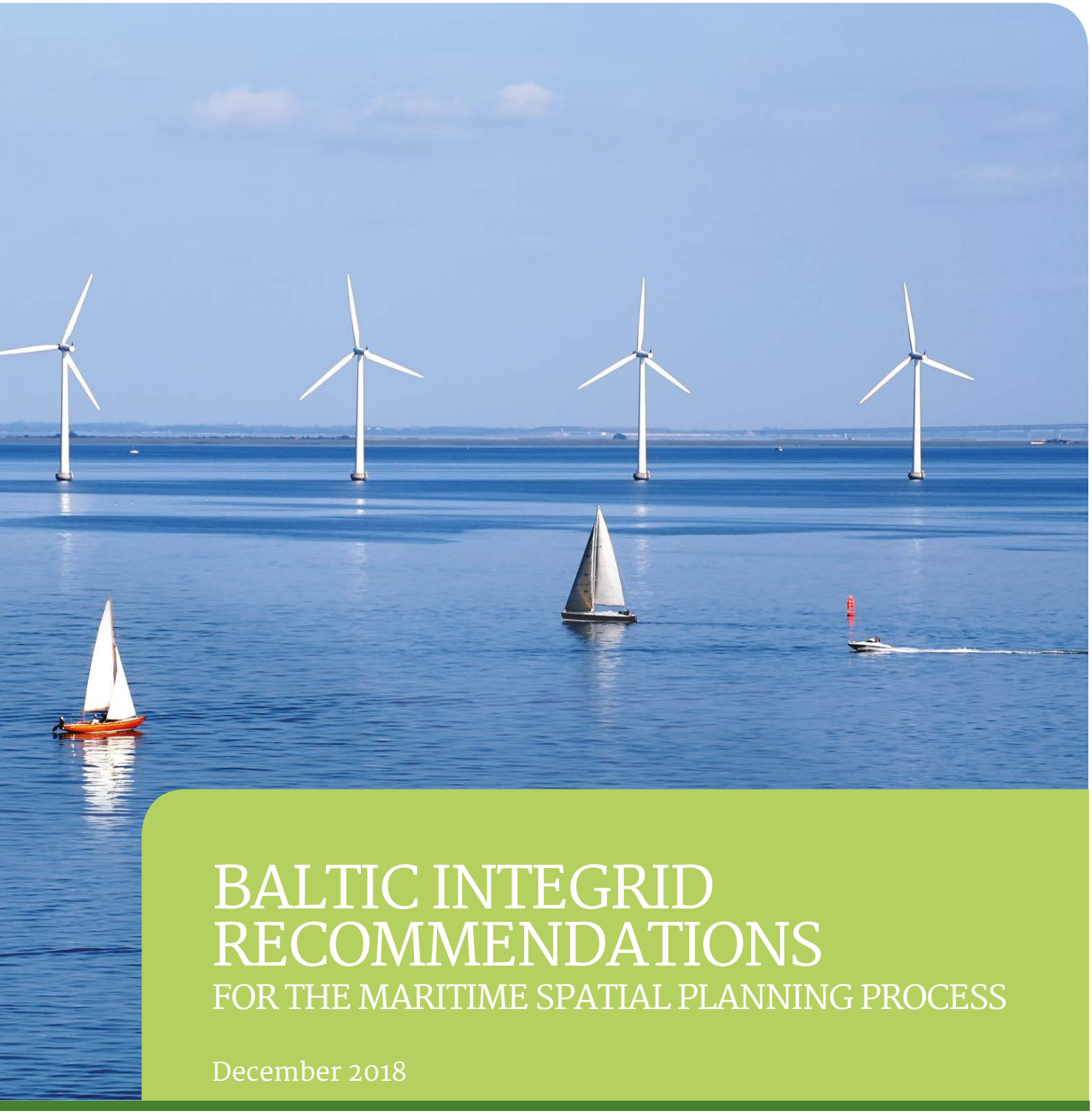
Baltic
InteGrid

Integrated Baltic Offshore
Wind Electricity Grid Development



BALTIC INTEGRID RECOMMENDATIONS

FOR THE MARITIME SPATIAL PLANNING PROCESS

December 2018

Interreg
Baltic Sea Region
EUROPEAN UNION
EUROPEAN
REGIONAL
DEVELOPMENT
FUND

Acknowledgements:

The Maritime Institute in Gdansk would like to thank all the contributors to the Baltic InteGrid recommendations on maritime spatial planning, whether contacted through surveys, interviews or workshops, for generously offering their time and knowledge. We are also grateful to the Baltic LINes project partners for their kind cooperation in exchanging data and for co-organising the workshop 'Energy Challenge for the Baltic Sea'.

Baltic InteGrid recommendations for the maritime spatial planning process

By:

Marija Lazić
Joanna Przedrzymirska
Joanna Pardus
Łukasz Szydłowski
(Maritime Institute in Gdansk)

Contributing author:

Mariusz Wójcik
(Foundation for Sustainable Energy)

Copyright:

Reproduction of this publication in whole or in part must include the customary bibliographic citation, including author attribution, report title, etc.

Cover photo:

Maritime Institute in Gdańsk

Published by:

Maritime Institute in Gdańsk

ISBN 978-83-62438-30-3

Disclaimer:

The content of the report reflects the author's/partner's views. The European Commission and the MA/JS are not liable for any use that may be made of the information it contains. All images are copyrighted and property of their respective owners.

www.baltic-integrid.eu

Content

CONTENT 1

SUMMARY 3

1. INTRODUCTION 7

2. THE SPATIAL NEEDS OF THE OWE SECTOR AND ITS INTERACTIONS WITH OTHER MARITIME USES 11

3. RECOMMENDATIONS TO THE MARITIME SPATIAL PLANNING PROCESS 15

APPENDICES 21

LIST OF ACRONYMS 31

Summary

The Baltic InteGrid project was implemented to study the possibilities to optimise the potential for a meshed offshore grid to improve the efficiency of offshore wind energy (OWE) production and transmission. The idea behind the project was to contribute to more sustainable local electricity generation, the further integration of electricity markets and a more secure supply of energy in the countries in the region. The issues addressed included numerous aspects of the development in the Baltic Sea Region (BSR) of the renewable energy sector in general and a meshed offshore grid in particular, among other things through the elaboration of a Baltic offshore grid vision for 2050 (BOG 2050).

To foster the development of a meshed offshore grid in the Baltic, the Baltic InteGrid also formulated three different sets of recommendations for EU and national-level stakeholders. Specifically, these are recommendations for the ENTSO-E's Ten-Year Network Development Plan (TYNDP), policy and regulatory recommendations for relevant stakeholders at the EU and national level, and recommendations for the maritime spatial planning (MSP) process.

The recommendations to the MSP process presented in this report for the countries in the BSR serve two mutually reinforcing objectives: to ensure that the needs of the energy sector are thoroughly integrated within maritime spatial plans and to enhance the MSP process so that it can more efficiently engage the stakeholders involved in the development of the energy sector while reconciling their various needs.

The Baltic InteGrid recommendations to the MSP process focus on the three fields of policy & regulatory framework, spatial management and information sharing. They are intended for target groups ranging from the authorities in charge of preparing and implementing maritime spatial plans to offshore energy regulators and operators. Overall, the recommendations aim to make the MSP process more efficient and better suited to facilitating offshore wind energy development in the BSR. Specifically, this means:

- securing marine space for the generation and transmission of offshore wind energy,
- ensuring the consistency of relevant policies,
- facilitating the stakeholder integration process,
- encouraging and securing the exchange of data,
- raising awareness of the benefits of offshore wind energy so as to facilitate its acceptance by other sectors and the public at large, and
- encouraging synergies and co-existence with other uses.

Summary

The resulting recommendations to the MSP process elaborated within the Baltic InteGrid project are the following:

1. Maritime spatial plans should be revised in a timely manner in response to major changes in national policies and strategies and industry-wide technological evolutions.
2. Robust frameworks should be established to ensure fruitful international cooperation in the service of producing the most useful maritime spatial plans for the BSR. There should be a unified approach to defining the priorities of the different sectors in the BSR and the same methodologies should be developed and applied across countries for the evaluation of the productivity of marine space.
3. Policy makers and public authorities should ensure that the OWE sector has a clear political mandate on the national and international level with well-defined OWE targets in the short and long term. The targets should be communicated properly at the local and international levels.
4. OWF and grid operators should consider setting up pan-Baltic associations/clusters (or strengthening existing ones) to represent their interests.
5. OWF and grid operators should consider organising face-to-face and/or online discussions within each sector before joining cross-sectoral MSP consultations.
6. To support international meshed offshore grid development, there should be cooperation between national MSP authorities and energy authorities from bordering countries to locate corridors and transfer gates for interconnectors.
7. Multi-use applications to encourage synergies between OWE and other sea uses should be enabled by MSP authorities on the basis of input from OWF operators and investors.
8. MSP authorities should enable early stakeholder engagement in the MSP process and face-to-face consultations/dialogue with the presence of principal decision-makers from the energy sector and maritime authorities.
9. MSP authorities should facilitate formalised coordination across the entire range of government institutions and authorities involved in maritime topics.
10. MSP authorities should ensure that they have at their disposal all the crucial information in terms of allocating space for OWE, and OWF and grid operators should provide this information regarding all potential constraints.
11. The public authorities involved in producing and implementing MSP policy should establish efficient data and information management systems at the scale of the BSR.
12. Public authorities should create agreed mechanisms together with the OWE sector to enable the broader use of commercial monitoring data collected for the purpose of OWE investments, including data collected for EIAs.

1. Introduction

Offshore wind energy (OWE) is one of the most dynamic energy sectors in Europe. The physical conditions in the Baltic Sea, including suitable wind speed, relatively shallow waters and proximity of productive sites to shore, represent a great opportunity for OWE developers. The sector plays a major part in generating economic value and employment and is expected to expand throughout the EU in the near and medium term.[1] The number of direct jobs in the offshore wind sector in the EU (160,000) exceeded that in, for instance, fishing (145,000) as early as 2016.[2]

The OWE sector is affected by a number of challenges, including grid access for offshore wind farms (OWFs) due to the limitations of the transmission systems, high connection costs caused by long distances and lack of synergy between projects, long lead times on high voltage cables and legal constraints.[3] Competition with other maritime uses also presents a challenge to the expansion of OWE in the Baltic Sea.

To balance the provision of marine ecosystem services and the high pressure they face from maritime activities, it is crucial to establish appropriate management structures for the sustainable development of maritime sectors, including an efficient maritime spatial planning (MSP) process.[4] MSP has been formally recognised as instrumental to the implementation of several EU policies, such as the Integrated Maritime Policy and Blue Growth Strategy.[5, 6] The EU's MSP Directive accordingly calls for all Member States to establish national maritime spatial plans by 2021.[7]

National maritime spatial plans are vital for the OWE sector, as they designate the areas suitable for infrastructure related to power generation and transmission. The EU's MSP Roadmap aims to facilitate the development of MSP by setting out key relevant principles and encouraging the development of a common approach among Member States.[8] It emphasises the importance of maritime spatial plans to the OWE investment process, and specifically the fact that they mitigate conflicts between different maritime uses.

Experience from past and ongoing projects and initiatives related to MSP (e.g. BaltSeaPlan, BalticScope[9] and Baltic LINes) makes it possible to identify several potential benefits that a more effective MSP process would have for the energy sector: cross-border cooperation supporting the Baltic Energy Market Interconnection Plan (BEMIP) initiative, spatial synergies in situations where different uses can coexist, and shared data collection and exchange.

Against the background of the EU's energy priorities, the Baltic InteGrid project was implemented to conduct analyses related to the design and implementation of meshed grid solutions. In a meshed grid, OWFs are connected to more than one national transmission system, and submarine cables can serve both as interconnectors and export cables – electricity from a given OWF can thus be routed to two or more national grids.

The Baltic InteGrid project developed a vision for a future meshed offshore grid in the Baltic Sea named BOG 2050. Given current plans for the installation of offshore wind farms and interconnectors, the main component of BOG 2050 would be centred on the southern Baltic, between Denmark, Germany, Lithuania, Poland and Sweden. A potential secondary focus could be envisaged in the northern part of the sea, between Estonia, Finland and Sweden. And a third prospect could be considered to link the northern and southern systems through a configuration situated off the coast of the Baltic States. Figure 1 below shows the proposed development corridors of BOG 2050 together with other sea uses.

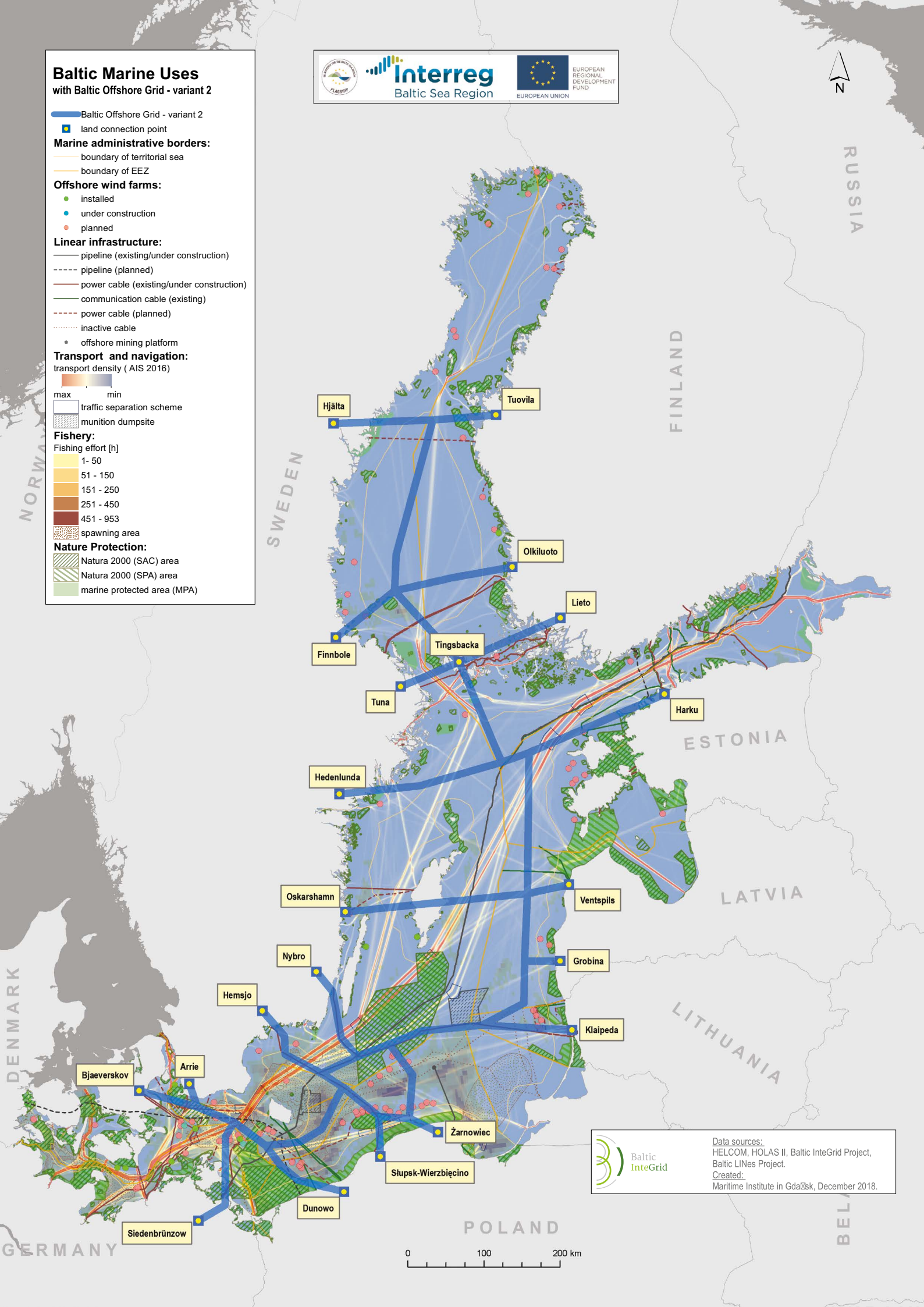

Baltic Marine Uses
with Baltic Offshore Grid - variant 2
Baltic Offshore Grid - variant 2
land connection point
Marine administrative borders:
boundary of territorial sea
boundary of EEZ
Offshore wind farms:
installed
under construction
planned
Linear infrastructure:
pipeline (existing/under construction)
pipeline (planned)
power cable (existing/under construction)
communication cable (existing)
power cable (planned)
inactive cable
offshore mining platform
Transport and navigation:
transport density (AIS 2016)
max
min
traffic separation scheme
munition dumpsite
Fishery:
Fishing effort [h]
1- 50
51 - 150
151 - 250
251 - 450
451 - 953
spawning area
Nature Protection:
Natura 2000 (SAC) area
Natura 2000 (SPA) area
marine protected area (MPA)
Interreg
Baltic Sea Region
EUROPEAN REGIONAL DEVELOPMENT FUND
EUROPEAN UNION
N
RUSSIA
FINLAND
SWEDEN
NORWAY
ESTONIA
LATVIA
LITHUANIA
DENMARK
GERMANY
POLAND
BELARUS
Hjälta
Tuovila
Olkiluoto
Lieto
Finnbole
Tingsbacka
Tuna
Harku
Hedenlunda
Oskarshamn
Ventspils
Nybro
Grobina
Hemsjo
Klaipeda
Arrie
Bjaeverskov
Żarnowiec
Słupsk-Wierzbięcino
Dunowo
Siedenbrünzow
0
100
200 km
Baltic InteGrid
Data sources:
HELCOM, HOLAS II, Baltic InteGrid Project, Baltic LINes Project.
Created:
Maritime Institute in Gdańsk, December 2018.

Figure 1: Map of current sea uses in the Baltic Sea and the corridors proposed within the framework of BOG 2050.

Introduction

The advantages of a meshed offshore grid

The development of OWE expected in the Baltic Sea in the coming decades will require a substantial expansion of transmission systems, both off and onshore, to accommodate the increased power flows expected in the future. A meshed grid would also have the added value of decreasing the number of radial connections and shore installations linking OWFs to onshore grids, thereby reducing potential spatial and environmental conflicts and other adverse effects.[10]

At their core, Baltic InteGrid recommendations to the MSP process aim to identify:

- Better ways to integrate the needs of the OWE sector in the planning process and
- The main spatial conflicts and possible synergies between all elements of the OWE generation and transmission system (OWFs, grids, substations, hubs and landing points) and other marine uses.

The recommendations draw on in-depth analyses of ongoing MSP projects and initiatives as well as research carried out within the Baltic InteGrid project. Specifically, they are based on:

1) An overview of the status of MSP in the Baltic Sea countries (as of September 2018) and its links with the development of OWE and grids in the eight countries in the Baltic Sea Region (BSR);[11]
2) An analysis of ongoing initiatives and projects, such as Baltic LINes, Pan Baltic Scope and the projects of the HELCOM-VASAB working groups;
3) Analyses of the policy and regulatory framework within which OWE and grid development take place;[12]
4) Analyses of the main characteristics of the energy sector and its specific spatial requirements, conducted on the basis of the two case studies elaborated in the framework of the Baltic InteGrid project and published in 'Towards a Baltic Offshore Grid: connecting electricity markets through offshore wind farms; pre-feasibility studies report' from September 2018;[13]
5) An identification of points where the energy sector interacts with other maritime uses, that is, of potential conflicts and synergies affecting OWE and grids; and
6) Consultations (workshops, surveys and interviews) of relevant actors from the MSP and energy fields.

The recommendations are primarily intended for two recipient groups: (1) the authorities responsible for developing and implementing maritime spatial plans at different governance levels and (2) stakeholders from the offshore wind energy sector, including policy makers and authorities, national agencies, and operators of OWFs and grids.

© [EnBW]

2. The spatial needs of the OWE sector and its interactions with other maritime uses

Spatial needs of OWE sector

OWE generation and transmission infrastructure require suitable sea space to be reserved. At the moment, only three BSR countries have set OWE capacity targets to be realised by 2030: Germany (15 GW overall, of which around 3 GW is expected in the Baltic Sea), Denmark (up to 10 GW for the North and Baltic Sea) and Lithuania (2.3 GW). These targets can be translated into corresponding requirements in terms of space based on a rough assumption that the average 500 MW wind farm covers 50 km^2.[14]

The areas considered for the construction of OWFs under the Baltic InteGrid scenarios for OWE development by 2050 were estimated in Baltic InteGrid pre-feasibility studies to almost 1748 km^2 (in the low-expansion scenario) and 3589 km^2 (high-expansion scenario). Please note that PFS concerned only areas in which the OWFs are on the route of potential interconnectors, i.e. the Stolp Bank, the Middle Bank, the south-east coast of Sweden and the Lithuanian coast (for Case study 1). For Case 2 it is the coast of Germany, west of Bornholm and the southern coast of Sweden. The exact spatial requirements of a given OWF can be known with precision only at the stage of the OWF planning; as detailed plans have not yet been developed for most of the planned OWFs taken into account in the scenarios, these estimates are based on very rough assumptions. Additionally, the layouts of OWFs may have spatial implications on potential co-uses (i.e. the use of the space in-between the turbines). At the same time, the MSP process needs intermediate plans as well as long-term visions regarding OWE development to be taken into account at a very early stage. For the planners to assess concrete demands for maritime space, they need to have access not only to development visions but also specific construction plans, as only this type of documentation allows targets to be translated into concrete demands for maritime space (an issue is that the timing of the actions of the OWE sector is often not the same as for planners, so building permits or construction plans for a given OWF may not be available when a plan is being elaborated/revised). However, it is also quite difficult to prepare tangible plans today for the long-term investments of tomorrow.

Potential conflicts between sea uses

Along the path of energy transmission from an OWF to the onshore connection point, there are a range of possible interactions with other uses of maritime space, such as protected nature areas, transport and navigation, other cables and gas pipes, fisheries, marine aquaculture, tourism and recreation, marine aggregates, and oil and gas extraction (shown in Figure 2).

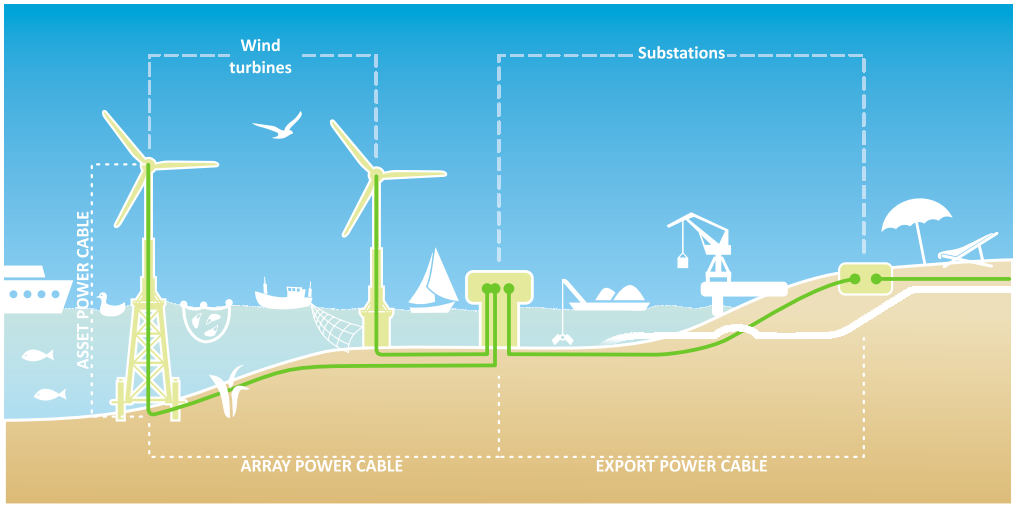


Figure 2: Energy generation and transmission system and other maritime uses (illustration: Magdalena Batko, MIG)

Spatial needs of OWE sector

This section considers the interactions between elements of the energy generation and transmission systems and other maritime uses, and the role that MSP can have in mediating synergies and mitigating conflicts. The interactions are divided into the four main categories nature protection, shipping & ports, pipelines & cables, and fisheries. This subsection presents the potential conflicts, while the following subsection suggests ways in which they can be mediated by MSP and hopefully mitigated enough to become opportunities or synergies.[15, 16, 17]

Potential spatial conflicts can arise between OWE generation/transmission infrastructure and a range of other sea uses, most of which can roughly be divided into four categories:[18, 19]

1. There are the potential threats to wildlife – bird collisions with blades, electromagnetic disturbance, risk of propagation of invasive species, disturbance of organisms on the seabed, dispersion and re-suspension of contaminants, noise, electromagnetic fields, thermal radiation, introduction of an artificially hard substrate and possible interference with the communications of mammals (porpoises or seals).[20, 21, 22]
2. There are risks to shipping and the operation of ports in the shape of possible accidents or collision if navigation corridors are routed close to OWFs and restrictions to shipping in certain areas. Vessels involved in the building and maintenance of infrastructure may also cause problems for other traffic, although this effect is generally short-lived and temporary.
3. Fishing vessels may collide with OWFs or damage submarine cables with their fishing gear or anchors.
4. The construction or operation of OWFs and new cables may damage or disturb existing pipelines and cables, and reduce their siting options in the future.

Other spatial conflicts worth mentioning include extraction of materials from the seabed, which is incompatible with OWE generation/transmission infrastructure, or tourism, which can be dislocated by near-shore projects.[23]

Proposed solutions and synergies

Once detailed construction projects are in place, interactions between OWE and other maritime uses need to be analysed. Likewise, the long-term planning of OWE should explicitly take into consideration other uses which may not be foreseen in national maritime plans yet, but are in development and fostered by European policies, including other blue economy sectors such as aquaculture.

The following step in providing relevant MSP recommendations is therefore to look more closely at the possible conflicts between OWE generation/transmission and other maritime uses identified above and to consider how they can be mediated or mitigated. Conflicts can arise for several reasons: a lack or shortage of appropriate regulation and policies, inconsistent management of human activities, or insufficient information.[24] Thus, the findings are grouped within the three fields of policy & regulatory framework, spatial management and information sharing.

Policy & regulatory framework

Nature protection and fishing can both benefit from the presence of OWFs if the appropriate policies are put in place to create a no-take zone around OWFs and/or artificial reefs around submarine foundations (such reefs have been shown by several studies to increase the diversity and richness of marine life).[25,26] Moreover, the health of ecosystems and the effects of climate change can be examined using the pre-existing sensors which monitor the status of cables.[27] Fishing can be further facilitated if regulations allow the use of certain types of fishing gear (fishing with lines as opposed to nets, for instance).[28] In addition, suitable procedures should be defined for needs such as determining liability in case of accidents.[29]

Spatial needs of OWE sector

Spatial management

Certain potential conflicts between OWE generation/transmission infrastructure and other uses can be mitigated through appropriate siting and spatial management measures. For instance, it is important to delineate cable corridors where fishing and navigation are restricted, as well as the area around OWFs and cables reserved for maintenance, so as to avoid any damage to cables. Adequate safety distances between vessels and OWE infrastructure also need to be established and enforced.

The multi-use concept

The multi-use approach, an umbrella term for the joint use of maritime resources in close geographic proximity, was investigated in depth in the Multi-Use in European Seas (MUSES) project.[30] The approach covers a multitude of use combinations in the marine realm and represents a radical departure from the concept of exclusive resource rights to propose an inclusive sharing of resources between several types of uses.

It is important to ensure that cable routes do not overlap with areas where resources are being extracted from the seabed or with Underwater Cultural Heritage (UCH) sites (this is discussed at greater length in the Baltic InteGrid publication 'Impact mitigation strategy of the Baltic Offshore Grid' from July 2018). Moreover, laying cables through maritime protected areas (MPAs) may be subject to several restrictions depending on the category of the MPA.[31] Conflicts with pre-existing cables could be kept to a minimum through crossing protection measures such as abrasion guards, reduction of the slope of the crossing and safeguards against thermal problems. Any issues between new onshore grid connection points and other maritime and coastal uses should be considered separately for each location.

Existing frameworks for mitigating conflicts

Several instruments and mechanisms have been established to promote the co-existence of different maritime uses in the same space. On a political level, they include the Integrated Maritime Policy and the MSP Directive, while relevant scientific structures comprise the MUSES,[32] TROPOS, SOMOS and MARIBE projects. These mechanisms have helped reformulate many potential spatial conflicts between OWE and other maritime uses as opportunities for synergies through the application of a multi-use framework, reconciling OWFs with aquaculture, fisheries or tourism, among others.

Information sharing

Effective information exchange can broaden stakeholders' understanding of the environmental impact of their actions, enhance knowledge about wildlife, help avoid disturbances to ecosystems, and enhance the understanding of sustainable development mechanisms. In this context, the HELCOM-VASAB MSP Working Group is currently developing guidelines to determine a data structure for the interoperability and harmonisation of spatial data sets for use in transboundary MSP outputs.[33]

Best practices in information sharing

The UK Marine Data Exchange portal shows an example of how commercial monitoring data can be shared efficiently. The exchange provides access to survey data and reports collated during the planning, building and operation phases of offshore renewable energy projects. Developers are required to submit the collected data as part of the consent conditions.[34]

3. Recommendations to the maritime spatial planning process

Recommendations

While considering the implications of the MSP process for OWE development, it is important to remember that maritime spatial development plans are regulatory tools that formally assign sea space to specific uses. In a maritime spatial plan, this allocation can be established in the form of priority (with a given use having precedence in a specific area without other uses being excluded) or in the form of exclusivity (with only the use in question being authorised to occupy a given space).

So far, most of the countries in the BSR lack maritime spatial plans. As of September 2018, only Lithuania and Germany have established national plans covering their maritime areas; Germany is also close to releasing the second maritime spatial plan for its exclusive economic zone (EEZ). In most of the other countries, the plans are under development and should be complete by 2021. Currently, the first draft plans are at the consultation stage in Latvia, Poland and Sweden, while the plans of Denmark, Estonia and Finland and Denmark are under development. A brief overview of the current status of MSP development in the Baltic Sea countries is presented in Appendix 2 of the present publication.

As mentioned above, conflicts can occur due to a range of situations, which can roughly be subdivided into three categories: inadequacies in terms of policy and regulations, flawed spatial management or insufficient information. This section presents a detailed analysis of the interactions between the OWE sector and other maritime uses within these themes.

1) Policy & regulatory framework

The role of MSP is to analyse and allocate the spatial and temporal distribution of human activities in marine space by ensuring an environmental, social and economic balance.[35, 36] To make sure that maritime spatial plans can be elaborated in a way that ensures optimal efficiency and fitness for purpose, there is need for clear political will at the highest level. Overarching goals and strategy need to be determined by governments and preferably agreed upon at an international level. Ideally, OWE targets would be set and transmission grids be planned for the whole Baltic. This would not only streamline the MSP process as a whole but would also help planners to identify and prioritise maritime areas dedicated to OWE.

For the energy sectors, policy certainty is of crucial importance. Maritime spatial plans are a legal tool that regulates the usage of the maritime space. This means that it is crucial that OWE development be considered when plans are drawn up – if a country lacks well-defined and politically & socially accepted OWE targets, possibilities for OWE development can be limited or excluded.

Once adopted, maritime spatial plans are expected to be regularly revised – the EU's MSP Directive dictates that revisions should take place at least every ten years. However, it is up to the Member States to set shorter revision time intervals if they wish. It is important to ensure that this time interval is short enough to allow maritime spatial plans to keep up with changes in national policies and strategies in a timely manner.

The current regulatory framework requires EIAs to be carried out only for certain projects implemented in the sea. This leads to a somewhat unequal treatment of maritime uses: the ones for which an EIA is not required are regarded as less harmful for the environment and thus treated as inherently less risky. At the same time, for many maritime uses there are no detailed socioeconomic analyses to ensure that the decisions taken are optimal from an economic point of view. Both of these considerations may lead to the risks of OWE development being overstated and maritime space being allocated to other uses instead.

Recommendations

To balance the needs of the OWE sector and the needs of other sectors making use of sea resources, the MSP process should be based on a unified approach to all sectors. A common political denominator is needed that defines the importance of different sectors (and their prioritisation) for the development of the BSR. A comparable assessment of economic benefits all maritime uses – so-called evaluation of the productivity of marine uses – would set up the foundations for such a unified approach.

As concluded by the BaltSpace project, there is a need to anchor the national MSP policies in domestic institutional structures.[37] However, this process may also lead to a decreased efficiency of the MSP process in a given country if interdependencies between adjacent countries are not considered. Meanwhile, international cooperation is important to support the development of a cross-border meshed offshore grid, especially when a decision must be made regarding the spatial location of the corridors or transfer gates for interconnections. Enhanced and continued international coordination of institutions responsible for the MSP process and sustainable energy development in the BSR would not only boost the coherence of approaches towards OWE but also provide opportunities for administrators and stakeholders to communicate more effectively and enable the accumulation of experiences that can be fed into increasingly refined coordination efforts.

The concrete recommendations of the Baltic InteGrid related to the MSP policy & regulatory framework are:

1. Maritime spatial plans should be revised in a timely manner in response to major changes in national policies and strategies and industry-wide technological evolutions. This is especially relevant given the speed of offshore wind energy development – and attendant technological and policy advances – expected in the Baltic Sea in the coming decades.
2. There should be a unified approach to defining the priorities of the different sectors in the maritime spatial plans; any EIAs and other analyses required should be carried out in a comparable manner for all maritime uses. The same methodologies should be developed and applied across countries for the evaluation of the productivity of marine space. There should be continuous international coordination and cooperation among institutions responsible for MSP processes and OWE development in the BSR, among other things to define corridors for interconnectors.
3. Policy makers and public authorities should ensure that the OWE sector has a clear political mandate on the national and international level with well-defined targets in the short and long term. The targets should be communicated properly at the local and international levels.
4. OWF and grid operators should consider setting up pan-Baltic associations/clusters (or strengthening existing ones) to represent their interests and act as a contact point for the government.
5. OWF and grid operators should consider organising face-to-face and/or online discussions within each sector before joining cross-sectoral MSP consultations.
6. To support international meshed offshore grid development, there should be cooperation between national MSP authorities and energy authorities from bordering countries to locate corridors and transfer gates for interconnectors.

2) Spatial management

Given the expected scope of the coming expansion of OWE in the Baltic and the fact that maritime space will become a valuable limited resource, there is an urgent necessity to fully understand the environmental effects of OWE installations (e.g., the creation of new habitats in OWF areas that act as artificial reefs) and reliably evaluate the economic benefits of the OWE sector. In fact, this is necessary for all maritime uses: decision-makers need to be given a reliable tool to support their decisions, especially in a long-term perspective. A common approach to the appraisal of sustainability in all

Recommendations

BSR countries would be very welcome in this context. This approach should be based on an evaluation of the productivity of the marine space used by each sector. The starting point for such an evaluation would be a tested and verified methodology – however, no such methodology currently exists.

An integrated approach to the MSP process would help reconcile conflicts and streamline developments. Managing potential sector conflicts early on would prevent many subsequent objections and make legal recourse less likely. The management of sectoral conflicts, which is also an issue of coordination, facilitates development by ensuring agreement on the horizontal (between sectors) and vertical (within a sector) levels. In practice, in many cases, conflicts are managed through consultations as part of the EIA of individual investment projects. This, however, seems to be insufficient for sound and forward-looking planning of maritime space. A good example on how potential conflicts can be resolved can be found in Scotland, where the authority responsible for development of maritime plans has introduced an additional (above minimum required standards) communication strategy based on a proactive engagement procedure jointly agreed among sectors.

Building on the example of the Baltic Energy Market Interconnection Plan (BEMIP), it should be possible to create a body or a joint initiative that would undertake coordinated actions for the development of a meshed offshore grid in the Baltic. Sharing available guidelines and best practice experience by MSP agencies, public authorities and public sector representatives involved in OWE may also contribute to solutions for minimising conflicts.

BEST PRACTICES IN CROSS-SECTOR COLLABORATION THROUGH A MEDIATING BODY

Regional level (example of the North Sea)

The North Sea Countries' Offshore Grid Initiative (NSCOGI) facilitates coordinated actions for offshore grid development between ten countries. Such coordination is necessary to enable more efficient energy transmission and help consolidate the European energy market. The advantages include increased operational flexibility, which is made possible by the consolidated network, as well as greater resilience for individual offshore wind power plants. In addition, larger (and thus fewer) cables and fewer landing points permit a reduction in overall environmental impact. Moreover, the meshed grid solution allows more space to be conserved for other uses. NSCOGI has been integrated into the Political Declaration on energy cooperation between the North Seas Countries, or North Seas Energy Cooperation, which was formed in 2016 to strengthen energy cooperation around the North Sea and improve conditions for the development of offshore wind energy so as to ensure a sustainable, secure and affordable energy supply in the area.

National level

Marine Scotland (MS) is the main authority responsible for the development of the National Marine Plan in Scotland.[38] In addition to its work on better understanding the social, economic and environmental needs of the offshore wind sector, MS is facilitating a co-ordinated and collaborative programme for social, economic and environmental research. To achieve better coordination with other sectors like fisheries and shipping, which may affect or be affected by OWE development, MS developed a communication strategy for the purpose of more proactive engagement through a procedure that has been jointly agreed among sectors. This is implemented in addition to already existing consultation procedures within sectorial planning and licencing.

Recommendations

The identification of shared drivers and benefits among different stakeholder groups (during discussions among stakeholders from different sectors) and the creation of a common vision on the use of clean energy sources in the Baltic Sea would be crucial steps toward a successful and sustainable OWE development. In addition, policies with both concrete targets and a clear commitment to OWE should be promoted in MSP practice, since they can generally enable more efficient and constructive processes.[39] Moreover, the potential reduction in conflicts that is being made possible by the development of technology in the OWE sector (e.g., floating platforms with incorporated aquaculture devices) and other maritime sectors should be investigated and communicated to interested stakeholders.

The Baltic InteGrid project proposes the following recommendations for spatial management:

7. Multi-use applications to enable synergies between OWE and other sea uses should be encouraged by MSP authorities on the basis of input from OWF operators and investors. This should include the development and implementation of guidance/regulations facilitating the deployment of multi-use solutions (e.g. single licensing process, risk-sharing rules).
8. MSP authorities should empower the early engagement of OWE stakeholders, including face-to-face consultations/dialogue with the presence of principal decision-makers from the energy sector. Sufficient resources should be set aside for this process.
9. MSP authorities should facilitate formalised coordination across the entire range of government institutions and authorities involved in maritime topics – for instance through the establishment of mechanisms or a central organisation responsible for inter-sectorial coordination.
10. MSP authorities should ensure that they have at their disposal all the crucial information in terms of allocating space for OWE (e.g., infrastructure standards, recommendations from insurance companies), and OWF and grid operators should provide this information regarding all potential constraints (buffer zones for cables, transformer stations, etc.). This information is necessary to properly designate infrastructural corridors, for instance, as well as to plan the transfer gates for interconnectors across borders.

3) Information sharing

At the moment, there is great fragmentation in the data required for MSP. These data are held by a range of institutions that represent different sectors, such as transport, environmental protection and tourism. Complicated as it is at the national level, the situation is even more complex when it comes to cross-border harmonisation of maritime spatial plans. There are some ongoing efforts to gather and harmonise data and information (for instance initiatives undertaken in the MSP-related projects mentioned above, by HELCOM or the HELCOM-VASAB MSP Working Group); however, there is still no central common management system at the international level. Such a system should be based on harmonised/standardised methods of data collecting and it should facilitate data and information storage and exchange.[40] Its construction could start with the establishment of a sectoral management system for a single sector, which could blaze a trail for further systems in more sectors.

Another important topic, from a regulatory perspective, is the availability and sharing of the environmental data required by the agencies in charge of formulating and implementing MSP for well-formulated and constructive SEAs. These data are to a large extent collected throughout the EIA process and are therefore in the possession of investors. A mechanism should be established to enable their fair use so as to enable the best possible SEAs.

The Baltic InteGrid recommendations regarding information sharing within MSP are the following:

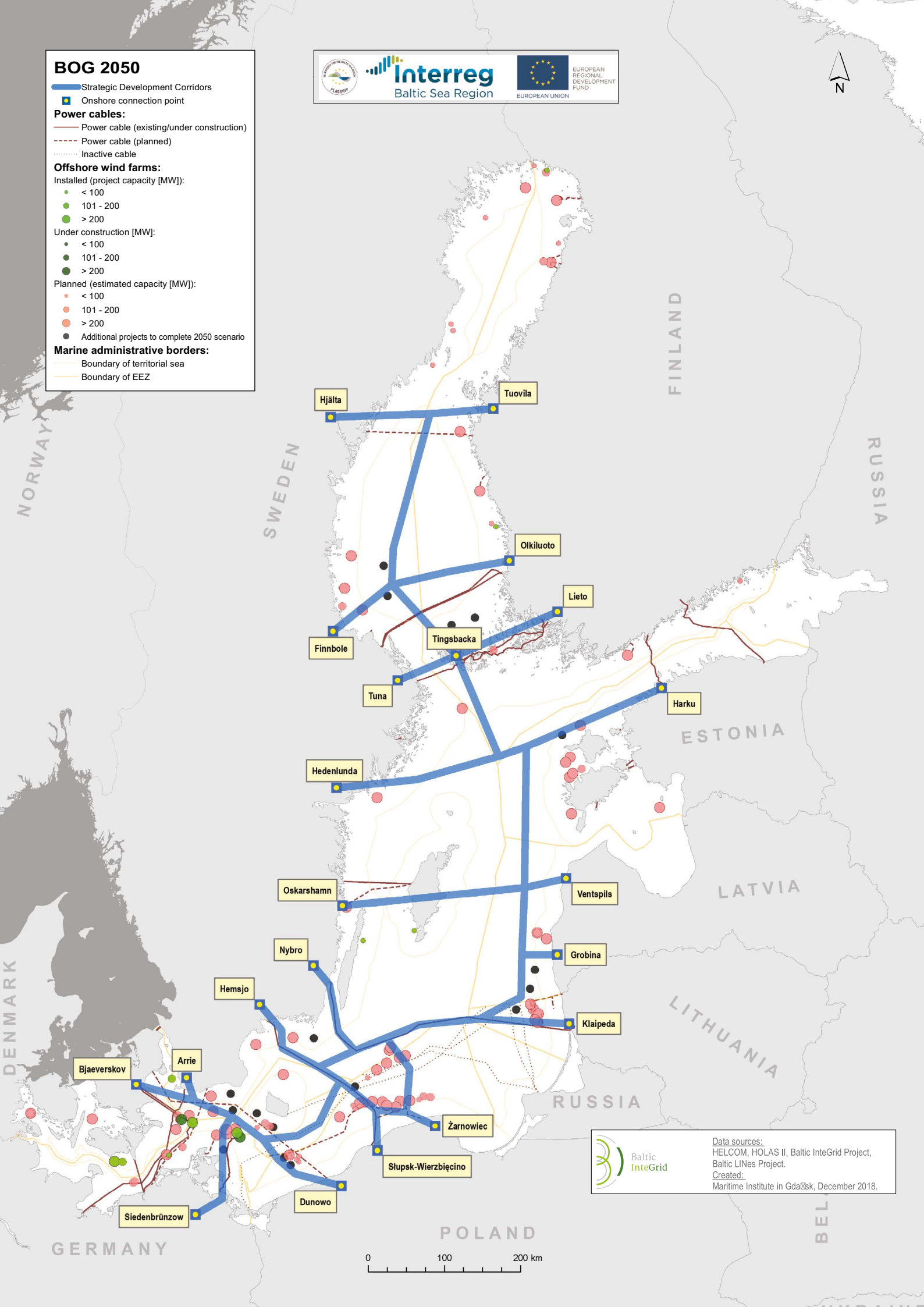
11. The public authorities involved in producing and implementing MSP policy should establish efficient data and information management systems at the scale of the BSR. These should be

composed of: (1) harmonised/standardised methods of data collecting, (2) a joint information system that integrates, stores, edits, analyses, shares and displays information, and (3) a data and information coordination centre where all the relevant data and information available are stored and updated in a centralised way.[41, 42]

12. Public authorities should create mechanisms that are agreed with the OWE sector (including a financial scheme for cost sharing, among others) to enable the broader use of commercial monitoring data collected for the purpose of OWE investments, including data collected for EIAs.

Recommendations

© [Fred. Olsen Windcarrier AS]


BOG 2050
Strategic Development Corridors
Onshore connection point
Power cables:
Power cable (existing/under construction)
Power cable (planned)
Inactive cable
Offshore wind farms:
Installed (project capacity [MW]):
< 100
101 - 200
> 200
Under construction [MW]:
< 100
101 - 200
> 200
Planned (estimated capacity [MW]):
< 100
101 - 200
> 200
Additional projects to complete 2050 scenario
Marine administrative borders:
Boundary of territorial sea
Boundary of EEZ
Interreg
Baltic Sea Region
EUROPEAN REGIONAL DEVELOPMENT FUND
EUROPEAN UNION
N
FINLAND
NORWAY
SWEDEN
RUSSIA
ESTONIA
LATVIA
LITHUANIA
DENMARK
GERMANY
POLAND
Hjälta
Tuovila
Olkiluoto
Lieto
Finnbole
Tingsbacka
Tuna
Harku
Hedenlunda
Oskarshamn
Ventspils
Nybro
Grobina
Hemsjo
Klaipeda
Bjaeverskov
Arrie
Żarnowiec
Słupsk-Wierzbięcino
Dunowo
Siedenbrünzow
0
100
200 km
Baltic InteGrid
Data sources:
HELCOM, HOLAS II, Baltic InteGrid Project, Baltic LINes Project.
Created:
Maritime Institute in Gdańsk, December 2018.

Appendices

A.1 The status of OWE in the countries in the Baltic Sea Region

As of December 2018, there were twenty OWFs operating in the Baltic Sea: ten in Denmark, two in Finland, four in Germany and four in Sweden. There are numerous plans for expansion in almost all countries in the BSR, with a total of more than 80 projects covering the whole range from early studies to fully permitted. While the Baltic had an installed capacity of just 1.8 GW in 2017, it is expected to host up to 9.5 GW by 2030 and up to 35 GW by 2050.

Figure 3: Spatial distribution of OWFs in operation, under construction or in planning stages.

A.2 Overview of the status of maritime spatial plans in countries in the Baltic Sea Region

	Progress of maritime spatial plan	Legal status of maritime spatial plan	Role of maritime spatial plan in the construction of OWFs	Are OWFs allowed?
Finland[I]	Under development	Non-binding, strategic plan	Marine uses examined in the maritime spatial plan include energy.	Not considered
Estonia[II]	Under development (expected to be adopted by the end of 2019/ beginning of 2020)	Binding	Identification of areas	Minimum distance is 10–12 km
Latvia[III]	In the consultation stage (second/final draft released in July 2018)	Non-binding, strategic plan	Areas identified, with the option to build OWFs in other areas if all conditions are met	Minimum planning distance is 8 km
Lithuania[IV]	In place since 2014 (currently being updated as a revision of Lithuanian Comprehensive Plan)	Binding	Plan proposes suitable areas, while the competent ministry is responsible for management	Beyond 20 m isobar line
Poland[V]	In the consultation stage (first draft released in June 2018)	Binding	Plan indicates areas suitable for OWFs	Only in EEZ
Germany[VI]	First plan for EEZ in place in 2009; second plan for EEZ under development (expected to be adopted by 2021)	Binding	Important for the federal plan (EEZ), and a guide for state waters	OWF areas indicated in the plan for EEZ; possibility for other areas to be designated
Denmark[VII]	Under development (first draft by mid-2019, final plan by 2021)	Binding	Plan coordinates all marine uses; the Danish Energy Agency is responsible for planning and management of OWFs	Location depends on size: 4–20 km from shore for smaller OWFs and over 15 km for large OWFs
Sweden[VIII]	In the consultation stage (three regional plan consultations by October 2018)	Non-binding regional plans	OWF areas not strictly defined by the plan; the Swedish Energy authority defines areas of national interest for OWFs, with possibility for more suitable areas to be proposed	On a case-by-case basis

I For more information, see Ministry of the Environment: www.ym.fi, www.merialuesuunnittelu.fi
II For more information, see Ministry of the Finance: www.mereala.hendrikson.ee
III For more information, see Ministry of Environmental Protection and Regional Development: www.varam.gov.lv
IV For more information, see Ministry of the Environment: www.am.lt
V For more information, see Ministry of Maritime Economy and Inland Navigation: www.mgm.gov.pl, Maritime Office in Gdynia: www.umgdy.gov.pl
VI For more information, see EEZ MSP. Bundesamt für Seeschifffahrt und Hydrographie (BSH): www.bsh.de; territorial waters: www.ikzm-strategie.de
VII For more information, see Danish Maritime Authority, Ministry of Business and Growth: www.dma.dk
VIII For more information, see Swedish Agency for Marine and Water Management (SWAM): www.havochvatten.se

Notes

1. EC, COM/2008/0768. Offshore wind energy: Action needed to deliver on the energy policy objectives for 2020 and beyond
2. European Union (2018). The 2018 annual economic report on the EU blue economy
3. Baltic SCOPE project (2017). Reports available on: http://www.balticscope.eu/events/final-reports/
4. EC, COM/2008/0768. Offshore Wind Energy: Action needed to deliver on the Energy Policy Objectives for 2020 and beyond
5. European Union (2018). The 2018 annual economic report on the EU blue economy
6. OECD (2016). The ocean economy in 2030. Paris. Available on: http://dx.doi.org/10.1787/9789264251724-en
7. Directive 2014/89/EU of the European Parliament and of the Council of 23 July 2014 establishing a framework for maritime spatial planning. Official Journal of the European Union, L 257/135
8. EC, 2008, COM(2008) 791. Roadmap for maritime spatial planning: Achieving common principles in the EU, Brussels
9. Baltic SCOPE project (2017). Reports available on: http://www.balticscope.eu/events/final-reports/
10. EC, COM/2008/0768. Offshore wind energy: Action needed to deliver on the energy policy objectives for 2020 and beyond
11. Baltic InteGrid (2018). Baltic Offshore Grid. Summary of interdisciplinary research and roadmap for a 2050 vision. Available at the project website: http://www.baltic-integrid.eu/index.php/download.html
12. Baltic InteGrid (2018): Maritime spatial planning and Baltic Grid. Status of the MSP and grid variants development. Available at the project website: http://www.baltic-integrid.eu/index.php/download.html
13. Baltic InteGridd (2018): Establishing an offshore meshed grid. Policy and regulatory aspects and barriers in the Baltic Sea Region
14. Baltic InteGrid (2018): Towards a Baltic Offshore Grid. Connecting electricity markets through offshore wind farms; pre-feasibility study report. Available at the project website: http://www.baltic-integrid.eu/index.php/download.html
15. ICES, 2017. Report of the workshop on conflicts and coexistence in marine spatial planning (WKCCMSP), 8–12 February 2016, Geesthacht, Germany. ICES CM 2015/SSGEPI:22. 18 pp.
16. Charbonnel E. et al. Effects of increased habitat complexity on fish assemblages associated with large artificial reef units (French Mediterranean coast) ICES Journal of Marine Science, Volume 59, Issue suppl, 1 January 2002, Pages S208–S213
17. WWF (2014). Environmental Impact of Offshore Wind Power Production in the North Sea: A literature overview
18. Renewable Energy Sources Act (EEG 2017)
19. Likic, I., Schultz-Zehden, A., Fernandez, J., Pascual, M., Nigohosyan, D., Maarten de Vet, J. (2018). Maritime spatial planning for blue growth, European Union, 2018
20. Garthe, S., Markones, N., Corman, A.M. (2017). Possible impacts of offshore wind farms on seabirds: a pilot study in Northern Gannets in the southern North Sea. J Ornithol 158:345–349
21. WWF (2014). Environmental impact of offshore wind power production in the North Sea: A literature overview
22. Baltic InteGrid (2018): Impact mitigation strategy of the Baltic Offshore Grid. Available at the project website: http://www.baltic-integrid.eu/index.php/download.html
23. Likic, I., Schultz-Zehden, A., Fernandez, J., Pascual, M., Nigohosyan, D., Maarten de Vet, J. (2018). Maritime spatial planning for blue growth, European Union, 2018
24. http://www2.seawind.eu/en/facts-and-figures/
25. Charbonnel E. et al. Effects of increased habitat complexity on fish assemblages associated with large artificial reef units (French Mediterranean coast) ICES Journal of Marine Science, Volume 59, Issue suppl, 1 January 2002, Pages S208–S213
26. WWF (2014). Environmental impact of offshore wind power production in the North Sea: A literature overview
27. Baltic InteGrid (2018): Impact mitigation strategy of the Baltic Offshore Grid. Available at the project website: http://www.baltic-integrid.eu/index.php/download.html
28. Joanna Przedrzymirska, Jacek Zaucha et al. (2018). Multi-use concept in European sea basins, MUSES project. Edinburgh
29. Lena Bergström et al. (2014). Effects of offshore wind farms on marine wildlife – a generalized impact assessment. Environmental Research Letter 9: 12 p.
30. MUSES project (2018). Reports available on: https://muses-project.eu/downloads/
31. Baltic InteGrid (2018): Impact mitigation strategy of the Baltic Offshore Grid. Available at the project website: http://www.baltic-integrid.eu/index.php/download.html
32. MUSES project (2018). Reports available on: https://muses-project.eu/downloads/
33. HELCOM-VASAB Working Group on Maritime Spatial Planning (2018). Available on/; http://www.helcom.fi/helcom-at-work/groups/helcom-vasab-maritime-spatial-planning-working-group
34. RGI (2016). Renewables Grid Initiative. 'Subsea cable interactions with the marine environment – Expert review and recommendations report Abridged version.'
35. Ehler, C., and F. Douvere. Visions for a Sea Change. Report of the First International Workshop on Marine Spatial Planning. Intergovernmental Oceanographic Commission and Man and the Biosphere Programme. IOC Manual and Guides. UBESCO, 2007, 83 p.
36. BaltSeaPlan Vision 2030. Towards the sustainable development of the Baltic Sea space. Baltic Sea Region Programme 2007–2013
37. Ibid.
38. Scotland's National Marine Plan (2015). Available on: http://www.gov.scot/Publications/2015/03/6517
39. EC, 2017. Report on the lue Growth Strategy: Towards more sustainable growth and jobs in the blue economy, Brussels
40. Ibid.
41. Baltic SCOPE project (2017). Reports available on: http://www.balticscope.eu/events/final-reports/
42. BaltSeaPlan Vision 2030. Towards the sustainable development of the Baltic Sea space. Baltic Sea Region Programme 2007–2013

List of Figures

Figure 1:
Map of current sea uses in the Baltic Sea and the corridors proposed within the framework of BOG 2050 9

Figure 2:
Energy generation and transmission system and other maritime uses 11

21

Figure 3:
Spatial distribution of OWFs in operation, under construction or in planning stages 20

List of acronyms

BOG 2050	Baltic offshore grid vision for 2050
BSR	Baltic Sea Region
EIA	Environmental impact assessment
EEZ	Exclusive economic zone
ENTSO-E	European Network of Transmission System Operators
EU	European Union
HELCOM	Baltic Marine Environment Protection Commission or Helsinki Convention
MIG	Maritime Institute in Gdansk
MSP	Maritime spatial planning
NREAP	National Renewable Energy Action Plan
OWE	Offshore wind energy
OWF	Offshore wind farm
SEA	Strategic environmental assessment
VASAB	Vision and Strategies around the Baltic Sea

www.baltic-integrid.eu