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

– unofficial translation –

Hamburg, June 2017

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1 Subject and Purpose

The environmental assessment for the updating of the Spatial Offshore Grid Plan for the Exclusive Economic Zone (EEZ) of the North Sea is based upon the German Environmental Impact Assessment Act¹. 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 converter 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 North Sea.

The Spatial Offshore Grid Plan aims at ensuring coordinated and consistent spatial planning of grid infrastructure in the EEZ, meaning converter 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 North Sea region Schleswig-Holstein and Lower Saxony. 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 North 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 converter 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 North 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 been 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 North Sea up to the 12-nm-border.

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, construct and operate the grid infrastructure. Pursuant to Section 17a EnWG, the Federal Maritime and Hydrographic Agency has been given the assignment of preparing a Spatial Offshore Grid Plan for the German EEZ under the conditions stated therein and update it every two years, starting in 2016. The plan spatially defines the required cable routes and sites for the entire required grid infrastructure in the EEZ of the North 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 North Sea into the terrestrial transmission grid. The grid infrastructure for the offshore wind farms will remain necessary even if the plan is not

implemented. The responsible Transmission System Operator (TSO) is pursuing a concept based on the high-voltage direct-current (HVDC) transmission, due to the required length of regularly more than 100 km for the area of the North Sea EEZ. So in the EEZ, in addition to the cable routes for subsea cable systems, areas for platforms to convert the alternating current generated in the wind farms into DC will also be needed. But in comparison to AC connection, a significantly lower number of subsea cable systems is required because of a higher transmission power, thus reducing the space required for the subsea cable systems.

Areas for subsea cable systems and converter 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 North 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 converter 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.

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 converter 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 sediment distribution in the study area has a sediment composition of sands with a differing proportion of fine grit (clay and silt) for both the planned converter sites and the planned subsea cable routes. Locally, in the clusters and in the region of the subsea cable routes of the eastern study area as well as in the “Borkum Riffgrund” Habitats Directive site, coarse sand, gravel and, in isolated cases, stones can be found. On basis of the information available on the sediment structure of the first 4 to 5 metres there is no indication against the suitability of the planned subsea cable routes contemplated in the Spatial Offshore Grid Plan for the installation of subsea cable routes. The sediments close to the surface are generally considered to be trenchable in the whole study area.

The pollutant load in the sediment, especially pollution resulting from metal and organic pollutants, decreases more or less rapidly from the coast out towards the open sea.

The converter 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 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. Thus no significant effects on the seabed or the water are expected as a result of the planned converter 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. As the sediments in the EEZ of the North Sea are primarily composed of fine and medium sand, with coarse sand in some locations, the suspended sediment will quickly settle.

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.

Furthermore, substantially-emissions are not expected to have a significant impact on water. In principle, substantially-emissions into the water body must be avoided as far as possible. Therefore, in the context of an emission study, a comprehensive analysis and assessment of possible effects on possible objects of protection has been made in framework of the concrete licensing procedure.

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 converter 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 converter 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 EEZ of the North Sea does not have any outstanding importance with regard to the species inventory of benthos organisms. The benthos communities identified do not present any particularities either as they are typical for the North Sea due to the prevailing sediments. Investigations of the macrozoobenthos within the framework of the approval procedure for the offshore wind farms and projects of the Alfred Wegener Institute from 1997 to 2014 found typical communities for the EEZ. The species inventory found and the numbers of red listed species suggest an average importance of the study area for benthos organisms.

The installation of the piles as well as gravity foundations of the converter 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. In the case of gravity foundations, an increased formation of turbidity plumes is to be expected within the framework of the construction site preparation. 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 - especially in case of gravity-based platforms.

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. 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. Due to the prevailing sediment composition in the North Sea EEZ, most of the disturbed sediment will settle relatively quickly directly in the immediate vicinity of the cable route.

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. If the cables are installed deep enough, as defined in the plan, and considering the fact that the effects will be limited in spatial scale, no significant effects on the benthos communities are expected according to the current state of knowledge.

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 converter platforms and subsea cables, provided that the 2 K-criterion is kept. The ecological effects are mostly small in scale and short-term.

Biotope Types

Possible effects of converter 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.

Impairment due to burial is likely to be small in scale due to the prevailing nature of the sediment will quickly settle. 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 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.

In accordance with the planning principles of the Spatial Offshore Grid 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. An investigation, whether these strictly protected biotope types are actually present in the area of the planned converter platforms and subsea cable routes and, where applicable, affected, is not possible due to lack of reliable data. The specific occurrence of legally protected biotope types will be investigated within the framework of the geotechnical surveys and environmental studies in the individual licensing procedure.

It is basically assumed that areas of Section 30 biotopes with a specific sensitivity to cable-laying, in particular reefs, only occur on a small scale and in isolated instances and can be avoided during the detailed routing. If it is not possible to avoid strictly protected biotope types, then a significant impact on these biotope types cannot be ruled out. In the individual licensing procedure, an investigation must be carried out based on available data from the geotechnical surveys to find out whether the affected area is so large that there is significant impact. Possible effects on the protected habitat types after the Habitats Directive are considered within the framework of the Habitats Directive impact assessment.

Fish

The fish fauna in the area of the planned converter platforms and subsea cable routes indicates a typical species composition for the southern North Sea. In all areas, the demersal fish community is dominated by flatfish, which is typical for the German Bight. According to the current state of knowledge the planned converter sites do not represent a preferred habitat for any of the protected fish species. Accordingly, the fish stocks in the area of the planned converter platforms and subsea cable routes do not have any ecologically outstanding importance compared with adjacent marine areas.

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 converter platforms and subsea cable routes. The effects of the converter platforms and subsea cable systems on the fish fauna are very limited in scale and time.

During the construction of the converter platforms and installation of subsea cable systems, the fish fauna may be impaired temporarily and on a limited scale due to sediment resuspension and turbidity plumes. Due to the prevailing sediment conditions, the released sediment will quickly settle again. The effects are generally small-scale and temporary based on the current level of knowledge. All things considered, negligible, small-scale impacts are expected for adult fish. Furthermore, the fish fauna is adapted to the typical natural resuspension of sediment brought about by storms.

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 wind farm clusters are used by harbour porpoises for crossing, resting and, partly, as feeding and breeding grounds. According to the current state of knowledge, a medium to seasonally high importance for harbour porpoises can currently be identified. Their use differs substantially in different sub-areas of the EEZ. This also applies to common seals and grey seals. The clusters identified for offshore wind farms 1, 2 and 3 have a medium to (seasonally-related in spring) high importance for harbour porpoises and a low to medium importance for common seals and grey seals. Cluster 4 is located in the identified main concentration area of the harbour porpoise in the German Bight during the summer months and has therefore of high importance. The cluster 4 has a medium importance for common seals and grey seals. Parts of cluster 5 are located in a large area which is used both as a feeding and breeding ground by harbour porpoises – even if the focus of the concentration is found in the “Sylter Außenriff” Habitats Directive site. Therefore, a high importance for harbour porpoises must be assumed for cluster 5. Cluster 5 has a medium importance for common seals and grey seals. Clusters 6 to 11 have a medium importance for harbour porpoises. However, parts of the cluster 11 as well as the cluster 13 are intensively used by harbour porpoises as a feeding ground in summer. They are located in the immediate vicinity of the contiguous main concentration area of the harbour porpoises in the German Bight and thus have a high significance for harbour porpoises during the summer months. The clusters 6 to 13 have a low importance for common seals and grey seals.

Risks to marine mammals can arise due to noise emissions during the installation of the converter 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 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 1 μ Pa²s and peak level of 190 dB re 1 μ Pa 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.

The current technical developments in the field of the reduction of underwater noise show that the use of appropriate measures can significantly reduce the impact of noise on marine mammals. The noise control concept of the BMUB has also been in place since 2013. According to the concept, piling work must be coordinated in time in such a way that sufficiently large areas, particularly within the protected areas and the main concentration area of the harbour porpoises in the summer months, are released from impacts caused by piling. Significant effects of the converter platforms on marine mammals during the operation phase can be ruled out according to the current state of knowledge.

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

After implementation of the noise-mitigation measures in the individual licensing procedure, the construction and operation of the planned converter platforms is currently not expected to have significant adverse effects on marine mammals. 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 and migratory birds. For breeding birds, the sites planned for the converter platforms do not have any special importance as a feeding ground due to the far distance from the coast and the islands with breeding colonies. Protected bird species as defined in Appendix I of the Birds Directive are found in various concentrations in the vicinity of the planned converter platforms. All findings to date suggest a medium importance for cluster areas 1, 2 and 3 for seabirds. Although cluster 4 is only of medium importance for most seabirds, divers come appear in high concentrations there in spring. The cluster 4 is largely in the identified main distribution area of the divers in the spring in the German Bight and therefore has a high importance for seabirds. The sub-areas of cluster 5 present a high occurrence of seabird species, in particular protected species as defined in Appendix I of the Birds Directive such as sensitive divers. All three sub-areas of cluster 5 are located in the main distribution area of the divers in the German Bight and thus have a high importance for seabirds (BMU, 2009). The area of clusters 6 to 13 is located outside the concentration focus of bird species found in Appendix I of the Birds Directive, such as divers, terns, little and common gulls.

Direct disturbances in the construction phase due to scaring effects are to be expected at most local and temporally limited. Due to the high mobility of the birds, significant effects can be excluded with high safety. The converter platforms will presumably have a permanent disturbance and scaring effect on certain bird species. Usually, an avoidance-distance of about 2 km is assumed. Due to the close proximity of the converter platforms to the offshore wind farms, there will be no appreciable additional habitat loss for resting and seabirds due to facility and operation. Due to the exclusion of converter platforms in the Natura2000 areas, habitat losses are reduced in important habitats.

In addition, the EEZ has an average to above average importance for bird migration. It is assumed that considerable population portions of the songbirds breeding in Northern Europe migrate over the North Sea. There are no recognisable special migration corridors in the area of the EEZ for any migratory bird species as bird migration takes place either near-coast and coastline-oriented or in a wide-front migration over the North Sea. There is an indication that migration intensity decreases as the distance from the coast increases; however this has not been clarified for the masses of nocturnally migrating songbirds.

Potential effects of the planned converter platforms 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 converter 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 platforms. Regarding potentially cumulative effects caused by converter 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 converter 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.

Facility- and operation-related effects of the subsea cable systems on the avifauna can be ruled out. A possible risk of collision due to construction vehicles can be classified as very low due to the short-term nature of the construction phase.

Bats

The migratory movements of bats across the North Sea have been poorly documented and remain largely unexplored to date. There is a lack of specific information on migratory species, migration corridors, migration altitudes and migration concentrations. The information available up to now merely confirms that bats, in particular long-distance migrating species, migrate across the North Sea.

Since the converter platforms are individual structures which are located in the immediate operating area of offshore wind farms, significant impacts on bat migration can be ruled out according to the current state of knowledge. It can also be assumed that any negative effects on bats can be reduced by the same prevention and mitigation measures which are implemented for the protection of bird migration. Effects on bats as a result of the installation and operation of the planned subsea cables can be ruled out with certainty.

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 North 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 North 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 converter platforms and cable routes.

Air

No measurable effects on air quality arise as a result of the construction and operation of the converter 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 converter 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 CO₂ 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 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 converter 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 30 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 converter 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 converter 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.

Due to the laying at least 1.50 m in the seabed, adverse effects on the natural scenery are to be ruled out for the subsea cable systems.

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 converter platforms. Individual underwater obstructions are present between the traffic separation schemes 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 converter 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 30 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 converter 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).

In order to assess the cumulative effects, it is necessary to evaluate to what extent a significant negative effect can be attributed to the converter 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 now in terms of Art.5 (2) of the SEA Directive. The position paper for the cumulative assessment of the divers habitat loss in the German North Sea (BMU, 2009) and the noise protection concept of the BMUB (2013) form an important basis for assessment.

Taking into account the existing assessment bases and the avoidance and mitigation measures which are arranged in the specific licensing procedure, it is currently assumed that for the 13 clusters no reasons are known or there are indications that there are insurmountable restrictions on access for the various protective goods.

Particularly for the clusters 1 to 8, which are planned to be developed by the end of 2030, are mainly wind farm projects, which have been approved after the implementation of an environmental impact study with extensive collateral clauses, also taking account of cumulative effects.

For clusters 9 to 13 there are knowledge gaps which still exist. These gaps can only be partially filled with results from research projects, from the monitoring of protected areas and project-specific environmental impact assessments.

Seabed, Benthos and Biotope Types

A significant proportion of the environment effects caused by the converter 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 converter 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 10 km² has been determined for the subsea cables, structures for cable crossings and local cable laying on the seafloor, converter 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. Of this, approximately 0.6 ha will be used within the Natura2000 areas.

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.

The cumulative impact of the plan on the stock of the harbour porpoises is considered in accordance with the noise control concept of the BMUB of 2013. Piling work which has the potential to produce disturbances in the main concentration area of the harbour porpoises during the sensitive season are coordinated in such a way that the share of the affected area always remains below 1%.

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 converter 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.

Multi-area consideration of the cumulative effects of offshore wind farms and the converter platforms of the Spatial Offshore grid on seabirds can be made based on results and observations from already realised offshore wind farm projects. Therefore, results such as those from offshore wind farms in neighbouring countries make it possible to anticipate changes in habitat use by seabirds. In particular, endangered and sensitive seabird species, for example divers, must be given consideration with regard to cumulative effects. 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).

In order to be able to assess the significance of cumulative effects on seabirds, any effects must be investigated species-specific. In this regard, questions concerning population biology-based thresholds and the significant reference value for such a threshold arise. The literature suggests that, for resting birds, interference should be considered inadmissible if 1 % of the bio-geographical population is affected by a loss of habitat. In the absence of other reliable criteria, the 1 % criterion seems at least suited to approach the quantification of an intervention. This criterion served as the basis for the first decisions of the licensing authority for the assessment of possible cumulative effects caused by the operation of offshore wind farms.

Based on new findings from environmental impact studies, research projects and monitoring, it has been possible, in the meantime, to identify and define a "main concentration area of divers" in the German EEZ. The area covers all areas of very high and most of the areas with high divers density in the German Bight.

Investigations in offshore wind farms in the German EEZ provide evidence of adverse effects caused by habitat loss for sensitive species. However, the extent varies according to the type and the position of the offshore wind farm. Similar results were also found in offshore

wind farms in other countries. In addition, an enrichment of the species inventory and thus the food resources for seabirds in the vicinity of offshore platforms can be identified and projected. There is still a need for research with regard to other impacts, in particular on population levels.

However, no visible obstacles appear to stand in the way of implementing the plan according to the current state of knowledge on the basis of the position paper of the BMU. All of the converter 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. This also refers to potential disturbance effects by shipping associated with the operation and maintenance of cables and platforms. Since the North 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 converter platforms in Natura2000 areas will contribute to prevent significant disturbances in protected areas. For the main concentration area of the divers, no wind farms (clusters) have been included in the plan, which are not already part of formally approved projects and which are also based on the delimitation of the area.

Migratory Birds

There is a potential risk for migratory birds on one hand due to the collision risk with the converter 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 converter 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 converter 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 converter platforms are or are regularly operated / planned at a distance of max. 1 km to neighbouring offshore 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.

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 offshore wind farm projects, 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 cluster 9 to 13 as well as of additional offshore wind farms outside the German EEZ, is not yet possible.

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 North 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 converter 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 North 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).

The planned converter 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.

4.5 Summary of the Assessment

In summary, with regard to the planned converter 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 converter 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 converter 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.

With regard to the evaluation of the effects on individual nature conservation interests, in particular strictly protected biotope structures, and with regard to the cumulative consideration of bird migration, there is currently still a lack of sufficient scientific knowledge and standard evaluation methods. 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. 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 converter 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 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 be significantly affected. The nature conservation area "Östliche Deutsche Bucht" (EU bird conservation area) and the three Habitats Directive sites "Borkum Riffgrund", "Sylter Außenriff" and "Doggerbank" are located in the German EEZ of the North Sea. Potential long-distance effects on the protected areas in the adjacent 12-nm-zone 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 Converter Platforms

The Spatial Offshore Grid Plan stipulates a total of 15 sites for converter platforms for cluster 1 to 8. None of the facilities is planned in a Natura2000 area. For clusters 9 to 13, no stipulations of specific sites were made, because these clusters will be developed under the regime of the Area Development Plan. The number of possible converters available in the plan is given by the area approach in chap. 4.3.3, BFO-N 2016/2017. The construction of these converters is not planned until 2031.

Seven of the planned converter platform sites for cluster 1 to 8 are located near Habitats Directive sites and must therefore be assessed with regard to their Habitats Directive compatibility. All other planned converter platform sites are located more than 10 km away from a protected area. For these locations, the preliminary study concludes that significant effects from the planned converter 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 converter platform sites from Natura2000 areas in the territorial sea respectively to protected areas of neighbouring countries, significant impairments to such areas in the territorial sea and in the adjacent waters of neighbouring countries 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 converter 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 "Östliche Deutsche Bucht". 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 and Gates

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.

On individual routes, reefs and sandbanks or other biotopes protected according to § 30 Federal Nature Conservation Act may occur. As there is currently no reliable scientific basis, a significant negative impact on the conservation objectives of Habitats Directive habitat

types and other protected biotope types with their characteristic benthos communities cannot be ruled out with the necessary certainty. A detailed Habitats Directive impact assessment is subject to each individual licensing procedure. If the occurrence of particularly sensitive biotope types is detected during the geotechnical surveys, they should be avoided if at all possible. Experiences from the approved projects "NordLink", "AC-Anbindung Butendiek" or "SylWin1 und SylWin alpha" show that a small-scale avoidance, e.g. of reefs is possible at least in parts within the scope of the final line layout in the individual licensing procedure.

If the avoidance of sensitive biotopes is not possible, a considerable impairment of these biotope types cannot be ruled out. In the specific individual licensing procedure, it is to verify whether there is a significant impairment on the basis of existing data from the surveys. If new findings are to be found in this regard, the routes will be adjusted as part of this update of the Spatial Offshore Grid Plan or as part of the Area Development Plan.

An examination of possible alternatives was carried out for the purposes of avoiding adverse impact on these structures for all cable routes running through Natura2000 areas and for which circumvention of the protected area is possible and appropriate in the context of the proportionality principle.

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. In summary, the plan's stipulations ensure that any possible negative environmental effects due to subsea cable systems and converter platforms in the area of the Natura2000 network will be kept as low as possible.

Because there is no robust scientific basis, a significant impairment of habitat types with their characteristic communities cannot be excluded for all areas with the necessary certainty. A detailed Habitats Directive impact assessment is subject to the individual licensing procedure. An examination of possible alternatives was carried out for the purposes of avoiding adverse impact on these structures for all cable routes running through Natura2000 areas and for which circumvention of the protected area is possible and appropriate in the context of the proportionality principle.

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 converter 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 North 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 1.3 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 converter 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.

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 converter 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 North 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 North Sea EEZ.

The spatial location of the gates results, on the one hand, from the spatial planning requirements and other state planning considerations in the coastal states, to which the planning of the EEZ is connected. The plans of the coastal states are, in turn, oriented towards the routes to suitable grid connection points of the high-voltage grid on land. On the other hand, crossings of existing pipelines or the traffic separation schemes are planned as right-angled as possible respectively the routes are planned parallel to these uses. Since anchoring prohibited areas have already been set up next to the pipelines, a few additional impairments for shipping are to be expected here. Under these prerequisites, there are no spatial alternatives to the chosen gates to the territorial sea, since in the area between the traffic separation schemes there is basically no more scope because of approved offshore wind farms and pipelines.

Specifically, within the framework of the habitats directive impact assessment, an examination of possible alternatives carried out for all subsea cable routes, which running through Natura2000 areas in the EEZ, insofar as an alternative routing outside the protected areas is possible and appropriate in the context of the proportionality principle.

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 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 findings on long-term effects from the operation of offshore wind farms and associated facilities such as converter platforms,
- compliance with measures pertaining to temperature losses in the sediment and
- data to assess the environmental status of the various nature conservation interests for the area of the outer EEZ.

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 (especially migratory birds) is not possible as long as a comparable basis for evaluation is lacking.

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 converter 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 converter 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 converter platform sites in relation to biological nature conservation interests. Monitoring during the construction phase of converter platforms with deep foundations comprises measurements of underwater noise and acoustic recordings of the effects of the pile-driving noise on marine mammals. In accordance with current licensing practice, a registration of birds and bats found dead on the converter platform must also be carried out and 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.

Results from the combination of comprehensive, quality-assured ecological data from impact assessment studies, the monitoring and ecological accompanying research of offshore projects (wind farms, grid connections) and research projects are already collected and archived in a geodatabase for various biological protective goods. With the map services for benthic organisms, seabirds and harbour porpoises available via the GeoSeaPortal under www.geoseaportal.de, quality-assured information is provided for other authorities, industry, science and the interested public.