BUNDESAMT FÜR SEESCHIFFFAHRT UND HYDROGRAPHIE

Non-Technical Summary of the SEA Report Draft on the Spatial Offshore Grid Plan for the German Exclusive Economic Zone of the Baltic Sea 2016/2017

– unofficial translation –

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Content

1 Subject and Purpose

The environmental assessment for the updating of the Spatial Offshore Grid Plan for the Exclusive Economic Zone (EEZ) of the Baltic Sea is based upon the German Environmental Impact Assessment Act[1]. The aim of the Strategic Environmental Assessment (SEA) is to identify, describe and assess likely significant environmental effects of the implementation of the plan on the nature conservation interests mentioned in Section 2 (1) Environmental Impact Assessment Act.

Pursuant to the provisions of Section 17a (1) Clause 2 No. 1 of the Federal Energy Act (EnWG), the Spatial Offshore Grid Plan defines offshore facilities suitable for collective grid connections. In accordance with Section 17a (1) No. 2 to 6 EnWG, the grid plan contains stipulations referring to sites for transformer substation platforms, required routes for the grid connections for offshore wind farms, cable routes for interconnectors as well as a description of possible cross-connections between grid infrastructures inside the German EEZ. The scope of this plan covers the German EEZ of the Baltic Sea.

The Spatial Offshore Grid Plan aims at ensuring coordinated and consistent spatial planning of grid infrastructure in the EEZ, meaning transformer substation platforms and subsea cable systems in particular for offshore wind farms. To ensure consistent planning with terrestrial grid planning up to the grid connection points onshore, consent and consultation procedures with the responsible authorities are required. These requirements have been taken into account by the agreement and consultation process with the Federal Network Agency, the Federal Agency for Nature Conservation and the coastal federal states – for the Baltic Sea region Mecklenburg-Western Pomerania and Schleswig-Holstein. The transition to the territorial sea is organised by gates for the bundled routing of cables. The Spatial Offshore Grid Plan defines standardised technical specifications and planning principles for implementation. The Spatial Offshore Grid Plan has the character of a sectoral plan and is closely linked to the Maritime Spatial Plan for the EEZ of the German Baltic Sea and the Offshore Network Development Plan (O-NEP). The O-NEP specifies the specific chronological order of implementation of the grid connection systems for the next ten and at most 15 years as well as an additional outlook for the next 15 and at most 20 years. On 25th November 2016 the Offshore Network Development Plan 2025 has been confirmed by the Federal Network Agency in consultation with the BSH.

The SEA report describes and assesses likely significant environmental effects of the implementation of the planned subsea cable systems and transformer substation platforms in the construction, operation and dismantling phases on the marine environment.

Environmental protection objectives have been considered when preparing the plan and implementing the SEA. Those objectives are based on international, EU and national conventions and regulations related to marine environmental protection. The plan primarily takes into account the (marine) environmental protection objectives through its various planning principles.

2 Description and Assessment of the Environmental Status

Within the spatial scope of the grid plan, i.e. the EEZ of the Baltic Sea, the examined scope of the SEA extends to the area for which specific spatial stipulations are made. In addition, as part of the Habitats Directive impact assessment, potential long-distance effects on the protected marine areas of neighbouring countries and in the adjacent territorial sea are also taken into account.

[1] In the version as published on 24 February 2010, Federal Law Gazette I p. 94, last amended by Art.2 of the Act of 30 November 2016 (Federal Law Gazette I, p. 2749).

The SEA does not, however, investigate whether the cable routes in the territorial sea necessarily arising from the stipulation of the gates could cause significant impact on those protected areas. This is subject of the SEA that has been carried out for the Offshore Network Development Plan by the Federal Network Agency or subordinate planning levels.

The SEA report on the Spatial Offshore Grid Plan describes and assesses the environmental status with regard to the following nature conservation interests:

- Seabed
- Water
- Plankton
- Benthos
- Biotope Types
- Fish
- Marine Mammals
- Seabirds and Migratory Birds
- Bats
- Biological Diversity
- Air
- Climate
- Natural Scenery
- Tangible Assets, Cultural Heritage
- Human Population and Human Health
- Interactions

In addition to data from large-scale surveys and findings from research projects and literature studies, a vast amount of data derives from small-scale data of environmental impact studies for offshore wind farms and subsea cable system projects. Pursuant to Section 14f (2) Clause 2 Environmental Impact Assessment Act, the SEA report shall contain the information which may be ascertained with reasonable effort and shall take into consideration the current state of knowledge and generally recognised testing methods.

3 Development in Case of Non-Implementation of the Plan

The expansion of offshore wind energy plays an important role in fulfilling the climate protection and energy policy objectives of the Federal German Government. According to Section 17d (1) Clause 1 EnWG, the responsible transmission system operator (TSO) must ensure the grid connections for offshore wind farms or, according to the specifications of the O-NEP confirmed by the Federal Network Agency respectively from 01 January 2019 in accordance with the provisions of the Area Development Plan and the Network development Plan pursuant to Section 5 WindSeeG, construct and operate the grid infrastructure. Pursuant to Section 17a EnWG, the Federal Maritime and Hydrographic Agency has be given the assignment of preparing a Spatial Offshore Grid Plan for the German EEZ under the conditions stated therein and update it. The plan spatially defines the required cable routes and sites for the entire required grid infrastructure in the EEZ of the Baltic Sea up to the 12-nm-border.

The installation of subsea cable systems for conducting power to the grid connection points onshore is absolutely necessary in order to be able to feed the power generated in the offshore wind farms in the EEZ of the Baltic Sea into the terrestrial transmission grid. The grid infrastructure for the offshore wind farms will remain necessary even if the plan is not implemented. Areas for subsea cable systems and transformer substation platforms will be used regardless of whether or not the grid plan will be implemented. The Spatial Offshore Grid Plan aims at ensuring coordinated and consistent spatial planning of grid infrastructure, especially the grid connections of the offshore wind farms in the EEZ.

Without the implementation of the Spatial Offshore Grid Plan, the existing system of individual grid connections without the coordination and systematic consideration of the overall area of the plan would continue to be carried out. The plan defines planning principles and standardised technical specifications that make it possible to minimise the space requirements. Therefore, as a matter of principle, it should be noted that in the event of the non-implementation of the plan, the potential effects described below on the individual nature

conservation interests should, potentially, be deemed more significant than in case of the implementation of the plan.

The lack of spatial coordination in the event of non-implementation of the plan would probably lead to longer cables and more cable crossings with corresponding effects on the nature conservation interests due to the necessary structures for cable crossings.

4 Description and Assessment of the Likely Significant Effects of the Implementation of the Spatial Offshore Grid Plan on the Marine Environment

The assessment of the likely significant environmental effects of the implementation of the Spatial Offshore Grid Plan comprises secondary, cumulative, synergistic, short, medium and long-term, permanent and temporary, positive and negative effects.

There is no standard definition of the term “significance” since the “significance in question is individually determined in each individual case” and cannot be regarded independently of the “specific characteristics of plans or programmes” (SOMMER, 2005). Generally speaking, significant effects could refer to ones which are serious and decisive in the context under consideration.

The SEA of the Spatial Offshore Grid Plan for the EEZ of the Baltic Sea examines, in contrast to an Environmental Impact Assessment at project level, the likely significant effects on the marine environment at a clearly more abstract level. In accordance with the character of the plan, large-scale environmental effects are investigated and the detailed investigation of small-scale environmental effects left to the subsequent, specific approval level. Therefore, the planned transformer substation platforms, bundling platforms and cable routes are investigated as an “overall system” within the framework of the SEA and their effects are investigated with regard to the entire study area.

At this superior level, taking into consideration the criteria mentioned in Appendix II of the SEA Directive, the environmental effects as they pertain to the total area are considered to be not significant. This conclusion is based on the currently available information and under the condition that mitigation and prevention measures will be applied. This does not mean, however, that the environmental assessment can declare the extent of the environmental effects of an individual facility (transformer substation platform, bundling platform or subsea cable) to be insignificant for a specific, individual case. Such an assessment is subject to the individual licensing procedure and cannot yet be made at this more abstract level of the SEA in the context of which the project-specific parameters are not yet known. However, a positive finding at this level means that, at least on a larger scale, no apparent circumstances could be detected which would prevent a corresponding designation due to obvious incompatibility.

4.1 Effects on the individual nature conservation interests

The examination of likely significant environmental effects of the implementation of the Spatial Offshore Grid Plan is conducted separately for transformer substation platforms, bundling platforms and subsea cable systems. The construction and dismantling, as well as the system and operating-related effects, are considered. The possible effects of repair and maintenance work are also considered here. The potential effects of dismantling depend on the method used. Since these effects cannot yet be realistically estimated at present, it is not possible to provide specific details on the effects. The effects will, however, generally be comparable to the construction-related effects (without noise impact by pile-driving).

Seabed and Water

The upper sea floor of the Baltic Sea is characterised by the ice age and very heterogeneous in composition. The sediments close to the surface in the EEZ of the Arkona Basin consist almost entirely of fine silts with various grades. Clusters of fine and medium sand can be found in the transition to Kriegers Flak and to Adlergrund.

The Kriegers Flak shoal is characterised by a very heterogeneous sediment composition of lag sediments, till, coarse sands and gravel with numerous stones and blocks. The area of the Adlergrund bordering on the south-east of the Arkona Basin also evidences a very heterogeneous sediment composition. The surficial sediments consist primarily of lag sediments and various well sorted gravels and sands. Extensive stone and block fields can be found here, together with till. The sediments change to fine sands, silts and clays in the direction of the Arkona Basin.

The transformer substation platforms or bundling platforms have a very locally limited environmental effect with regard to the nature conservation interest “seabed”. Only in the immediate vicinity the sediment is permanently affected by the foundations and the resulting soil sealing. Sediment resuspension and turbidity plumes associated with the construction of the foundations of the transformer substation platforms/bundling platforms are also of limited duration and spatial scale, according to the current state of knowledge.

Due to operations, long-term resuspension and redistribution of the sediment may occur through the interaction of the foundations and hydrodynamics in the immediate vicinity of the pile. Based on experience gained so far in the North Sea, current-dependent permanent sediment redistribution is only expected locally around the individual piles. Such experiences are currently not available for the Baltic Sea. However, due to the low flow rates close to the seabed, only local scouring is expected here as well. Thus no significant effects on the seabed or the water are expected as a result of the planned transformer substation platforms, according to the current state of knowledge.

In addition, according to the current state of knowledge, there are no significant effects to be expected on the seabed and water due to the installation and operation of subsea cable systems. The potential effects are locally limited. There is a brief disturbance to the sediment structure when subsea cables are installed. The turbidity of the water column increases as a consequence of the sediment resuspension. The extent of the resuspension mainly depends on the installation procedure and the fine grain contents in the seabed. In areas with lower fine grain content, the majority of the disturbed sediment will settle relatively quickly in the immediate vicinity. In areas with soft sediments and correspondingly higher fine grain contents, the seabed currents are relatively low so that only temporary local effects are expected in these areas. Pollutants and nutrients may be briefly released from the sediment into the water body. The possible release of pollutants from the sandy sediments is deemed to be negligible. A significant release of pollutants from the sediment into the water body may occur in the seabed areas containing silts and clays. The pollutants generally adhere to falling particles which, due to the low currents in the Baltic Sea basin, hardly drift over great distances and remain within their local environment. In the medium term, this remobilised material is deposited back in the silty basin.

Operationally, energy losses of the subsea cable systems result in heating of the surrounding sediment. The Spatial Offshore Grid Plan stipulates a planning principle with regard to sediment warming. This planning principle defines that the cable-induced sediment heating should not exceed a limit of 2 kelvin 20 cm under the seabed. If this precautionary value is kept, significant effects on the seabed and water can be avoided according to the current state of knowledge.

Plankton

According to the current state of knowledge, no significant effects on the plankton will result from the uses planned in the grid plan. During the construction of transformer substation

platforms, bundling platforms and installation of subsea cable systems, there may be effects on the phytoplankton and zooplankton as a result of sediment turbidity plumes. However, as these effects are small-scale and short-term, significant effects on the phytoplankton and zooplankton due to the transformer substation platforms, bundling platforms and subsea cable systems can be ruled out with fair certainty. Effects on the plankton during operation can also be ruled out with the necessary certainty.

Benthos

The species inventory of the EEZ of the Baltic Sea, with approx. 200 macrozoobenthos species, is viewed as average. The benthos communities are also typical for the Baltic Sea and do not present any particularities in the main. Based on currently existing studies, the macrozoobenthos of the EEZ of the Baltic Sea is also to be seen as average with regards to the number of red listed species found here.

Investigations into the macrozoobenthos within the framework of the approval procedure for offshore wind farms and subsea cables systems from 2002 to 2012 have confirmed this evaluation. The inventory of species found and the number of red listed species suggest an average importance of the study area for benthos organisms.

The installation of the piles for the transformer substation platforms or bundling platforms results in small scale and short-term disturbances to the seabed, sediment resuspension and turbidity plumes. Due to the resuspension of sediment and the subsequent re-sedimentation, it is possible that the benthos in the immediate vicinity of the platform foundations will be affected or damaged for the duration of construction. These effects are only expected to have a small spatial effect and are very limited in duration. Facility-related, changes in the species composition may arise in the immediate vicinity of the construction as a result of the local surface sealing and insertion of hard substrates. As the colonisation of the artificial hard substrate is linked to an increase in organic material, it is possible that a local decrease in oxygen occurs due to the biodegradation process.

In addition, as a result of the installation of the subsea cable systems, only small-scale disturbances to the benthos due to sediment resuspension and turbidity plumes are to be expected in the area around the cable route. Possible impacts on the benthos are dependent on the installation method used and the geological and hydrographical conditions. Only negligible disturbances to the benthos in the area around the cable route are expected due to the comparatively environmentally-friendly jet burial method. Local sediment dispersal and turbidity plumes are expected for the duration of the subsea cable installation. The cable will be laid by milling where the seafloor consists of more cohesive and rocky soil. This method is also linked to a disturbance of the sediment and the benthos fauna, as well as sediment resuspension. In areas with lower fine grain contents, the majority of the disturbed sediment will settle relatively quickly directly in the immediate vicinity of the cable route. In areas with soft sediments and correspondingly higher fine grain contents, the seabed currents are relatively low so that only temporary local effects are expected in these areas.

Pollutants and nutrients may be briefly released from the sediment into the water body. The possible release of pollutants from the sandy sediments is deemed to be negligible. A significant release of pollutants from the sediment into the water body may occur in the seabed areas containing silts and clays. The pollutants generally adhere to falling particles which, due to the low currents in the Baltic Sea basin, hardly drift over great distances and remain within their local environment. In the medium term, this remobilised material is deposited back in the silty basin.

Benthic habitats will be directly overbuilt in areas where rock fills are required for cable crossings or for cable sections laid on the seafloor. The resulting loss of habitat will be permanent, but small-scale. A hard substrate foreign to the location will result and this can lead to small-scale changes in the species composition. Due to operations, the sediment may heat up right over the cable. This can lead to impairments to benthic communities.

The Spatial Offshore Grid Plan stipulates a planning principle with regard to sediment warming. This demands that the cable-induced sediment heating should not exceed a limit of 2 kelvin in 20 cm under the seabed (so-called 2 K-criterion). If this precautionary value is kept, significant effects on benthic organisms can be avoided according to the estimate of the German Federal Nature Conservation Agency.

According to the current state of knowledge no significant effects on benthic communities are expected as a result of the planned transformer substation platforms, bundling platforms and subsea cables, provided that the 2 K-criterion is kept. Only very small-scale areas outside of protected areas will be used and a rapid re-colonisation is very probable due to the generally rapid regeneration capability of the existing populations of benthos organisms with short generation cycles and their widespread presence in the German Baltic Sea.

Biotope Types

Possible effects of transformer substation platforms, bundling platforms and subsea cables on biotope types can occur as a result of a direct use of protected biotopes, potential habitat changes or their covering under sedimentation from material released by construction. Direct use of Natura2000 sites, which is generally prohibited for transformer substation platforms and bundling platforms, will also be completely avoided by subsea cable routes due to the spatial stipulations of the Spatial Offshore Grid Plan. In accordance with the planning principles of the plan, known areas of protected biotopes according to Section 30 Federal Nature Conservation Act (BNatSchG) shall be avoided to the greatest extent possible or treated with special consideration within the framework of the licensing procedure.

Impairment due to burial is likely to be small in scale due to the prevailing nature of the sediment in areas where the presence of protected biotopes can be expected as the released sediment will quickly settle. Due to the prevailing low seafloor currents in areas with soft sediments, turbidity plumes that significantly exceed natural suspended particulate matter maxima may be expected up to a distance of approx. 500 m. The released material remains for such a period of time in the water column that it is dispersed over a wide area, and a high level of deposited material is therefore not expected due to the comparably low volume. Simulations show that the released sediment is re-deposited after max. 12 hours. The effects are therefore generally small-scale and temporary based on the current level of knowledge.

Permanent habitat changes are limited to the immediate vicinity of the platform foundations and the rock fills that become necessary in the case of cable laying on the seafloor and for cable crossings. The rock fills represent a permanent hard substrate foreign to the location. This offers benthos organisms a new habitat and can lead to a change in the species composition. Significant effects on the nature conservation interest “biotope types” are not expected as a result of these small-scale areas. In addition, the risk of a negative impact on the soft-bottom benthos community caused by species atypical to the region is low since the recruitment of species is very likely to occur from the natural hard substrate habitats. Possible effects on the protected habitat types after the Habitats Directive are considered within the framework of the Habitats Directive impact assessment.

Fish

The habitat-typical fish fauna is present in the German EEZ according to the current state of knowledge. The pelagic fish community is represented by herring, sprats, salmon and sea trout, while the demersal fish community includes larger fish species such as cod, plaice, flounder and dab. This character is of average significance due to the habitat-typical fish communities. Within the framework of various studies, a total of 64 fish species were found in the eastern area of the EEZ, including 4 red listed species. The planned transformer platform locations do not represent a favoured habitat for any of the protected fish species according to the current state of knowledge. Accordingly, the fish stocks in the area of the planned

transformer substation platforms do not have any particular ecologically importance compared with adjacent marine regions.

According to the current state of knowledge, there is nothing to suggest a significant impact on the fish fauna as a result of the planned transformer substation platforms, bundling platforms and subsea cable routes. The effects of the transformer substation platforms, bundling platforms and subsea cable systems on the fish fauna are very limited in scale and time.

During the construction of the transformer substation platforms or bundling platforms and installation of subsea cable systems, the fish fauna may be impaired temporarily and on a limited spatial scale due to sediment resuspension and turbidity plumes. Due to the prevailing low seafloor currents in areas with soft sediments, turbidity plumes that significantly exceed natural suspended particulate matter maxima may be expected up to a distance of approx. 500 m. Simulations show that the released sediment is re-deposited after max. 12 hours. The effects are therefore generally small-scale and temporary based on the current level of knowledge.

All things considered, negligible, small-scale impairments are expected for adult fish. In addition, fish may be temporarily dispelled by noise and vibrations during the construction phase. Noises produced during the construction phase shall be minimised with appropriate measures. For this purpose the Spatial Offshore Grid Plan stipulates a planning principle regarding noise-mitigation (cf. 5.2.2.7 Spatial Offshore Grid Plan). More local effects on the fish fauna may be caused by the hard substrates introduced additionally as a result of a potential change in the benthos.

With regards to the operation-related effects of the subsea cable systems due to sediment heating and magnetic fields, no significant effects on the fish fauna are expected.

Marine Mammals

The areas of the three wind farm clusters, like the entire western Baltic Sea, are a part of the harbour porpoise habitat. According to the current state of knowledge, these areas are used by harbour porpoises for crossing purposes. There are as yet no indications that these areas have any special functions as feeding or breeding grounds for harbour porpoises. Common seals and grey seals only use the three cluster areas sporadically as crossings. Based on the findings from the monitoring of the Natura2000 areas and studies for offshore wind farms, a medium to seasonally high importance of cluster 1 and 2 for harbour porpoises can currently be identified. The seasonally high importance of the area results from the possible use by individuals of the separate and highly endangered population of porpoise in the winter months. These areas have no particular significance for common seals and grey seals.

Risks to marine mammals can arise due to noise emissions during the installation of the transformer substation platform foundations. Without the implementation of noise-mitigation measures, significant impairment to marine mammals during pile driving in individual sub-areas cannot be ruled out. The pile-driving of transformer substation platform foundations will therefore only be permitted in the individual licensing procedure if effective noise-mitigation measures are implemented. In this regard, the Spatial Offshore Grid Plan defines a written commitment with regard to the principle noise-mitigation (cf. 5.2.2.7 Spatial Offshore Grid Plan).

This states that the installation of the platform foundations may only be carried out if strict noise-mitigation measures are implemented. In the individual licensing procedure, extensive noise-mitigation and monitoring measures are ordered for the purpose of compliance with applicable noise prevention values (sound exposure level (SEL) of 160 dB re 1µPa²s and peak level of 190 dB re 1µPa at 750 m distance around the pile-driving site). Suitable deterrence measures must be taken to ensure that no marine mammals are residing in the immediate vicinity of the pile-driving area. Significant effects on marine mammals during the

operational phase of the transformer substation platforms can be ruled out according to the current state of knowledge.

The exclusion of construction of transformer substation platforms in Natura2000 areas will contribute to a reduction of the risks to harbour porpoises in important feeding and breeding grounds.

Significant adverse effects on marine mammals as a result of the construction and operation of the planned transformer substation platforms are not currently estimated considering the successful implementation of noise-mitigation measures by meeting the noise prevention values. These measures have to be ordered in the individual licensing procedure. No significant effects on marine mammals are expected as a result of the installation and operation of subsea cable systems either.

Seabirds and Migratory Birds

The individual wind farm clusters are of differing importance for seabirds. A medium importance for seabirds must be assumed in general for cluster 1. This partial area touches at its southern and south-eastern borders the extensive resting habitats of the Pomeranian Bight and the Adlergrund. Overall, cluster 1 shows a medium seabird occurrence and a medium occurrence of endangered and protected species. According to the current state of knowledge, clusters 2 and 3 have a lower importance as feeding and resting habitats for seabirds. Both clusters show a low occurrence of endangered and protected species. They do not belong to the main resting, feeding and over-wintering habitats for species in Appendix I to the Birds Directive.

Due to the water depth and the seabed composition, all three clusters are of low importance as feeding grounds for diving sea ducks. Like divers, these only use the partial areas as crossings. For breeding birds, the cluster areas do not have any special importance as a feeding ground due to the distance from the coast with breeding colonies.

Primarily, seabird disturbances during the construction phase will be due to noise and light emissions and visual disturbances. These can cause differing, species-specific scare and barrier effects. Direct disturbances during the construction phase are expected to be limited in scale and time. Due to the high mobility of the birds, significant effects can be ruled out with high certainty. The transformer substation platforms and bundling platforms will have a permanent disturbance and scare effect on certain bird species. Generally, an avoidance distance of approx. 2 km is assumed. No additional loss of habitat for seabirds or migratory birds will occur from the transformer substation platforms and bundling platforms and its operation as a result of the immediate proximity of the platforms to the offshore wind farms. Due to the exclusion of transformer substation platforms and bundling platforms in the Natura2000 areas, habitat losses in important habitats will be reduced.

In addition, the EEZ has an average to above average importance for bird migration. Every year, up to one billion birds migrate across the Baltic Sea. The Baltic Sea is an important crossing for sea ducks and geese from Northern Europe and Russia (up to Western Siberia), whereby the majority of the migrations occur in autumn close to the coast from East to West. The Western Baltic Sea is crossed by several species that require special protection (e.g. barnacle geese, whooper swans, eider ducks, black scoters and white-winged scoters), in varying to high levels.

Birds that use thermals and other species migrating in the daytime preferably migrate along the “bird flight line” (“Vogelfluglinie”; along the islands of Fehmarn, Falster, Møn and Seeland, Falsterbo). These birds migrate in substantially less densities to the east of this main route. The Western Baltic Sea has an above average significance for crane migration.

Potential effects of the planned transformer substation platforms and bundling platforms in the operations phase could result from barrier effects or collision risks for the migrating birds. Under clear weather conditions, which are preferred by the birds for their migrations, the

probability of a collision with a platform is very low. Poor weather conditions increase this risk.

As the transformer substation platforms and bundling platforms are individual structures which are also located in the immediate operating area of offshore wind farms, a significant impairment to bird migration is not expected. It is assumed that any negative impact can be avoided by use of suitably compatible lighting during the operation of the transformer substation platforms. Regarding potentially cumulative effects caused by transformer substation platforms in interaction with the offshore wind farms, please see below.

According to the current state of knowledge, no significant effects are to be expected on migratory birds or seabirds during the time-limited construction phase as a result of either the construction of the planned transformer substation platforms or the installation of the planned subsea cable systems. Scaring effects occurring during construction will be local in scope and will not extend beyond the disturbances generally associated with slow ship movements.

According to the Spatial Offshore Grid Plan (planning principle no. 5.4.2.7 Spatial Offshore Grid Plan) a sufficient sediment cover of the cable systems has to be permanently guaranteed. Therefore facility- and operation-related effects of the subsea cable systems on the avifauna can be ruled out.

Bats

The migratory movements of bats across the Baltic Sea have been documented to various extents, but definitive information about migratory species, migration corridors, altitudes and concentrations is not available so far. The information available up to now merely confirms that bats, in particular long-distance migrating species, fly over the Baltic Sea. Based on observations so far, it is assumed that bats primarily migrate in swarms across the sea, probably at significant altitudes and along regularly used migration routes.

Risks to bats can arise in particular during the operation phases of the transformer substation platforms and bundling platforms. The sensitivity of bats to onshore structures and the related risk of collision are known, as well as the risk of collision with wind turbines. In addition, possible barrier effects onshore, and habituation and attractant effects are known. In addition, potential barrier effects as well as habituation or attracting effects are known on land.

However, effects of tall structures in the offshore region are mainly unknown.

A cumulative assessment of the possible risk potential is currently impossible for lack of reliable data.

Biological Diversity

Biological diversity comprises the diversity of habitats and communities, the diversity of species and genetic diversity within species (Art. 2 Convention on Biological Diversity, 1992). The public's focus is on the diversity of species.

With regard to the current status of biological diversity in the Baltic Sea, it should be noted that there are countless indications of changes in the biodiversity and the species structure at all systematic and trophic levels of the Baltic Sea. These are mainly attributable to climate changes or human activities such as fishing and marine pollution, resp. climate change. Red lists of endangered species have an important control and warning function in this context since they show the status of the inventories of species and biotopes in a given region. Potential effects on the biodiversity are considered in the SEA report under the individual nature conservation interests. In summary, it should be noted that, according to the current state of knowledge, there are no significant effects to be expected on biological diversity by the planned transformer substation platforms, bundling platforms and cable routes.

Air

No measurable effects on air quality arise as a result of the construction and operation of the transformer substation platforms as well as bundling platforms and installation of subsea cable systems within the framework of the implementation of the Spatial Offshore Grid Plan.

Climate

Adverse effects on the climate caused by the planned transformer substation platforms and bundling platforms are not expected since climate-relevant emissions are not measurable either during construction or operation. Rather, planning security for the expansion of offshore wind energy is enhanced thanks to the coordinated development of the grid infrastructure in the offshore area. The CO_2 savings associated with the expansion of offshore wind energy is expected to have a positive impact on climate protection over the long-term. This can make a significant contribution to the achievement of the Federal Government's climate protection objectives.

Natural Scenery

The landscape of the EEZ of the Baltic Sea has been largely unspoiled up to now. The realisation of offshore wind farms will lead to effects on the natural scenery since it will be changed due to the construction of vertical structures.

The construction of transformer substation platforms and bundling platforms can also lead to visual changes in the natural scenery. However, due to the distance of the planned sites from the coast (more than 25 km), significant impacts on the natural scenery as seen from the coastline can be ruled out. At such a distance, it will barely be possible to make out the transformer substation platforms and bundling platforms even if visibility conditions are good. This also applies to navigation lights at night.

Another factor to take into account is the fact that the transformer substation platforms and bundling platforms are always planned in spatial connection with the offshore wind farms. Therefore the change in the natural scenery resulting from individual structures in the immediate geographical vicinity of the wind farms will only be negligibly increased. Adverse effects on the natural scenery can be ruled out for the subsea cable systems as the cables are laid in the seabed.

Tangible Assets, Cultural Heritage

Due to existing hydro-acoustic studies as well as according to the evaluation of the underwater obstruction database, there is no information on tangible assets or cultural heritage in the area of the planned transformer substation platforms and bundling platforms. Individual underwater obstructions are present in two areas along the planned subsea cable routes. These must be treated with special consideration in the individual licensing procedure.

Should culturally significant findings or tangible assets be detected during the required geotechnical survey within the licensing procedure for the construction of transformer substation platforms as well as bundling platforms and installation of subsea cables, then appropriate measures must be taken to preserve them. With this requirement in mind, there are no significant effects on the nature conservation interest “tangible assets, cultural heritage” to be expected as a consequence of the implementation of the Spatial Offshore Grid Plan.

Human Population including Human Health

In general, the area to which the Spatial Offshore Grid Plan definitions apply has limited importance for human health and well-being. Humans are not directly affected by the stipulations of the plan instead they may be indirectly affected through their perception of the natural scenery (cf. nature conservation interest “natural scenery”) and possible influences

on the leisure function of the landscape for water sports people and tourists. Due to the considerable distance to the coast of about 25 km, those effects can be estimated as insignificant.

4.2 Interactions

Generally, effects on a conservation interest result in various consequential effects and interactions among the conservation interests. The interactions of the biotic natural conservation interests are based on the food chains. Possible interactions arise during the construction phase from sediment movements and turbidity plumes along with noise emissions. These interactions are, however, limited in duration restricted to just a few days or weeks.

Facility-dependent interactions, for example due to the insertion of hard substrate, are expected to endure, but only locally. A transformer or bundling platform as a stand-alone space-limited structure only results in very small-scale habitat changes. The same applies to required structures that may become necessary for crossing cable structures or for subsea cable systems laid on the seafloor.

Due to the variability of the habitat, interactions cannot be described very precisely. Generally speaking, it can be noted that there are no interactions which could endanger the marine environment.

4.3 Cumulative Effects

The SEA report also covers the assessment of cumulative effects pursuant to Art.5 (1) of the SEA Directive. Cumulative effects arise as a result of the interactions of various independent individual effects which are added together due to their co-action (cumulative effects) or which mutually reinforce each other, thereby having an effect which is greater than the sum of their individual effects (synergistic effects). Currently, there are still no Europe-wide evaluation criteria or investigation methods defined for considering cumulative effects in principle in terms of time and space.

In order to assess the cumulative effects, it is necessary to evaluate to what extent a significant negative effect can be attributed to the transformer substation platforms, bundling platforms and subsea cable systems contemplated in their interaction with the wind farm clusters outlined in the plan. The wind farm projects are being examined at the level of this sectoral plan based on the state of knowledge up to know in terms of Art.5 (2) of the SEA Directive.

In clusters 1 and 3, there are primarily approved wind farm projects within the priority areas for wind energy. Therefore, statements about cumulative effects are possible for these areas, based on information available so far in the environmental impact studies (EIS). Existing knowledge gaps concern the areas outside the priority areas, particularly cluster 2, in which there are currently no definitive approvals or planning approval decisions following the implementation of an environmental impact assessment.

These gaps can only be partially filled with results from research projects, from the monitoring of protected areas and project-specific environmental impact assessments.

So far no serious or lasting licensing restrictions have been determined, however, the projects are located in an area of the Arkona Basin in which the information available so far regarding the geomorphological conditions and sediment distribution indicates that restrictions may arise with regards to construction of wind turbines and grid infrastructure systems.

As the project-specific requirements and detailed information about environment and geological site conditions only normally become known at the level of the individual licensing procedure, any additional environmental effects caused by the wind farm projects can only

be checked in detail at the individual project level. Additionally, the Federal Agency for Nature Conservation in its statement within the scoping process refers to the location of cluster 2 in an area of particular importance for bird migration.

Seabed, Benthos and Biotope Types

A significant proportion of the environment effects caused by the transformer substation platforms, bundling platforms and subsea cable systems on the seabed and benthos will take place exclusively during the construction time (turbidity plumes, sediment movement, etc.) and within a small and local area. Construction-related cumulative effects are less probably because of the incremental implementation of the individual projects.

Possible cumulative effects on the seabed that can directly affect the nature conservation interests “benthos” and specially protected biotope types arise from the permanent surface sealing by the foundations of the transformer substation platforms and installed subsea cable systems in interaction with the surface sealing caused by the foundations of wind turbines. The individual effects are small and local in scale. In order to estimate direct use of space, an approximate calculation is carried out for the planned platforms and subsea cable systems and the included wind farms.

On the basis of a model assumption, direct use of space of around 90 ha has been determined for the subsea cables, structures for cable crossings and local cable laying on the seafloor, transformer substation platform foundations and the foundations of the wind turbines and measuring masts stipulated in the Spatial Offshore Grid Plan. In total, this represents a total use of significantly less than 0.2‰ of the overall EEZ area. In comparison, 55% of the Baltic Sea EEZ is under protection. Areas within the Natura2000 areas are not used within the EEZ. No statements can currently be made regarding the use of specially protected biotope types pursuant to Section 30 Federal Nature Conservation Act due to the lack of a reliable scientific basis. Comprehensive sediment and biotope mapping currently underway will provide more reliable information for the planned updates in the future.

In addition to the direct use of the seabed and thus the habitat of the organisms living there, the foundations and structures for cable crossings will result in an additional supply of hard substrate. The hard substrate introduced leads to a loss of habitat for the macrozoobenthos fauna adapted to soft-bottoms. This could give rise to cumulative effects due to the construction of several offshore structures. However, as with regard to the grid infrastructure and the wind farms the use of space will be in the ‰ range, there are no significant cumulative negative effects on the seabed and the benthos to be expected according to the current state of knowledge.

Marine Mammals

Cumulative effects on marine mammals, in particular harbour porpoises, could occur primarily due to noise pollution during the installation of foundations. Therefore, marine mammals could be significantly impaired due to the fact that there is not enough space available for these animals to avoid and withdraw if pile-driving is carried out at various locations within the EEZ at the same time. Since, to date, normally only one offshore construction site has been active at the same time, there is no experience regarding the time and space overlapping in the propagation of pile-driving noise. There is also no scientific basis for evaluating the potential cumulative effects on marine mammals. For this reason, the approval authority reserves the right, in respect of the individual project pile-driving operations, to coordinate in terms of time and space in order to minimise the overall noise periods.

It is also obvious, from the descriptions of the Offshore Network Development Plan 2025 and the second draft of the Offshore Network Development Plan 2030 that grid infrastructure systems and individual offshore wind farms will be built gradually over the next years, not simultaneously.

Seabirds

Vertical structures, such as transformer substation platforms, bundling platforms and wind turbines, can have different effects on seabirds, such as loss of habitat, increased collision risk or scare and barrier effects. The habitat loss due to the realisation of multiple constructions can be of importance to resting birds in particular.

In particular, endangered and sensitive seabird species, for example divers, must be given consideration with regard to cumulative effects. The assessment of the cumulative effects on divers has to consider additive to the effects of offshore wind farms also the effects of shipping (for operation and maintenance of the cables and platforms).

As all findings to date suggest a low importance for the wind farm cluster regarding species in Appendix I to the Birds Directive, no visible obstacles appear to stand in the way of implementing the plan according to the current state of knowledge. All of the transformer substation platforms and bundling platforms are planned in the direct vicinity of offshore wind farms, meaning that there is also no cumulative loss of habitat to be expected in addition for species sensitive to disturbances. Due to the distance of the cluster from the SPA “Pomeranian Bight”, any disturbance to overwintering birds in the protected area can be excluded. This also refers to potential disturbance effects by shipping associated with the operation and maintenance of cables and platforms. Since the Baltic Sea is highly frequented by shipping, no additional impact on sensitive species is expected from the increased shipping traffic during construction or during repair and maintenance operations. The exclusion of construction of transformer substation platforms and bundling platforms in Natura2000 areas will contribute to prevent significant disturbances in protected areas.

Migratory Birds

There is a potential risk for migratory birds on one hand due to the collision risk with the transformer substation platform/bundling platform and the individual wind turbines and on the other due to the negative effects brought about by forced changes to their flight path.

Under normal migration conditions preferred by the migratory bird species, no indications have been found that the birds typically migrate through the danger zone of the facilities and/or do not detect and avoid these barriers. Under clear weather conditions which are preferred by the birds for their migrations, the probability of a collision with transformer substation platforms/bundling platforms or wind energy facilities is therefore very low. Sudden fog and rains resulting in poor visibility and low flight altitudes represent a potentially dangerous situation. Particularly problematic is the coincidence of poor weather conditions with so-called mass migration events. The risk of collision for birds migrating during the day and seabirds is considered to be low. These birds orientate themselves visually and are usually able to land on water. The risk of a bird strike would therefore be more likely to occur with nocturnally migrating, numerous songbird populations.

In order to avoid and/or minimise the collision risk, the facilities should be constructed such that light emissions are avoided during construction and operation to the greatest extent possible provided that they are not necessary and unavoidable pursuant to safety regulations for ship and air traffic and occupational safety requirements.

Cumulative effects of the transformer substation platforms and bundling platforms in interaction with adjacent offshore wind farms could, in addition to the bird strike risk, also lead to a lengthening of the migration path for the migrating birds. The migration path could be diverted and thus lengthened due to a potential barrier effect. It is known that wind farms are avoided by birds, meaning that they fly around or over them. The transformer substation platforms and bundling platforms are a part of the individual wind farms. Flying around the platforms on an indirect route is, in this context, be negligible since, due to their immediate geographical proximity to a wind farm, they do not generate their own barrier effect, nor do they amplify that of the wind farm. Even though the number of birds concerned is higher due to the accumulation with other facilities along the migration route, the extra energy

expenditure for the individuals remains the same and therefore low. The effects will be slightly more significant for individuals which have to avoid multiple structures. The increase in energy used is also minimal here compared with the total route. Taking into account that the non-stop flight distances covered by most migratory bird species are in the range of over 1,000 km (BERTHOLD, 2000) significant effects on the energy budget of migratory birds is not expected.

A maximum diversion of approx. 60 km would be necessary for birds migrating from East to West and bypassing all three clusters. The possible barrier effect is in the same order of magnitude when looking at the North-South migration route. The distances between the individual clusters are wide enough, so there is sufficient space for flying around them. Taking into account the wind farm “Arcadis Ost 1” and “Gennaker”, planned in the territorial sea, a maximum barrier effect spanning 40 km results for the North-South migration route.

Based on the available knowledge about the migratory behaviour of the various bird species, the usual flight altitudes and the migration distribution over the time of day, it can be concluded that significant effects on bird migration are unlikely from a cumulative perspective of the already approved projects in the priority areas, according to the current state of knowledge. Flying around the priority areas on an indirect route should not give any reason to expect any significant negative effect on the further development of the populations.

In this regard, it should be noted that this forecast is made according to the current state of science and technology under premises which are not yet suited to guaranteeing the basis for migratory birds in a satisfactory manner. There are knowledge gaps with regard to species-specific migration behaviour in particular. It has not been possible to fill these gaps, despite extensive research.

Due to the abovementioned knowledge gaps, a conclusive cumulative consideration of all offshore wind farms to be taken into account, including projects in areas for which there are not yet any definitive approvals or planning approval decisions following an environmental impact assessment, as well as of additional offshore wind farms outside the German EEZ, is not yet possible. The environmental impact assessments available for the projects in cluster 2 do not indicate any significant importance of these areas for bird migration. However, in addition to other things, increased crane migration was observed within the framework of the basic investigations for the projects in cluster 2. The experts determined that this was due to the birds drifting because of unfavourably changing winds during the Baltic Sea crossing.

Based on these observations, significant cumulative effects cannot be excluded at this point, particularly due to the fact that a concentration of bird migration is assumed in the sea area between Ruegen and Schonen (cf. Federal Nature Conservation Agency, 2006).

4.4 Transboundary Effects

The SEA report comes to the conclusion that no significant impacts on the areas of the neighbouring states bordering on the German EEZ of the Baltic Sea can be noted based on the stipulations made in the Spatial Offshore Grid Plan, according to the current state of knowledge. In addition to the subsea cable routes and transformer substation platform sites, the plan also stipulates clusters for offshore wind farms which are, however, not its primary subject matter. The individual wind farms in the clusters are included within the framework of the cumulative assessment. A comprehensive assessment of the possible significant environmental impacts of these wind farms will be implemented within the framework of the individual licensing procedures, where environmental impact assessments will be regularly implemented, taking into account the stipulations for transboundary assessment.

Significant transboundary impacts can be generally excluded for the following nature conservation interests: seabed, water, plankton, benthos, biotope types, natural scenery, tangible assets and human population, including human health. Possible significant transboundary impacts could at the most arise for the highly mobile fish, marine mammals,

seabirds, migratory birds and bats species with regards to the cumulative assessment, taking into account all planned wind farm projects in the German Baltic Sea.

The SEA concludes that, according to the current state of knowledge, the implementation of the Spatial Offshore Grid Plan will not have any significant transboundary impact on the fish fauna. This is because the area in which the plan stipulations apply does not have any significant function for fish and also because the recognisable and predictable effects are temporary and small scale. The same applies to marine mammals, seabirds and passage migrants. They primarily use the cluster areas as crossing areas. A significant loss of habitat for strictly protected seabird species is not expected.

Significant transboundary impacts can therefore be excluded, according to the current state of knowledge, and taking into account prevention and mitigation measures. For example, in the individual licensing procedure the installation of the platform foundations is permitted solely under strict application of effective noise mitigation measures (cf. section 5.2.2.7 Spatial Offshore Grid Plan).

Due to the fact of particular risk to the separate Baltic Sea population of harbour porpoises, intensive monitoring measures must be implemented during the implementation. Where necessary, noise mitigation measures must be adapted or pile-driving operations coordinated to exclude any cumulative effects.

The planned transformer substation platforms and bundling platforms could represent a barrier or collision risk for migratory birds. As the platforms are individual structures located in the immediate operating area of offshore wind farms, a significant impact on bird migration due to the plan stipulations alone is not expected. Significant impacts regarding the cumulative consideration of bird migration in interaction with the offshore wind farms cannot be excluded with the necessary certainty at present.

A cumulative assessment of the level of risk for bat migration is currently not possible as sufficient knowledge is still not available. As the transformer substation platforms and bundling platforms are individual structures, significant impairment to bat migration is not expected solely due to the proposed maximum ten platforms, according to the current state of knowledge. As the locations are more than 25 km from the coast, it is assumed that the major concentrations of the bat migrating along the coast will not be endangered.

4.5 Summary of the Assessment

In summary, with regard to the planned transformer substation platforms, bundling platforms and subsea cable routes, the coordinated overall planning of the offshore grid infrastructure should minimise impacts on the marine environment. Significant effects caused by the planned transformer substation platforms and bundling platforms can be avoided through strict compliance with prevention and mitigation measures, in particular through sound protection measures during the construction phase.

The installation of subsea cables can, amongst other things, be performed in a way which is as environmentally friendly as possible such that protected areas and biotope structures are circumvented to the greatest extent possible. A planning principle with regard to sediment warming is intended to ensure, that any significant adverse effects of sediment warming on benthic communities can be avoided. The avoidance of cable crossings to the greatest extent possible will also serve to prevent adverse impacts on the marine environment, particularly on the seabed, benthos and biotope types.

Based on these descriptions and assessments, and also with regards to any interactions, it can be noted for the SEA that no significant impacts on the marine environment are expected from the planned transformer substation platforms, bundling platforms and subsea cable systems, according to the current state of knowledge and at the abstract level of sectoral planning. The potential effects are small-scale and largely short-term as they are limited to the construction phase.

Large parts of the cluster 1 and 3 areas are located within the priority areas for wind energy of the Maritime Spatial Plan for the German EEZ of the Baltic Sea. For those areas adequate knowledge is available. For individual areas, particularly those outside the priority areas that have a high thickness of mud, sufficient information for technical implementation (cable installation procedure, platform construction procedure) is lacking as proven state of the art is currently not available here. The evaluation of the effects depends primarily, however, on the procedures applied.

In addition, there is currently still a lack of sufficient scientific knowledge for the cumulative consideration of effects on individual nature conservation interests such as bird and bat migration. Therefore these effects cannot be conclusively evaluated within the framework of the existing SEA and are fraught with uncertainties. A more in-depth investigation must be carried out within the framework of the individual licensing procedure.

5 Species Conservation Assessment

In addition, the SEA report contains a statutory species conservation assessment pursuant to Section 44 Federal Nature Conservation Act in conjunction with Art.12 of the Habitats Directive. At the more abstract level of the SEA, this assessment concludes that, according to the current state of knowledge, in strict compliance with prevention and mitigation measures, no significant negative effects via which prohibitions under species conservation law will be met are associated with the transformer substation platforms, bundling platforms and subsea cable routes planned in the Spatial Offshore Grid Plan. The potential effects are small-scale and largely short-term as they are limited to the construction phase. This also applies to the transboundary impact assessment. A detailed statutory species conservation assessment is incumbent upon the individual licensing procedure.

6 Habitats Directive Impact Assessment

Pursuant to Sections 34 and 36 Federal Nature Conservation Act, in conjunction with Art. 6 (3) of the Habitats Directive, the SEA shall also contain a Habitats Directive impact assessment, i.e. an assessment of the compatibility of the plan contents with the protection and conservation objectives of Natura2000 areas (Habitats Directive sites and special protected areas according to EU Birds Directive).

Therefore, it must initially be determined as part of a preliminary study whether a Natura2000 area can, in principle, be significantly impaired. The nature conservation area “Pomeranian Bight” (EU special protected area, SPA) and the five Habitats Directive sites “Fehmarnbelt”, “Kadetrinne”, “Adlergrund”, “Westliche Roennebank” and “Odra Bank” are located in the German EEZ pursuant to the ordinance of 15 September 2005.

Potential long-distance effects on the protected areas in the adjacent territorial sea and in the adjacent waters of neighbouring countries are also taken into account as part of the impact assessment.

Nature conservation interests include the habitat types “reefs” and “sand banks” pursuant to Appendix I of the Habitats Directive, certain fish species and marine mammals pursuant to Appendix II of the Directive and various bird species pursuant to the EU Birds Directive (Appendix I Art. 4 (2)). Species defined according to Appendix IV of the Habitats Directive (e.g. harbour porpoises) must be strictly protected everywhere, therefore also outside the defined protected areas.

6.1 Habitats Directive Impact Assessment of the Planned Transformer Substation Platforms respectively Bundling Platforms

The Spatial Offshore Grid Plan stipulates a total of 9 sites or search areas for transformer substation platforms and one additional, optionally proposed, bundling platform. None of the

facilities is planned in a Natura2000 area. 8 of the planned 10 sites are located near Habitats Directive sites and must therefore be assessed with regard to their Habitats Directive compatibility. The planned transformer sites in cluster 3 are located more than 30 km away from a protected area. For these locations, the preliminary study concludes that significant effects from the planned transformer substation platforms on Natura2000 areas can be ruled out, according to the current state of knowledge, due to the distance. Due to the large distance of all planned transformer sites from Natura2000 areas in the territorial sea, significant impairments to such areas in the territorial sea can be ruled out with certainty.

The Habitats Directive impact assessment concludes that, according to the current state of knowledge, the construction and operation of the transformer substation platforms respectively bundling platforms defined in the Spatial Offshore Grid Plan, in strict compliance with prevention and mitigation measures, will not have any significant effects on the neighbouring Habitats Directive areas or the bird conservation area “Pomeranian Bight”. In order to prevent significant impacts the plan sets written stipulations, in particular with regard to noise protection.

6.2 Habitats Directive Impact Assessment of the Planned Cable Routes

Potential effects of subsea cables are normally limited to the installation phase and thus very limited in terms of space and time. Effects on Natura2000 sites are only expected in case that the cables are routed in the immediate vicinity of those special protected areas; long-distance effects are not anticipated according to the current state of knowledge. Therefore, following an extensive preliminary study for the Habitats Directive impact assessment, only cable corridors which are routed in the immediate vicinity, i.e. along the edge of Natura2000 sites, will be considered.

In particular due to the small scale and short duration of the cable installation, significant impacts on marine mammals can be ruled out. With regard to potential operational effects, there are also no significant effects to be expected based on the cable configurations and the planning principles regarding sediment cover and sediment warming stipulated in the Spatial Offshore Grid Plan. Potential significant impairment to the conservation objectives of special protected areas resulting from the installation and operation of subsea cable systems can also be excluded. The cable installation works only last a few days and are only associated with typical ship noise and scaring effects.

Significant impacts on the protected areas due to sediment drifting during the construction phase can be excluded according to the current state of knowledge. The closest Habitats Directive area “Westliche Roennebank” is located at a distance of min. 900 m from a cable route and therefore outside the drift distance discussed in the scientific literature. Therefore, no release of nutrient or pollutant concentrations that might impact Habitats Directive areas is expected.

6.3 Result of the Habitats Directive Impact Assessment

At the more abstract level of this SEA and according to the current state of knowledge, the Habitats Directive impact assessment comes to the conclusion that the implementation of the Spatial Offshore Grid Plan, in strict compliance with prevention and mitigation measures, will not have significant effects on Natura2000 sites. This refers to protected areas in the German EEZ as well as Natura2000 sites in neighbouring countries or in the territorial sea. The above mentioned prevention and mitigation measures are stipulated within the framework of the individual licensing procedure. For this purpose the Spatial Offshore Grid Plan stipulates general planning principles.

In summary, the plan’s stipulations ensure that any possible negative environmental effects due to subsea cable systems and transformer substation platforms respectively bundling

platforms in the area of the Natura2000 network will be kept as low as possible. A detailed Habitats Directive impact assessment is subject to the individual licensing procedure.

With regards to the function of the protected area network, no indications can be found at the current level of knowledge that the coherence of Natura2000 areas could be significantly affected by the grid plan stipulations. All clusters are located to the north-west of the SPA “Pomeranian Bight”, the Habitats Directive areas “Adlergrund”, “Westliche Roennebank” and “Pomeranian Bight with Odra Bank”, and the protected areas in the territorial sea, so that no barrier effect results that could affect the exchange or networking between the protected areas.

In addition to the effects within the EEZ, the present Habitats Directive impact assessment explicitly only investigates possible long-distance effects of the stipulations in the EEZ on protected areas in the neighbouring territorial sea or waters of neighbouring countries. The transformer substation platforms, bundling platforms and subsea cable corridors are usually sufficiently far away from the protected areas in the territorial sea. That is why significant effects on these protected areas are not to be expected. This assessment does not take into account, however, the direct effects of the inevitable cable routes in the territorial sea resulting from the gates provided for the Spatial Offshore Grid Plan. This is subject to the SEA that has been carried out by the Federal Network Agency for the Offshore Network Development Plan or subordinate planning levels.

7 Measures to Prevent, Reduce and as fully as possible Offset any Significant Adverse Effects of Implementing the Spatial Offshore Grid Plan on the Marine Environment

In accordance with the requirements of the SEA Directive, the planned measures designed to prevent, reduce and, as fully as possible, offset significant adverse effects resulting from the implementation of the Spatial Offshore Grid Plan will be presented.

Basically, any negative effects resulting from the stipulations in the Spatial Offshore Grid Plan on the development of the environmental status of the EEZ of the Baltic Sea should be avoided. If the plan is not implemented, the investigated uses would develop without the space and resource-saving management and coordination effect of the Spatial Offshore Grid Plan.

Concretely speaking, the plan sets spatial and written stipulations which, in accordance with the environmental protection objectives defined in Chapter 1.4 of the SEA report, serve to prevent or reduce the significant negative effects of the implementation of the plan on the marine environment. This mainly refers to written stipulations regarding space-saving planning, avoiding use of protected areas and habitat structures pursuant to Section 30 Federal Nature Conservation Act, noise mitigation, compliance with the 2 K-criterion, the obligation to dismantling and following the best environmental practice and the state of the art.

Mitigation and prevention measures will be concretely defined and ordered by the competent approval authority at the project level for the planning, construction and operation phase. With regard to the planned transformer substation platforms respectively bundling platforms, this concerns in particular noise mitigation and prevention measures as well as environmentally-friendly lighting during the operation of the platforms. Measures to prevent and reduce any potential negative effects of subsea cable systems must be considered within the framework of the cable routing and technical design. To prevent significant adverse impacts on benthic communities by cable heating the revised Spatial Offshore Grid Plan specifies a planning principle regarding sediment warming.

8 Examination of Possible Alternatives and Description of the Implementation of the Environmental Assessment

8.1 Examination of Possible Alternatives

Pursuant to Article 5 (1) Clause 1 of the SEA Directive, the environmental report includes a brief presentation of the reasons for the selection of examined reasonable alternatives. In addition, Section 17a EnWG stipulates that seriously considered alternatives for cable routes, corridors for cable routes and sites must be examined. Various types of alternatives can be considered for examination of alternatives, particularly strategic, spatial or technical alternatives. The main requirement is that they are reasonable and serious enough for consideration. At the same time, the effort for the determination and evaluation of alternatives to be considered must be reasonable.

It must be noted in general that all stipulations in the form of planning principles and standardised technical specifications emerge from a “preliminary study” of possible and conceivable alternatives.

There are already a number of different uses and legally protected interests in the EEZ. As can be gathered from the justification of the individual planning principles, particularly those concerning the environment, the respective principle is already based on a consideration of the potential public interests and legal positions involved, meaning that a “preliminary examination” of potential alternatives was carried out as a result.

A strategic alternative, e.g. with regards to the Federal Government’s objectives the Spatial Offshore Grid Plan is based on, is not currently being considered for the plan as the expansion targets of the Federal Government also represent the planning horizon for the plan. These objectives are also an essential basis of the demand planning for the land-based grid expansion.

The zero option is not a reasonable alternative as the lacking coordination would probably lead to greater use of space, more cable crossings and therefore additional negative environmental effects (cf. Chap. 3).

With regard to the examination of spatial alternatives, the grid plan sets both spatial and written stipulations in the form of planning principles and standardised technical specifications for subsea cable systems and transformer/bundling platforms in the EEZ. These specifications serve largely to stipulate these uses in an environmentally sound way and to balance the concerns and legal positions in a manner that meets all interests. The spatial stipulations of the grid plan fit in with the existing uses and the area designations defined within the framework of the Maritime Spatial Plan for the Baltic Sea EEZ. Tight limitations are therefore set on the planning of routes right from the start.

The cable routes are planned on the shortest possible path (also to minimise the environmental effects) insofar as there are no overwhelming opposing concerns. There are no basic alternatives to these cable routes in the Baltic Sea EEZ.

One option of evaluating spatial alternatives is offered by the definition of search areas for transformer or bundling platforms that have not been approved yet.

Within the framework of the consultation procedure, it was demanded that a direct current (DC)-connection-concept should be examined in the SEA as a technical alternative. The advantage of such a connection-concept lies primarily in that a DC cable system, with approx. 900 MW transmission capacity, can transmit several times more power than an AC cable system (250 MW). This would lead to a significantly reduced quantity of cable systems compared to the AC-technology proposed by the TSO and significantly reduce the area used by the subsea cable systems. On the other hand, however, it is fact that by using the DC-technology a converter platform must be built at sea and an additional one onshore to convert the alternating current generated by the wind farms to direct current.

For the grid connection of the wind farm “EnBW Baltic 2” which is already under construction an AC-connection-concept is fixed. Also for both the offshore wind farm “Arkona Becken Suedost” and the wind farm “Wikinger” located in the priority area that are already approved and under realisation over the short term due to the advanced status of the proceedings an AC-connection-concept is stipulated. Within the framework of the approval of the "Seekabelsysteme 1 bis 6 / Querverbindung" four AC subsea cable systems for the connection of the projects "Wikinger" and "Arkona Becken Südost" as well as a cross connection between these projects were approved. Furthermore two AC subsea cable systems were approved to the bundling point in the southern region of the cluster 2. In this respect, the question arises of a technical alternative for the areas outside the priority areas, in particular for cluster 2.

A converter platform alone for the project located outside the priority area in cluster 1 does not appear to be economically or from an ecological point of view because of the comparatively low generation potential. A connection to a possible converter in cluster 2 would be conceivable. For this purpose, the already stipulated routes for cross-cluster subsea cables systems could be used, which currently lead to the search area for bundling platforms and cable systems. In Cluster 3, the use of a DC concept would eliminate the need for reactive power compensation when using AC. However, the capacity remaining in cluster 3 outside the priority area is rather small.

In the case of cluster 2, due to the potential generation capacity of the offshore wind farms, the environmental impacts of a possible additional converter platform (at sea) must be compared with those of four additional subsea cable systems and checked with regards to their potential effects during construction and operation. A final assessment is not possible at present, as the potential environmental impacts depend primarily on the methods and the foundation construction used, and also because proven state of the art is currently not available for the areas with high levels of mud, according to the current state of knowledge. A detailed investigation will only be possible after detailed, project-specific framework conditions are available. Even then, a final assessment is generally estimated to be difficult due to the very different environmental impacts of subsea cables and foundation constructions.

Basically it must be noted that from an ecological perspective a DC-connection-concept may represent a suitable alternative over the long term for cluster 2 as well as for cluster 1 and 4 (cluster 4 of the Offshore Network Development Plan), connected via cross-cluster subsea cable systems. In the current draft of the Offshore Network Development Plan 2030, the transmission network operator proposes a DC connection as an alternative to four AC subsea cable system for the remaining capacities from clusters 1, 2 and 4 (in the territorial sea), and this is mainly due to bottlenecks in the territorial sea. A final assessment is not possible at this time due to the numerous uncertainties and unpredictabilities. However it needs to be noted, that to the current state of knowledge cluster 2 does not have a particular importance from a sedimentological aspect or with regards to benthos, biotope types or fish. So – taking into consideration the short lengths of the subsea cable systems within the EEZ – no significant impacts on these nature conservation interests are expected from the use of AC-technology (cf. Chap. 4.2). By using a transmission voltage of 220 kV the highest possible transmission capacity per cable system for an AC-connection can be realised.

The lower transmission capacity of an AC-cable can, in some circumstances, be evaluated as an advantage as this enables needs-based grid expansion. The lower transmission capacity might be regarded as an advantage especially considering the fact that outside the priority areas a number of issues are still unsolved, for instance regarding the sediment/ construction conditions or the cumulative impact on bird and bat migration. Therefore, the use of AC-technology offers the option of reacting as flexibly as possible to developments regarding offshore wind farms and avoiding over-capacity when setting up the grid infrastructures.

Rather, what is central for the consideration of the grid-connection-concept is the routing of the cables in the territorial sea because the predominant proportion of the cable routes (more than four-fifths) is located in the territorial sea. Furthermore in the territorial sea the cable routes cross protected areas. From an ecological view, factors such as material consumption, etc. also play a role with regards to the total length of the subsea cables.

The SEA report of the Federal Network Agency 2013 provides an abstract comparison of the potential environmental impacts of the two alternative grid-connection-concepts on the basis of the estimated area consumption. In the most recent environmental report 2014, no comparison of the environmental impacts took place since no new findings are available. It is referred to the previous environmental report. The examination of possible alternatives is based on the four grid connection projects (964 MW), that have been confirmed by the Federal Network Agency in the framework of the Offshore Network Development Plan 2013. The assessment of alternatives comes to the conclusion that under the assumed framework conditions the area consumption of a DC-connection-concept would result in an approximately 42% reduction compared to an AC-grid connection-concept despite the necessary additional converter platform (cf. Federal Network Agency (BNetzA), 2014: Umweltbericht 2013 (only available in German).

The SEA report 2013 of the Federal Network Agency points out that with respect to the considerable costs associated with the grid connection systems, however, beyond the SEA additional investigations concerning the economic consequences of a change of the connection-concept are needed (BNetzA, 2014).

Taking into account these economic considerations and as a result of the consultation procedure of the confirmation of the Offshore Network Development Plan 2013 the Federal Network Agency comes to the conclusion that for all measures confirmed in scenario B2023 the chosen AC-technology is appropriate. The Federal Network Agency concludes that to the current state of knowledge the use of AC-technology seems to be the more economical alternative. In particular the advanced planning stage of the measures proposed in scenario B2023 suggest that the AC-technology should be maintained. Any deviation from the intended use of AC-technology would likely lead to considerable delays of the grid connection of the wind farms affected (cf. Federal Network Agency, 2014b: Offshore Network Development Plan 2013).

Therefore the Spatial Offshore Grid Plan stipulates for all projects that have been confirmed in the framework of the Offshore Network Development Plan 2025 and that will be realised in the short term an AC-grid connection-concept (cf. Chap. 5.1.1.1 Spatial Offshore Grid Plan). The reason is that it is currently estimated that at least for these projects a need-based development is made possible. Besides there are not any significant effects to be expected using AC-technology to the current state of knowledge. This estimation has to be evaluated in the further proceedings. It should be pointed out that, within the framework of the approval of the "Seekabelsysteme 1 bis 6 / Querverbindung" four AC subsea cable systems for the connection of the projects "Wikinger" and "Arkona-Becken Südost" as well as a cross connection between these projects were approved. Furthermore two AV subsea cable systems were approved to the bundling point in the southern region of the cluster 2. Any new knowledge can be appropriately reacted on within the framework of this update of the Spatial Offshore Grid Plan respectively the setup of the Area Development Plan.

For all other projects to be realised over the long term the Spatial Offshore Grid Plan does not define the use of AC-technology because for those projects DC-technology might represent a reasonable alternative – at least from an ecological perspective. It should be pointed out that in the second draft of the Offshore Network Development Plan target year 2030, a DC-connection-concept is proposed due to the limited available space for the connection OST-2-4. Nevertheless the Spatial Offshore Grid Plan takes an AC-connection concept as a basis for all planned cable routes and platform sites as well as search areas for platforms. This is to assume a maximum of the area required and as a consequence to reserve sufficient space for future grid topology.

A more detailed examination of the DC-connection-concept for those areas can be implemented within the scope of this plan update respectively the setup of the Area Development Plan, when further knowledge, especially from practical experience, is available.

8.2 Any Difficulties in Compiling the Necessary Information

The data base has improved over the last few years particularly thanks to the extensive surveys within the framework of environmental impact studies for the offshore wind farm projects, the environmental investigations of the grid connection "Seekabelsysteme 1 bis 6 / Querverbindung" and the accompanying ecological research.

Information gaps continue to exist, in particular with regards to:

- lack of comprehensive sediment and biotope mapping in the EEZ,
- reliable data pertaining cumulative effects (bird migration) and potential interactions,
- bat migration (migration routes, migration behaviour) across the Baltic Sea and
- compliance with measures pertaining to temperature losses in the sediment.

In addition, there is a general lack of evaluation criteria with regard to both the evaluation of the status of biological conservation interests and the effects of anthropogenic activities on the development of the living marine environment. A transboundary assessment of the cumulative effects of existing uses on highly mobile conservation interests (seabirds and migratory birds, marine mammals, fish) is not possible as long as a comparable basis for evaluation is lacking. In terms of the consideration of cumulative effects, there is a lack of Europe-wide defined study methods and scientific evaluation criteria to fundamentally consider cumulative effects both in terms of time and space.

9 Measures Envisaged concerning Monitoring the Significant Environmental Effects of the Implementation of the Spatial Offshore Grid Plan

The potential significant effects on the environment arising from the implementation of the Spatial Offshore Grid Plan shall be monitored pursuant to Section 14m (1) Environmental Impact Assessment Act. This is intended to ascertain unforeseen, negative effects so that suitable corrective actions can be taken. The monitoring also serves to examine the gaps in knowledge described in the SEA report or the uncertain forecasts. Pursuant to Section 14m (4) Environmental Impact Assessment Act, the monitoring results must be considered when the plan is updated. The actual monitoring of potential effects on the marine environment can only begin when the definitions laid down in the plan are realised.

Therefore, the project-related monitoring of the effects of transformer substation platforms, bundling platforms and subsea cables is assigned great significance. The main objective of the monitoring is to combine and assess the findings from the various monitoring results at the project level. In addition to this, existing national and international monitoring programmes must be taken into account to avoid duplication of effort.

The study of the potential environmental effects of transformer substation platforms, bundling platforms and subsea cables must take place on project level, based on the standard “Investigation of the Impacts of Offshore Wind Turbines on the Marine Environment (StUK4)” and in consultation with the approval authority.

The results from the studies of neighbouring offshore wind farm projects and those to be connected must be used as a basis for the assessment of the transformer and bundling platform sites in relation to biological nature conservation interests. Monitoring during the construction phase of transformer substation platforms with deep foundations comprises measurements of underwater noise and acoustic recordings of the effects of the pile-driving noise on marine mammals. In addition, further monitoring programmes are planned to

determine the effects of water layers on the expansion of the pile driving noise under certain hydrographical conditions in the Baltic Sea and to implement additional measures, where possible. In accordance with the current licensing practice, a registration of birds and bats found dead on the transformer substation platform must also be carried out at every visit and be documented.

The StUK4 contains monitoring requirements for the investigation of cable routes with regard to benthos, habitat structures and habitat types during the baseline study and operational phase. Each individual habitat structure, as determined by sediment investigations along the cable route, has to be covered by at least 3 transects for the benthos investigations. Each transect consists of 5 stations. Identified areas suspected to be specially protected habitats under section 30 of the Federal Nature Conservation Act shall be demarcated by additional benthos investigations according to the mapping guidelines issued by the Federal Nature Conservation Agency. After the cables have been installed, their position has to be checked via operational monitoring measures. One year after the subsea cable systems are put into operation, studies into the benthic communities must be carried out on the same transects as in the baseline survey.

The SEA for the Spatial Offshore Grid Plan will use new information from the environmental impact assessment studies and from the joint assessment of research and impact studies data. As a result of the joint assessment, products are also being created which enable a better overview of the distribution of biological nature conservation interests in the EEZ. The combination of information leads to an ever more solid basis for the forecasting of effects. Currently, on behalf of the Federal Maritime and Hydrographic Agency several research and development studies on evaluation approaches are in preparation. The projects serve for the continuous further development of a uniform and quality-tested basis of marine environment information to assess the possible effects of offshore facilities and provide an important basis for the update of the Spatial Offshore Grid Plan respectively the setup of the Area Development Plan.