Baltic LINes

Coherent Linear Infrastructures in Baltic Maritime Spatial Plans

IDENTIFICATION OF TRANSNATIONAL PLANNING CRITERIA

Work Package 4.2

Interreg Baltic Sea Region

EUROPEAN UNION
EUROPEAN REGIONAL DEVELOPMENT FUND

Editing authors:

Nele Kristin Meyer, Federal Maritime and Hydrographic Agency (BSH); nelekristin.meyer@bsh.de

Hanna Nieminen, Finnish Environment Institute (SYKE); Hanna.P.Nieminen@ymparisto.fi

Riku Varjopuro, Finnish Environment Institute (SYKE); riku.varjopuro@ymparisto.fi

Annika Koch, Federal Maritime and Hydrographic Agency (BSH); annika.koch@bsh.de

Foreword

As the EU MSP Directive (2014) requires all member states to adopt Maritime Spatial Plans for their sea spaces by 2021, many countries are currently in the drafting phase, designating areas for the use by one or more sectors in the coming decades. Planning the national sea area is a complex task where the different sectoral interests need to be carefully weighed against each other, conflicts have to be solved and planning solutions need to be found. Finding the balance between economic interests of the shipping industry, the offshore energy industries or fisheries, and space needed for environmental protection or recreational uses, is even further complicated by the desire to plan coherently across borders.

The EU Interreg project Baltic LINes focusses the topics of shipping and offshore energy in the context of transnational MSP. Work package 4 concentrates on the identification of planning mismatches for these two sectors in border areas and collects methods how these could be avoided or solved. Planning criteria and their (different) application in different countries are of high relevance when trying to find the source for mismatches and to be able to suggest planning solutions. This report summarizes the knowledge gathered on planning criteria for shipping and offshore energy in the context of MSP. Main findings were made in course of discussions during project meetings, stakeholder consultations and expert interviews.

After the introduction part, legal aspects and international regulations are presented to form the general basis on which planning of shipping and offshore energy is accomplished. The third chapter introduces the most commonly used planning criteria and describes the different national approaches for the planning of shipping and offshore energy in the context of MSP. The conclusion summarizes the findings of the paper and gives advice on how to approach transnational planning of shipping and energy to obtain greater coherency now and in future. The paper is complemented by two guidelines that were developed by the project partnership: “A practical guide to the planning of ship corridors in Maritime Spatial Planning” and “A practical guide to the planning of offshore energy in Maritime Spatial Planning”. The guidelines suggest step-wise approaches for the sectoral planning and aim to help planners in the MSP draft phase.

The documents contain opinions and views from the Baltic LINes team and do not necessarily reflect the perspectives of the national competent planning authorities.

Hamburg/ Helsinki, August 2018

Table of contents

1. Introduction

Over the past decades there has been an increasing spatial demand for human activities in the Baltic Sea. Competing demands result in potential conflicts between different sectors as well as between different uses and marine nature conservation - also on transnational level. Maritime Spatial Planning (MSP) has been identified as the central instrument for creating a balance between sectors and managing the sea more coherently and is supported by the European Union (EU). The adoption of the EU Directive on Maritime Spatial Planning (2014/89/EU) has promoted the process of MSP as it requires all coastal EU member states to prepare cross-sectoral maritime spatial plans by 2021. The MSP Directive recognizes that MSP is a national competency - each member state defines the topics, format and process of their national MSPs.

Countries in the Baltic Sea Region (BSR) are currently planning the use of their respective sea areas. The EU MSP Directive (2014) sets a common framework for respective plans. Also jointly formulated HELCOM-VASAB MSP principles (HELCOM-VASAB 2010) as well as a roadmap for MSP in the Baltic Sea Region (HELCOM-VASAB 2013) are at hand to support the national MSP processes. Representatives of Baltic Sea countries meet regularly in the context of the HELCOM-VASAB MSP working group and there has been a series of MSP related projects that have promoted collaboration between the countries. As a consequence there is a lot of exchange between the Baltic Sea countries and, on a general level, common understanding of the MSP already.

When looking at a more detailed level, however, countries do not practice MSP in an identical way and differences can be identified (see table 1). For instance, how binding the MSP plans are in legal terms, the temporal planning horizon or the scale of planning (i.e. the level of detail the plan is designed for). Also the type and number of sectors addressed in MSP varies between countries. The countries planning authorities are allocated at very different ministries ranging from the ones responsible for the environment to those that are in charge for transport infrastructure or the economic development of a country. Accordingly the overriding objectives MSP shall be used for can vary considerably; emphases may be put on economic, social or environmental preferences depending on the countries future aims. It is also often noted that MSP processes have varying timelines in different countries - some are about to start their process and others have already finalized their first round of planning and are about to start with the second edition.

Despite these differences, the EU MSP Directive (2014) calls for consistency and coherence of national maritime spatial plans across borders. Promoting greater coherence among plans despite the notification of different planning systems represents the key challenge especially for those uses and activities that are of transnational character. Therefore, Baltic LINes addresses specifically the coherent planning of shipping routes and energy infrastructure and aims to support transnational cooperation in MSP across the BSR.

Table 1. Country information table showing differences and similarities in MSP processes

	Denmark	Estonia	Finland	Germany	Latvia	Lithuania	Poland	Sweden
Competent Ministry	Ministry of Industry, Business and Financial Affairs	Ministry of Finance	Ministry of Environment	Ministry of Transport and Digital Infrastructure	Ministry of Environmental Protection and Regional Development	Ministry of Environment	Ministry of Maritime Economy and Inland Navigation	Ministry of Environment and Energy
Competent planning authority	Danish Maritime Authority	Spatial Planning Department	Department of Built Environment & Regional Councils	Federal Maritime and Hydrographic Agency & Coastal Federal States	Department of Spatial Planning	MSP tendered to consortium led by Klaipeda University	Department of Maritime Economy & Maritime Offices of Szczecin, Słupsk and Gdynia	Swedish Agency for Marine and Water Management
Number of planning areas	1 National MSP	1 (+2) 2 earlier regional plans incorporated into national MSP	3 +1 3 Regional MSPs 1 Åland	1+3 1 EEZ 3 Territorial Waters	1 National MSP	1 National MSP	1 Coordinated between three regions	3 Regional MSPs (from 1nm zone)
Expected progress in MSP (national plans)	1st edition 1st draft: ~ 04/2019, MSP: ~12/2020	1st edition 1st draft: ~07/2018, MSP: ~09/2019	1st edition 1st draft: ~04/2020; MSP: ~03/2021	2nd edition 1st draft:01/2019 MSP: ~01/2020	1st edition 1st draft: ~12/2016 MSP: ~12/2018	2nd edition 1st draft: ~06/2019 MSP: ~06/2020	1st edition 1st draft: ~04/2018 MSP: ~07/2019	1st edition 1st draft: ~04/2017 MSP: ~12/2019
Scale of MSP	Not decided yet	1:200.000	Not decided yet	1:400.000	1:200.000	1:200.000	1:200.000	1:700.000 – 1:1.000.000
Planning horizon	~2050	~2030	Not decided yet	Not decided yet	~2030	~2050	~2030	~2050
Binding/non-binding MSP	Binding	Binding for all structures, incl. OWE installations	Very strategic, non-binding	Binding	Non-binding	Binding	Binding	Non-binding

	Denmark	Estonia	Finland	Germany	Latvia	Lithuania	Poland	Sweden
National MSP objective	Promote economic growth, the development of marine areas and the use of marine resources on a sustainable basis.	Define the long-term uses of the assigned marine area through a public process, taking into account the different economic, social, cultural and environmental interests and needs.	Promote sustainable development and growth of different uses of marine areas, sustainable use of marine resources and achieving good status of the marine environment.	Promote sustainable spatial development, which brings social and economic demands regarding sea space in line with the sea's ecological functions and leads to a permanent, large scale balanced order.	Balance environmental, societal and economic interests and promote sustainable development of marine space by allowing or limiting actions at sea and seacoast. Balance interests of coastal municipalities and the state.	Foster the regulation of marine uses and create preconditions for development of maritime economic activities. MSP as precautionary measure for sustaining a good status of the marine environment.	Create preconditions for blue economy growth and to coordinate (functionally and spatially) the various maritime economic activities. Ensure the realization of maritime investment' projects in sustainable way.	Describe Governments' & institutions overall view on how we use our oceans (now & future), support the development of sea-linked industries, increase predictability for actors that intend to operate offshore, facilitate management work (i.e. environmental assessment, fisheries policy and MPA protection).

1.1 Aim of the report

This report is produced as a part of Baltic LINes project's Work Package 4 (WP4). Work Package 4 can be seen as one of the centerpieces of the project as it aims at proposing transnationally coherent planning criteria and solutions for linear infrastructures (namely shipping and energy). One important step for proposing common planning solutions is the identification of transnational, cross-sectoral planning criteria.

The original aim of WP4 has been the assessment of existing planning criteria and the development of joint planning criteria. Rationale behind this has been 1) the desire to match the respective national maritime spatial plans at borders, 2) understand the planning approaches to shipping and energy, and 3) work on the 'planning mismatches'. It is important to notice that the 'planning mismatches' at borders do not often pose any current operational problems since there is still enough sea space. However, issues may become more critical if sea space gets more limited and scarce due to increasing offshore installations and increasing maritime transport activities. Research on planning mismatches and national approaches to support development and planning of shipping and energy infrastructure can thus enhance planning security in the region.

Agreeing on certain planning criteria would require standardization of national approaches which seems to be fairly difficult due to aforementioned differences in planning systems. Therefore, project partners have come to the conclusion that finding agreement on a set of planning criteria cannot be realized in course of the project as it would lead to only very general findings. Moreover, it was found more useful to collect those planning criteria that are most frequently used by countries, describe the national approaches and suggest a way how to approach the planning of shipping and energy for MSP on a practical level. Explaining the rationales behind the planning of shipping and offshore wind energy (OWE) infrastructure in different countries may also help to reduce the need for harmonization of maritime spatial plans in some cases.

1.2 Definition of planning criteria

In general, planning criteria can be seen as *factors relevant for assessment, regulation and spatial designation of specific spatial uses and activities*. Spatial designation refers here to the selection of suitable areas for offshore wind farms, cable corridors and important corridors for shipping ("site/corridor selection criteria"). Thus, planning criteria are different factors that are considered when identifying and deciding which areas are suitable for a specific use.

Literally 'criterion' is a principle or standard by which something may be judged or decided. Often in the previous published reports, the following types of criteria for spatial designation are mentioned: 1) exclusionary criteria, 2) restrictive criteria, and 3) textual regulations (see table 2).

Table 2. Three types of criteria for spatial designations

Exclusionary criteria	Restrictive criteria	Textual regulations
Sometimes referred as "hard constraints", "no go areas" → areas that are not available Areas unsuitable for development due to natural or technical conditions Areas designated / licensed for other incompatible uses / priority areas for other uses	Sometimes referred as "soft constraints" Activities or interests to be considered that may preclude development Areas available for development only at a reduced density	Legislation or similar, with regard to e.g. 1) safety issues (buffers around offshore installations), 2) environmental aspects (e.g. avoidance of cable routing through Natura 2000), 3) height restrictions for offshore turbines, etc.

There is also a number of other criteria that might not have direct spatial implications, but are otherwise relevant part of the decision-making processes. These can be for instance different economical, technical, social etc. factors. However, these are not in the main scope of this paper.

2. General international regulations

This chapter provides an overview of the international regulations for the use of sea space by the shipping and energy sector.

Whenever one talks about legislation at sea, the United Nations Convention on the Law of the Sea (UNCLOS), which was adopted in 1982, will be mentioned. UNCLOS defines the rights and responsibilities of nations with respect to their use of the world's oceans, establishing guidelines for the industry, covering environmental interests, and rules the management of natural resources. UNCLOS determines a number of different zones of legislation from which only the following two are relevant for the Baltic Sea region (see figure 2):

(1) The Territorial Sea (TS) is the area that extends from the coastal baseline (usually the mean low-water mark) to a maximum of 12 nautical miles. The TS is regarded as the sovereign territory of the coastal nation, although foreign ships hold the right of innocent passage. This sovereignty also extends to the airspace above and seabed below.

(2) The Exclusive Economic Zone (EEZ) is the sea area that extends from the outer limit of the TS to a maximum of 200 nautical miles offshore. Here, a coastal nation has special rights regarding the exploration and use of marine resources, including energy production from water and wind. The difference between TS and EEZ is that the former gives full sovereignty over the seabed, the water column and the airspace, whereas the latter is merely a "sovereign right" to the water column and sea bed (see Fig XX). Subsequent to the EEZ the High Seas begin. In case the continental shelf exceeds 200 nautical miles the sovereign rights to the seabed may extend beyond the EEZ to the High Seas.

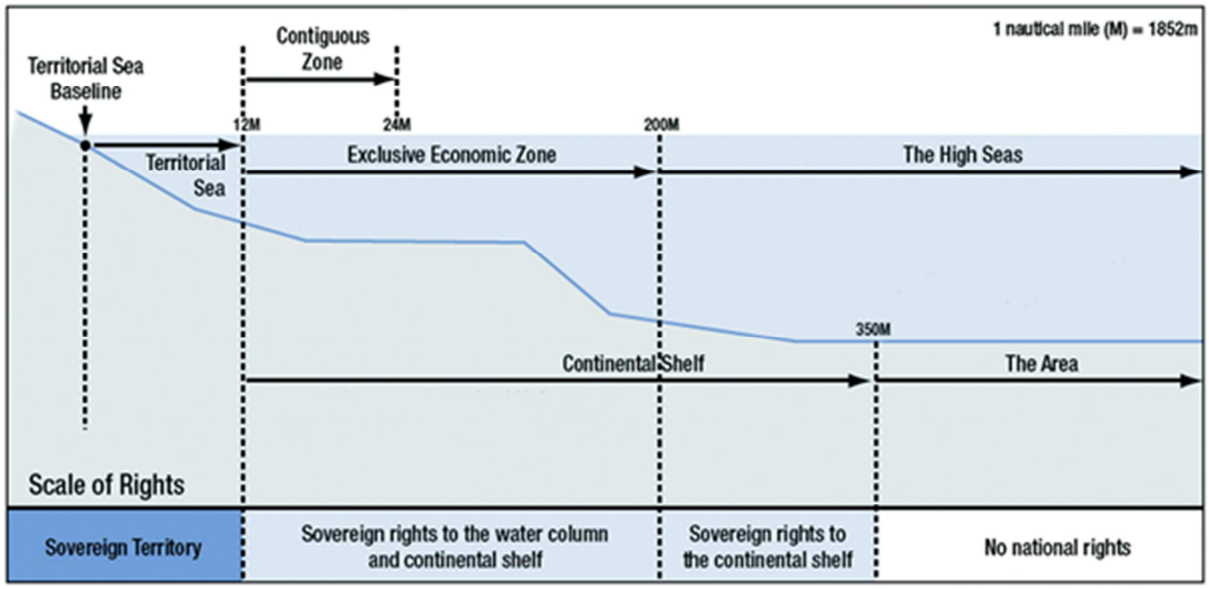

Figure 1. Maritime Zones according to UNCLOS 1982 (Lallier et al. 2013)

Regardless of these UNCLOS zones (and long before they were existent) maritime space has been occupied by ships for centuries. The construction of offshore wind farms (OWF) and related grid connections on the other hand started less than 30 years ago when UNCLOS was already in place (the first OWF was put into operation 1991 in Denmark). While the comprehensive regulatory framework for shipping has historically grown and is internationally recognized by basically all flag states, an international regulation framework for offshore energy production and related grid connections is as good as non-existent. International coordination of wind energy and grid development is based on much looser organizations and processes. The following subchapters give a more detailed overview about the regulations (and their absence) for shipping and energy in context of maritime spatial planning.

2.1. Shipping

The regulation of maritime traffic and related spatial restrictions for navigation are the result of a slowly over centuries evolving process. The busier the maritime straits became the more collisions and other accidents occured. Therefore, in 1846, the first collision regulations were enacted by the British Parliament for the Dover Strait, which is still one of the busiest areas at sea worldwide. Thereafter, safety at sea became more and more important and accidents, like the Titanic tragedy in 1912, acted as catalysts for the development of a comprehensive system of international regulations at sea as well as for the foundation of the International Maritime Organization (IMO) in 1958. Up to today the IMO is with 174 Member States the standard-setting authority when it comes to the regulation of international shipping.

The most relevant regulations for maritime spatial planning are the International Convention for the Safety at Sea (SOLAS), the Convention on the International Regulations for Preventing Collisions at Sea (COLREGs) and the General Provisions on Ship's Routeing Systems of the IMO (GPSR).

The first version of SOLAS was adopted in 1914 in response to the Titanic disaster; the latest version is SOLAS 1974, as amended. The convention specifies minimum standards for the construction, equipment and operation of ships to be ensured by the flag states. Safety of navigation urges the mandatory carriage of voyage data recorders (VDR) and automatic ship identification systems (AIS). The latter system is in turn not only used for determining the dimension of IMO routeing measures but also by maritime spatial planners as the main source for the definition of shipping areas in their plans (see also chapter 3.1. and Annex 2).

The latest COLREGs version of 1972 recognizes traffic separation schemes (TSSs) (first established in the Dover Strait in 1967) as spatial regulation mandatory for larger vessels. It also gives guidance in determining a safe speed and reducing the risk of collision when navigating in or near traffic separation schemes. COLREGs is divided into five sections and four annexes dealing with regulations for steering, signaling via lights, shapes and sounds as well as technical requirements for ships.

The GPSR is the standard reference for the design, development, charted presentation and use of routing measures adopted by IMO. The objective is to "improve the safety of navigation in

converging areas and in areas where the density of traffic is great or where freedom of movement of shipping is inhibited by restricted sea room, the existence of obstructions to navigation, limited depths or unfavourable meteorological conditions" (GPSR 1.1).

In the EEZ national governments are able to propose routing measures to the IMO (jointly if the EEZ of two or more countries is involved). The following routing measures can be proposed by governments to the IMO (according to IMO webpage):

- Traffic Separation Scheme: separation of opposing streams of traffic by the establishment of traffic lanes.
- Traffic Lane: a corridor with established one-way traffic; natural obstacles, including those forming separation zones, may constitute boundaries.
- Separation Zone: a zone (1) separating traffic lanes with opposite or nearly opposite directions; or (2) separating a traffic lane from the adjacent sea area; or (3) separating traffic lanes designated for particular classes of ship proceeding in the same direction
- Roundabout: a circular separation zone/ traffic lane within defined limits.
- Inshore Traffic Zone: a designated area between the landward boundary of a traffic separation scheme and the adjacent coast.
- Recommended Route: a route of undefined width, for the convenience of ships in transit, which is often marked by centre line buoys.
- Deep-water Route: a route within defined limits which has been accurately surveyed for clearance of sea bottom and submerged articles.
- Precautionary Area: an area within defined limits where ships must navigate with particular caution and within which the direction of flow of traffic may be recommended.
- Area To Be Avoided: an area within defined limits in which either navigation is particularly hazardous or it is exceptionally important to avoid casualties and which should be avoided by all ships, or by certain classes of ships

A proposal for a routing measure has to involve a description of the respective sea area (incl. offshore structures nearby), an agreement for the cooperation of states, traffic consideration, a hydrographic survey, and an overview about alternative routing measures. As the main goal of introducing routing measures is to improve safety, a probabilistic risk assessment in course of a Formal Safety Assessment (FSA) is therefore also strongly recommended. Once the documents are complete the IMO Sub-Committee on Navigation, Communications and Search and Rescue (NCSR) checks if the design of routing measures is in accordance with the GPSR standards, e.g. that the course alteration is as few as possible, route junctions are absent, traffic lanes adapt to water depth and designated navigable areas are from edge to edge usable. For the final approval of the routing systems the proposal is forwarded to the Maritime Safety Committee (MSC) of the IMO (see figure 2).

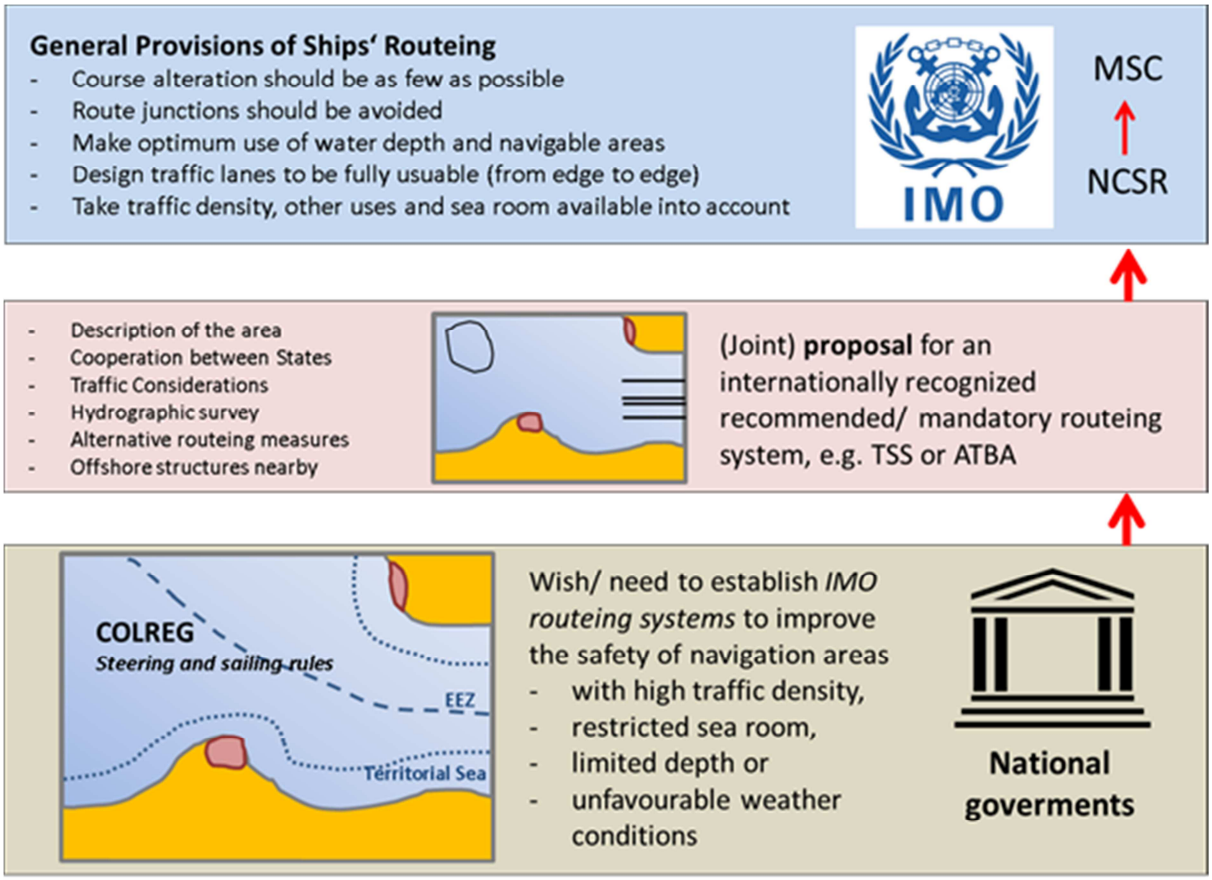

Figure 2. Schematic overview of the proposal process for ships' routing systems

All IMO routing measures are provided on nautical charts with respective explanations. A collection of all IMO routing measures (including textual note for each measure) as well as recommendations on route planning can be found in the Mariners' Routeing Guide (see e.g. http://balticsearouteing.dk/plan/).

2.2. Energy

In order to combat climate change there is a global need to increase the production of renewable energy considerably. The EU has been particularly active in supporting this development by launching a Renewable Energy Directive in 2009, an Energy Strategy in 2010 and a Roadmap to achieve the renewable energy target in 2011. In 2015 the EU kicked-off a policy process, called "Energy Union", to strengthen actions in order to reach the goals set. To increase the production of renewable energy, including offshore wind, has thus a strong political support. Obviously, energy policies have also other objectives such as energy security and affordability.

Aside from these EU ambitions, the Baltic Sea Region lacks an established intergovernmental collaboration to coordinate activities in the offshore energy field. Until 2015 the Baltic Sea Region Energy Cooperation (BASREC) fostered intergovernmental cooperation in regular meetings and by conducting studies such as the one on offshore wind energy potential in the BSR (http://basrec.net/projects/wind-power/). The Baltic Energy Market Interconnection Plan (BEMIP) is another, still active forum for collaboration between the BSR countries. Here, the main focus is on energy grids (electricity and gas), but it also follows up on the development of the offshore wind sector in the region. For instance, in 2018-2019 a study on potential of offshore wind and grid development was conducted for the BEMIP. Also the EU Strategy for the Baltic Sea (EUSBSR) has a dedicated policy area for energy. The EUSBSR policy on energy is focusing on six themes: electricity and gas markets, security of supply, energy infrastructure, power generation, renewable energy and energy efficiency. In 2015 a memorandum of understanding was adopted together with BEMIP to strengthen the coordination between the two processes and decision-making between in BSR countries.

The legal framework for allocating and considering locations for offshore renewable energy installations (OREIs) varies substantially from the one that exists for shipping sector. There is no international convergent and binding legal framework to regulate, for instance, the allocation of offshore wind energy installations. Also a recognized intergovernmental body (as compared to IMO for the shipping sector) is lacking.

Typically, the regulation of offshore renewable energy installations is based on regulation of other sectors – such as shipping, defense and nature protection. Thus, allocating locations for OREIS, there are lots of restrictions to start with. However, some international guidelines are relevant also for energy sector considerations. These are:

- UN Convention on the Law of the Sea (UNCLOS) – general principles (i.e. rights to decide and use sea areas) and mention of the possibility for coastal states to establish in EEZs “reasonable” (max. 500m) safety zones around artificial islands, installations or structures (incl. OREIs).
- International Maritime Organization (IMO) – designated sea-lanes and TSSs (Traffic Separation Scheme) are excluded zones for OREIs, but rerouting for the benefit of other sea uses is possible.
- Nature conservation regulation (CBD[1], IUCN[2], EU and HELCOM) – protected areas (often) prevent building of OREIs.

UNCLOS (Art. 60) states that countries have the exclusive right to construct, authorize and regulate the construction, operation and use of artificial islands (e.g. OREIs) in their EEZs. “The breadth of the

[1] CBD = Convention on Biological Diversity

[2] IUCN = International Union for Conservation of Nature

safety zones shall be determined by the coastal State, taking into account applicable international standards. Such zones shall be designed to ensure that they are reasonably related to the nature and function of the artificial islands, installations or structures, and shall not exceed a distance of 500 meters around them, measured from each point of their outer edge, except as authorized by generally accepted international standards or as recommended by the competent international organization. Due notice shall be given of the extent of safety zones" (UNCLOS Art. 60 §5). It is important to highlight that this 500m safety zone is meant as protection for the structure but not as a safety distance for ships (see also chapter 3.1.3).

3. Planning criteria

3.1. Shipping

When referring to spatial designations for shipping one has to distinguish between routing measures that are adopted by IMO and areas that are designated in course of maritime spatial planning. As described in chapter 3.1 the designation of IMO routing measures has a quite long tradition and started in areas characterized by many ship accidents. The main goal of routing measures is to directly increase the safety of navigation of today's traffic and thus adopted routing measures are mandatory to be used. However, the larger part of the sea area outside of IMO measures has remained unregulated and “freedom of navigation” prevails here. This is still the case, when maritime spatial planning is conducted in these unregulated areas as it doesn’t have any legal impacts on running ship traffic. However, as shipping and maritime transport is not only one of the most traditional uses but is also of high economic relevance for all Baltic Sea countries it is necessary to protect the activities of the shipping sector also in areas where IMO schemes are absent. This can be achieved by indicating the spatial demands in maritime spatial plans and reserve space for future times.

Usually the main goal for designating shipping areas in MSP is to safeguard space for current and/or future needs of the shipping sector during the weighting process as opposed to other uses. As a maritime spatial plan shall cover the spatial needs for different activities over the entire (national) sea area two questions arise: a) how to deal with IMO regulated areas and b) how to deal with areas that are completely unregulated to this date (i.e. how to transfer existent regulations and how to designate new areas for shipping). While transferring existing IMO regulations to an MSP seems to be fairly easy, the determination of how much space is needed for shipping outside the routing schemes (now and in future) is a more tricky question. In this context it is important to underline that even priority areas for shipping designated in maritime spatial plans shall not limit maritime transport to certain corridors nor regulate ship traffic (ergo “freedom of navigation” remains). This circumstance also explains why the responsibilities for MSP and those for the regulation of ship traffic often lie at different competent authorities.

Unlike international regulations for shipping are the MSP planning principles varying between countries. For example, while the in many countries just one type of area is used to designate shipping areas (usually called priority area for shipping), does Germany also designate so-called reservation areas for shipping, which have a different status when weighting with other uses.

The following chapter gives an overview of the parameters that are of importance for the designation of shipping areas in MSP. Underlying data and information will be presented and descriptions will be given on how planning criteria are applied in different countries. Table 3 gives an overview about the national characteristics for shipping corridor designations. All information was gathered in course of Baltic LINes meetings.

Table 3. Country information table showing differences and similarities in MSP shipping area designations

	Denmark	Estonia	Finland	Germany	Latvia	Lithuania	Poland	Sweden
MSP's role in providing space for ship traffic	Priority areas for shipping shall safeguard space for ship traffic, no incompatible activities (e.g. artificial installations) are allowed. Safety zones are included in these.	"Fairways" (parts of a waterway that are most suitable for water traffic) are published in navigational information , likely to be transferred to MSP	Presently priority areas are shipping lanes, traffic separation schemes and anchoring areas. These will be adopted into MSP.	Priority areas for shipping shall safeguard space for ship traffic, no incompatible activities (e.g. artificial installations) are allowed. Safety zones are added as reservation areas. These have a less strong status as priority areas in the weighting process.	Priority areas for shipping shall safeguard space for ship traffic. Safety zones are included in these. No incompatible activities (e.g. artificial installations) are allowed unless accepted by all competent authorities.	Priority areas for shipping shall safeguard space for ship traffic, other uses are allowed unless they are fixed installations, not compatible or disturb the traffic in any manner	Priority areas for shipping shall safeguard space for ship traffic, so that the development of this function cannot be constrict by other functions.	Priority areas for shipping shall safeguard space for ship traffic, conflicting or disturbing activities are restricted.
Existing IMO routeing measures	Large area is regulated by IMO, which will be transferred to MSP + 2nm safety zones along TSS	Several IMO routing measures in national sea area, likely to be adapted in MSP	Several IMO routing measures in national sea area, likely to be adopted into MSP.	Large area is regulated by IMO, which is also transferred to MSP + 2nm safety zones along TSS.	Only IMO recommended route, covered via MSP shipping area designations.	No IMO regulations in national sea area	Several IMO routing measures in national sea area, which will be transferred to MSP + 2nm safety zones along TSS	Large area is regulated by IMO, which will be transferred to MSP, no additional safety zones are added.

	Denmark	Estonia	Finland	Germany	Latvia	Lithuania	Poland	Sweden
Planning criteria used for MSP shipping area designation	Width of priority areas + safety zones according to traffic density (AIS data from 2016) and ship sizes on main traffic routes, guidance taken from Nautical Institute paper. Corridor widths between 6 and up to 10 nm.	AIS based shipping density is used for discussing/ deciding on multi-use of marine space or establishing spatial constraints (e.g. Ships' route design).	Shipping density maps based on HELCOM AIS data will be used to determine corridor width	Larger corridors equal widths of TSS; 1nm width for 1000-4900 vessels/year; 10nm for >10,000 ships. Designation in MSP from 2009 based on AIS data from 2005-2009 (national stations).	The areas reserved for shipping are based on main shipping routes (centre line of shipping area) by using AIS data and consulting all Latvian ports. The width of the shipping corridor and safety zones of these areas reserved for shipping is 6 nm to/from major ports or transit routes and 3 nm to/from small ports of Latvia. The width was agreed upon by consulting Maritime Administration of Latvia and taking into account the guidance document of Nautical institute.	Shipping routes and roadsteads are well defined and strictly respected in the MSP documents and charts. Yearly summary of ship density was taken as a basic information for justification of the corridors	Widths of priority areas not defined in detail yet	AIS data was used to designate national interest areas, which were the basis for later designations of areas in MSP. MSP only covers the nationally important corridors. Smaller routes rely on the "freedom of navigation".

3.1.1. Transfer of IMO routing measures to MSPs

Chapter 3.1 has already explained the high status of IMO routing measures for the safety of navigation. Thus, in most Baltic countries IMO routing systems are or will be transferred to the national maritime spatial plans. However, when it comes to the method how this transfer can be done one need to distinguish between the different types of IMO routing measures that were introduced in chapter 3.1., i.e. between measures that are linear and those which are planar. From a practical point of view it is easier to transfer a planar traffic separation scheme than linear measures such as recommended routes or deep-water routes.

Planar routing schemes, like traffic separation schemes and traffic lanes, have already a spatial dimension that can be directly adapted. Therefore, identified areas are usually simply copied to the plan and indicated as priority areas for shipping. For linear routes the spatial dimension is less clear and corridor widths need to be defined by the national planning authorities (see chapter 3.1.2).

Only very rarely IMO routing measures are directly re-examined by the MSP authorities. Outstanding example in the Baltic Sea is a potential proposal from Sweden to relocate a routing measure south of Gotland as it is strongly conflicting with nature protection interests. The discussion initiated by the national MSP process may lead to a proposal for possible change of parts of the IMO routing system in the area and thus have a direct impact on international shipping regulation. However, such a proposal would need to find common agreement - both on a national and an international level – which will probably be hard to find.

Some countries, like Latvia and Lithuania, do not have approved IMO routing measures located in their sea area or only a few routes recommended by IMO (in Latvia). By nature, recommended routes have a far lower priority than approved schemes or routes and roughly overlap with the highest ship densities. Here, no special methods for transferring these recommended routes to the plan are applied and corridor designations directly start with ship density analyses that are accomplished for unregulated areas (see chapter 3.1.2).

3.1.2. Defining corridor widths outside IMO regulated areas

In areas where there is no IMO regulation at all shipping density maps are generally used to determine where priority corridors for shipping need to be established and which width they should have. Shipping density maps are commonly derived from AIS data which is available for all ships >15m and ferries. More precisely signals of the Automatic Identification System (AIS) of ships are collected and summarized in annual and/or monthly raster maps where each pixel reflects the number of ship crossings in that respective area.

HELCOM produces ship density maps for different types of ship traffic for the entire Baltic Sea (http://maps.helcom.fi/website/AISexplorer/). These maps are used by most of the smaller countries which started the concrete planning of shipping corridors after 2016 when the data got published by HELCOM. Germany and Sweden, however, produced their own ship density maps based on AIS data received by national base stations from shore and complemented by satellite data for areas with bad

reception. Although all Baltic countries are using ship density maps at some point for the designation of shipping corridors the choice of ship types considered in the analysis may differ. While all countries analyse cargo, tanker, ferry and cruise traffic, are leisure, military and fishing traffic only reviewed in some of the countries.

Once the ship density is calculated for the national sea area the corridor width can be estimated. A common method is to use numerical approaches to calculated corridor widths from ship densities based on fixed formulas (see info box). Planners from Denmark and Latvia indicated that they used this approach to define the widths of shipping corridors. Other countries outsourced this task to shipping experts which estimated the needed widths from ship density maps and based on their expert knowledge. The basic underlying assumption for both approaches is that the larger the ship traffic the more space needs to be given for overtaking vessels.

An exception is often made for areas that are located in between two IMO routing schemes. Here, shipping corridors are not based on the shipping density but usually adjusted to the outer widths of the schemes, thereby connecting them in a coherent way. However, differences in width are minor as also methods used for defining corridors width via shipping density analyses (see info box) result in comparable widths as defined for existing IMO routing schemes.

3.1.3. Safety margins

Designated shipping corridors are mainly serving the running ship traffic. However, weather conditions or technical problems may cause specific situations where even more space is needed. Therefore, emergency stopping distances especially in the vicinity to the coast or artificial structures at sea need to be taken into account. Safety zones are also of importance with regard to the quality of vessel radar information in the vicinity of offshore wind farms. The safe distance to avoid interference has been determined to be 0.8nm (while the protection zone for offshore structures defined in UNCLOS Art. 60 is only 500m).

According to COLREGS collision avoidance manoeuvres take up to 0.3nm and round turns take about six ship lengths (see figure 3).

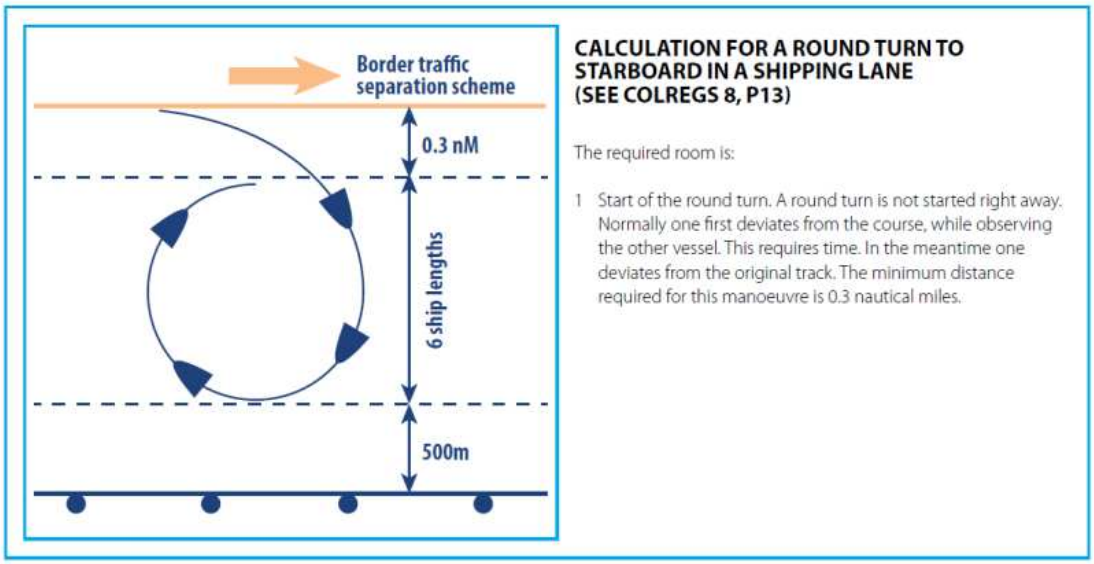

Figure 3: Calculation of distances required for safety zones according to COLREGS Art. 8 (Patraiko and Holthus 2013)

Other approaches, e.g. the PIANC assessment, suggests even larger safety zones of 2nm to both sides of a path for the UK (see figure 4 and http://www.pianc.org). Safety zones often take a larger part than the actual path frequented by running traffic. Excluding safety zones or having less strong textual regulations in the MSP for the safety zones than for the paths could therefore be a way to find agreements between co-existing uses. However, it has to be kept in mind that safety zones still need to fulfil their task at all times. Therefore, these decisions need to be taken in accordance with the competent authorities for the safety of navigation in the national sea area.

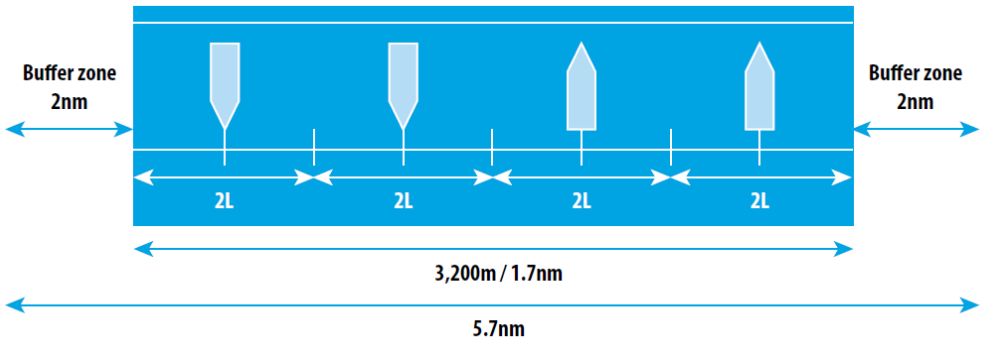

Figure 4: Path width and safety zones suggested by the PIANC assessment for the UK

However, some countries designate safety margins along the outer edges of shipping priority corridors. Denmark and Germany, for example, have added 2 nm along traffic separation schemes and their continuations. These areas do have another status in the plan than the priority areas and usually other (compatible) uses are allowed here. This is not the case for Latvia and Lithuania where safety margins are included in the priority areas and thus hold the same priority status. Other countries, like Estonia and Finland, will designate safety margins but probably only very case specific. Still others are not designating additional safety margins along the shipping corridors at all. In Poland, safety margins for ship traffic will be added to the priority areas for offshore energy. Here, ample space will be given around offshore structures to avoid collisions at sea. Sweden, on the other hand, has not designated safety margins at all. Swedish planners argue that the risk assessment from IMO for traffic separation schemes should guarantee sufficient space for ships. Partly the argumentation is also based on the Swedish strategy only to designate corridors and areas that are of national importance. Here, additional space for the shipping sector as well as smaller routes rely on the "freedom of navigation" and are not further indicated in the plan.

3.2. Energy

This section of the report focuses on energy sector installations at sea and spatial regulation of them within different Baltic Sea countries MSP processes. The section presents an overview on factors that have been found to be important when designating offshore energy installations in different countries. These findings are based on a literature review and the information collected during the Baltic LINes project from the project partner organisations. Workshops on the topic were organized during partner meetings and representatives of the countries were also interviewed. This section of the report addresses first wind energy. The last part of this section focuses on grid and energy cables in MSP.

3.2.1. Offshore wind farms

Offshore wind energy planning criteria have been discussed in Gothenburg (September 2017), Tallinn (March 2018) and Gdansk (June 2018) partner meetings. Also a working group session was organised in Baltic InteGrid partner meeting in Klaipeda (November 2017).

Groupworks organised in 2018 collected information on the national approaches to handle offshore wind energy (OWE) in MSP. Country representatives prepared posters to describe national approaches. The posters were taken as a starting point for the country comparisons. Additional information was collected from online sources, especially useful were country fact sheets that are produced and updated by the HELCOM-VASAB working group on MSP (http://www.helcom.fi/action-areas/maritime-spatial-planning/country-fact-sheets). Based on literature review and web research, concise draft country descriptions were compiled. These descriptions gave a more detailed view on how locations for OWE production sites are defined, and include also other background information related to the topic. During May-June 2018 country representatives were interviewed to comment and correct the country descriptions. Following countries were interviewed: Estonia, Finland, Germany, Latvia, Lithuania, Poland and Sweden.

This section first summarises the main findings on how countries find locations for offshore energy productions. This is followed by description of the planning criteria as they are used in many of the countries.

National approaches to deal with offshore wind

The work on handling OWE in MSP focussed on 1) how locations of offshore wind energy production areas are selected in different countries, 2) what kind of criteria and issues are important in this process and on its different steps (from designating the areas to granting permits) and 3) what is the role of MSP in all this.

Table 4 below summarises the findings per country. The table below indicates that the role that the MSP has in deciding locations of offshore energy installations at sea is differs a lot between countries. Especially the relationship between sectoral decision making and MSP differs. In brief, in some countries MSP simply takes into account the decisions made in sectoral planning, while in other countries MSP steers sectoral decision making. Similar differences can be seen in how strongly MSP is

linked to permitting procedures. The role of MSP in permitting procedures is also linked to how binding MSP is (see table 1 above).

Some countries have a practice of deciding of the offshore production areas and then to open a tendering process for the private operators to apply for permits. However, most of the countries have an “open doors” approach, in which private operators take the initiative and apply for permits either in the areas pointed out by the authorities or in any locations. A shift can also be seen in the roles of private operators and authorities. The current tendency is that the authorities have or are taking stronger role steering the use of the sea areas for offshore energy. This does not mean, however, that there would be less possibilities for offshore energy production.

An important finding of this study that was conducted in 2017 and 2018 is that the way how countries decide about locations of offshore wind production and related installation is changing. On the one hand, offshore energy is still rather new use of the sea areas – and as the table below indicates not yet existing in many countries. There are also relatively new energy strategies in many countries and national policies to develop renewable energy production also offshore. That is one reason why countries currently need to rethink the matter. On the other hand, countries are doing or reviewing their MSP. Offshore energy is, obviously, an important topic to address in marine plans. MSP is also a new policy process for most of the Baltic Sea countries, which has led to reconsideration of the roles of different authorities. These institutional changes caused by introduction of MSP are another reason why handling of offshore energy is currently in a change.

Table 4. Country information table showing differences and similarities in MSP wind energy area designations. Information about Denmark is based only on available documents. (*"open doors approach" refers to situation when operators are free to suggest building wind a wind farm in areas indicated in a plan or outside these areas).

	Denmark	Estonia	Finland	Germany	Latvia	Lithuania	Poland	Sweden
MSP's role in locating OWE	Until now sectoral decision-making and planning by the Danish Energy Agency. MSP's role is to coordinate use of the sea areas for different uses.	Identification of possible areas. More detailed regulation by the permitting procedure	not known yet	Important in the federal plan for the EEZ, important also on state level	MSP has identified suitable areas for OWE, but OWE can be located outside of these	MSP screens potential areas, sector ministry responsible for more detailed management	MSP indicates suitable areas for locating OWE. Not possible in other areas. Sector authorities decide about the licenses.	National interest areas from energy authority taken into MSP plan, but MSP suggest also new areas. OWE can be built outside the designated areas.
MSP linked to permit procedure		Guiding on the locations, difficult to ignore in a permit procedure.	MSP not known, regional and municipal level plans are required for the permit	Shows suitable areas in EEZ and territorial waters.	No official decision yet. The role of MSP authority has been discussed with the issuing authority.	MSP shows suitable areas, permitting procedure by energy authorities	Licenses only in designated areas possible	MSP has a guiding influence, municipalities have a veto right.

	Denmark	Estonia	Finland	Germany	Latvia	Lithuania	Poland	Sweden
Tendering process: open door * or government call for tender?	Government call for tender	Open door (developers initiating) at least before; possibly in the future as well	Open door (developer initiating) process will be changed	Open door; changing now into government call for tender	Mix: 1st step Open door 2nd step government tender	Government call for tender (process under development, not yet decided)	Procedure under development; so far open door	Open door policy; MSP and Energy Agency's "national interest areas" are guiding, and projects are initiated by developers
Initiative from the operators or from the authorities		So far the initiatives have come from the operators	Currently the initiative from the operator	Until now initiatives from the operators. The government taking now bigger role	Initiatives from the operators	Until now initiatives from the private operator, but the government is now trying to have a stronger role	Private operators have taken the initiative. Research projects have identified possible areas.	Initiatives come from the operators
Use of planning criteria	Set of criteria has been used by the energy authority	No use for a fixed set of planning criteria	Probably not needed	Set of criteria is being developed	Set of criteria used in MSP	A set of criteria was used to identify	Research projects have developed sets of planning criteria	Has an indicative list, but always case by case
OWE distance from the shore	Smaller OWF located between 4 and 20 km Large OWF are located > 15 km distance	In the two existing plans distances are 10 and 12 km	not known yet	Not defined, but visibility has been a reason why far from the coastline	In national MSP process a distance of 8 km was used	20 metres or deeper sea areas. The depth curve is from a few kilometres to approx. 12 km	Wind energy only allowed in EEZ.	Not defined (case by case)

	Denmark	Estonia	Finland	Germany	Latvia	Lithuania	Poland	Sweden
Existing OWF	13 offshore wind parks (516 turbines) 3 under preparations	0 8 projects in the pipeline or expressed interest	1 (11 turbines) 10 projects in different phases	3 (in the Baltic Sea) • 3 in EEZ (210 turbines) • 1 in Mecklenburg-Vorpommern (21 turbines) • 1 approved	0 Several expressions of interest	0 Three finished EIAs for OWE projects	0 1 project has received a permit 1 project has finalized EIA	5 (77 turbines) 7 OWF approved + several projects in preparation

Overview on offshore wind energy planning criteria

Based on a limited review of previous projects and other published reports on energy sector planning criteria, there is no common understanding of the factors that needs to be considered when planning and designating new locations for offshore wind farms (OWFs). During the project we identified a list of 40 different factors that have found to be relevant for both assessing wind energy potential at sea and actual spatial planning of OWFs. One example of a list of planning criteria is presented below, and these were found to be relevant when identifying and suggesting the most attractive future offshore wind areas in Baltic Sea Region (BSR). In BASREC (2012) report strategy for offshore wind development in the BSR is presented, and more detailed spatial analysis for suggested areas is recommended.

Example of a list of planning criteria

Source: Baltic Sea Region Energy Co-operation BASREC (2012) report on energy challenges and offshore wind potentials in the Baltic Sea Region (BSR)

Criteria for deciding the attractiveness of offshore areas in BSR

- Cost of energy (consists of factors that influence productivity and costs of building wind energy i.e. wind speed, distance to shore and water depth)
- Hard constraints (e.g. other wind farms in operation or in construction etc.)
- Soft constraints (e.g. shipping and fishery)
- Regional electricity demand
- Potentials grid links to the continental power system
- Local employment and growth stimulation
- National targets for CO2 reduction and renewable energy deployment

In addition to examining general lists of planning criteria used and/or collected in previous projects and surveys, views on offshore wind energy planning criteria were collected from Baltic LINes project member countries and their representatives. After this, all the criteria were combined and categorized thematically (see table below). Number after each of the criteria reflects the amount of sources that mention the criteria.

Categories found are: technical infrastructure and connections, environmental habitats and species, physical and natural conditions, other sea uses, economic factors, policies and social aspects. Based on the reviewed material, some of the criteria were seen as *soft constraint* or *hard constraint* in all reviewed sources. On the other hand, for example marine and coastal protected areas (including Natura 2000 areas) were seen both as soft constraint and no-go areas. Thus the same factor can have different interpretations in different processes.

Table 5. Categorisation of the commonly mentioned issues to be taken into account while identifying locations for wind energy production at sea. A number after each of the criteria reflects the amount of sources that mention the criteria.

Technical infrastructure and connections	Environmental habitats and species	Physical and natural conditions	Other sea uses	Economic factors	Policies	Social aspects
Future (planned) development potential of the grid (connections, extensions) (2)	Marine and coastal protected areas (Natura 2000 areas) (5)	Ground conditions and type of sea bed (example: sandy sediments vs. rocky substrates; preferably homogenous) (5)	Shipping - lanes (TSS), anchoring areas and routes (no-go areas) (example: buffer zones) (5) AND safety of navigation (4)	(Regional) Demand for electricity (2)	Climate policy trends and targets (nationally and globally) (2)	Visual impact on the landscape and views from the coast - nationally important landscape areas (4)
Distance to shore and to construction/ operation/ maintenance port (4) (example: distance from coast as soft constraint, proximity favored)	Biotopes (1)	Wind - annual mean wind at defined height (e.g. 100m) or other measures of wind speed at the location (8)	Pipelines and cables (4)	Local employment and growth stimulation (2)		Stakeholder involvement (1)
Availability of connections and distance to (onshore) grid and its substations/links (8)	Mammal (seasonal) distribution (1)	Water depth - average depth of the sea, depth of certain areas (8)	Other existing permanent infrastructure (3) AND local priority areas / restrictions of other sectors (3) AND existing leases (1)	Trends in energy sector		
Space demand per turbine	(Concentrated) Bird migration routes (2)	Ice conditions (3)	Fishing – (regional) fishing zones, spawning and nursery areas (soft constraint) (3)	Economic profitability		
Area and project size (space demand per turbine (3)	Important bird areas (1) *(different than bird N2K areas)*	Waves, currents	Dumped munitions (3) (no-go areas)			
Grid capacity (2)			Proximity of existing wind farms in operation / construction and wind farm test sites (2)			
			Cultural heritage (underwater; ship wrecks) - world heritage sites (2)			
			Radars (meteorological, aviation, military) (2)			
			Military (prohibited) zones (2)			
			Marine mineral resources (extraction) (1)			

In a detailed analysis of national approaches and in the literature there are large variations in the criteria. For instance, differences on what is seen as "adequate" wind ranges from:

- 9m/s (NorthSEE project);
- In Uusimaa regional plan in Finland no-go areas with wind speed less than 6m/s at the height of 100m and possible areas with average wind speed 6-6,5m/s
- In Latvian MSP, limit for average mean wind areas was 7,5-8,5m/s

Also depths considered suitable vary between countries:

- Latvia <60m
    - was earlier <30m, but recently changed due to rapidly developing technology
- Lithuania 20-50m
- Sweden <40m

Mostly the consideration of depth was related to technical aspects and economy of construction, but Lithuania has a unique approach: areas shallower than 20 metres are excluded from wind energy production because shallow areas are typically ecologically valuable areas.

In table 5 distance to shore is one of the factors that are considered. In many of the reviewed reports it was conceived as an economic factor influencing the costs of building or operating the turbines. In addition to the economic considerations the distance to shore is also linked to social aspects. In many countries a minimum distance to shore is regulated in order to minimise disturbance caused to people onshore. Here again suitable or acceptable distance, however, varies, e.g.:

- Denmark
    - Smaller turbines located between 4 and 20 km
    - Large turbines are located > 15 km distance
- Estonia
    - Hiiumaa > 12 km
    - Pärnu bay > 10 km
- Latvia > 8 km
- Poland > 22,2 km (EEZ=12nm)

Some countries have not defined any distance as this is decided case by case.

A clear conclusion on the variety of criteria is that there are several aspects that need to considered, but as OWE is rather new topic in many countries, methods and approaches are not stabilised. There are not any existing international bodies who would take the role of developing common sets of criteria. As the introduction to this report pointed out that countries practice MSP in different ways, there is also one notable difference between countries. It is that in some countries decisions and planning is based on using national standards, while in some countries matters are handled case by case and there are not any clear national standards. If countries could agree on common standards, those would apply well into the decision-making culture of countries that are used to using standards, but would not apply to countries that make decisions case by case.

Table 6. Spatial considerations in different Baltic Sea countries for identifying location for wind energy production in MSP processes.

Country	Planning criteria
Denmark	Regarding the distances from shore Denmark has two different limits: • Smaller OWF located between 4 and 20 km • Large OWF are located > 15 km distance
Estonia	While designating areas for OWE, a fixed set of planning criteria is not defined. Used criteria (and how they are weighed) differs a lot in different parts of Estonia and is case specific. In two MSP pilot plans different criteria were used on how far from the coastline OWE can be build: Hiiu Island 12km and Pärnu Bay 10km. These distances can be unacceptable for the developers in the northern coastline of Estonia because of the depth of the sea. Both in Hiiu and Pärnu MSP pilot plan areas, the main reason for the distance from coastline was visibility from the shore.
Finland	Finland's MSP will be a broad scale, strategic plan. A set of planning criteria is probably not needed. Finland has also lower level spatial planning at sea. For instance, in the Satakunta regional spatial plan areas suitable for offshore wind were identified in 2009. The approach used excluding principle, i.e. identifying areas where not to locate offshore wind and appropriate distances as shown in the following list: • Recreational housing, distance 2000m • Shipping lane (depth 5m or over), distance 350m • Shipping lane (depth less than 5m) , distance 50m • Light house, distance 1000m • Ship wreck, distance 1000m • Finiba(bird protection areas) , distance 500m • Recreational areas, distance 3000m • Valuable areas for cultural history , distance 3000m • Natura 2000 areas , distance 3000m • Other protected areas / natural protection, distance 3000m

Germany	Germany is currently changing its system for determining wind energy production locations at sea. Authorities will have a stronger coordinating role than until now. The planning criteria will be used in three stages:
	1. Screening of suitable areas
	  • Bathymetry (water depth)
	  • Distance to shore/harbours
	  • Existing wind farms/cable connections (clustering potential)
	  • Wind conditions (best wind)

Germany	2. Estimation of capacity per area and time schedule for project realization • Political targets • Timing of development of connection to terrestrial grid 3. Detailed check of suitability of areas • Seabed assessment/ ground investigations (sediment, geology) • Environmental assessments (EIA) In different parts of the sea (i.e. in different locations), the most important planning criteria differ in details (suitable water depth, wind conditions, etc.) Visibility and distance from the coast can play a different role in the coastline and be important criteria from for instance tourism perspective, but no standard distances are defined.
Latvia	The national MSP process has identified areas for researching suitability for wind energy production. Criteria used for defining these research areas were: • Depth up to 60m (thought earlier 30m, but new technology was taken into account), • Distance from shore more than 8km (because of visual aspects) • Other important uses (areas for other important uses were cut out; but not all, like Research area for biodiversity) • Gas and oil exploration licenses (were cut out) • Possibility to connect to shore/ to grid, • Wind speed (more than 8m/s in the height of 100m)
Lithuania	For identification of suitable areas for offshore wind energy production the following criteria were used in the national MSP: • Suitable depth (20–50 m); • Good wind conditions; • Distance from the shore/infrastructure corridor for connection; • Least conflicting areas are chosen = away from anything that might pose discussion/conflicts with other uses and users such as: o shipping lines and port roadstead/anchorage sites o military areas (training and radar zones) o Natura 2000 sites (existing and potential/under research) o main fishing grounds o away from coastal zone (= deeper than 20m) o wrecks, potential UCH sites.
Poland	In Poland where wind energy installations are allowed only in the EEZ the ongoing MSP process has identified suitable offshore wind production areas. The topics that were considered to identify favourable areas in the MSP process were: • Wind speed • Depth • Legal provision

Poland	• Existing permissions • Distance from shore • Bathymetry • Other uses: nature protection, fishing, shipping, military activities The more detailed identification of the exact location for wind turbines is done by private operators. They consider: • Geomorphology • More detailed wind conditions • Nature conditions (protected species, biodiversity, general description) • Underwater cultural heritage • Other uses • Safety of navigation
Sweden	A standard set of planning criteria is not defined as the issue will be handled case by case when detailed planning criteria are defined. However in the MSP process the following were considered: • Depth down to 40m • Stable, flat and homogenous seabed • Average wind speed (at least approx. 9m/s annual average wind speed) • Distance from shore (not too close, not too far) • Proximity of cable connections on land to the electrical grid • Proximity of areas of high energy consumption • Good accessibility for ships because of construction, operation and maintenance

3.2.2 Offshore energy grid and cables

As already mentioned in chapter 1, national MSP approaches differ from country to country. This also refers to spatial designations and rules for energy cables. In some countries the designation of corridors for offshore energy cables is part of the MSP process, other countries waive MSP regulations for the offshore grid. In general, compared to offshore wind turbines electricity cables as well as data cables or oil/gas pipelines seem less conflictual with other interests. Therefore identification of planning criteria for subsurface linear infrastructure seems simpler than for offshore wind energy development (compare also Baltic Scope, 2016).

From transnational perspective interconnectors have a special relevance, as these are always cross-border in nature. With regard to cross-border cables the German Offshore Grid Development Plan states: “In order to create the spatial conditions for a transnational Baltic Sea grid, gates through which future interconnectors are to be routed when entering the German EEZ have been stipulated over and above the existing specific planning, complying with standardised technical specifications and planning principles.”

National approaches for consideration of electricity cables in MSP

In order to ensure transboundary coherence of cable corridors, Estonia, Germany and Lithuania define or intend to define transfer gates for interconnectors at EEZ borders. Sweden and Latvia do not plan to designate transfer gates. Denmark, Finland and Poland have not decided yet about designation of gates. Differences in planning approaches regarding transfer gates between neighbouring countries (“over-planning” vs “non-planning”) could lead to conflicts.

Considering existing MSPs, both Lithuania and Germany (MSP for EEZ and for territorial sea of Mecklenburg-Vorpommern) have defined spatial regulations for electricity cables. In the Lithuanian plan infrastructure corridors for future energy cables connecting offshore wind farms to land are specified. The existing German MSPs include transfer gates at the border between the territorial sea and the EEZ. Based on the various offshore wind farm applications in the German EEZ the German government recognised the need for a more detailed grid plan and mandated the BSH in 2011 by the German Federal Energy Act to develop a Spatial Offshore Grid Plan (now: Grid Development Plan). The grid plan takes a sectoral planning approach and defines power cable routes and sites for the entire required grid infrastructure in the EEZ. Spatial and textual designations of the sectoral plan will be integrated into the updated MSP for the EEZ.

Considering MSPs under preparation, not all plans include regulations for offshore energy cables. Swedish MSP has a more guiding character and therefore does not include any spatial rules for electricity cables. Estonia as well as Finland and Denmark are at a very early state of their MSP and have not decided yet how to treat electricity cables in their national MSPs. Also case specific regulations might be an option. Latvia defines corridors for perspective energy cables for connecting offshore wind farms to land as well as for future interconnectors. Poland is still in the planning process and plans to include corridors for connecting OWF and offshore oil rings with land into their MSP. These corridors are built upon the issued permits and existing infrastructure. Some of these corridors are planned as "combined" or "multimodal” corridors for pipelines and cables.

Table 7. Spatial considerations in different Baltic Sea countries for offshore electricity cables in MSP.

Country	Spatial rules for submarine electricity cables	Width of cable corridor	Gates for energy cables at borders	Comments
Denmark	Not decided yet	Not decided yet	Not decided yet	
Estonia	Place and case specific	Place and case specific	Yes	Cabling safety measures are implemented according the case-specific technical requirements. The planning options for the subsea cabling are generally based on the case / place specific technical, environmental and socio-economic requirements and constraints.
Finland	N.A.	No national standards, is considered case-by-case in permit procedures	Not yet thought of	
Germany (Baltic EEZ)	Submarine cables for the transport of power generated in the EEZ shall cross priority areas for shipping and other cables by the shortest route possible (right-angled) if they cannot be run parallel to existing structures	500m to both sides of cable = no construction; 300m to both sides of cable = no shipping routes	Yes	Definitions for submarine cables specified by the German Offshore Grid Development Plan
Germany (Territorial Waters M-V)	Submarine cables shall cross priority areas for shipping and other cables by the shortest route possible (right-angled) if they cannot be run parallel to existing structures	no standard value	Yes	
Latvia			No	all issues concerning cables are foreseen to be regulated by CM regulations No 631 on Construction Regulations for Structures in the Internal Waters, Territorial Waters and Exclusive Economic Zone of the Republic of Latvia
Lithuania	organized in the designated infrastructure corridors	2 km corridor	Yes	
Poland	Submarine cables in the Polish sea areas cross the majority of areas for shipping and other priority areas, like military areas, nature conservation areas. The crossing must be the shortest route possible, perpendicular to shipping routes and other linear infrastructure. It is planned in Polish MSP to create functional multimodal corridor.	200 m to both sides of cable = restrictions for anchoring (mostly of 3km width, so it is possible that few investors could use it)	no details yet but planned	In the cable corridor = no construction, anchoring ban, when the cable is not dug = **bottom trawling** restrictions
Sweden	No	No	No	

Overview on planning criteria with regard to offshore energy grid/ cables

With regard to technical suitability seabed conditions are the most important issue to consider. On the other hand ground conditions do not cause a real obstacle to the laying of cables. It is more a question of the technique of cable laying/ cable securing. From the shipping sector perspective it is for example necessary that cables are buried as deep as possible or secured by rock dumping. Uses that are particularly to consider when planning cable corridors:

- Shipping
- Natura2000 areas and sensitive biotopes/ habitats
- Pipelines
- Military exercise areas, esp. exercise areas for submarines
- Cultural heritage sites, for example wrecks
- Sand and gravel extraction
- Offshore Wind Farms
- Fishing grounds
- Dumping grounds
- Munition

For the definition of cable corridors space is needed for the cable itself and its laying, for a safety zone around it to ensure sufficient space for potential repairs, space at cable crossing areas (secured by dumped rocks) and/or specific distances in case of parallel routing with other uses need to be considered. Necessary distances between cables and other uses depend on the water depth, site-specific ground conditions and technical required distances for cable laying and cable repairs. Regarding the question of appropriate distances guidelines of the International Cable Protection Committee (ICPC) and the European Subsea Cables Association (ESCA) can give helpful advice. As for offshore energy cables, the International Cable Protection Committee (ICPC) recommends that existing cables in shallower waters (up to a depth of 75m) are given a default 500m exclusion zone on either side. The actual distance varies between single countries. In general, offshore renewable energy infrastructure and cable corridors should be integrated whenever possible to maximize concentration of sea uses.

Examples of planning criteria

In the Baltic Scope project (Baltic SCOPE, 2016) the following criteria were suggested to be applied for electricity cables and gas / oil pipelines:

- Space needed for pipeline / cable
- Safety zone around it
- Info on existing cables and pipelines
- Other sea uses: like cultural heritage sites (wrecks) in some cases, affect can be temporary; e.g. construction works might have temporary effect on biotopes; e.g. dumped munitions

In the Polish MSP process the following criteria are considered:

- Seabed conditions
- Dumpers (ammunition, pipelines, cables)
- Vulnerable habitats
- Safety of navigation

Latvian MSP considers the following criteria:

- Areas with wrecks and/or other features of cultural and historical significance exclude cable placement.
- When planning cable paths, where possible, shipping routes that require deepening and maintenance must be avoided, anchorage sites, sediment disposition areas, important areas for benthic trawling, as well as areas that could be potentially significant for the extraction of mineral resources.
- Installation of cables would not be permitted in the explosives dumping grounds.

Planning Criteria/ planning principles in the German Offshore Grid Development Plan

- Maximum bundling possible by parallel routing: cables and other offshore infrastructure should be integrated whenever possible to maximize concentration of sea uses and reduce use of space
- Consideration of all existing and approved uses and adequate safety distances to constructions and shipping routes
- Crossing of priority and reservation areas for shipping by the shortest route possible/ as right-angled as possible (for safety reasons, covered by the provisions of UNCLOS)
- Routing as far outside of Natura2000 areas/protected biotopes
- Consideration of cultural heritage sites, esp. wrecks and other underwater obstacles
- special consideration of sites where munitions have been discovered
- Shortest route possible (relevant from economic perspective), under consideration of conflict minimisation with other uses and nature protection issues
- Coverage, which ensures a permanent safety of subsea cables
- Avoiding cable crossings (Crossings increase the risk of malfunctions, leading to higher maintenance requirements and, consequently, to increased traffic of maintenance/repair vessels, which should be avoided.)
- Routing of interconnectors through transfer gates at EEZ borders

Definition of technical specifications

Apart from spatial criteria also technical specifications can be relevant for planning corridors for electricity cables in MSP, as these are often also of spatial relevance. For example the implementation of the cable system as direct current or alternating current is relevant for the capacity of the cable and therefore determines also the number of cables required to transmit a certain capacity. The technical specification of the grid connection systems of offshore wind farms often depends on the distance to shore. Interconnectors are usually implemented as direct current cable systems with a supply conductor and return conductor as a bundled cable system in order to minimize negative effects from magnetic fields on sensitive species. Interconnectors should be planned under consideration of the existing grid and incorporated in the overall grid planning.

4. Conclusion

The aim for coherent planning across borders is strongly supported by the EU MSP Directive (2014). Especially in the Baltic Sea where transnational cooperation is strong countries engage in EU projects and pan-Baltic working groups to find agreement on common planning solutions in border areas.

The report highlights the differences in the legal backgrounds for the planning of shipping and offshore energy in the Baltic Sea. Historically grown the shipping sector is strongly legally organized and gains power through international organizations like the IMO. The shipping industry perceives the sea as their asset out of tradition (supported legally by the so-called “Freedom of Navigation” as stipulated in UNCLOS). On the other hand offshore energy is less structured and regulations vary greatly between countries. However, it is all the more a powerful sector from an economic point of view. In addition, ambitious climate protection targets urgently require the construction of offshore wind farms and inter-European grid connections on a considerable scale and, thus, offshore energy projects also often gain strong support from the political side.

Both sectors claim more and more sea space and thus not only come into conflict with each other but also with spatial demands of other sea uses. Thorough weighing of sectoral interests and sustainable planning helps to cope with this task. The report presents the different national approaches to sectoral planning of shipping and offshore energy. For shipping many similarities can be found with regard to the input data used for ship corridor designation in national MSP. However, differences exist how the data is used, e.g. which planning criteria are applied. For energy the picture is more diverse as countries have very different approaches. A noteworthy observation is that currently (in 2018) the ways how countries have organised decision-making concerning offshore energy is changing. When it comes to planning criteria that are used for offshore energy there are a few common criteria that are used in many countries and also in many published studies. These can be taken as the common set of criteria.

Even though the legal status of national MSPs differs and finding agreement on a fully synchronized planning approach is unrealistic, this collection of information and the guidelines attached aim to increase common understanding and align methods between countries.

References

Baltic Scope 2016. **Central Baltic case: Topic paper on energy.** Available online: http://www.balticscope.eu/content/uploads/2016/11/Energy_Topic_Paper_CBC_final_version_.pdf

COLREG (Convention on the International Regulations for Preventing Collisions at Sea)

HELCOM-VASAB. 2010. **Baltic Sea broad-scale maritime spatial planning (MSP) principles**. Baltic Marine Environment Protection Commission. Available online: http://www.helcom.fi/Documents/HELCOM%20at%20work/Groups/MSP/HELCOM-VASAB%20MSP%20Principles.pdf

HELCOM-VASAB. 2013. **Regional Baltic MSP Roadmap 2013–2020** (2013). Baltic Marine Environment Protection Commission.

IMO (International Maritime Organisation), 2018: **General Provisions on Ship's Routeing Systems of the IMO** (GPSR) - GPSR 1.1. (IMO webpage: http://www.imo.org)

Jacobs, J. 2016. **Spatial planning in cross-border regions: A systems-theoretical perspective**. Planning Theory 15: 68-90.

Keivanpour, S., Ramudhin, A. & Kadi, D.A. 2017. **The sustainable worldwide offshore wind energy potential: A systematic review**. Journal of Renewable and Sustainable Energy, Volume 9, Issue 6.

Lallier, L., McMeel, O., Greiber, T., Vanagt, T., Dobson, A. & Jaspars, M. 2014. **Access to and use of marine genetic resources: understanding the legal framework**. Natural Product Reports 31, p. 612-616.

Låg, S. & Brathagen With, S. 2017. **Standardisation as an enabler of digitalisation in the maritime industry**. DNV GL Position Paper 2017.

Netherlands (2013): **White Paper on Offshore Wind Energy. Appendix 6 - Assessment Framework for defining Safe Distances between Shipping Lanes and Offshore Wind Farms.** Report to the Director Maritime Affairs at the Ministry of Infrastructure and the Environment.

Patraiko, D. & Holthus, P. 2013. **The Shipping Industry and Marine Spatial Planning – a professional approach**. The Nautical Institute. Available via http://www.nautinst.org/en/forums/msp/

Shipping Advisory Board North Sea (2014): **International regulations and guidelines for maritime spatial planning related to safe distances to multiple offshore structures (e.g. wind farms)**. Available via http://www.cesma-eu.org/MSP.pdf

SOLAS (International Convention for the Safety of Life at Sea)

UNCLOS (Convention on the Law of the Sea)

Lead partner

BUNDESAMT FÜR SEESCHIFFFAHRT UND HYDROGRAPHIE

EUROPEAN UNION

Partners

HELCOM

corpi

Mecklenburg Vorpommern
Ministry of Energy, Infrastructure and State Development

Liikennevirasto
Finnish Transport Agency

Swedish Agency for Marine and Water Management

NHTV Breda University of Applied Sciences

SYKE

Vides aizsardzības un reģionālās attīstības ministrija

Breaking New Ground
Aalborg University

Maritime Institute in Gdańsk

VASAB
Vision & Strategies around the Baltic Sea

Urząd Morski w Gdyni

Tartu Ülikool
Universitas Tartuensis
1632