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Inspire Policy Making with Territorial Evidence

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MSP-LSI – on demand service for Luxembourg

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MSP-LSI – on demand service for Luxembourg

Final Report

Disclaimer

This document is a final report.

The information contained herein is subject to change and does not commit the ESPON EGTC and the countries participating in the ESPON 2020 Cooperation Programme.

The final version of the report will be published as soon as approved.

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Abbreviations

BEIS	(Department of) Business, Energy and Industrial Strategy
DMPS	Designated Maritime Protection Areas
EC	European Commission
EGSS	Environmental Goods and Services Sector
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EU	European Union
LSI	Land-Sea Interaction(s)
MARA	Maritime Area Regulatory Authority
MSP	Maritime/Marine Spatial Planning (ref. for legal background EU/2014/89)
NSEC	North Sea Energy Co-operation
SEA	Strategic Environmental Assessment

1 Introduction

This is a spin-off project, emanating from the targeted analysis project Maritime Spatial Planning and Land Sea Interactions (MSP-LSI) and has been commissioned by the ESPON EGTC for Luxembourg, as a member of the North Seas Energy Cooperation (NSEC). The focus of this targeted analysis is to explore the potential spatial tensions between the deployment of renewable sources of blue energy (energy derived from our seas and oceans), with a particular focus on offshore wind energy, and other (potential) utilisations of the European seas. By doing so, it will provide inspiration and support for stakeholders of the NSEC to be better equipped for knowledge exchange and strategy development in this field of territorial development. The European Union also has ambitous targets with regards to offshore renewable energy generation, with the target set for an installed capacity of at least 60 GW of offshore wind and 1 GW of ocean energy by 2030, and 300 GW and 40 GW, respectively, by 2050 (European Commission, 2020).

This final report draws heavily on the key methods and findings from the MSP-LSI project with a view to performing a comparative analysis of the coverage of blue energy, particularly offshore wind energy within maritime spatial plans in Europe. The project will also examine the spatial conflicts that exist within those plans and the instruments which can be used to address them.

1.1 Setting the Context

Offshore wind energy along with other forms of blue energy generation (including ocean energy derived from the power of currents, tides and waves and to a lesser extent from thermal and saline gradients in some locations) is emerging as a key element of Europe's Blue Economy (European Commission 2021), with ambitions of contributing significant economic growth to coastal regions, as well as inland areas. Pan-European supply chains associated with blue energy are developing as the industry expands, involving both innovative SMEs and larger manufacturing companies with relevant capabilities in, for example, shipbuilding, mechanical, electrical and maritime engineering but also environmental impact assessment.

In recent years there has been a growing realisation that the maritime environment offers new potential for what has become known as 'blue growth' and one of the most significant sectors is that of renewable blue energy, which is currently dominated by offshore wind, but also includes tidal waves currents and potentially thermal. The need to decarbonise our existing energy systems in order to tackle the climate emergency has given rise to the ambition of seeking to exploit the potential for marine renewables.

Currently, offshore wind is the fastest growing blue economy sector and is now a major contributor to European employment. With more than 90% of the world's total installed capacity, Europe is the world leader in offshore wind energy. Overall, the sector contributed to 0.2% of the jobs, 0.8% of the GVA and 1.4% of the profits to the total EU blue economy in 2018 (European Commission, 2021). At the present time the main producers in the EU are Germany, the Netherlands, Belgium and Denmark. Moreover, the EU is involved in about 90% of the newly finished offshore wind energy projects in the world, although China currently has the greatest fully commissioned

capacity at 44% of the global total and is also the country with the greatest number of offshore wind farms under construction (4COffshore, 2022). The North Sea currently plays an important role in the decarbonisation of Europe's energy supply and this is set to intensify. In September 2022, the Energy Ministers from the NSEC agreed to further colloborations setting the ambition of generating more that 260GW of offshore wind energy by 2050. This would constitue 85% of the EU's current ambitions (Russell, 2022a).

Acceleration in the deployment of offshore renewabes is intended to contribute to multliple objectives. It is seen as a sector with significant growth potential in terms of jobs and helps the post pandemic recovery process. It provides a green source of energy and is vital to the plans to diversify Europe's energy needs away from fossil fuels and achieving ambitious plans for net zero emissions by 2050. These are seen as important targets for the global community, represented primarily by the Paris Agreement and more recently the Glasgow Summit, which witnessed an increasing interest in accelerating the delivery of low carbon energy. The European Green Deal is a seven year, 1.8 trilion Euro funding package designed to help fully decarbonise Europe's economy by 2050, create new economic growth opportunities and promote social inclusion. More recently, following the invasion of Ukraine, which has resulted in increased fossil fuel prices and greater fuel insecurity, the European Union's immediate response was the REPower EU energy plan (EC Com 2022), which is a multi-faceted strategy to reduce Europe's dependency on Russian oil and gas, improving energy efficiency at home, transforming energy intensive industries and, perhaps most importantly for this project, the more rapid deployment of wind energy capacity (both on and offshore) by 20% by 2030. Similarly, many individual states have all expressed a desire to promote and accelerate the adoption of more renewable sources of energy, whether on land or sea, as quickly as possible. Offshore renewable energy is seen as a rapidly market with huge opportunities to contribute to these wider agendas.

Whilst there may be a strong and growing policy rhetoric about the importance of delivering a more diversified, lower carbon and more locally secure and affordable offshore renewable energy supply system, the processes of delivery are challenging, involving the interaction of multiple stakeholders. Spatial planning is an exclusively state sponsored activity, operating at a variety of different scales (national, regional and local), which seeks to shape what type of development is suitable for certain locations. It seeks to co-ordinate the interests of the public, private and civil sectors, in order to the create a more rational use of space in the 'public interest'. Each country has their own spatial planning systems. These reflect the particular historical, administrative, political, legal, social, economic and environmental context of that place. Whilst these have traditionally focused on the land, or terrestrial based assets, there is growing realisation that within sea space, there are multiple and competing interests for the use of that space which requires a co-ordinated and integrated approach to managing how that sea space could be used.

Over the last decade or so, maritime spatial planning has emerged as critical mechanism for reconciling spatial conflicts between actual and potential users of maritime space. Maritime spatial planning can be seen as a **process** whereby various sea user interests can come together to

determine how sea space can be allocated to meet the needs of different uses. This might involve protecting existing user rights, it may create areas where the protection of the marine environment takes priority or it may create space for new uses and users. The outcome of this process usually takes the form of a plan, which represents a negotiated outcome of balancing varying interests at a particular moment in time. The plan can, and will be refined, reviewed and modified over time, as societal needs and priorities, including environmental agendas, evolve. Hence, the plan should not be seen necessarily as a fixed or static instrument, but one that can adapt and change in response to developing circumstances and political imperatives. Furthermore, whilst the plan sets out an aspirational view of what might be acceptable in terms of different uses for the territory covered by the plan, and may allocate, in principle, potential areas for new development, the plan itself does not authorise new development. Therefore, the second key element of maritime spatial planning is how does the consenting/licencing/authorisation/permitting of new development, with regards to blue energy occur and resolve potential conflicts? The terminology used varies from country to country, but this process involves the granting of permission by the state to a developer about the precise number, size and orientation of where offshore energy infrastructure is to be located and how the energy generated is to be transmitted to shore. In this report we have used the term consenting for consistency. Both of these processes, plan making and regulating and consenting development are essentially state led activities and hence shaped by political priorities. Finally, there is the question of implementation, or how to encourage the private sector to deliver. These are what have been described elsewhere in the MSP-LSI project (ESPON 2020) as the framework conditions. These, within the wind energy sector, might include auctioning processes, subsidies, guaranteed prices, support to develop the necessary capacity and skills to satisfy the recruiment needs of this emerging sector (both within the public and private sectors) and infrastructure to support the development of the offshore industry. Thus, there is a complex interplay of actors involved in planning and delivery of offshore wind which has to be understood if these ambitions to increase EU offshore wind capacity fivefold from 12GW in 2020 to over 60GW by 2030 and 300GW by 2050 are to be realised (EU 2020). These targets should be seen within wider aspirations of the EU's Offshore Renewable Strategy (2020), which seeks to accelerate the roll-out of wave and tidal energy.

For coastal member states of the European Union the creation of a maritime spatial plan is now a legal requirement as per the EU (European Union) **Maritime Spatial Planning Directive** (2014/89/EU). While the Directive does allow for a large amount of flexibility regarding the form each country's plan or plans can take, several minimum requirements exist, including consideration of land-sea interactions, the ecosystem-based approach and transboundary cooperation between member states. Article 5 of the Directive advises that "through their maritime spatial plans, member states shall aim to contribute to the sustainable development of energy sectors at sea". Reference is made to EU offshore renewable targets within the Directive highlighting the importance that spatial planning processes (plan making and consenting regimes) will play in facilitating delivery.

This project focuses on the role of maritime spatial planning and the instruments that it can use, to reconcile the conflicts over sea use in relation to the delivery of various forms of offshore renwable energy (predominantly wind, but including the potential of tidal, wave and in some areas thermal gradients). In terms of planning instruments, as outlined above, this report conceptualises the higher level instruments as the making of maritime spatial plans and the licencing or authorisation of individual projects. The outcomes of these **processes** are the adoption of a plan and authorising blue energy development. Within the many steps and stages involved as part of these processes, a variety of mechanism are employed to try and recocile the conflicts between different sea users, but ultimately the decisions made will represent trade-offs and whose interests are best served by these decisions are shaped by political priorities.

1.2 Project Aims and Objectives

This MSP-LSI on-demand activity for Luxembourg will concentrate on the following objectives:

(i) Comparative analysis of the coverage of blue energy, particularly offshore wind energy, in the existing maritime spatial plans of European coastal states.

(ii) Identification of potential spatial conflicts in European sea basins in relation to blue energy and offshore wind energy deployment in particular.

(iii) Analysis of instruments to resolve (potential) sea use conflicts in different European sea basins.

(iv) Elaboration of policy recommendations for dealing with sea use conflicts related to blue energy and offshore wind energy in particular.

1.3 Research approach

This report is largely a synthesis of material from a variety of sources which relate to the development of offshore renewable energy, with an emphasis on the most developed source to date, namely offshore wind. In doing so, we readily acknowledge in spatial planning terms there are other potential sources of marine renewables, but as yet they remain largely aspirational. The second point to make is that here the focus is on spatial planning's role in facilitating roll out of renewable energy, but recognise there are many other factors that can enable and obstruct the stated multifaceted objectives of decarbonisation of Europe's energy supply system, creating new environmental goods and services sector (EGSS) jobs in the offshore renewables industry and ensuring greater self-sufficiency in energy production.

First, we draw up recent experiences of working on ESPON projects, most notably MSP-LSI which explored how in practice MSP was dealing with land sea interactions, with specific reference to the Netherlands, Germany, Poland, Slovenia and Croatia. Secondly, we use the EU MSP Platform as a base to explore the current state of plan of maritime spatial plans across Europe's coastal

communities comparing their nature and form and the extent to which they are making provisions for offshore renewable energy. Critical comparisons include the nature of the planning instruments used, who has responsibility for spatial planning, both within the marine environment and on land, who sets and revises renewable energy targets and which renewable energy sectors are prioritised in the plans. These reviews have been supplemented by interviews with critcial stakeholders in the Baltic (with an emphasis in Estonia), Ireland and Portugal. The final source of information is the 4C Offshore leading market intelligence body (for which we have a subscription) and this provides detailed information on all offshore wind farms that have already been commissioned, that are in construction, and the current status of designated development zones for future wind farm developments. This powerful database allows for information to be collated on a country by country basis, across the EU. Furthermore, this database provides detailed information on individual project timescales, from the inception (when a wind operator gains development rights to an area) through the design and consenting process, to construction timescales and finally information on how long the project will be operational for.

For the purposes of this report, we have also included the UK and Norway in our discussions.

The report is structured around three main chapters. Chapter 2, outlines what the current situation is in terms of offshore wind energy production and compares the predicted role out programme with European targets. Chapter 3 provides a comparative analysis of the approaches taken to maritime spatial plan making across Europe and highlights the diversity of approaches taken. More sepcifically we explore the spatial conflicts that are occuring between existing and potential uses of sea space and how the planning processes seek to acknowledge and reconcile these conflicts. The plan, once approved or adopted, represents concensus at a particular moment in time about where development in the sea might occur and equally, which areas of sea space are protected from development. Chapter 4 explores an under- researched aspect of maritime spatial planning, namely the consenting or authorisation processes currently being employed. Again, within this chapter a focus is on the spatial conflicts between users and the instruments which are being used to resolve these. Chapter 5 provides a brief synthesis of the key findings and some critical policy recommendations.

2 Current and anticipated delivery of Blue Energy in Europe

In this chapter we briefly review the current state of provision for offshore wind within Europe set against the aspirations of European policy.

2.1 Existing delivery and aspirations for Blue Energy across Europe

The EU's offshore renewable energy strategy (European Commission 2020) suggests that offshore wind energy capacity was 21GW in 2020 and there is a goal to achieve at least 60GW by 2030 and 300GW by 2050. Assuming the *REPowerEU* (EU 2022) targets of accelerating the deployment rate by 20%, it can be implied that the current revised target for offshore wind provision by 2030 should be at least 72GW.

Current provision of offshore wind capacity within Europe is predominantly concentrated within the North Sea(s) and Baltic Sea, where some countries have a long-established experience in offshore wind deployment.

Whilst there is a good story to tell in terms of how the offshore wind industry has grown in recent years, understanding whether the EU's aspirational targets for 2030 and beyond can be met becomes much more challenging. Some countries, such as UK, Denmark, Netherlands and Belgium have what might be described as well-established and dynamic offshore wind deployment markets. Others, such as Germany have more recently stalled, as legal challenges by tourism and environmental groups put plans and projects for offshore wind deployment on hold (ESPON 2020). Others are in a more commissioning phase, where space has been allocated in maritime spatial plans, but as yet no schemes have been commissioned, (for example Ireland, Poland, Estonia, and Latvia). Others have begun stepping into the sea either, by recently auctioning sites without a plan (Italy), or making strong pronouncements of their intentions to rapidly deploy offshore wind (Greece). The approach and content of maritime spatial plans will be explored in more detail in the next chapter, but for now projecting into the future becomes more precarious the longer the timescales are. We have a good understanding of what has already been auctioned, consented and is in the construction phase. This provides a relatively good indication as to when a scheme will become operational. What is much more difficult to predict is the speed at which emerging markets come forward and will the energy providers be prepared to take the risks in regimes that, as yet, have not been fully tested. How long will the consenting process take to complete, will there be legal challenges and how will the market respond to opportunities?

Reflecting this degree of uncertainty Figures 1 and 2 represent the industry expert's guestimate of new offshore wind development over the next eight years. Figure 1 represents the rapid growth in offshore wind generation to date and the potential across the whole of Europe, until 2035. These figures also include the UK and Norway. By 2020 30GW of offshore wind was produced

across the whole of Europe (see Figure 1), of which 21GW was being produced by EU member states (see Figure 2). Rapid continued deployment means that by the end of 2022 some 37GW will be generated across Europe. Whilst within the near future schemes that are already under construction, or for which consents have already been secured, carry more certainty of delivery. Nevertheless, by 2030 4C Offshore are suggesting, that across Europe as a whole, some 145GW of offshore wind energy will be generated, of which 100GW will be produced within the EU. This suggests that the targets being proposed by the EU are not sufficiently aspirational and may well be an underestimate of the true market potential.

It is probably worth noting that currently the UK is the dominant provider of offshore wind, generating about 45% of the European total. By 2030, whilst the UK is set to almost double its existing capacity, from approximately 17GW to 38GW, expansion within the EU is expected to be much more significant, and so, by 2030, the EU's share of the offshore wind market will have grown to 74% of the European capacity.

Figure 1. Cumulative capacity (MW) by offshore start year (Source: 4C Offshore)

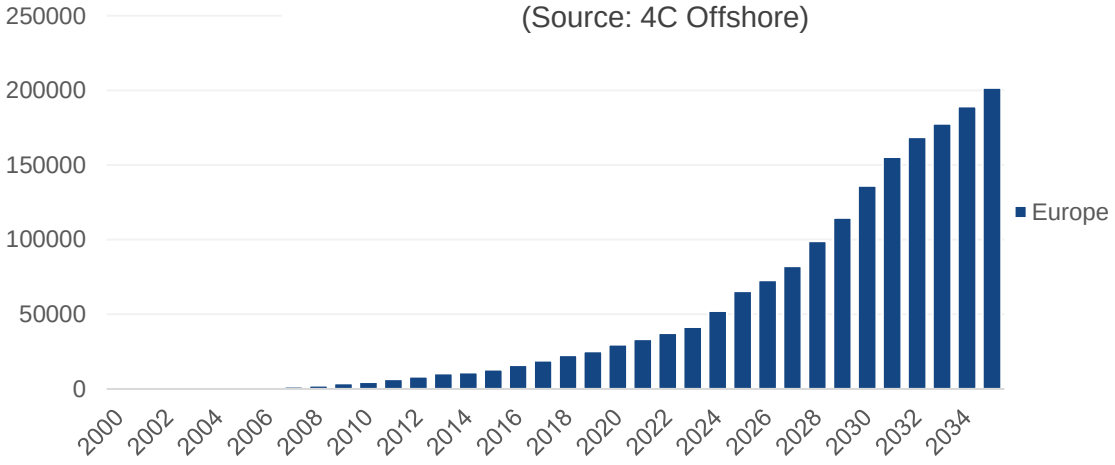
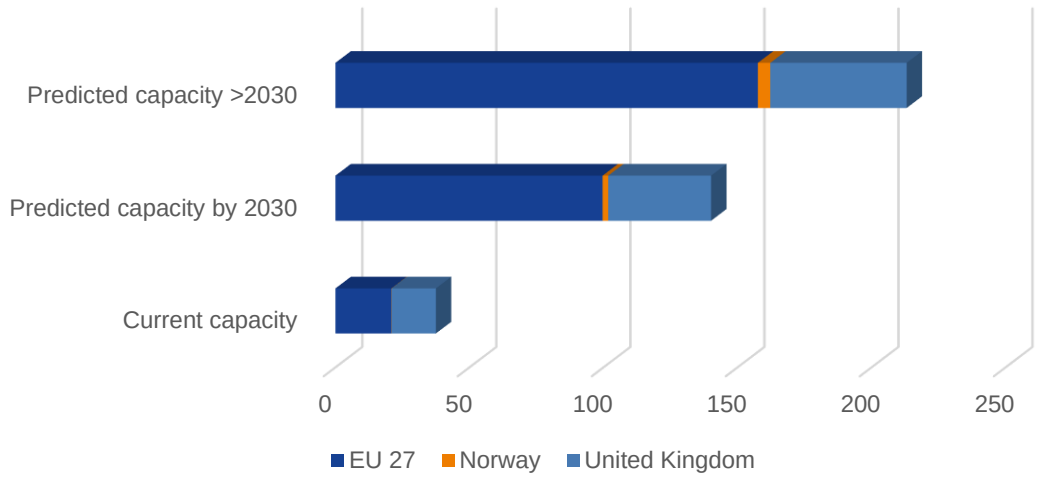


Figure 2. Offshore Wind Production in Europe (in GW)
(Source: 4C Offshore)



While the four currently big producers, (Germany, Denmark, Netherlands, and Belgium) will continue to dominate the market, both in terms of numbers of operating wind farms and generating capacity, significant new country players are expected to join the market, and their aspirations are already embedded in existing plans (see below). Hence by 2030, the generating capacity will be more equally divided, the proportion of offshore renewable wind energy produced by the 'Big 4' will reduce from 88% of the European total to 70%. New country players emerge (see Figure 3), but the North Sea and Baltic will remain the dominant generators of wind energy.

Figure 3:Cummulative growth in operational wind farms in Europe by country
Source: 4COffshore (data)

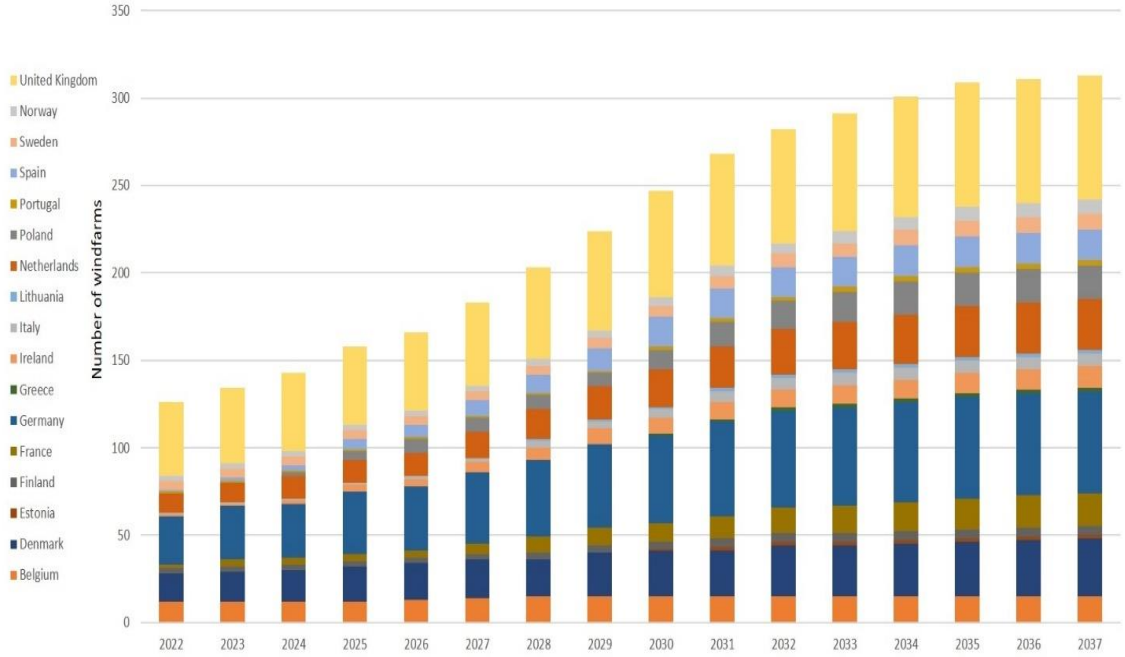
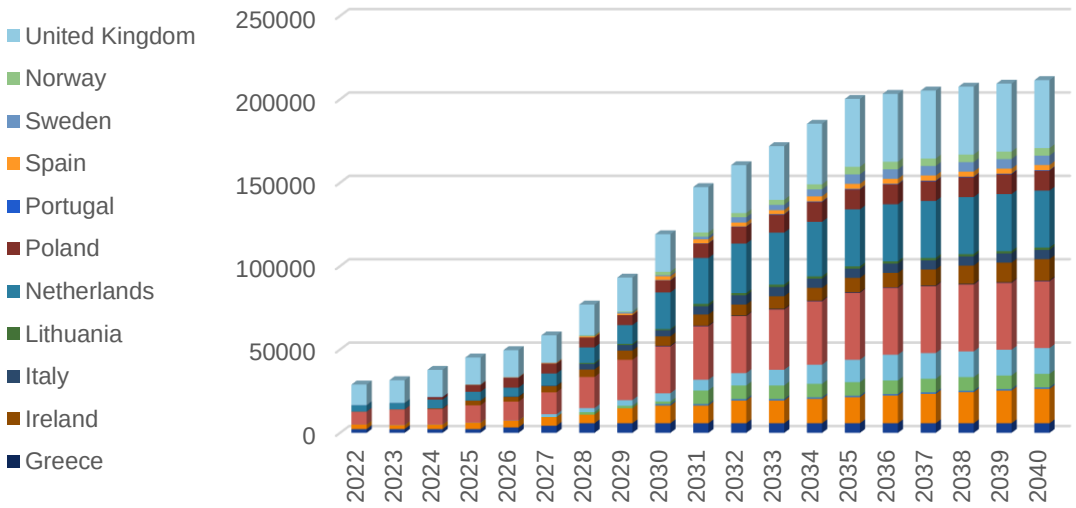


Figure 4: Predicted cumulative capacity in Offshore Wind in Europe in MW
Source: 4COffshore



As maritime spatial planning has developed over the last decade, one of the new uses making new demands for maritime space has been marine renewables, predominantly offshore wind farms. Many of the first generation of maritime spatial plans have made specific allocations, in the sea to satisfy this new need, which often causes conflicts with other sea users. The plan allocations will not in themselves guarantee delivery and indeed the nature of the plans are very different reflecting national characteristics. Figure 4 above shows the projected production in mega-watts for EU countries plus Norway and the UK out to 2040, providing a further indication of the likelihood of meeting the ambitious renewable energy targets which have been set. It is worth reiterating that project forecasts beyond 2030 are much more uncertain and based on lower confidence levels in terms of when new projects may be commissioned. However, given the current political imperatives around energy security combined with a need to decarbonisation of energy supply, additional projects may come forward.

This brief overview shows that the market for offshore renewable energy in Europe is extremely buoyant and it is expected that the market will deliver more provision than it is currently set out in European targets, and indeed expects to do so. One of the critical questions to therefore ask is can the spatial planning systems respond with sufficient speed and dexterity, both in terms of making space for renewable energy within the ocean, through the plan making process and then in consenting and formally authorizing particular blue energy projects? These are two important and critical stages for the future deployment of offshore renewable energy. It is important to note

that the auctioning process does not authorise development, but merely grants a particular wind operator preferred status to exclusively develop a proposal for a wind farm within a specified area which will, then be subject to some future consenting process.

2.2 The contribution of maritime spatial planning to blue energy

Other ESPON projects (e.g.ESPON 2020, MSP-LSI) have explored the role of martime spatial planning in helping to realise the economic benefits from new development in a maritime context, whilst at the same time seeking to protect the environmental integrity of the seas and looking to balance these goals against the social needs of local coastal communities and other stakeholders with an interest in the sea. Sea space is an increasingly scarce resource and when new users for that space, or existing users wish to intensive their use of the space, other users may feel that their traditional rights are being compromised. This inevitably leads to contrasting opinions of how the space should be used and whose interests are prioritised. Maritime spatial planning is a process of acknowledging and addressing such conflicts in the broader interests of society. These priorities change over time and are inevitably shaped by politics. This growing interest in sea use led the EU member states to agree, in 2014, to the Maritime Spatial Planning Directive which required coastal states to have prepared the first iteration of their maritime spatial plans by March 2021. This provision required those maritime countries to go through a process based on promoting the sustainable growth of maritime economies, the sustainable development of marine areas and the sustainable use of marine resources. Whilst there have been delays in plan production in some countries, in part attributable to Covid-19, good progress has been made across EU member states as a whole (EC 2022).

Within many of the European seas, cross border and transnational issues are particularly critical and whilst many countries have claimed exclusive rights to exploit the sea space within their jurisdiction, the flows within seas do not recognise these boundaries, which are inevitably much more permeable. Hence, what happens in one national territory can have very significant impacts on another. Furthermore, many of the seas of Europe are shared by a number of countries and the need for transnational collaboration and co-operation is of great significance.

In essence maritime spatial planning is a political, state administered activity designed to shape the way sea space is exploited for economic gain and protected from adverse human interference.

Maritime spatial planning in essence has two key components, the preparation of a plan, which is the outcome of a process, to determine sea use priorities and allocate, often in fairly general terms how sea space may be used, areas that need protecting and areas where certain forms of activity may be permitted. Within a marine environment these are often strategic broad allocations. What is important to note is that the plan itself does not authorise development.

The consenting process is also another integral part of maritime spatial planning. Understanding what licences are required, who provides them, how long the consenting processes take and how offshore infrastructure intersects with onshore infrastructure are all critical elements for the rollout

of offshore energy provision. These consenting processes do not just take place in the sea, but the connectivity of offshore blue energy to the grid on land will also necessiate land based consenting processes to be satisfied.

The framework conditions are those factors/incentives that encourage the market to deliver. These are often not planning matters per se, but may encourage the market to invest in certain locations in preference to others.

This report now turns to the role of maritime spatial plan making in resolving conflict and proactively supporting national aspirations to decarbonise energy production.

3 Conflict Resolution in Maritime Spatial Planning: An Overview

In this chapter we compare the approach to blue energy based on a comparative review of existing and emerging Maritime Spatial Plans (MSP) for those countries of the European Union, who have a coastline and direct access to the marine environment, plus the UK and Norway. There is a particular emphasis placed on conflicts and how they are reconciled through the plan-making and implementation processes The emergence of MSP has been discussed before in different ESPON Projects (ESPON 2020) and the context and background is not repeated here, suffice to say that this is a relatively new and emerging area of activity and whilst there might be strategically common objectives for MSP, as defined by the MSP Directive, the nature of the plans and their degrees of maturity (whether they have currently been adopted or not), like terrestrial planning on the land, reflects particular country specificities.

Much of the data from this section is accessible via the EU MSP Platform and this provides excellent links to the current status of marine plans. While the **Maritime Spatial Planning Directive** (2014/89/EU) does allow a large amount of flexibility regarding the form each country's plan or plans can take, several minimum requirements exist, including consideration of land-sea interactions, the ecosystem-based approach and transboundary cooperation between member states. This means that the plans should be prepared through an open and transparent process recognising that in some cases compromises may have to be made in order to satisfy over-arching political imperatives. Within this context it is worth noting that Article 5 of the Directive advises that "through their maritime spatial plans, member states shall aim to contribute to the sustainable development of energy sectors at sea". This suggests there needs to be a balancing between environmental, social and economic imperatives, but there is a clear steer that space for blue renewable energy should be found.

In this chapter we explore the extent to which plans have been prepared and adopted, the degree to which they have built in flexiblity to adapt to changing circumstances and political priorities and the emphasis they place on blue renewable energy, with a particular emphasis on offshore wind. In essence, these plans create a generic framework within which specific decisions can be made about specific projects, but the plans in themselves are not the consenting regimes. In some cases offshore energy projects may have been consented and indeed commissioned without the plans being approved. Thus, plans in themselves are only part of the story of offshore energy deployment. Looking both at the plans and the consenting regimes in practice, in the conclusions we create a schematic typology of the current state of offshore energy planning regimes.

3.1 Status of Current Maritime Spatial Plans

Appendix 1 shows how many countries had adopted their maritime spatial plans as of Februray 2022, and perhaps most importantly when they expect to review the plans. This is a snap shot in time, and more and more countries are making more progress. For example, the Estonian

maritime spatial plan was adopted in May 2022, and the maritime spatial plans for Italy are expected to be concluded in the early summer of 2022. In most cases, within the marine environment, it is usually an arm of national government that is responsible for the preparation of maritime spatial plans. One notable exception is Germany, which as a federal state means that the coastal *Länder* have planning responsibilities out to the extent of the edge of the territorial waters, and from the territorial waters to the Exclusive Economic Zone (EEZ) planning at sea becomes a Federal responsibility.

However, the specific body or bodies that are responsible for MSP changes considerably from country to country. In some countries the national body responsible for planning at sea is different from the bodies responsible for planning on land and this can create tensions when dealing with land and sea interactions. In several countries a more integrated territorial approach has been developed and the same national agency is responsible for planning in the sea and on the land. In Slovenia, for example, the recent Spatial Planning Act 2017 (which came into force in June 2018) embedded the requirement for MSP into national legislation and pro-actively promoted an integrated approach by empowering a single national body, the Ministry for Environment and Spatial Planning, with preparing national spatial documents for both land and sea. For a full discussion of this 'one space' integrated planning approach please see the ESPON MSP-LSI project. Hence who is actually responsible for the creation of spatial plans varies from country to country and to complicate things still further certain activities often associated with major infrastructure (e.g. port infrastructure) are the responsibility of yet another sectoral body, both for strategic planning and the issuing of consents to authorise the development.

In some countries plans have already been fully prepared and adopted, and in some cases are in the process of being revised and updated. These tend to be those countries that might be described as being the front-runners in terms of offshore wind deployment and include the Netherlands, Begium, Denmark Germany and the UK. In many cases plans within this group are being constantly updated and modified.

Elsewhere plans have more recently been adopted, and they are moving into a phase of implementation. Croatia, Estonia, Ireland, Lithuania and Poland are examples of this type.

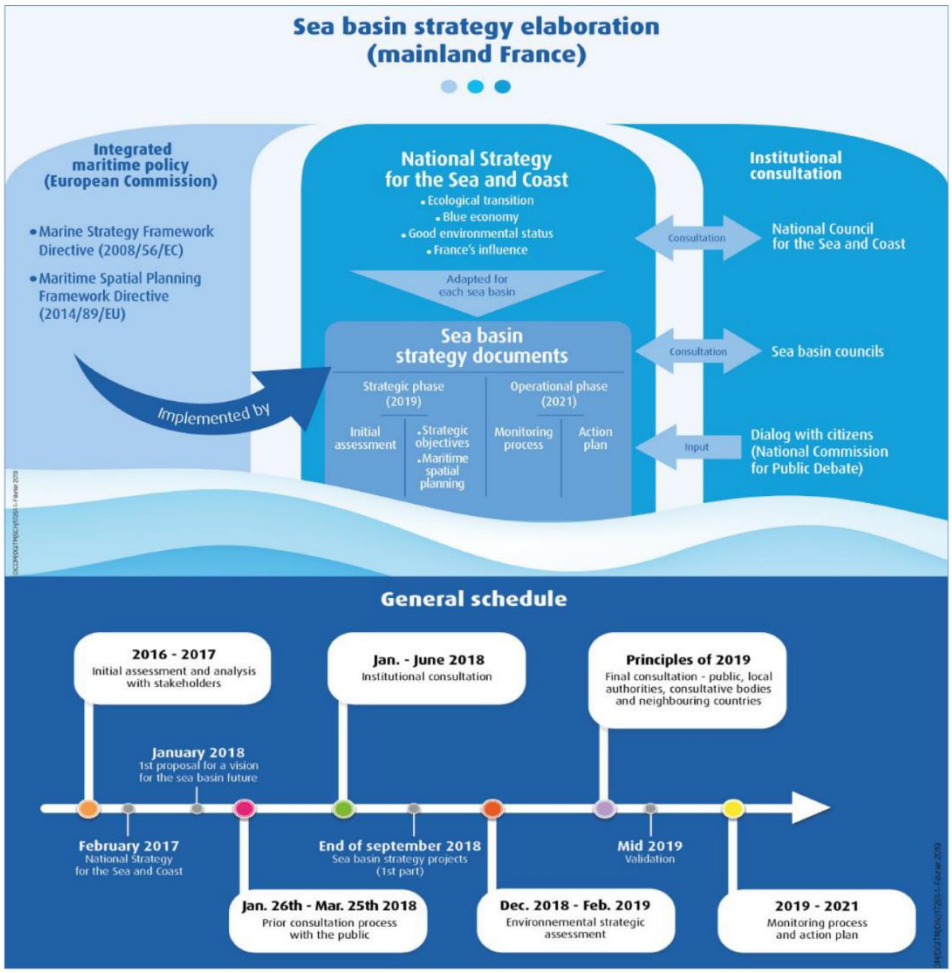
Some plans are still at various stages of preparation, like in Cyprus, Greece, Italy, Bulgaria, Romania. Having an approved or an adopted plan is not a necessary pre-requsite for authorising offshore renewable energy projects and some countries may have already authorised and commissioned some offshore wind facitlites (e.g.Italy). This does not mean that proposals for offshore wind energy projects are not being actively pursued in the absence of an MSP. In Greece, for example, the Ministry of Environment and Energy is the competent authority for the implementation of MSP who cooperates with the Ministry of Maritime Affairs and Insular Policy, which is reponsible for the 'National Strategy of Maritime Policy.' This Ministry has approved a National Energy Climate Plan, which envisages a rapid decommissioning or conversion of its lignite powered electricity generating system to be replaced with a rapid deployment of renewables, wind and solar, both on land and in the sea. Offshore wind farms are likely to be

predominantly made up of floating turbines because the depth of the seas around Greece is too great to allow for fixed turbines. It is expected that in June 2022 a public consultation will commence on their ambitious plans for offshore wind deployment. It is still not clear whether initial deployment and licencing will commence before maritime spatial plans have been approved. It is expected that national government will identify broad areas were offshore wind may be permitted and then the more regional plans should provide more detail. How quickly in practice these aspirations are likely to be realised is open to debate. What seems likely to happen is that national government will scope out broad areas of search where offshore wind projects may be accomodated and will allow for the commissioning of projects to begin.

Finally it is worth noting that in the light of the current situation (a combination of political energy insecurity and need to decarbonise energy supply systems) some countries (e.g. Sweden and Latvia) are looking to bring forward early revisions of existing plans or conducting interim reviews, with an expressed desire to increase the space allocated for blue energy.

On the land, while spatial planning may have a broadly similar agenda in terms of what it is trying to achieve, in practice the way it is organised in particular countries is characterised by the diversity of approaches, shaped by a particular country's administrative, political and historical context. Similarly within the marine environment, despite the common framework provided by the MSP Directive, there is still significant diversity in approach, reflecting and respecting particular country approaches. This means that there is a great diversity in how the plans are configured and the comparative analysis suggests that in broad terms two types of spatial plans are evident in different countries. We have described these as ***interactive planning regimes*** and ***static plans***. Within an interactive plan, there is usually an overall framework policy statement which is aspirational as to what might be expected from maritime spatial plans. This is then followed by a more spatial articulation of what is expected. Within France this is reflected in schematic plans for both the Mediterranean and Atlantic and then more detailed action plans are prepared on a rolling basis to deliver projects on the ground (see Figure 5).

Figure 5: Maritime Strategy for France.

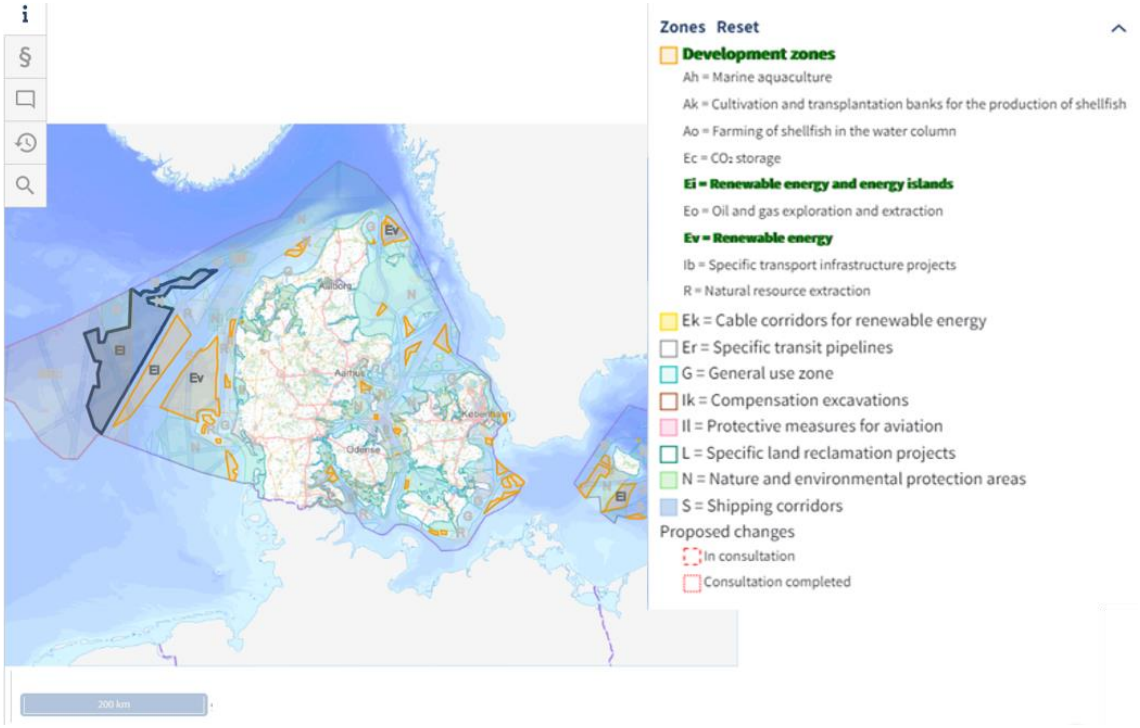


Maritime spatial planning process and sea basin strategic document production schedule

Source: Mer Littoral 2030

In Denmark, certain areas have already been investigated for their potential for future offshore wind energy production but have not yet been zoned or specifically identified as being suitable for offshore wind farm development. Following a more detailed assessment of these areas against various criteria, which in Denmark include different capacity densities for particular areas, these potential areas may be rezoned with the plan period allowing for a successful tender for an offshore wind farm to be made. No restrictions of other activities are placed upon these areas at the time of plan production but these may be introduced subsequently should future projects progress. These areas can be seen labelled EV or EI (for energy islands) in Map 1 below. The purpose of these broad development zones within the MSP is to ensure that associated facilities and installations can be established for future projects (Danish Maritime Spatial Plan, 2022).

Map 1: Renewable Energy Development Zones as specified in the current Danish Maritime Plan 2022.



Source: [Denmark's Maritime Spatial Plan]

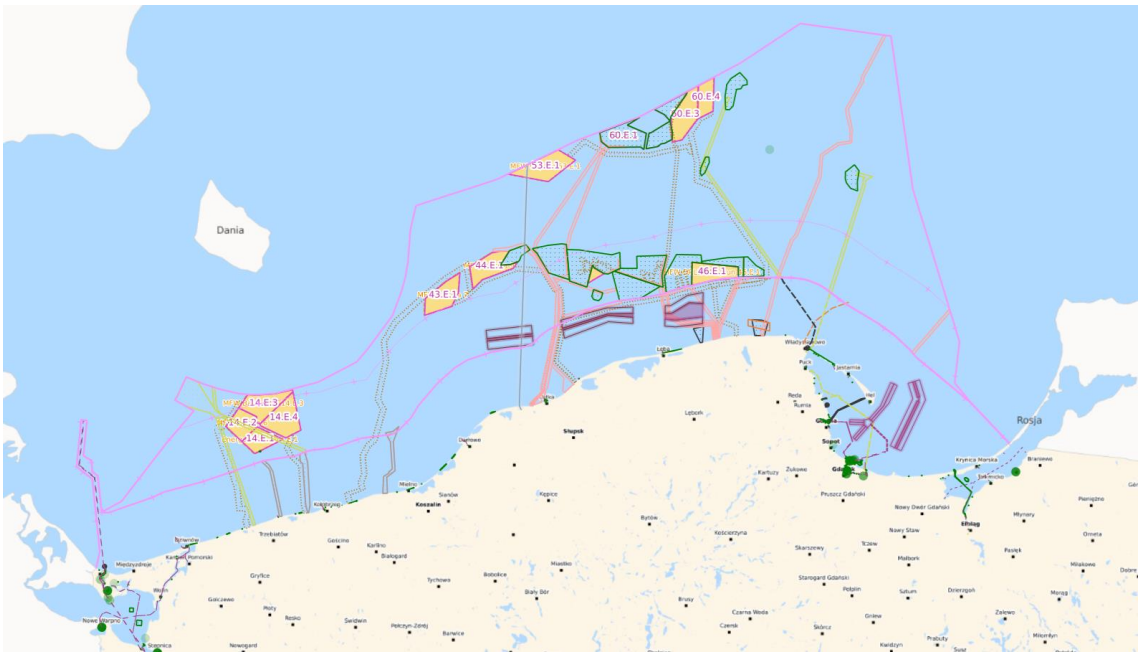
Elsewhere, for example in Poland the plan might be described as being static. The MSP for Poland was formally adopted, in May 2021, and comprises a generic plan for the whole of the Polish Seas Areas, as well as more detailed plans for Szczecinski and Kamienski Lagoon, Vistula Lagoon, and port area waters. Within the plan, significant space has been allocated for offshore wind energy. The Polish Law, which created the legal framework, suggests that the plan should be reviewed periodically- at least every 10 years, and so the review process is not due to take place till the end of the decade, and therefore is not necessarily responsive to changing political circumstances and priorities. This should not necessarily be seen as a problem. If all the space currently zoned in the plan for offshore wind is developed to its full potential, then Poland will become a significant player in offshore wind by the end of the decade.

In Portugal, maritime spatial planning comprises two basic instruments, the Situation Plan, the Plano de Situação do Ordenamento do Espaço Marítimo (PSOEM), and the Allocation Plan. The Situation Plan is intended to meet the requirement of existing sea uses, including identifying the natural and cultural assets that need protecting achieve environmental sustainability. Currently the situation plans for Portugal and the autonomous region of Madeira have been approved and the plans for the Azores will soon be ready for public consultation. The focus of these plans is on existing uses of the sea. The Allocation Plan is designed to zone or allocate space for 'private uses' that have not been reserved by the situation plan. These private uses include port and navigation easements and designations for offshore renewable energy. What is really important about this plan is that before a private activity can begin it requires a private use permit (TUPEM

- Título de Utilização Privativa de Espaço Marítimo). Such a permit will be granted in accordance with the space allocations in the allocations plan. This plan is currently in preparation and it is not clear exactly when it will emerge. It is important to note that offshore renewables (wind and wave) are being given serious consideration. Aware of some of the conflicts with other maritime users in the near coastal zone, current thinking is moving towards offshore wind development areas rather than specific sites and because of the substantial depths of the water off the coast of Portugal and the islands it is expected that offshore wind energy will involve floating platforms, perhaps combined with wave energy. What this example illustrates is the importance of having the maritime spatial planning frameworks in place, before the licencing/ consenting process can begin. This case perhaps also explains why there have been further delays in the auctioning of the first projects in Portugal (see chapter 4).

What this brief review illustrates is that there is an enormous amount of ongoing activity in terms of preparing and revising maritime spatial plans. Whilst created within a common framework of the MSP Directive, these plans take many different forms, depending on the national characteristics of each individual member state, which, whilst sharing generic common objectives, have to date been largely operating in their own national or regional interests.

Map 2 : MSP Poland, highlighting wind farms within development zones (yellow) and those in a very early concept / planning phase (green outline).



Source: SIPAM.gov.pl

3.2 Types of Blue Renewable Energy being Prioritised in Plans

Currently the plans make two types of provisions for blue renewable energy. Unsurprisingly, the most common references are for offshore wind. With this type of blue renewable energy references are made both within the narrative text of the plan and space is specifically allocated within the spatial aspects of the plans, i.e. within the maps. The detail can vary considerably from plan to plan, partly depending on the relative maturity of the offshore wind market. Sometimes broad areas of search for offshore wind schemes are proposed and elsewhere more detailed and focused development areas ready for auctioning might be evident. The level of detail and flexibility is a reflection of the extent to which the plans are interactive or static.

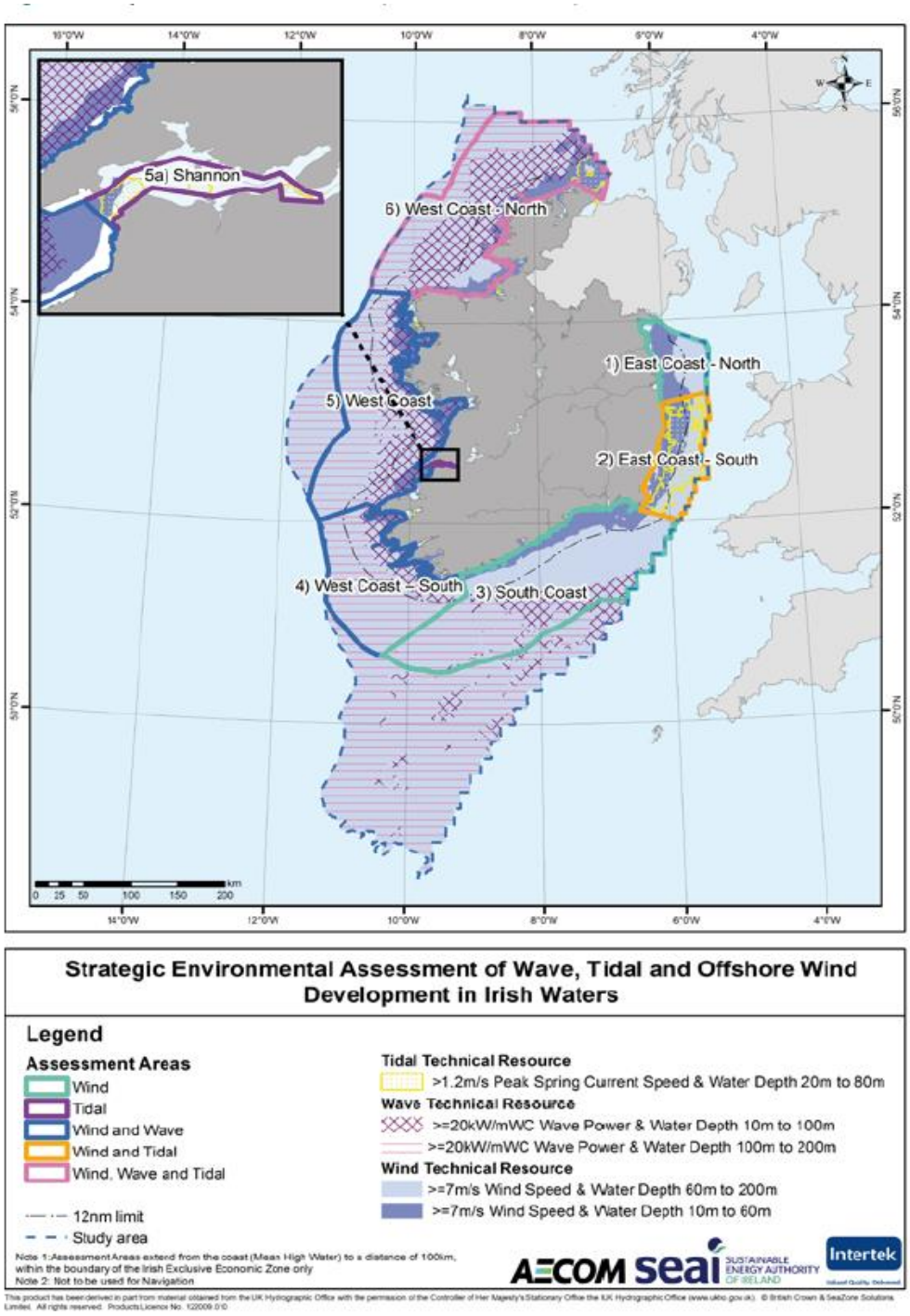
Other forms of blue energy potential are often mentioned in plans, but often in embryonic and aspirational terms, and usually only within the text. For example, within the Irish plan there is much reference made to the potential of wave and tidal energy, and indeed maps are produced showing potentials, but as it is a developing technology, little if any space has been zoned or allocated for this particular type of activity. So, for example, in Ireland the potentials of other forms of marine ocean energy have been explored in the plan (see Map 3) with sea areas spatially designated for exploration of certain technologies.

France has been at the forefront of tidal energy production globally, with the world's first tidal energy power plant in the estuary of the River Rance, in Brittany, entering production in 1966 and still producing electricity today. Obtaining marine energy goals is listed as a priority action within the Sea Basin Strategy Document (DSF) for France. Further tidal projects are listed in the regional strategies including in the Iroise marine natural park within the North Atlantic western channel strategy.

Similarly, in Slovenia, which has a very small marine area to plan for, 'Installation of wind farms is not possible, because installation of additional infrastructure would restrict the existing and future activities that can be performed exclusively at sea. The areas of future sea energy as a renewable source of energy need to be determined. This involves heat pump technology and potential pipe locations in the sea and the availability of necessary infrastructure on the land needs to be explored.' (Ministry of Environment and Spatial Planning 2021). What this illustrates is that there is an aspiration for marine renewable energy exploitation, but in planning terms it is still very embryonic, but is a rapidly developing area of activity.

Looking towards the future, very recently, offshore wind company Vattenfall has been granted a £9.3million grant funding package from the UK's Business, Energy & Industrial Strategy (BEIS) to explore the potential of using off-shore wind generation to drive an electrolyser, which will generate hydrogen generation. The hydrogen generated will then be piped ashore. This is very embryonic and experimental but shows how offshore wind can be used to generate other forms of fuel, not just electricity (Russell 2022b).

Map 3 Potential of other offshore renewables in Ireland



Source: National Marine Planning Framework for Ireland (NMPF)

Hence it is clear that within many maritime spatial plans the dominant renewable energy source is offshore wind, but with potentials for other types of potential blue renewable energy being recognised.

3.3 Instruments of conflict resolution

Whilst it is clear that blue renewable energy is being recognised as a new and important use of sea space, inevitably there are conflicts between existing and new user demands for an increasingly scarce resource.

Table 1 indicates some of the conflicts that can and do exist between different competing users for sea space. With respect to blue energy, the conflicts are between existing user rights and typically include:-

- impacts from the coast on seascape with perceived negative impacts on the local tourism offer, especially when this is often seen as the mainstay of a vulnerable rural/coastal economy;
- real and perceived disruption of new development in the sea for fishing rights;
- given the emphasis on protecting, maintaining and enhaning ecosystem services within the MSP Directive, conflicts between ecological assets and offshore energy infrastucture;
- disruption to existing shipping lanes; and
- disruptions to commercial flight paths.

Within the process of making maritime spatial plans there are a variety of mechanisms and instruments designed to bring such conflicts out into the open and, through the plan preparation process itself, at least reach an acceptable compromise. These processes operate at a range of spatial scales, within national space, in cross-border collaborations and transnationally across sea basins.

Table 1. Cross Sectional Spatial Conflicts

	Maritime tourism	Offshore wind	Cables and pipelines	Defence*	Maritime transport	Commercial fisheries	Aquaculture	Area-based marine conservation
Maritime tourism		x					x	
Offshore wind	x				x			x
Cables and pipelines					x	x		
Defence*								
Maritime transport		x	x					x
Commercial fisheries			x					x
Aquaculture	x							
Area-based marine conservation					x	x		

Source: EU MSP Platform, 2018,10

As marine spatial planning is a relatively new activity whose form, within Europe has been shaped by the MSP Directive, there is a lot of institutional learning and support within the MSP community in terms of how to address certain issues. Within this context it is important to acknoweldge the support of the EU in facilitating regional seas networking and projects designed to seek ways of addressing conflicts. Other European projects have assisted the plan making authorities build local capacity to deal with specific tasks, e.g. developing the evidence base for an Strategic Environmental Assessment (SEA), undertakening the SEA, or facilitating stakeholder engagement.

In the next five sections, we examine the instruments and mechanisms used within the making of maritime spatial plans to identify and reconcile competing interests over sea use.

3.3.1 The Process of Plan Making and Stakeholder Engagement in national space

Within the making of maritime spatial plans, a key part of the process involves stakeholder engagement and consultation. Effective processes of stakeholder identification and participation mean that throughout the plan making process critical stakeholders have been pro-actively and meaningfully engaged. These processes can mean that the plans themselves take considerable time to come to fruition as stakeholders learn to respect and trust alternative perspectives regarding uses of the sea. During these processes of stakeholder engagement, conflicts between user groups can be identified and attempts made for reconcilations and compromises between the diverse and divergent interests of existing and new users of the sea.

These differences of opinion and mechanisms of resolution can take place at a series of spatial scales and the mechanisms to resolve them involve some form of collaborative engagement.

At a more local/national level it is often the process of stakeholder engagement that enables conflicts to be resolved, or at least understood and accepted. Indeed the creation of the plan and the adoption of a broad zoning approach for different types of activities (whether these are for exclusive use (for conservation or potential development or shared use), the plan in effect is an attempt, at a particular moment in time, to take a position to resolve conflict. If the plan has broad acceptance, the process of plan making will have been able to reconcile conflicts. However, maritime spatial planning priorities are determined by the national governments, albeit framed in terms of the MSP Directive, and these will change over time. This in turn might highten, refresh or reignite previous conflicts over sea space use. In other words there is a need for ongoing processes of stakeholder consultation.

One of the critical elements within this process is when do the stakeholders choose to engage in the process. In Latvia for example, it was reported that fishing interest groups decided to join the process relatively late in the consultation and this effectively delayed the plan making by up to a year.

Another important factor in relation to stakeholder engagement is maintaining the contacts and dialogue between stakeholders even after a plan has been adopted. Here it is important to

understand that maritime spatial planning is an ongoing process, and as recent events in Ukraine have shown, there may be shocks that significantly alter the context of the plan necessitating a refresh. In many countries involved in maritime spatial planning, there has been an intensive period of stakeholder engagement activity. In some countries, this has been facilitated by European Union funded projects. For example in Solvenia, a great deal of the stakeholder engagement for the MSP was facitated by the transnational EU funded project SUPREME, which sought to develop a consensus in terms of reconciling national and local priorities, through processes of stakeholder engagement and consultation (ESPON 2020b). This project supported maritme spatial planning across the whole of the Eastern Mediterranean, including Croatia, Greece, Italy and Slovenia. In Poland, MSP is a national responsibility and the competence for it sits between the Minister for Maritime Economy, but also with the Minister for Building, Spatial Planning and Housing (and must be carried out in consultation with Ministers responsible for the environment, water management, culture and national heritage protection, agriculture, fishery, internal affairs and the Minister of National Defence, local authorities and other relevant stakeholders). The responsibility for the preparation of the plan fell to an organsation called the Directors of the Maritime Offices, who because of a lack of skills and capacity within that organisation, subcontracted out a lot of the techinical work to research institutes. These groups, through the consultation processes, built the trust and relationship between the stakeholders, which meant that when the final plan was presented, conflicts had been resolved or reconcilled (ESPON 2020c). Within Poland, given that the plan is not due to be revised until 2030, and that the sub-contractors involved in the plan preparation have finished their work, there are some concerns that the stakeholder interactions that developed during the plan prepartion phase might not be maintained, so that when the time comes for renewing Poland's maritime spatial plan, there will need to be another period of rebuilding the stakeholder network. To some extent this raises the issue of institutional capacity within the maritime spatial planning authorities and whether they can retain the support and trust of critical stakeholders.

3.3.2 Cross border collaboration

Given the nature of European seas, many national maritime spatial plans have important cross-border implications and the EU MSP Directive makes it a requirement that effective cross border consultation should take place as part of the plan making process. A number of EU funded projects have sought to facilitate these process, particularly in the Baltic, where projects such as Plan4Blue and Baltic LINes have worked to create a framework for continuous collaboration between countries and coherence of energy corridors within maritime spatial plans respectively.

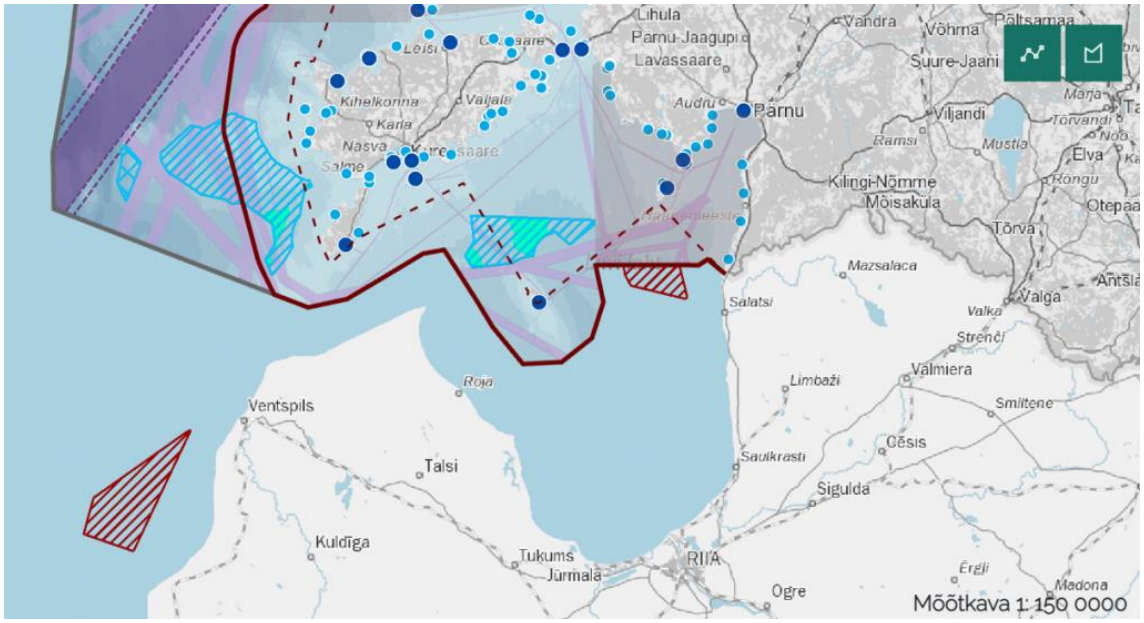
At a cross border scale, there are usually formal cross border organisations which meet regularly to discuss and hopefully resolve matters of mutual interest. For example, in the Baltic Sea, between Gemany and Poland there is a formal cross border institution that meets on a regular basis, that has a longstanding history of collaboration and co-operation. The German-Polish Governmental Commission for Regional and Border Collaboration was established 1991. In 1999, the Commission incorporated a joint Spatial Planning Committee as a forum for discussion and

where necessary political decision making on topics such as transport infrastructure, energy, culture, sustainable development, economic growth and investment. The Polish and German authorities (at federal and federal state level) use this Spatial Planning Committee, as well as the Baltic working groups under HELCOM and VASAB and bilateral meetings for regular formal and informal exchanges with other partnering states about their spatial planning activities (ESPON 2022c).

In some cases, cross border collaboration can lead to nation states collectively identifying commom areas for wind farm deployment and the each country within its own national plans zones areas for development. One of the best examples of this is in the Baltic Sea where between Germany, Demark and Sweden an intense area for wind energy deployment has been designated straddling the borders of all three countries. However, in practice the timing and sequencing of individual wind farms in national space means the potentials for collaborative provision has not been realised, despite several studies advocating the potential benefits of collaborating over implementation (see chapter 4 for a fuller discussion).

A further example of good cross border collaboration and the designation within plans of cross border wind farms is between Estonia and Latvia. The collaboration, commonly known as ELWIND has seen significant cooperation between the two countries with both being presented on the Estonian maritime spatial plan (Map 4). Here, Estonian wind farm development areas are highlighted in blue and Latvian in maroon.

Map 4: Offshore wind park development areas in Estonia and Latvia



Source: [MSP of Estonia, Hendrikson&Ko/Estonian Riigihangete register](#).

As well as identifying areas of common potential straddling the border, cross border collaboration may be necessary to jointly reconcile conflicts between wind energy and other sea users. Collaborative cross boundary working was necessary for the wind farms that sit astride the Belguim and Dutch border. Here significant stakeholder engagement between the nation states

and the maritime transport industry enabled the shipping lanes to be re-aligned to create areas for wind farm development.

Map 5: Wind farms in the North Sea in both Belgium and Dutch waters.

Source: 4COffshore online database

Therefore there are numerous good examples of cross border collaboration in plan making which is facilitating cross boundary allocation of space for blue energy, predominantly offshore wind, and these collaborations can help to resolve potential conflicts.

3.3.3 Transnational Collaborations

Sea space especially within sea basins also involves signficant transnational collaboration. Well established examples of transnational collaboration include the Barcelona Convention, VASAB, Helcom, North Sea Commission and NESC, for example, whereby national, regional and local stakeholders discuss issues of mutual concern. Within this context longstanding and sustained funding of projects by the EU have helped to create and maintain these networks. What is important in terms of plan making is that critical stakeholders can exchange experiences and know-how, for example at project organised workshops or using tools developed as part of joint often EU funded projects (e.g. the SUPREME projected facilitated a more common approach to stakeholder engagement across Mediterranean countries), thereby leading to a process of mutual learning.

3.3.4 Strategic Environmental Assessment

Strategic Environmental Assessment (SEA) is an instrument required in plan making to ensure that the environmental effects of a planned project are fully considered in the plan making process. SEA is a European requirement for all major plans and the MSP Directive makes it a

required aspect to maritime spatial plan making. All countries with maritime spatial plans have engaged in this process and consultations around SEA have operated effectively in national, cross- border or transnational space. In some countries, particularly in southern Europe (e.g. Portugal) EU funded projects have enabled some of the SEA processes to be fulfilled by research groups. This instrument allows for environmemtal factors in maritime spatial plan making to be explicity taken into account. Whilst all countries have complied with the proceedural requirements for SEA, it is hard to determine what impact it has had on the outcome of the maritime spatial plans themselves.

3.3.5 Creating multifunctional space for sea uses

Where sea space is a scarce resource and where there is insufficent space to accommodate users needs, some countries have started to experiment with multifunctional use of sea space, both spatially and over time. The European Commissions' report on the implementation of the MSP Directive (2014/89/EU) highlights how Belguim's approach to maritime spatial planning is seeking to resolve conflicts between an increased demand for offshore energy and other uses of maritime space (European Commission 2022). Belgium's 2050 vision for the North Sea through an indepth analysis of multi-functional uses, both in time and space, provides extensive support for offshore renewable energy in Belgium's limited sea space.

3.3.6 Use of Legal Recourse to challenge decisons

Where compromise is not possible and there remain aggrieved parties to a plan, the approach for conflict resolution is usually through the court system in that particular country. This has been the case in Germany, where the second maritime spatial plan has been a cause of conflict in Mecklenburg-Vorpommern. Here, the proposed zoning of offshore wind turbines was perceived by the tourism providers to be too close to shore and the visual impact of wind turbines from the coast would be damaging to the tourism industry. Environmental groups also felt that insufficient consideration had been given to critical ecosystem services. Both groups felt that the planning process had failed to fully appreciate their concerns. Approval of the plan has been challenged through the courts with the environmental interests arguing that the correct proceedures and processes had not be followed and their concerns have not sufficiently been taken into account. What the outcome will be is yet to be determined.

These issues or conflicts have different impacts, real or perceived, in different places and some countries have responded by limiting the potential for offshore wind close to the shore. For example in Poland, such potential conflict between tourism and environmental interests has been avoided. In part, because much of Poland's coastline is covered by Natura 2000 designations (areas of European importance) and national legislation has defined the minimum distance that any offshore wind turbines can be permitted from the coast.

Similarly, in Portugal, competition for space close to the narrow strip of coastline is high, with tourism, transport and fisheries being the predominant activities taking place in these zones. The narrow continental space has meant fixed turbine wind farms have not been deemed feasible in

this, already crowded area. Therefore proposals have centred around floating offshore wind, further out to sea.

3.4 Final Reflections

There is considerable variability in the progress being made with the development of maritime spatial plans across Europe. Some countries are already in the process of updating and revising plans, and this is likely to be much easier if the plan takes an adaptable and flexible format. In these cases, the expectation is that more space will be made available for offshore blue energy, predominantly offshore wind. Other plans, that have been recently adopted, have also created considerable space for offshore wind. It is also likely that emergent plans (notably Italy, Greece and Portugal) will make significant space available for that purpose. It will be interesting to see, in the next few years, how rapidly they are able to reach the point of consenting new wind farms, but most appear to have sufficient capacity embedded in maritime spatial plans to witness significant new offshore wind capacity being commissioned, consented, constructed and operational by 2030. Other countries have more embryonic aspirations for blue energy, either reflected in emergent spatial plans, or ambitious energy strategies with a focus on offshore renewables,or a combination of both.

Unsurprisingly the North Sea and Baltic Sea, with their longstanding traditions of offshore renewable energy delivery, have the more advanced planning regimes, but there are good examples emerging in Southern Europe, especially within the Atlantic and Mediterranean, of strong emerging interest in offshore wind in particular.

Overall, from a policy perspective, it appears that as MSP practice develops across Europe, there is a recognition that marine energy is an integral component of blue-green growth, combined with an increasing desire to create a more energy self-sufficient European space.

Plan making integrates established processes and practices designed to manage conflict between different sea users. Often it takes time to build and maintain stakeholder trust. But an approved or adopted plan reflects a political compromise at a particular moment in time, given that spatial planning is an inherently political activity. In most cases, the scale of the plans created are what might be described as strategic, in terms of allocating broad areas of space where, in principle at least, offshore blue energy infrastructure may be permitted. However, this is not necessarily guaranteed and there may well be further challenges in consenting or authorising processes of particular developments. This is the issue to which the report turns in the next chapter.

4 Maritime Spatial Planning Issues Associated with Consenting Regimes

In terms of maritime spatial planning, even if plans have allocated specific space for potential types of offshore energy production, there are still often considerable challenges in reaching the point at which renewable energy generation actually begins. In this chapter we explore the challenges in renewable energy deployment associated with specifically the planning regime.

The auctioning process signals to the market when a nation state is ready to begin the process of authorising offshore wind farm development. These auctions can be conducted at anytime, even if there is not an adopted or draft maritime spatial plan. However, in those countries with an adopted or emerging maritime spatial plan the areas for potential offshore wind farm development have often been identified, often in great detail. Where plans are more embyronic, more speculative small scale schemes may be authorised, such as in Italy. This auctioning process is an important step. Once the auction has been completed, the successful offshore wind development company will have won the right to start the detailed design of an offshore wind farm, in a specific locality. If the state is not ready, or delays the process, then this can and will create uncertainty within the market and further interrupt the initial design process. This has recently happened in Portugal, where the Energy Transition minister Joao Matos Fernandes announced in March 2022 that auctions for 3-4GW for offshore wind projects would take place in the summer of 2022. This has now been delayed, until at least, the summer of 2023, for unspecified reasons (4C Offshore 2022b).

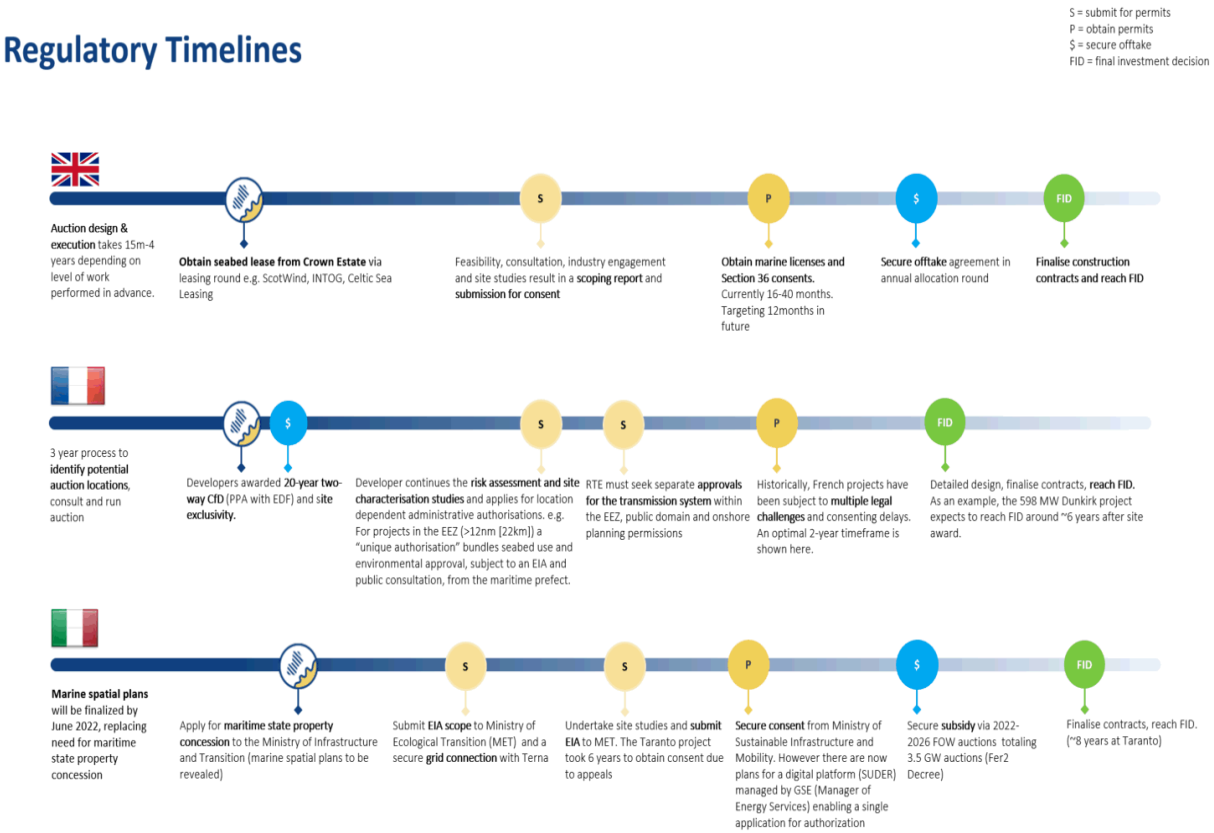
Such uncertainties in the timing of processes can lead to wind farm operating providers making commercial decisions in terms of which sites are priorities for them. Issues that they might take into account might be the relative maturity of the market in a particular country and the relative certainty that the necessary licences will be forthcoming in a timely manner. In an immature market, the risks may be ameliorated to some extent by the degrees of support offered by the state. These might include for example, a guaranteed price for the electrity and the state providing the offshore cables to bring the energy ashore, as happened with some of the early Dutch projects. These are to a large extent what we have described as the framework conditions which are important facilitators of wind energy deployment, but often operate beyond the scope of the maritime spatial planning regime itself.

Once a preferred bidder has been selected, the detailed planning and design process needs to begin. To a large extent this is largely in the hands of the wind farm developer and sits outside the scope of the formal maritime spatial planning system. During the design phase the wind farm developer will have to conduct, or commission, an Environmental Impact Assessment (EIA). An EIA is a required process for large scale infrastructure development, according to Annex II of EIA-Directive 85/337/EEC (amended by 97/11/EC and 2003/35/EC). In relation to offshore wind development, the EIA Directive applies to schemes with more than 20 turbines and the majority

of offshore wind farms exceed this minimum threshold. The process is designed to ensure that any adverse environmental impacts can be ideally designed out, or minimised. Formally, the only part of this initial process that involves the regulatory authorities is the scoping process. This determines the critical environmental issues to be explored. At the end of the EIA process, Environmental Impact Statememt (EIS) is submitted, by the offshore wind developer, as part of the documentation seeking approval/authorisation for construction to begin. The emphasis should be on the word ***process*** and the scheme's design can be altered to address significant potential environmental impacts, which often involves discussions with critical stakeholders, such as other marine users, e.g. fisheries or transport and environmental groups, hopefully to minimise their concerns. Depending on where the wind farm is proposed to be located, these critical stakeholders could include local tourism interests, environmental groups, fishing interest and other groups that may have concerns over an offshore wind farm (see Table 1).

Once the specific design for the wind farm has been completed, then the process of consenting, authorsising or licencing the development begins. The precise timescales and processes vary from country to country (see Figure 6). What is clear is that the steps of regulatory compliance are broadly the same, although the timing and sequencing of various activities is very different, depending on national approaches. In the UK, the time taken from auctioning sites to the point at which construction has been authorised and can begin takes anything between 15 months and four years, depending on scale and complexity of the project. In France, it is a three year process. In many of the emerging countries who as yet have not consented many wind farms, apart from small experimental schemes, some of these processes have yet to be fully defined and tested to see in practice whether they will work as anticipated. This is the case for example in Italy (see above), Greece, Poland and Portugal.

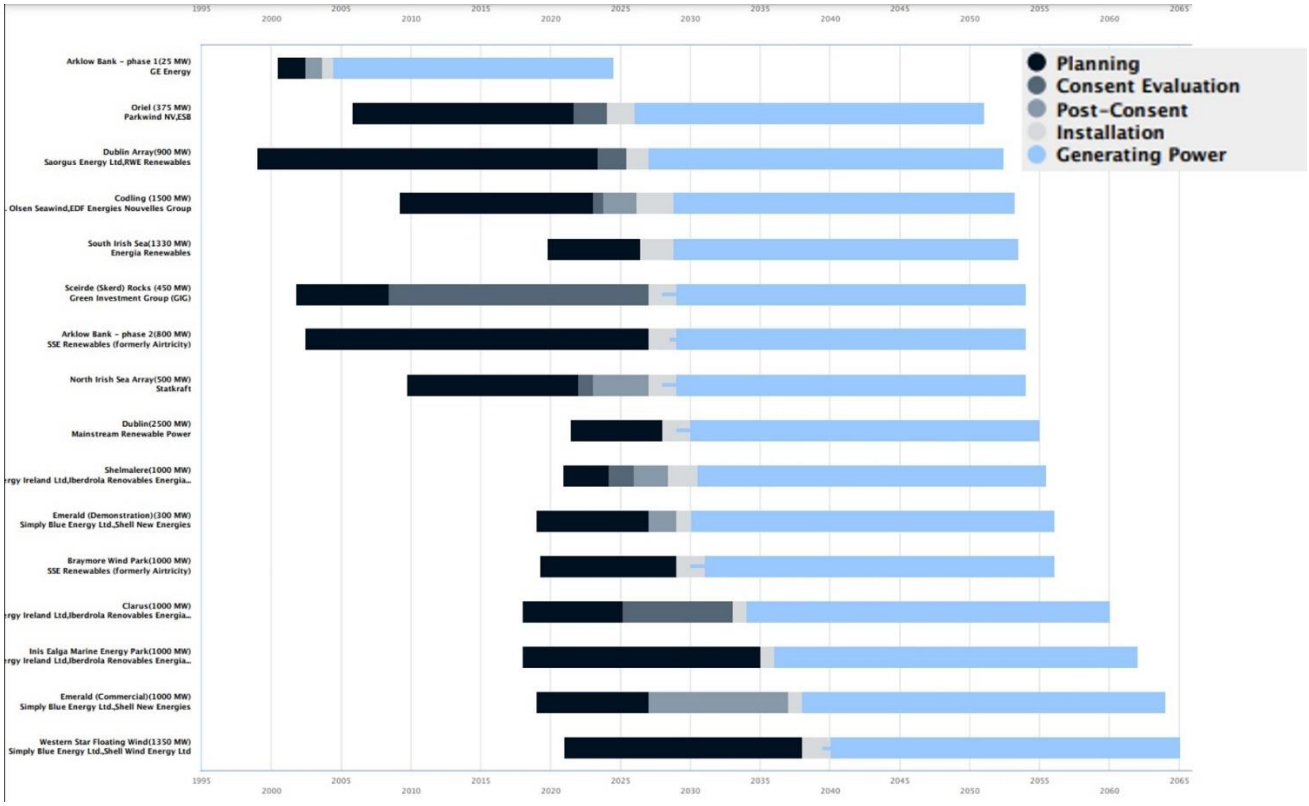
Figure 6 : Example regulatory timeframes for UK, France and Italy.



Source: 4COffshore Source: 4COffshore

But the planning (by which we mean preparing the detailed design of the scheme by the developer) and the consenting process can often take up to two years. Figure 7 shows the time lines of several proposed wind farm projects in Ireland. While most are likely to be operational before the end of the decade, it is clear that considerable time is spent from the auctioning process in planning, consenting and construction phases, before commission. These sorts of timescales are not uncommon across Europe. However, given the current geo-political context of a decarbonising agenda combined with energy security expectations diversifiying away from oil and gas, it is clear that there is a growing political disquiet in the time spent between auctioning offshore wind farn projects and them coming on stream. Thus there is a desire and aspiration to streamline and speed up these prcocesses.

Figure 7 Offshore Wind Project Pipeline for Ireland to 2040.



(Source 4C Offshore)

In the next section we begin to explore some of the challenges of delivering offshore wind through the planning consenting process, recognising that the regulatory authorities are only directly involved in a relatively small part of the process. This is a largely under-researched aspect of the delivery process.

4.1 Approaches to overcoming delays in the consenting process

Having understood how complex the consenting processes are with regards to licencing or authorising specifically designed projects, this section seeks to explore some of the instruments and mechanisms which currently appear to be delaying these processes in some countries and ways of addressing them.

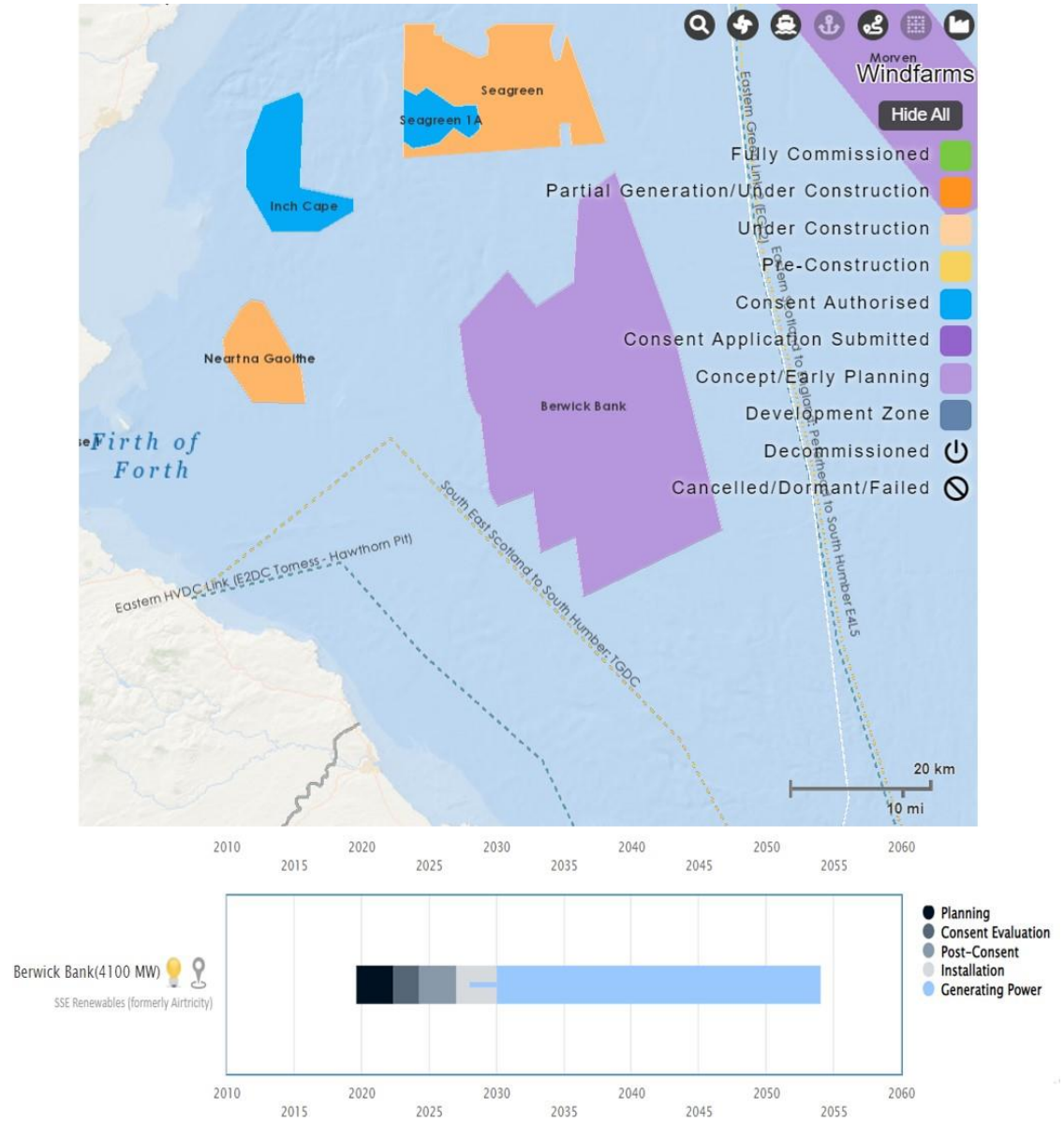
4.1.1 Role and importance of EIA

The EIA is an instrument of maritime spatial planning which provides an opportunity for the developer to engage with critical stakeholders to explore the extent to which the design of a wind farm can minimise or reduce negative impacts to acceptable levels. The nature of the key stakeholders and the issues to be considered will vary from scheme to scheme and depends on the development sites' proximity to other sea uses. For example, a wind farm in relatively close proximity to a Natura 2000 site may have to pay specific attention both to the potential impact on

the ecological integrity of the site itself and the flight paths of migrating birds (both heights and routes) and other migrating marine species. The process of conducting an EIA should engage critical stakeholders and other significant environmental threats, and should, as far as possible, design these out at the project stage.

A good example of the process in action, is the Berwick Bank scheme (see Map 6) off the coast of Scotland. It has recently been reported that the developers have reduced the footprint of the proposed wind farm, initially by 10% and more recently by a further 20%, in order to limit the potential negative effects on ornithology, benthic and shellfish ecology, fishing, shipping and navigation. The output capacity from the wind farm is likely to stay the same as originally envisaged, through the construction of a smaller number of larger wind turbines. These changes to the wind farm design have been initiated in response to stakeholder concerns which emerged as a result of proactive engagement in the EIA process. These changes in the detailed design process are likely to result in further delays to the submission of the wind farm for final planning consent by a further three to six months. This will subsequently delay when construction can begin, subsequently delaying the date the wind farm becomes finally operationalised, which is currently set for 2028 (4COffshore, 2022). However, such pro-active engagement with critical stakeholders is likely to speed up, or at least not delay the consenting process, because many of the potential objections will have already been mitigated. This small example illustrates a number of critical points, first the detailed planning of any offshore wind energy scheme is a lengthy process, within which the formal process of gaining planning consent is a relatively short, but critical part. Even in a relatively mature planning environment these processes are still likely to take over two years and these processes make some of the predictions as to when the construction phase is likely to start and when ultimately the wind farm can begin operating fraught with uncertainty.

Map 6. Proposed location and milestones of the Berwick Bank wind farm, Scotland, UK.



Source. 4COffshore

Our review has identified very few proposed wind farm developments which have been prevented from proceeding because of their envisaged environmental impacts. One case however is the Hiumaa in Estonia. Here a proposed wind farm was being investigated prior to a maritime spatial plan being adopted. Various objections were raised on the basis of the EIA process not being sufficiently robust and the initial approval was annulled by the supreme court. Subsequent modifications to the proposal have since been undertaken and revised technical plans for the windfarm are due to be completed in August 2022 (4COffshore online database).

In this case one of the critical stakeholders was the commercial aviation industry and through the EIA process concerns were raised about the potential impacts of the offshore wind farm on commercial flight paths.

The EIA process is an accepted part of the planning and design process, and whilst it can be time consuming, if done properly can lead to better schemes and less opposition to final decisions as to whether a wind farm should be authorised.

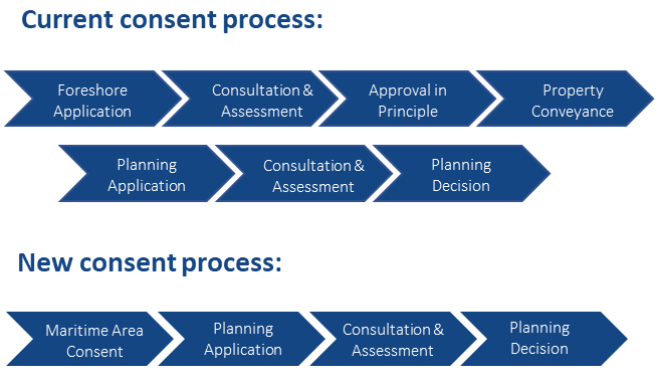
4.1.2 Simplifying the consenting process

The offshore wind farm industry is a highly specialised industry and the consenting process is not always straight forward, as often the company seeking to build the wind farm is different from the company looking to bring the energy ashore, often via a small substation in the sea and cables to shore. This may lead to two separate consenting processes in the sea, one from the wind farm developer, which focus on the distrubtion of the wind turbines across the site and a separate licence for transmitting the energy to shore. When the cables come ashore further infrastucture is required to connect the energy to the national grid and this will often require other consenting regimes to be satisfied, and these will be the responsibility of land based authorities. Thus, in some cases there are at least three separate consenting processes that need to be satisfied and approved before an offshore wind farm can become operational. Who is responsible for these authorisations may vary from country to country. In most countries, it is a national government department (or departments) who are responsible for final granting of consents in the sea so that construction can begin. In Federal countries such as Germany, the authorisation permits are shared between the *Länder* and the Federal government, depending on where the infrastructure is located. Hence, in the Exclusive Economic Zone, the German Federal government will authorise offshore wind development, but to bring the energy ashore will require an authorisation from the relevant *Länder* authority. Similarly, in Portugal, maritime spatial planning assigns responsibility to three separate entities. The islands of the Azores and Madeira are autonomous states and are responsible for MSP to the EEZ, the Directorate General of Natural Resources, Security and Maritime Services, a part of the Ministry of the Seas, is responsible for planning the Continental maritime area (close to the mainland) and the extended continental shelf. Furthermore, it is important to realise that the national government agencies, authorising offshore wind developments in the sea, are not necessarily the same as the national agencies responsible for co-ordinating maritime spatial plan making. Hence, the system is complex.

Ireland, whose offshore wind industry is currently classed as an emerging market with great potential, has incorporated legislation measures within the development and revision of marine planning to expedite the consenting process. There is already recognition that pre-existing processes in terms of legislation and institutional capacity were likely to slow down the consenting process and therefore the ability of the country to realise its ambitions for delivery as articulated

in the National Marine Planning Framework for Ireland (see Figure 7). The original consenting process included duplication of EIAs from two different Acts, the Foreshore Act and Planning Act (4COffshore, 2022). To respond to these identified challenges, a Maritime Area Planning Act (2021) has provided much needed reform to marine governance. The Act will help to facilitate a reduction in reliance on carbon fuels and will be a critical enabler for delivering on Ireland's target to increase offshore wind capacity to 5 GW by 2030. This Act establishes a new maritime spatial planning system underpinned by a statutory Marine Planning Policy Statement and guided by the National Marine Planning Framework. The Act also provides provision for the establishment of a Maritime Area Regulatory Authority (MARA), designed to build the capacity to administer the new licensing and development management regime, to be administered by the MARA, in conjunction with An Bord Pleanála (an independent planning body who considers any appeals agianst spatial planning decisions on land or in the sea) and the coastal local authorities.

Figure 8: Streamlining the Offshore Wind Consenting Process in Ireland.



Source: 4COffshore, 2022

It is probably in this area of maritime spatial planning that more research and understanding of the processes are required to understand whether delays in making decisions exist and are they really a significant problem for the offshore development industry. Some of this may be due to delays in the detailed design process before wind farms are submitted for approval and controlled by the developers. As we have shown above, this may be a deliberate decision to engage and accommodate to the best of their ability other stakeholder concerns, thereby minimising objections at the consenting phase. In other respects these timescales might not be a real problem for the wind farm operators as they enable them to sequence the construction phases to suit their needs.

What is clear is that in many countries, even in mature planning systems, such as the UK, attempts are being made to streamline the consenting process. This might involve adjusting the systems and processes and/or building capacity to process the applications. Whilst recognising that each country has its own system for authorising new offshore wind development, there is

scope to share and learn from each other. This is already taking place with the countries who are in the early stages of developing offshore wind farms either looking to adjust their approach (e.g. Ireland) or looking to design their systems based on best practice (e.g. Greece).

The process of consenting or finally authorising the location, size and orientation of a wind farm, and ensuring that there is certainty that all the consents are approved, can be fraught with difficulties, even within mature markets. For example, off the Suffolk coast (within the North Sea off the English coast), there are proposals for up to seven major offshore wind farms, many of which have already received their consents to be built. More recently, in order to speed up the delivery of onshore wind infrastructure development, the Department for Business Energy and Industrial Strategy (BEIS) has taken over the responsibility of authorising onshore energy infrastructure away from the local authorities. A local action group, Suffolk Energy Action Solutions, has been granted a judicial review to challenge the Secretary of State of BEIS' decisions for the onshore infrastructure. They are not objecting to the offshore wind farms per se, which they support. But rather their objections are based on the lack of integrated thinking about what the cumulative effect that multiple transmission lines and small substations being built across extremely sensitive and vulnerable environments on the land will be. What the group is advocating is more joined up and strategic thinking with all the wind farms transmission cables coming ashore at one point and being connected to the grid via substations located on brownfield (previously developed and abandoned industrial sites). What the outcome of the judical review will be is unclear, and will not be known until the autumn of 2023.

What is evident is that this process of producing the necessary consents within a country context is complicated and introduces differences in terms of how long proposals may sit at the project proposal stage before being built and finally commissioned. As the desire for offshore wind gains public support and political momentum, a cost effective solution to achieving energy security is required.

4.1.3 Cross border co-operation in help of the consenting process

Cross border co-operation is an important feature of maritime spatial planning for offshore wind deployment and potentially other forms of blue renewable energy. But in practice, consents for specific farms and their transmission connectivity to the shore tend to be organised in national space only. The examples below illustrate some of the opportunities of effective cross border cooperation in the implementation of projects.

Netherlands/Belgium. One of the earliest heavy concentrations of offshore wind production can be found on the Dutch/ Belgium border. Cross border negotiations were required to realign the shipping lanes to make space for a number of potential development zones that have now all be fully commissioned. Despite the potential of working together to create economies of scale in terms of bringing the energy ashore, there were different framework conditions operating in each country which meant that this was impossible. As part of the incentivisation process to attract bidders to potential lots, the Offshore Wind Energy Act of 2015 in the

Netherlands sought to simplify and accelerate delivery. It did this in two important ways. First, it simplified the consenting process, by making the government responsible for the spatial planning arrangements and the environmental assessments. Secondly, the government became responsible for the cables connecting the wind farms to shore, which in many other countries was another consenting process and a developer responsibility. This in effect acted as a further subsidy to the wind farm developers and helped to de-risk the projects, as both the specific locations of development and the cabling to shore are a government responsibility. But interestingly the wind farms sitting on either side of the border have been consented according to Dutch and Belgium consenting regimes

Latvia/Estonia. Both countries have relatively recently signed a Memorandum of Understanding (MoU) to establish a joint cross border wind farm. Originally planned to generate 1000MW, this has later been revised downwards to a generating capacity of 0.7-1GW. This project is still in its very early tentative stages and whilst a feasibility study has concluded that there should be few, if any, specific local Latvian or Estonian difficulties that might prevent the project from progressing smoothly, the idea is very much in its infancy. The Estonia MSP was approved in May 2022, with significant space being zoned for offshore wind. In Latvia, several areas have been identified as having potential for offshore wind, including the Elwind scheme. It is expected that tenders will be placed to develop this joint project in 2026, and current guesstimates suggest, perhaps rather optimistically, that it will go into operation by 2030 (4COffshore, 2022). This project might be considered as one of the earlier front runners in terms of cross border project development. But it is not clear yet how in practice the process will operate and whether a streamlined design and consenting process can be operationalised, or may a single project developer need to submit applications to both Latvia and Estonia.

4.1.4 Transnational Co-operation Opportunities and Challenges

Much has been made of the transnational opportunities to achieve efficiencies in the deployment of offshore wind energy. To date these have largely been theoretical academic explorations, and most implementation of offshore renewable energy projects have to date been stand alone projects exclusively delivered in the national space of a particular country. Nevertheless, more future rapid and cost effective deployment of offshore renewable energy could benefit from cross border and transnational cooperations.

Transnational scoping of hybrid projects. Many projects to date have been almost exclusively national in orientation, with connectivity to that countries' national grid. To realise the full potential of offshore wind, increasing sites are being identified further and further offshore. One of the significant costs involved in offshore wind deployment is the cost of grid connectivity and because projects are designed on an individual basis, this grid connectivity design is also *ad hoc* and incremental, undertaken on a project by project basis. The potential of 'hybrid schemes', whereby offshore wind schemes in different countries could share a single connector, thereby allowing the wind generation to directly feed into another countries' grid, has

been explored in some detail. The North Sea Energy Co-operation (NSEC) programme signed a declaration in 2016 to encourage offshore wind operators, transmission system operators and national governments to explore the potential of hybrid projects. Such projects could, in theory, by sharing transmission infrastructure, reduce total project costs of offshore wind farm development by betwee 5% and 10% within the North Sea. For five potential projects that were investigated, this could achieve saving of between Euro 300 million to Euro 2,500 million per project (European Commission, Directorate-General for Energy, Kern, S., Zorn, T., Weichenhain, U., et al., 2019). However, to date these hybrid schemes remain only a theoretical possibility and there are many barriers to be overcome, including the need to find answers to questions like who is responsible for project costs, how can different national subsidy arrrangements be aligned, what is the position of the UK in relation to energy markets following its withdrawal from the EU, how can the projects on either side of a border be aligned and synchronised to ensure that the advantages of cooperation be realised? The report (European Commission, Directorate-General for Energy, Kern, S., Zorn, T., Weichenhain, U., et al., 2019) talks about the fact that to date there is only one hybrid project in Europe. This, they claim, is the Baltic Sea with the Kriegers Flak project where there are three wind farms straddling the German, Danish and Swedish borders. Currently two offshore wind farms have been commissioned. The German project was an early adopter, with the scheme starting generating power in 2015, on the Danish side of the border two offshore wind farms, Kriegers Flak K2/K3, were consented in 2016 and will become fully commissioned by 2021. The Swedish scheme has only recently been awarded a consenting licence as the operators increased the size of the turbines and generating capacity from 500-640MW. It still has to apply for cable connectivity to bring the energy ashore and connect it to the grid. A final investment decision will be made in 2025 and it is anticipated to be fully commissioned by 2028. What this example shows, is that although these series of projects may have had the potential for being a hybrid project, actual synchronising of delivery in three separate countries, with three operators and three tranmission providers is extremely difficult. Nevertheless, the potential of hybrid projects is clear for all to see, but there remain technical challenges to delivery.

More recently in 2020, the Baltic Sea countries and the EU signed a ‘Baltic declaration for offshore wind energy’ which is intended to promote further cooperation in renewable energy deployment, including the desire to implement hybrid projects facilitating transmisson of renewable energy around the Baltic.

4.1.5 Private sector initiatives to drive co-operation in transmission systems

More recently TenneT, a commercial tranmission operator has announced plans for a tender of up to Euro 30 billion with key market partners for eight years to provide shared transmission opportunities to shore. This follows the Esjberg declaration in May 2020 at the NSEC, where Germany, the Netherlands, Demark and Belgium agreed to **jointly** deliver 65GW of offshore wind energy by 2030 (Russell 2022). Such a project should in theory reduce the number of

transmission cables coming ashore, thereby reducing cost and the number of consents required, although this will require some of the issues outlined above, regarding the timing and sequencing of offshore wind farms in national space to be better synchronised.

4.2 Addressing problems in the consenting process

As has been noted above there are variations existing and emerging practices in the consenting process, which may be a challenge in the effective delivery of offshore renewable energy.

Some of the key challenges include:-

- The authorising authorities may not have sufficient human capacity to process the major applications coming forward.
- As this is a very new and emerging area of activity, there is very rapid learning taking place about which systems and processes are the most efficient and effective in processing specific applications for offshore wind energy projects. Currently, most of the experiences have been with offshore wind farms that are fixed to the sea bed. There is less experience of dealing with floating offshore wind farms, which is an emerging technology. Countries like Greece and Portugal, because of the depth of their sea space, envisage this type of offshore wind farm as a significant part of their blue energy aspirations and are seeking support as to whether they have additional factors to consider.
- Often the wind farm operators are different from the companies that connect the power to shore and then further consents are required to connect these offshore infrastructures to the onshore grid.
- One can go further in looking at planning to integrate individual wind farm projects in close proximity to one another, especially with the transmission of the energy to shore, in both national and transnational space. This potentially could save considerably in terms of costs by sharing the cost of an individual cable, rather than multiple cables for each wind farm. There are of course technical challenges to be overcome in terms of timing and sequencing.
- The delivery of offshore wind facilities as part of national and European infrastructure is a complex process involving multiple stakeholders with many different and contested interests. From a governance perspective, it may not always be clear and transparent who is responsible for doing what, with the plan making authority often being linked but diferrent to the consenting authorities.

Some of these challenges are evident in both national space and across sea basins, and already there is considerable work being undertaken on a cross-border transboundary basis to try and address these issues. Some examples of emerging best practice are outlined throughout

this report, but there are some very practical challenges to effective cross boundary working, which are of technical nature and often not a spatial planning problem per se.

4.3 Future proposed developments

One further change that the offshore wind industry may face over coming years is whether to increase array voltage from 66kV to 132kV. It is anticipated this change could result in significant cost savings for the industry and allow for the development of farms with larger turbines. The key benefits of this move would be:

- Enable more efficient power collection for future wind farms globally.
- Reduce the length of cables in the offshore wind farm.
- Less cable will lower costs and environmental footprints.
- Facilitate the next generation of offshore wind turbines.

The research behind this decision was led by the UK Offshore Wind Accelerator, part of the Carbon Trust, who partnered with numerous developers. Extensive engagement was also undertaken with suppliers, energy system operators, marine planners and policy makers and regulators. This shift to a High Voltage Array System (Hi-Vas) is thought to be key in the next generation of offshore wind farms currently in the pipeline. Realistically the earliest any 132kV wind farms can be operational is the late 2020's and significant coordination between the industry providers and the regulatory authorities will be required (Carbon Trust, 2022).

What this example serves to illustrate is how rapidly the technology associated with offshore renewable is developing and this brings new challenges for consenting authorities in terms of what will the impacts of the new developments be for a range of different stakeholders.

4.4 Final Reflections

The consenting process is perhaps the most problematic aspect of maritime spatial planning. The maritime spatial plans can allocate space for particular types of development, or prevent incursions into sensitive environmental areas. This can create a degree of certainty for wind farm operators that consents are likely to be forthcoming so plans can help to de-risk project development. However, the time it takes from auctioning sites to construction beginning can be considerable and there are now calls for this process to be streamlined and speeded up in order to accelerate offshore wind deployment. More work needs to be undertaken to fully understand where the bottlenecks are and what actually causes them.

5 Conclusions and Recommendations

Over the last decade there has been a dramatic increase in the amount of renewable energy being generated offshore. This trend is likely to continue and accelerate as the market matures, European aspirations for a more self-sufficient and decarbonised energy market become more prominent as new countries start to realise their ambitions and begin to use their potential for offshore energy generation. In many respects this can be seen as a success story. Significant amounts of new offshore renewable energy are being produced and there are significant proposals in the pipeline that give every indication that current European targets for growth will be achieved and probably exceed. In this report we have focused particularly on the emerging experience of maritime spatial planning as a very important, predominantly state led activity, whose plans for sea use creates the space for offshore energy production, and through the authorisation processes provides the consent for the schemes to be built and connected into the grid. It is also important to recognise that there are many other framework conditions which can impede and/or facilitate offshore wind deployment

By taking a comparative approach across European space (see Table 3), it is very evident that different countries are at different stages of this journey.

Table 2. Status of European Offshore Renewable Energy Delivery.

	Countries
Mature	Belgium, Denmark, Germany, The Netherlands, UK
Emerging	Estonia, Ireland, France, Latvia, Lithuania, Poland, Sweden, Norway
Aspirational	Bulgaria, Croatia, Cyprus, Italy, Greece, Malta, Portugal, Spain, Slovenia, Romania

Some countries have both, adopted plans that make space for offshore energy production, predominantly, though not exclusively, in the field of offshore wind, and in addition, have significant experience, over a decade or more, for authorising particular schemes. Here the offshore wind farm operators have a degree of certainty as to ‘how to play the game’ and are willing to bid for licences to develop schemes. These are what we describe as being relatively mature systems.

Other countries have adopted, or almost adopted plans, which articulate an aspiration for rapid redeployment of offshore wind, but as yet have limited experience of the authorisation process. For these groups, the commercial wind farm operators may have some concerns and worries about how exactly the consenting regime will operate in practice and may make risk-based decisions about whether to bid. In these circumstances certain incentives may be required to stimulate the market. These we have described as emerging systems.

The final generic group are what we describe as aspirational. These are countries, which have politically stated high ambitions for offshore wind energy deployment. For example, a country may have an approved plan, but no specific space allocated for offshore renewable energy. Alternatively, a country may have authorised schemes without a maritime spatial plan or there are significant claims being made by one Ministry about offshore renewables, but as yet there is no planning framework to enable this to happen. In essence, they are at the start of their journey to deploy blue energy.

These characterisations are not necessarily definitive, and over time it is likely that countries move up the hierarchy towards the mature types. How quickly, in practice, this is likely to happen is hard to determine, but what is clear is the rapid deployment of offshore renewable energy is an ambition that is gaining increasing political momentum.

Most countries are developing their offshore renewable energy production within their own national territories. There are only a few examples of cross border collaboration within the production of particular offshore schemes, see for example between Belgium and the Netherlands and a proposed joint wind farm between Latvia and Estonia. But the latter is still very much an embryonic scheme.

It seems that over the next few years new countries will start producing offshore renewable energy and estimates suggest that currently anticipated developments might lead to European targets being exceeded. This means that production will be diversified away from the current market pioneers, Germany, Belgium, the Netherlands and Denmark. By 2030, 15 of the coastal EU states are expected to have started generating offshore wind energy.

Nevertheless, the role of the European Union, working in partnership with member states and neighbouring countries, has been instrumental in shaping maritime spatial planning practices, funding projects which enable plans to be realised and supporting institutional settings, which enable a sharing of experiences in a rapidly developing and evolving new policy environment, namely maritime spatial planning, with a political imperative on the rapid role out of renewable blue energy.

Most countries recognise the need for better cross-border and transnational co-operation more widely in terms of maritime spatial planning and have created agencies to facilitate exchanges. An example includes the tripartite scheme between Germany, Poland and the Land of Mecklenburg-Vorpommern. Elsewhere, well-established sea basin collaboration programmes, such as Helcom, VASAB, and the North Sea Energy Cooperation group are calling for more cross border cooperation in offshore wind deployment in order to increase both the efficiency and effectiveness of delivery through cross-border and transnational co-operation by using space more efficiently and achieving cost effectiveness in delivery through sharing transmission infrastructure (European Commission 2019).

Maritime spatial plans across Europe are making significant spaces available for offshore renewables, but this of and itself does not mean that new wind farms will be developed. The consenting

process is a component of MSP that has largely been under-researched, although this work suggests that once an application is submitted it can take up to two years to be approved. The private sector has built in these timescales to project management, and it is not clear whether the time it takes for consents to be authorised is really slowing down delivery. In some countries, these time delays may be a combination of long, slow and cumbersome processes, which they are looking to simplify (e.g. Ireland). Delays may also be due to simple lack of sufficient knowledge and skills (human capacity) within the consenting authorities, which keeps them from speedily process the applications. Within those countries with little experience to date, consenting off-shore wind means that private sector operators may take a risk-based approach by focusing on markets with which they are familiar with.

From a maritime spatial planning perspective, the evidence shows that an open inclusive and transparent process both, in plan making and in seeking consents, is the best way to tackle potential conflicts. These processes seem to be working reasonably well, recognising of course that the decisions made by policy makers are not neutral, but represent trade-offs between different users of sea space at a particular point in time. The relative weights given to economic, social and environmental factors are ultimately political in nature, as maritime spatial planning obtains its power and authority from the state, and the context within which these decisions are made is constantly changing. Hence, it is important to recognise the dynamic nature of these processes and practices.

However, it is important to realise that the ambitious delivery and roll-out plans for offshore renewable energy currently being expressed by individual countries needs to recognise the complexity of delivering offshore and onshore infrastructure simultaneously and the diversity of consenting authorities that might be involved. Furthermore, it is important to realise not all of the challenges of a speedy delivery are necessarily related to maritime spatial planning, and could be a function of other framework conditions. These include the investment plans of the private sector developers (both for offshore wind farm development and transmission providers), the capacity of supply chains to deliver the necessary infrastructure (materials, logistical infrastructure and human capacity to build and maintain offshore renewable energy projects), the perceived risks of operating within a mature market as opposed to an aspirational market and local framework conditions provided by national governments that may incentivise developers.

Taking all of these factors into account, our conclusions lead to the following recommendations:

Recommendation 1. To acknowledge that resolving or reconciling conflicts between sea users requires time to enable diverse stakeholders to build mutual respect and trust for each other so that they can appreciate why decisions (whether in maritime spatial plans or in consenting projects) that have been made may appear to favour a particular interest group. As there are different demands for how sea space can be used, some interests are likely to be prioritised over others, this is an inevitable outcome when a scare resource needs to be rationed or allocated in the public interest. These interests are ultimately determined by state

priorities, hence are political in nature. Priorities with regards to how sea space should be used can and do change overtime. In the short term this is likely to lead to an increased prioritisation of offshore renewable energy over other agendas

Recommendation 2. To acknowledge that resolving conflicts between competing user groups for sea space is a dynamic process and the relative weight given to a specific interest can change over time depending on national political priorities. Given the current geopolitical situation in Ukraine and the impacts that this has on European energy prices and security, greater political importance is being attached speeding up the delivery of renewable energy (including blue renewable energy). This rollout may exacerbate existing tensions between users of sea space or create new conflicts. The existing processes provide a series of fora where these conflicts can be articulated. It is not clear whether the offshore wind farm industry has grown used to these processes, and the timescales involved in gaining the necessary consents are built into their project planning processes. Other framework conditions, such as the high price of energy, may create further interest in developing offshore wind energy, and thus certainly in the medium term the prospects for an ever-expanding market seem rosy. Whether the maritime spatial planning system, or other framework conditions (lack of a skilled work force, lack of suitable marine vessels, lack of capacity to build the wind farm infrastructure) or some combination of the two slows delivery is a mute discussion point.

Recommendation 3. More investigation is needed to determine whether the consenting process is actually slowing down the delivery of offshore wind provision or does the consenting process allow time for user conflicts to be effectively reconciled. It is at this stage of planning that conflicts between sea users start to have a specific impact. It is at this stage the EIA process can be used as a mechanism to address conflicts between maritime users and seek accommodating solutions. The process is in the hands of the developer and the consenting authority will use the EIS (a statement describing the findings of the EIA process) to determine whether the conflicts have been effectively reconciled. Ultimately planning, whether on land or in the sea, is a political process, and these political priorities may determine the outcome of a decision. There is already some recognition by some countries that these processes are not as integrated as they might be and they are proposing changes to streamline the processes, and improve the institutional governance capacity to act (see for example, Ireland). It will be interesting to see whether this actually addresses perceived issues.

Recommendation 4. More emphasis needs to be placed on overcoming the challenges of hybrid, cross-boundary transnational working. There is good evidence and a commitment that hybrid transmission and connecting infrastructure can provide significant efficiencies in offshore renewable energy deployment. MoUs to this effect are in place in both the Baltic and North Seas. There is a greater need to synchronise the auctioning of projects so that the benefits of hybrid transmissions can be fully realised and more thought needs to be given to joint consenting processes in two or more countries.

Recommendation 5. More emphasis needs to be placed on the human capacity (skills and knowledge) with governmental institutions necessary to process the offshore wind farm applications. In many countries, the maritime spatial planning teams are small and constantly changing. The European Union has been important in facilitating projects that enable technical expertise to be brought in to facilitate particular tasks (e.g. expertise to undertake the SEA associated with plan making, or projects which have facilitated stakeholder engagement processes). Elsewhere, specialist teams have been commissioned to prepare the plans. As we move into a new phase of maritime spatial planning with an emphasis on implementation of the content of plans, do the regulatory authorities have the capacities to cope? Some countries, e.g. Ireland, have already acknowledged this might be a future blockage to the system, which they are currently trying to address.

Recommendation 6. Recognising that the system of consenting for offshore wind, both in the sea and on the land is complex and involves multiple governmental agencies, greater efforts should be made to make explicit and visible those agencies involved in the process, their roles and the extent to which they effectively collaborate. In some countries, for example the UK, high level governmental working groups have been established in order to bring together the necessary licencing authorities, industry and those responsible for the onshore and offshore grid connections to ensure a more joined up way of working is established to mitigate potential future delays to delivery.

Recommendation 7. With certain countries ready to review and update plans, consideration should be taken before adoption of what the real consequences of the current marine licencing / consenting processes are. More emphasis needs to be placed on how offshore wind energy projects can be seen as a part of an integrated system, rather than a collection of individual projects with greater emphasis being placed in integrated transmission systems, both in national and transnational space. A number of European maritime spatial plans are currently undergoing review, or in the near future will be reviewed. In a context where maritime spatial planning is relatively new and many projects have been realised in an ad hoc and incremental manner, there is an opportunity to think much more strategically how offshore wind energy (currently and for the foreseeable future the dominant source of blue energy) can be related to an integrated energy system, involving the wind farms themselves, integrated transmission routes to shore, and ultimately integrated connectivity to the onshore grid system.

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7 Appendix 1: Current status of Maritime Spatial Plans in Europe

	Plan No	Plan Name	Planning Authority	Data collection	Draft MSP	Revision of Draft Plan	Final MSP	Plan approval	Implementation	Monitoring and evaluation
Belgium	3	Belgian MSP for the North Sea	Marine Environment Service	Spatial analysis	Published 28 June 2018	End 2018	7th December 2018	King approval 22 May 2019	Entry into force 20 March 2020	Review of the plan every 6 years
Bulgaria	1	Maritime Spatial Plan for the Republic of Bulgaria	Ministry of Regional Development and Public Works	Spatial database from MarSPlan Project, data	June 2020	December 2020	*Upcoming*	*Upcoming*		Review every 10 years
Croatia	2	TBD	Ministry of Physical Planning, Construction and State Assets - MPPCSA	Continuous	State Plan for Spatial Development					
Cyprus	1	TBD	Shipping Deputy Minister to the President	Done – continuous	Started Sept 2020 end by March 2021	September 2021	*Upcoming*	*Upcoming*	*Beginning of 2022*	Review at least every 10 years

	Plan No	Plan Name	Planning Authority	Data collection	Draft MSP	Revision of Draft Plan	Final MSP	Plan approval	Implementation	Monitoring and evaluation
Denmark	1	Danish MSP	Danish Maritime Authority (DMA), Ministry of Business and Growth	Expert led workshops	Early 2019	2019	2022	March 2021 prior to public consultation	2022	
Estonia	1	Estonian MSP	Estonian Ministry of the Finance	Early 2018	July 2018 March 2019	July – January 2020	Autumn 2021	February 2022	From February 2022	Review every 5 years after adoption
Finland	1	Finnish MSP	Finnish Ministry of the Environment	Baseline review 2018	Early 2019	End of 2019	Finalisation end 2020	18 December 2020	From 2021	From 2021
France	1	Sea Basin Strategy Document (DSF)	Ministère de la Mer	"Existing situation" of draft sea basins strategy documents	Draft Sea basin Strategy Document (sept. 2018)	2020	-	*Upcoming*	*2022*	Reviewed every 6 years
Germany	2	Baltic MSP & North Sea MSP	German Federal Ministry of the Interior, Building and Community; Federal Maritime and Hydrographic Agency (BSH)	Summer 2018 status quo	1st draft MSP & SEA (winter 2019/2020)	Revised plan + SEA report (2020)	Final plan (2021)	1st September 2021	2021-2022	

	Plan No	Plan Name	Planning Authority	Data collection	Draft MSP	Revision of Draft Plan	Final MSP	Plan approval	Implementation	Monitoring and evaluation
Greece	1	TBD	Ministry of the Environment and Energy	Done	2021	October 2021				
Ireland	1	National Marine Planning Framework	Department of Housing, Local Government and Heritage (DHLGH)	Issues paper (September 2018)	National Maritime Planning Framework (NMPF)	2020	July 2021			
Italy	1	TBD	Ministry of Infrastructure and Transport; Directorate General for Port Authorities, Port Facilities and Maritime and Waterways Transport	Done	Sub regions delimitation and mapping					
Latvia	1	Latvian MSP	Ministry of Environmental Protection and Regional Development, Spatial Planning Department (MoEPRD)	Early 2015	Draft MSP (end 2015	End 2016	End 2016 Final draft and SEA	14th May 2019	2019-2030	Annually, Report every 6 years

	Plan No	Plan Name	Planning Authority	Data collection	Draft MSP	Revision of Draft Plan	Final MSP	Plan approval	Implementation	Monitoring and evaluation
Lithuania	2	Comprehensive plan of Lithuania (including marine)	Ministry of Environment	Based on 1st plan	Draft concept, October 2019	Draft solutions, July 2020	February 2021	29th September 2021	2021-2030	Evaluation of the 1st plan
Malta	1	Strategic Plan for the Environment and Development (SPED)	The Planning Authority (PA)	Series of 16 topic papers (2004)	Draft plan (early 2014)		Final version (end 2014)	Approval 2015	2016	Revision of 2nd phase (2021 2026) according to MSPD
Netherlands	3	Programme North Sea 2022-2027	Interdepartmental Directors' Consultative Body North Sea led by the Ministry of Infrastructure and Water Management	Ruimtekaart / spatial map April 2018	March 2021		March 2022	March 2022	2022	
Poland	1	Polish MSP	Ministry of Infrastructure	Status/data collection (2nd half 2016)	MSP V1. (early 2018)	December 2018 draft plan	November 2020	24 April 2021	2021	At least after 10 years
Portugal	1	National Maritime Spatial Planning Plan (PSOEM)	Directorate-General for Natural Resources, Safety and Maritime Services (DGRM);	First PSOEM (2018)	Second PSOEM (2019)	2019	2019	December 2019	2021	

	Plan No	Plan Name	Planning Authority	Data collection	Draft MSP	Revision of Draft Plan	Final MSP	Plan approval	Implementation	Monitoring and evaluation
			Directorate-General for Maritime Policy (DGPM)							
Romania	1	Maritime Spatial Plan of Romania	Ministry of Development, Public Works and Administration (MLPDA); Ministry of Environment, Waters and Forests	Spatial database from MarSPlan Project	January February of 2021					Reviewed every 10 years
Slovenia	1	Pomorski prostorski plan Slovenija	Ministry of the Environment and Spatial Planning	Carto. basis for MSP (2015 2016 2019), Metho. basis for MSP (2018)	September 2020	February – March 2021	May 2021	July 2021	From July 2021	From June 2021 onwards
Spain	1	Ordination Plan of Maritime Space (POEM)	Ministry for the Ecological Transition and Demographic Challenge;	2018	Draft POEM 2020		*Beginning 2022*	*Beginning 2022*	*2022*	

	Plan No	Plan Name	Planning Authority	Data collection	Draft MSP	Revision of Draft Plan	Final MSP	Plan approval	Implementation	Monitoring and evaluation
			General Directorate for the Sustainability of the Coast and the Sea							
Sweden	1	MSP Bothnian Golf, Baltic Sea & Skagerrak	Ministry of Environment; Swedish Agency for Marine and Water Management (SwAM)	Current status description (early 2015)	Draft MSP (winter	Publication of final draft 14th of March 2019	Hand in proposal to government (December 2019)	10th February 2022	2022	At least after 8 years

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