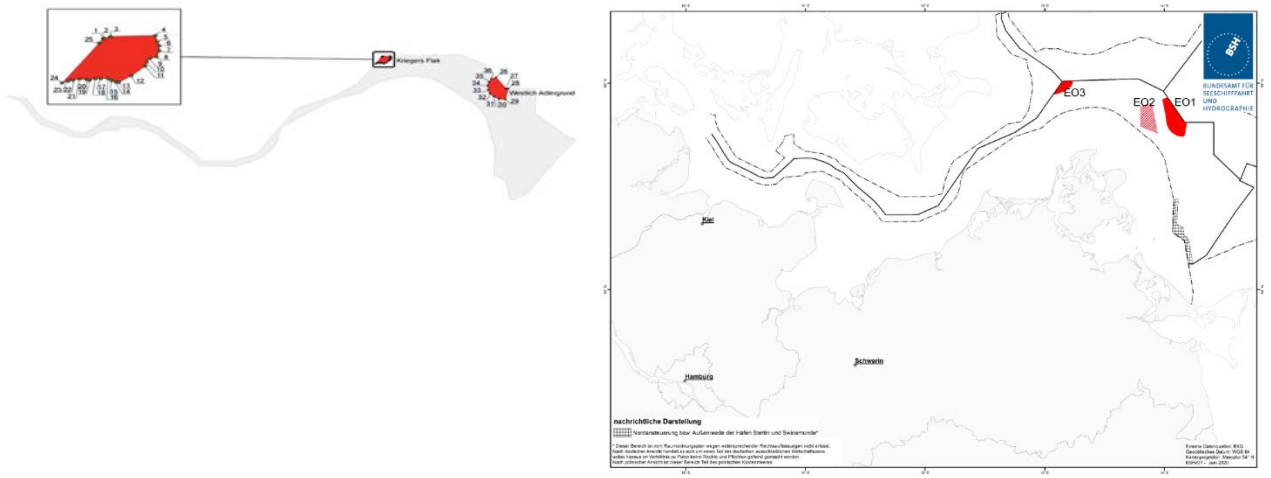

Figure 28: Wind energy areas of the 2009 Baltic Sea EEZ spatial plan (left) and of the draft spatial plan (right)

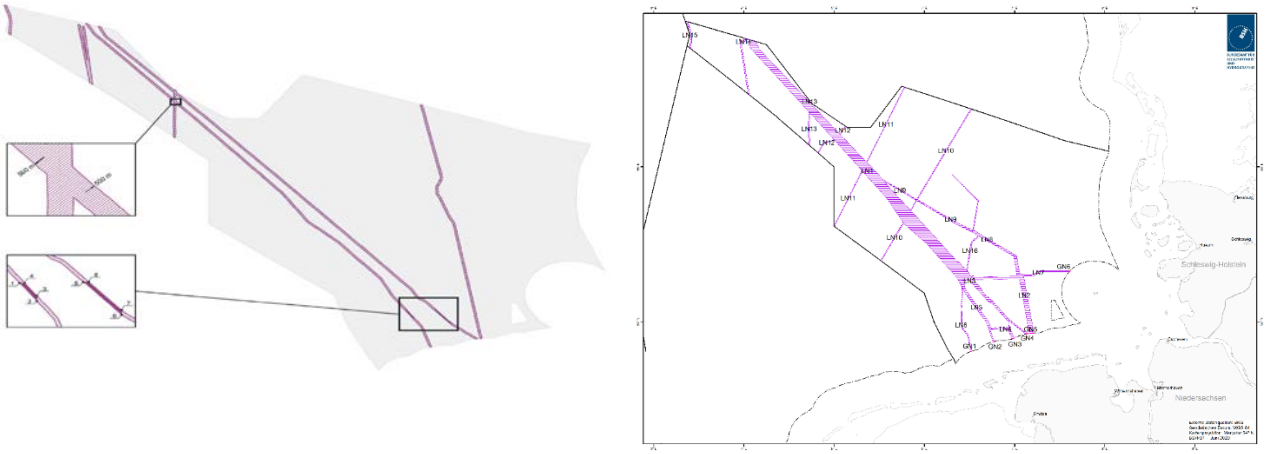

Figure 29: Line corridors of the 2009 North Sea EEZ spatial plan (left) and of the draft spatial plan (right)

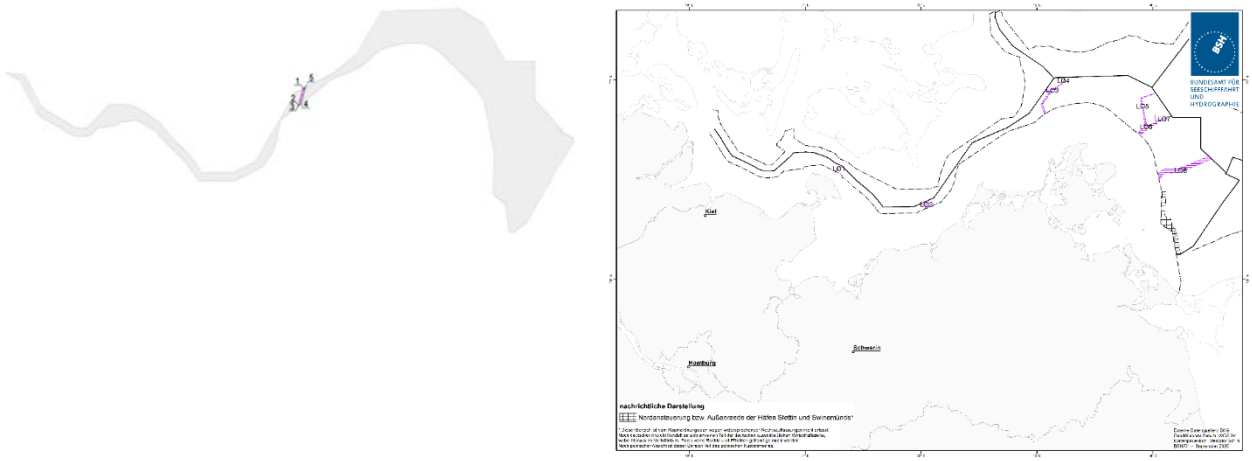

Figure 30: Line corridors of the 2009 Baltic Sea EEZ spatial plan (left) and of the draft spatial plan (right)

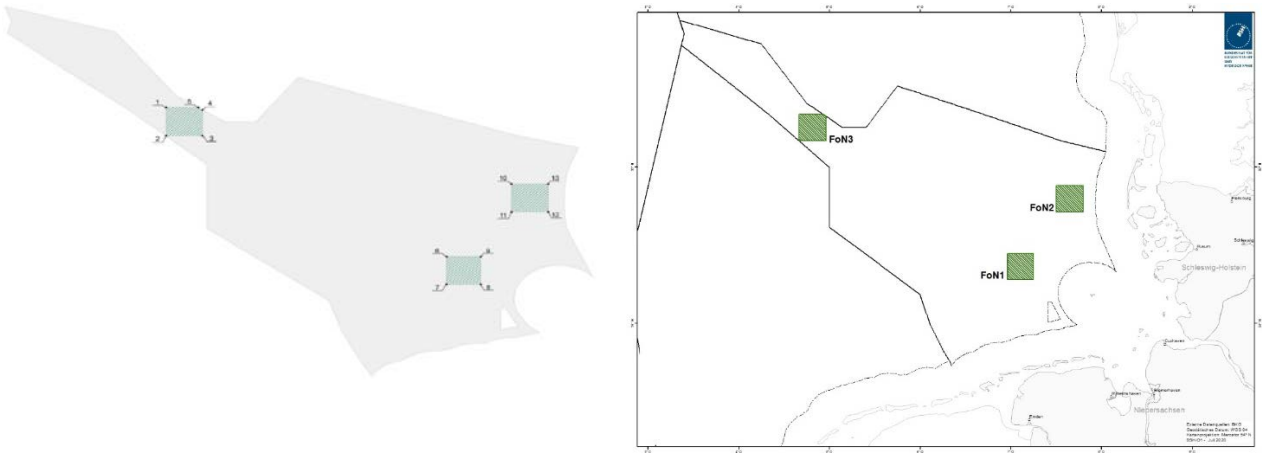

Figure 31: Research areas of the 2009 North Sea EEZ spatial plan (left) and the draft spatial plan (right)

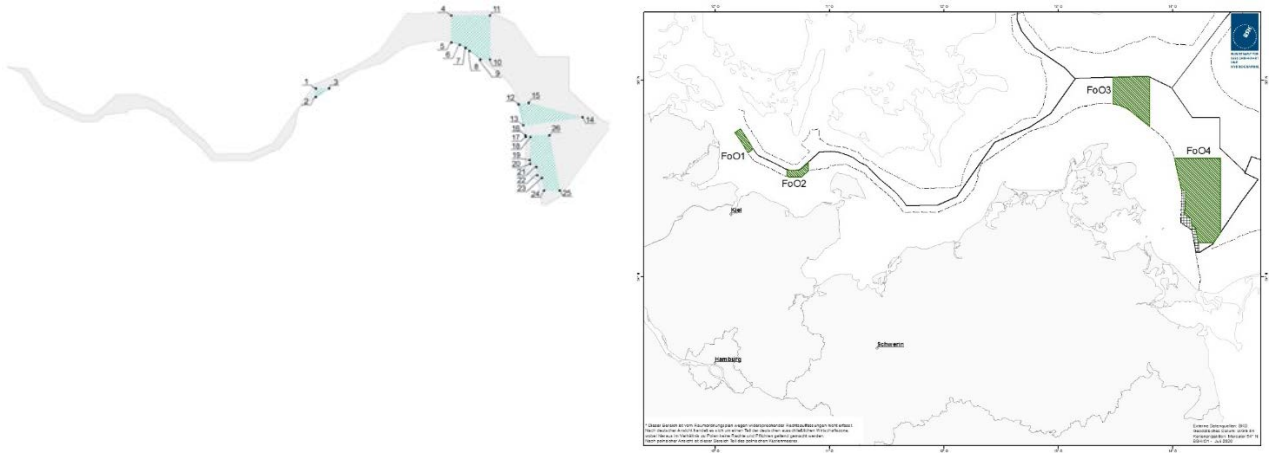

Figure 32: Research areas of the 2009 Baltic Sea EEZ spatial plan (left) and of the draft spatial plan (right)

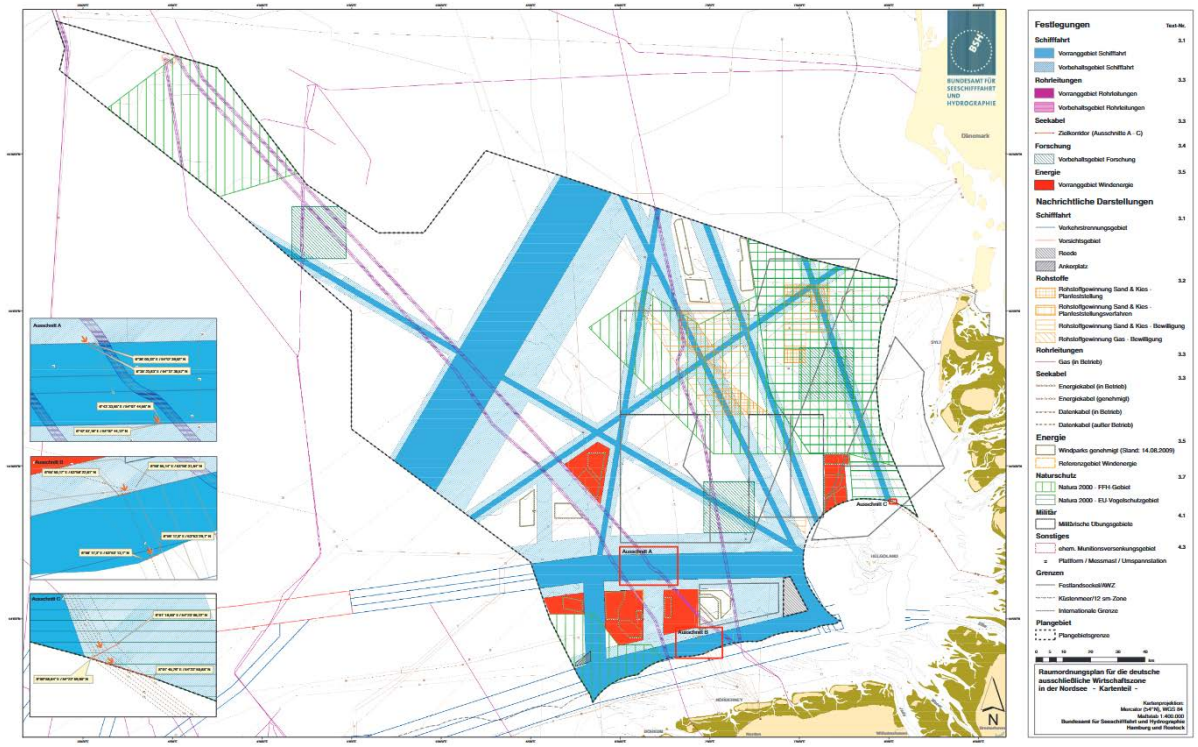

Figure 33: Spatial plan 2009 North Sea EEZ

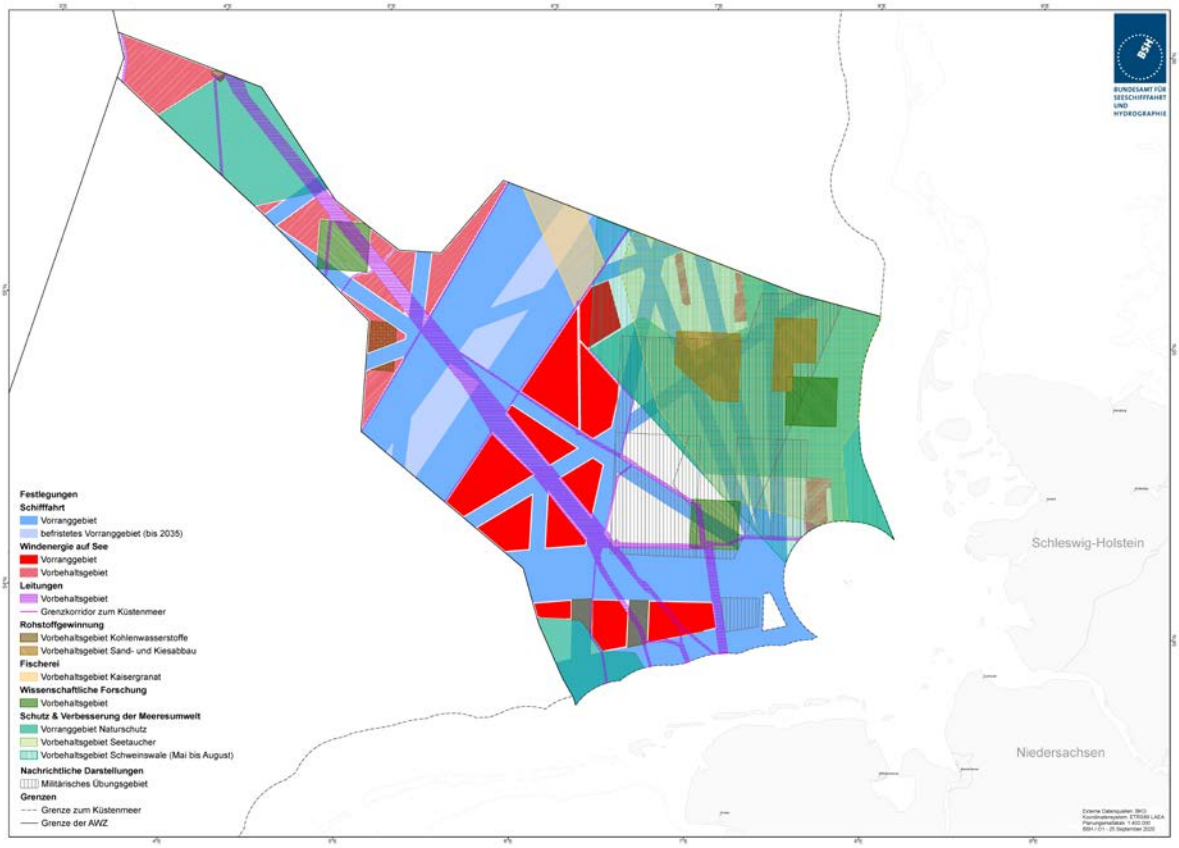

Figure 34: Draft of spatial plan for the German EEZ in the North Sea and Baltic Sea – North Sea map section

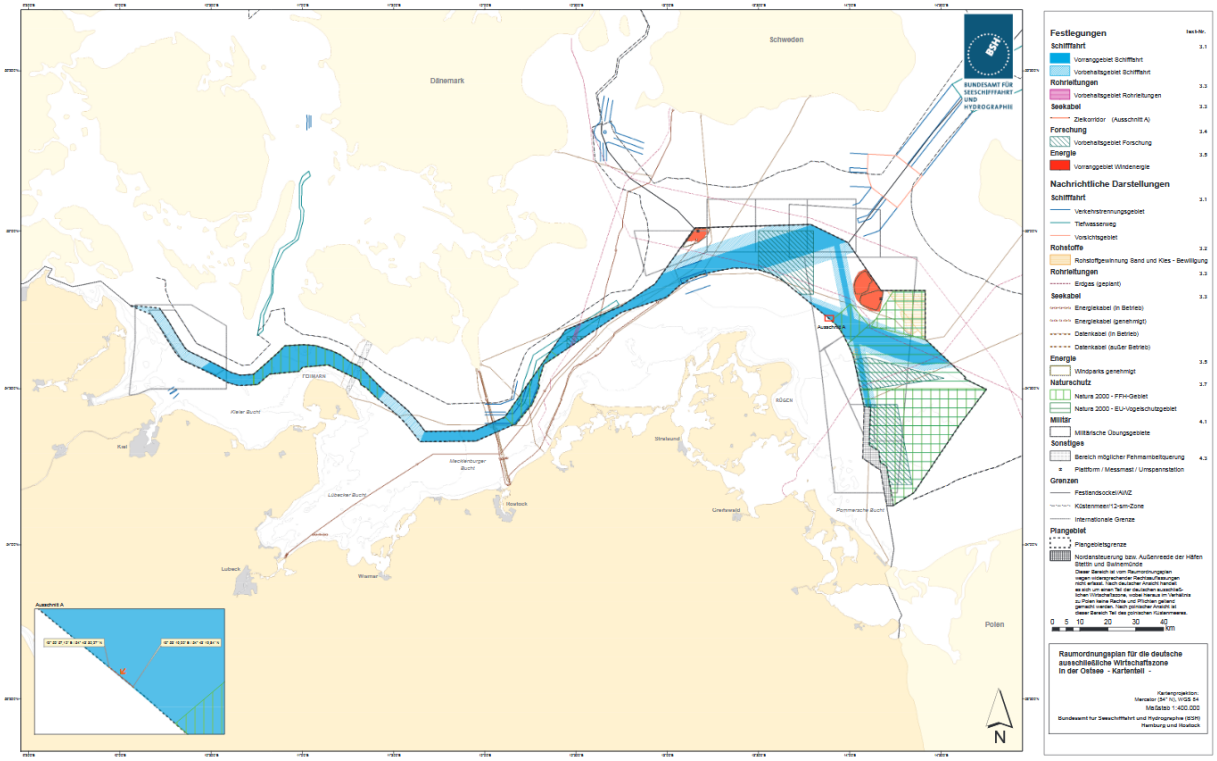

Figure 35: Spatial plan 2009 Baltic Sea EEZ

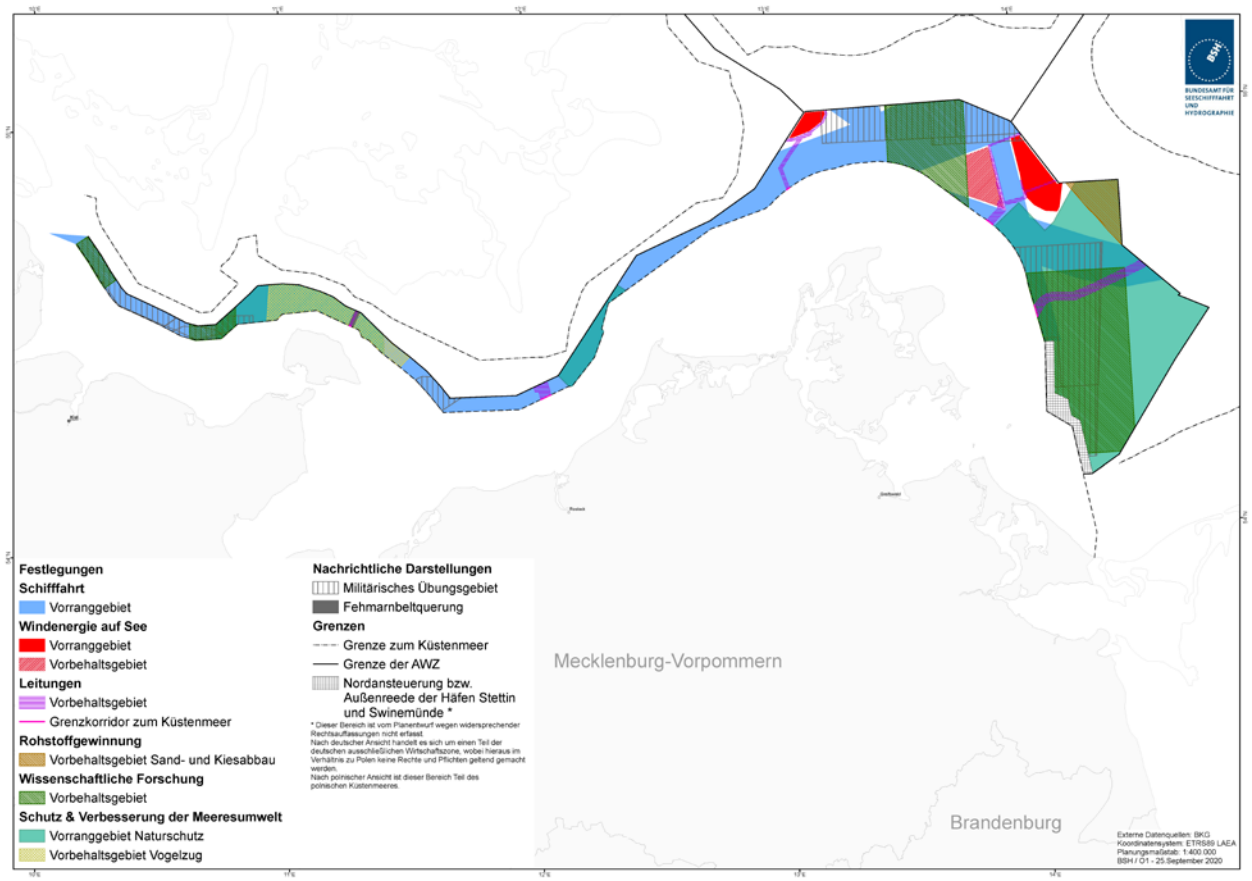

Figure 36: Draft of spatial plan for the German EEZ in the North Sea and Baltic Sea – Baltic Sea map section

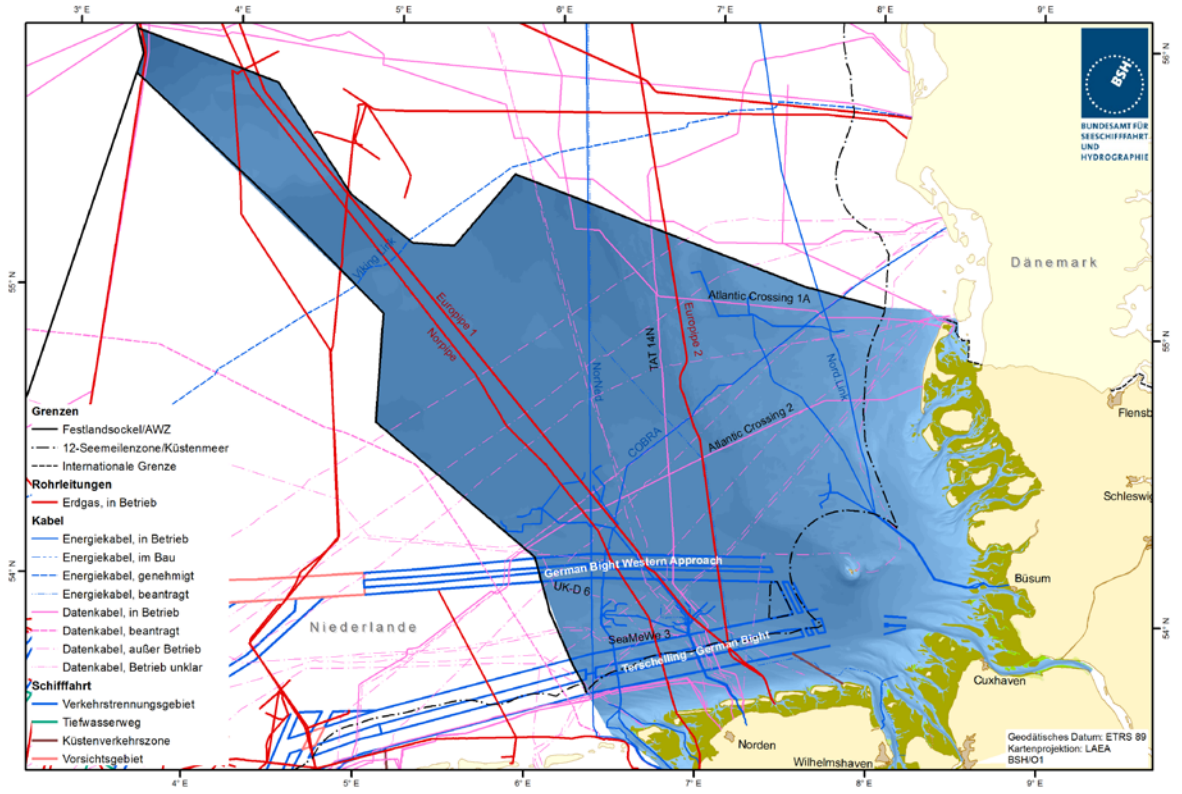

Figure 37: Designations submarine cables, pipelines, traffic separation areas (North Sea)

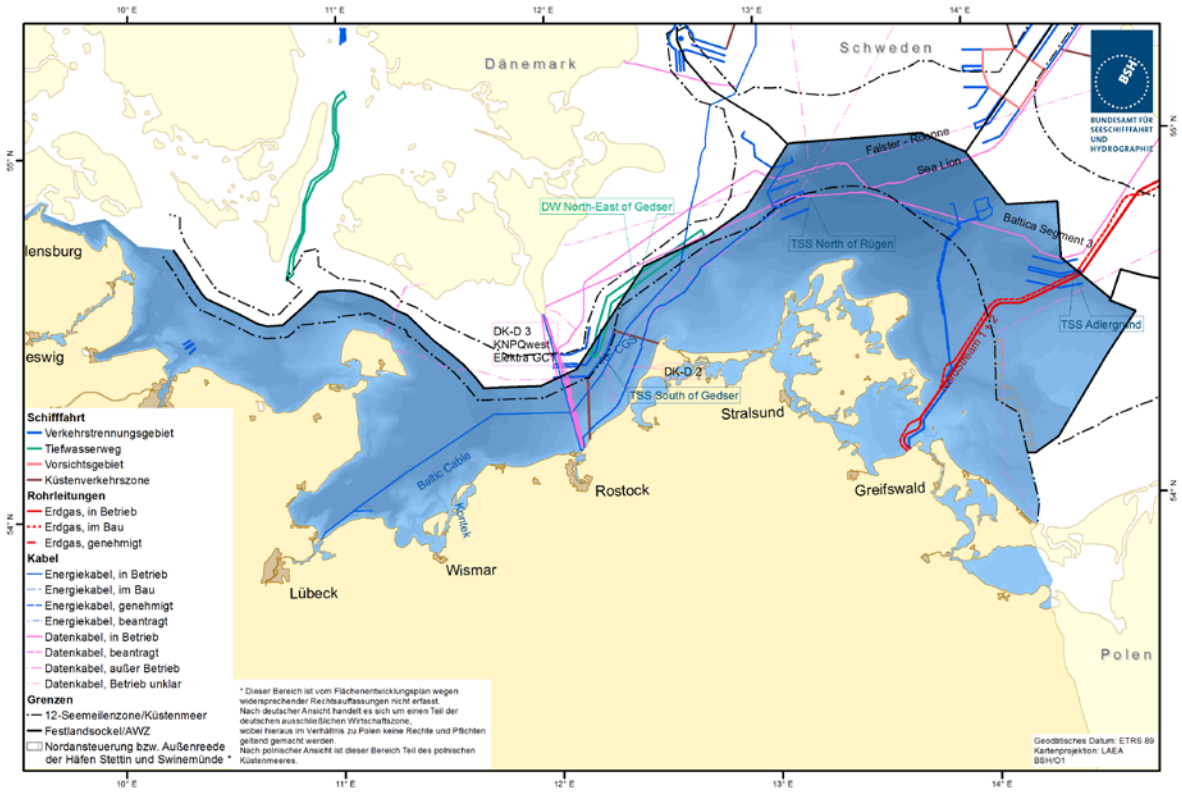

Figure 38: Designations submarine cables, pipelines, traffic separation areas (Baltic Sea)

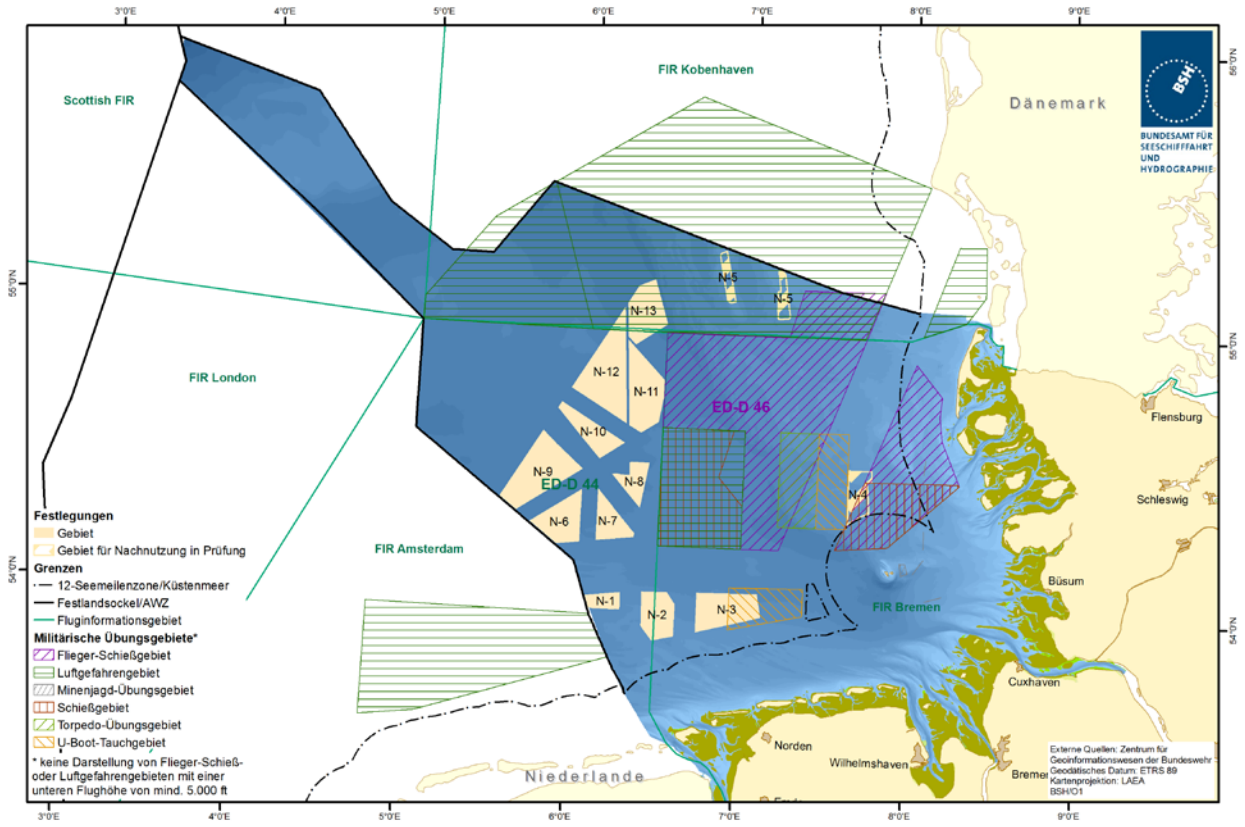

Figure 39: National defence areas (North Sea)

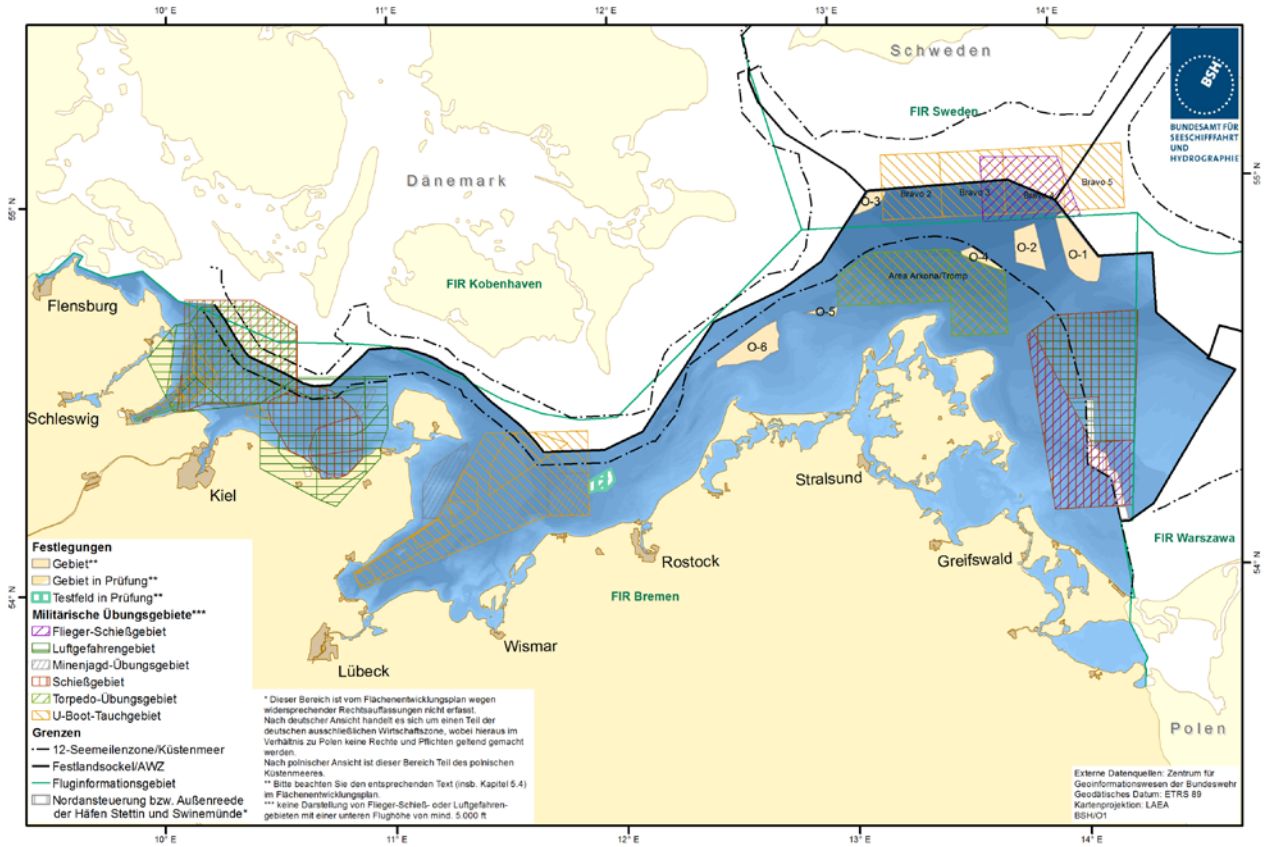

Figure 40: National defence areas (Baltic Sea)

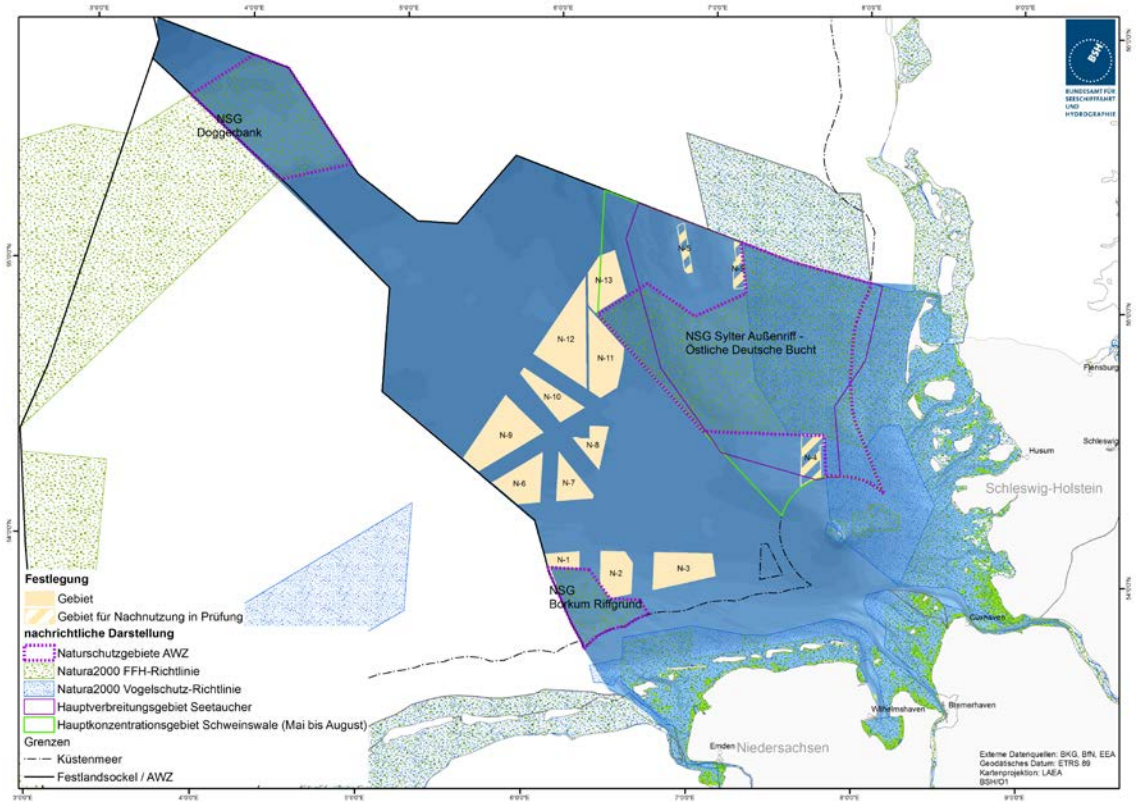

Figure 41: Areas for the construction and operation of offshore wind turbines in the German EEZ of the North Sea and nature conservation areas.

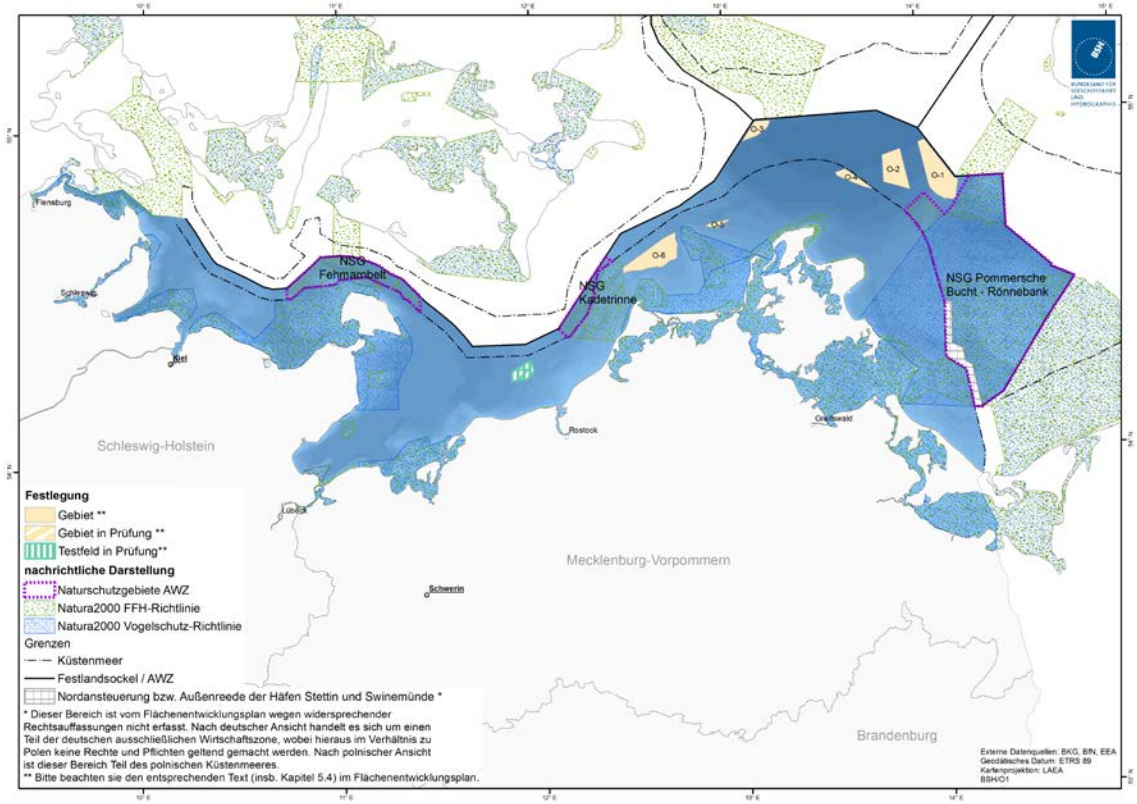

Figure 42: Areas for the construction and operation of offshore wind turbines in the German EEZ of the Baltic Sea and nature conservation areas.

13 Appendix: Overview table

Calendar year Tender	Site designation	Calendar year & quarter pulling of inner-farm cabling	Calendar year and quarter commissioning	Expected installed power [MW]	Switch bays/ J-tubes for connecting the WT	Total expected installed power [MW]	Network connection system				
							Name	Calendar year and quarter IBN	Transmission capacity [MW]	Connection concept	Switch bays/ J-tubes for connecting the WT
2021	N-3.7	n/a	Q3 2026	225	n/a	958	NOR-3-3[1)]	n/a	900	155 kV	n/a
	N-3.8	n/a	Q3 2026	433	n/a						
	O-1.3	Q2 2026	Q3 2026	300	5		OST-1-4[1)]	Q3 2026	300	66 kV	5
2022	N-7.2	Q3 2027	Q4 2027	930	12/14[3)]	930	NOR-7-2[1)]	Q4 2027	930	66 kV	12/14[3)]
2023	N-3.5	Q1 2028	Q3 2028	420	7	900	NOR-3-2[1)]	Q3 2028	900	66 kV	14
	N-3.6	Q2 2028	Q3 2028	480	7						
2024	N-6.6	Q1 2029	Q3 2029	630	11	2,900	NOR-6-3[1)]	Q3 2029	900	66 kV	14
	N-6.7	Q2 2029	Q3 2029	270	3						
	N-9.1	Q1 2029	Q3 2029	1,000	14		NOR-9-1[1)]	Q3 2029	2,000	66 kV	28
	N-9.2	Q2 2029	Q3 2029	1,000	14						
2025	N-9.3	Q1 2030	Q3 2030	1,000	14	4,000	NOR-9-2[1)]	Q3 2030	2,000	66 kV	28
	N-9.4	Q2 2030	Q3 2030	1,000	14						
	N-10.1	Q1 2030	Q3 2030	1,000	14		NOR-10-1[1)]	Q3 2030	2,000	66 kV	28
	N-10.2[2)]	Q2 2030	Q3 2030	1,000	14						
Total target system						9,688					
Projected park 2025						10,800					
Projected park 2030						20,488					

[1)] Please refer to the GDP 2019–2030 and the preparation, review, and confirmation of the GDP 2021–2035.
[2)] Site N-10.2 is not fully required to achieve 20 GW.
[3)] 14 J-Tubes and 12 switch bays will be installed by the TSO on the NOR-7-2 converter platform for the connection of subsidised WT installed on the respective sites. If necessary, two of these switch bays allow two cable systems to be pulled into one switch bay (three-leg concept).

14 Appendix: Informative presentation of a long-term expansion path (scenario framework 2021–2035)

Table 17: Informative presentation of sites potentially available in Zones 1-3 beyond 2030 based on the 2021–2035 scenario framework (30 GW by 2035)

Tender calendar year	Commissioning calendar year	Site designation	Grid connection system	Expected installed power [MW]	Total expected installed power [MW]
after 2025	after 2030	N-12.1/N-12.2	NOR-12-1	2,000	8,000-10000
		N-12.3/N-12.4	NOR-12-2	2,000	
		N-11.1/N-11.2	NOR-11-1	2,000	
		N-13.1/N-13.2	NOR-13-1	2,000	
		N-11.3/N-12.5/N-13.3 if applicable	*NOR-11-2 if applicable*	*If necessary, 2,000*	
Expected total potential in zones 1-3					approx. 28,400–30,4001)

1) Additional potential could result from the development of free sites in Area O-6. However, this is subject to the actual availability of the sites.