Advanced Design Tools for Ocean Energy Systems Innovation, Development and Deployment

Deliverable D8.5

Relevant legal, institutional, and political frameworks

Lead Beneficiary	WavEC Offshore Renewables
Delivery Date	30/06/2021
Dissemination Level	Public
Status	Released
Version	1.0
Keywords	Legal framework, consenting process, marine renewable energies, political barriers and enablers, stakeholder questionnaire, environmental impact assessment, marine spatial planning

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 785921

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Document Information

Grant Agreement Number	785921
Project Acronym	DTOceanPlus
Work Package	WP8
Related Task(s)	T8.5
Deliverable	D8.5
Title	Relevant legal, institutional, and political frameworks
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File Name	DTOceanPlus_D8.5_Legal institutional & political frameworks_WavEC_v1.0.docx

Revision History

Revision	Date	Description	Reviewer
0.1	20/07/2020	Working draft for review	Tecnalia, UEDIN, WES, FEM
0.2	9/04/2021	Working draft for review	WavEC
0.3	20/05/2021	Final draft for review	WP8 partners
0.9	14/06/2021	QA Review	AAU, Coordinator
1.0	30/06/2021	Final version for the EC	EC

Part of this work has been submitted for publication as a paper on legal and political barriers and enablers to the deployment of marine renewable energy [1].

EXECUTIVE SUMMARY

This report is the outcome of Task 8.5 'Analysis of the effect of the overall legal, institutional and political frameworks' of the DTOceanPlus project. It provides a critical evaluation of the ocean energy sector's legal, institutional, and political frameworks with an identification and analysis of barriers and enabling factors for the deployment of ocean energy. The task focuses first on an initial review of the current political and regulatory frameworks on a set of countries to consolidate up to date information and set the basis for the identification of the main challenges faced by the sector. Subsequently, a critical analysis of the main barriers and enablers was carried out, supported by a questionnaire conducted to regulators, technology developers and test site managers. This survey aimed at gaining further insight into in-depth experiences on the subject.

Ocean energy is bringing unique challenges to marine governance frameworks, with legal, institutional, and political issues being frequently perceived as significant non-technological barriers to the advancement of the sector. Based on the literature review and respondents' perceptions, several challenges and enabling features were identified within the national and international policies and the consenting procedures namely regarding the existent legislation, environmental impact assessment and monitoring, guidance, marine spatial planning, stakeholder consultation and entities involved in the process. Results from this task can provide guidance to future policy instruments and give support to consenting measures to be designed in a more informed and effective manner and to help accelerate the development of the sector.

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ABBREVIATIONS AND ACRONYMS

AMETS	Atlantic Marine Energy Site
ANR	National Research Agency
CCDR	Commission of Coordination and Regional Development
DCCAE	Climate Action and Environment
DEA	National Danish Energy Agency
BEIS	Department for Business, Energy and Industrial Strategy (UK)
DGRM	Directorate General for Natural Resources, Safety and Maritime Services (Portugal)
DL	Decree-Law
EC	European Commission
ECJ	European Court of Justice
EDP	InnovFinThematic Products - Energy Demo Projects (EU Finance for Innovators)
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
ES	Environmental Statement
EU	European Union
MITECO	Ministry for the Ecological Transition and the Demographic Challenge (Spain)
MMO	Marine Management Organization
MPE	Ministry of Petroleum and Energy (Norway)
MPDM	Marine Planning and Development Management
MS LOT	Marine Scotland Licensing Operations Team
MSF	Marine Strategy Framework Directive
MSP	Maritime spatial planning
MTES	Ministry for the Ecological and Inclusive Transition (France)
NECP	National Energy and Climate Plan
nm	Nautical miles
NREAPs	National Renewable Energy Action Plans
O&M	Operations & maintenance
OE	Ocean energy
OES	Ocean Energy Systems
ORE	Offshore Renewable Energy
OREDP	Offshore Renewable Energy Development Plan
RED II	Revised Renewable Energy Directive
SEA	Strategic Environmental Assessment
SEAI	Sustainable Energy Authority of Ireland
SNML	French National Maritime and Coastline Strategy (*Stratégie nationale pour la mer et le littoral – SNML)*
SOWFIA	SOWFIA Project: Streamlining of Ocean Wave Farm Impacts Assessment
SP	Situation Plan
TUPEM	Permits for Private Use of the National Maritime Space (Portugal)
TRL	Technology Readiness Level

1 INTRODUCTION

1.1 SCOPE OF THE REPORT

This report is the outcome of Task 8.5 "Analysis of the effect of the overall legal institutional and political frameworks" of the DTOceanPlus project. Work Package 8 looks at market analysis and implementation feasibility of ocean energy projects. The aim of Task 8.5 is to report, at a high level, how legal, institutional, and political frameworks could act as a barrier or enabling element for future deployment of ocean energy. This report performs a critical evaluation of the ocean energy sector's legal, institutional, and political frameworks. This includes an analysis of barriers or enabling features for the deployment of ocean energy during both the development and industrial roll out stage of both wave and tidal energy. Although the report focuses on wave and tidal energy, examples of more streamlined legal and regulatory framework of technologies such as offshore wind are given throughout the report. When mentioned together, wave and tidal energy will be referred herein as ocean energy.

The report is structured into **4 sections**:

- **Section 1** provides an introduction and scope of the report, justifying the need for a study on barriers and in the sector and the methodology adopted.
- **Section 2** provides a literature review describing the legal and regulatory framework of nine countries- Denmark, France, Ireland, Italy, Norway, Portugal, Spain, Sweden, and the United Kingdom - by covering the following topics: EU policies and legislation, national policies and legislation and consenting process by country.
- **Section 3** introduces the questionnaire and details the stakeholder identification. Furthermore, it presents the analysis of main barriers identified for each of the topics described in Section 2, through the literature review and the questionnaire results.
- **Section 4** summarises results and draws conclusions.

1.2 GENERAL CONSIDERATIONS

To date, ocean energy remains an emerging energy industry. Although the global power supply mix continues to be dominated by coal and gas, low carbon technologies made up around 25% of electricity generation in 2018 [2], up from 19% in 2000 [3]. Over 12% of the global total primary energy supply in 2017 was from traditional renewable sources (e.g., hydro and biomass), with modern renewable sources (e.g., solar, wind, ocean) comprising a modest 1.8% [4]. Renewable energy sources have increased from a 5.1% of Europe's TPES in 1990, to 14.6% in 2017 [5], which is the result of long-term strategic plans and ambitious policy mandates aiming to decarbonise all energy sectors. To date, cumulative global wave and tidal stream capacity has more than doubled since 2017 reaching approximately 65 MW in 2020 [6], which does not yet represent an established market as none of these developments has reached commercialization. Results from D8.2 Analysis of the European supply chain, estimates that a maximum of 2,388MW of tidal stream capacity and 494MW of wave energy capacity can be expected by 2030. Countries such as the United Kingdom (UK), France, the Netherlands and Spain represent countries with potential for tidal energy deployment, whilst Spain and Portugal could be the most relevant markets for wave energy across Europe [7].

Being still at relatively low maturity, the ocean energy sector can benefit from the established supply chain of more mature industries such as offshore wind, considering the many synergies and transfer possibilities between sectors. Leveraging on these potential synergies can help address the challenge related to the cost competitiveness of OE technologies as well as encourage third parties to engage with the OE sector and enter the value chain [7].

On one hand, ocean energy can contribute towards the achievement of the EU ambitious targets in the long term. On the other hand, the progress of the sector continues to face several challenges across EU Member States. Besides, barriers related to technology, infrastructure, costs, market incentives and supply chain, the ocean energy sector faces challenges related to national supporting policies and regulation. These challenges arise from issues such as the lack of streamlined procedures for planning and licensing, insufficient government support policies, not fit-for-purpose legislation (i.e., based on other sectors) and the presence of multiple regulatory authorities involved. Moreover, there are national incentives and funding available, but results have yet to be demonstrated, and investors are not always willing to take financial risks [8]. These risks bring uncertainty which in turn increases costs to ocean energy development.

Policymakers have been confronted with the key challenge of allowing appropriate incentives to make early projects more attractive and making the route to access suitable sites more transparent.

Dedicated and supporting policies, as well as the appropriate consenting and legal framework, are thus crucial to ensure and enable investment in ocean energy technologies which intend to accelerate their commercialisation readiness and make them competitive with other renewable energy technologies.

1.3 METHODOLOGY

Given the objectives of DTOceanPlus project, the goal of this task is to identify and analyse barriers and enabling factors in the current ocean energy legal framework to allow future policy instruments, support and consenting measures to be designed in a more informed and effective manner and to help accelerate the development of the sector. To achieve this goal, work was divided into two main subtasks:

- **An initial review on the current political and regulatory frameworks** was carried out to consolidate up to date information and set the basis for the identification of the main challenges faced by the sector. This review focused on a selected set of 9 countries active in the ocean energy sector: Denmark, France, Ireland, Italy, Norway, Portugal, Spain, Sweden, and the UK.
- **A critical analysis of the main barriers and enablers** was performed, supported by a questionnaire conducted to regulators, technology developers and test site managers. This aimed at collecting views and perceptions from this target group on the topic, hence enriching the analysis with personal experiences.

2 REVIEW OF LEGAL AND REGULATORY FRAMEWORKS

This section comprises information gathered from the following EU Member States on their current legal, political, and regulatory frameworks: Denmark, France, Ireland, Italy, Norway, Portugal, Spain, and Sweden. Although the UK is no longer an EU Member State, it was included in this analysis due to its relevance as a global leader in the ocean energy sector. The review builds on existing data from Ocean Energy Systems (OES) reports and previous projects such as RiCORE and SOWFIA. Hence only the latest updated information on each country's framework is explored in more detail. It should be noted, however that, although a final review was carried out closer to the to the report submission to add any key changes, the main review was carried out between January 2019 and March 2021. This chapter is structured around the following core topics: (i) EU policies and legislation, (ii) National policies and legislation and (iii) Consenting process.

2.1 EU POLICIES AND LEGISLATION

Ocean energy has been the subject of different policy initiatives in the past years, both at European and national levels. Table 2.1 shows the most relevant policy fields on EU level.

TABLE 2.1: EU POLICY FIELDS FOR OCEAN ENERGY. ADAPTED FROM [9] [10].

Policy field	Examples	References
1.Renewable energy targets	Governance regulation, 2050 Long-term strategy, Revised Renewable Energy Directive (RED II)	[11],[12]
2.Ocean energy targets & strategies	Strategic Energy Technology (SET) Plan, European Green Deal, Blue Growth Strategy, Energy Union	[13] ,[14]
2.Technology push, including funding for R&D	Horizon 2020, Horizon Europe, Ocean ERA-NET Cofund, InnoEnergy, NER300, InnovFin Energy Demo Projects (EDP)	[15],[16],[17],[18],[19], [20]
3. Demonstration projects: Financial instruments	FORESEA, OceanDemo, Blue Gift, Innovation Fund, InnovFin EDP, Blue Growth Investment Platform, Horizon 2020, European Maritime + Fisheries Fund	[21],[14], [22]
4. Market incentives/pull (e.g., FIT schemes)	Innovation Fund, Revised Renewable Energy Directive	[11],[11],[23]
5. Resource allocation and standardisation	MET-Certified	[24]
6.Information sharing	Ocean Energy Europe, ETIP Ocean, Marine Energy Alliance, Ocean Power Innovation: EU POLICY fields FOR OCEAN ENERGY Network	[25], [26], [27]

The Energy Union, the Blue Growth Strategy and the SET-Plan are the main policy initiatives currently in place in the European Commission (EC). The first 'Annual Report of the Blue Economy', published in 2018, examines the role of ocean energy as an emerging sector [28]. The 'SET-Plan Implementation Plan for Ocean Energy' was approved in 2018 and includes the delineation of Levelized cost of energy

(LCOE) targets for 2030[1]. The EC has been funding ocean energy market and technology development projects since early 2000's. The European Investment Bank (EIB) together with the EC, have launched the **InnovFin Energy Demo Projects (EDP)** which provides support in the form of loans for first-of-a-kind projects. Horizon Europe will be the successor of Horizon 2020. The EC has proposed an **EU Innovation Fund** for the period 2021-2027, which will build on the NER300 program. It aims at enhancing cost-effective emission reductions and low-carbon investments, among other sectors, innovative renewable energy technologies. **OCEANERA-NET Cofund** is a Horizon 2020 funded initiative of eight agencies from six European countries (UK, Sweden, Spain, Ireland, Portugal, and France) which will run from 2017 to 2021 to support collaborative innovation in the ocean energy sector. Networks such as OES and European Energy Research Alliance (EERA) have also been playing an important role in the advancement of the sector.

Although each Member States under analysis has their own planning and development legislation, it is important to note these must comply with EU legislation. These directives affect the development, monitoring and consenting of the sector as they may result in regulators and developers having to conduct specific assessments. While each of them defines future achievements and goals, their implementation is the responsibility of each Member State through their adaptation to national laws. The following Directives are among the most relevant ones:

- Revised Renewable Energy (RED II) Directive – establishes an overall policy for the production and promotion of energy from renewable sources in the EU.
- Marine Strategy Framework (MSF) Directive – protects the marine ecosystem and biodiversity upon which our health and marine-related economic and social activities depend.
- Marine Spatial Planning (MSP) Directive - establishes a framework for maritime spatial planning
- Environmental Impact Assessment (EIA) Directive – regulates the assessment of the effects of certain public and private projects on the environment
- Birds and Habitats Directives – The Birds Directive provides a legal framework, binding for all Member States, for the protection of all wild birds in the EU, including their eggs, nests, and habitats. The Habitats Directive ensures the conservation of a wide range of rare, threatened, or endemic animal and plant species.

The international environmental regulation of all types of energy generation activities at sea is first and foremost anchored to the **United Nations Convention on the Law of the Sea (UNCLOS)** [29]. This establishes rules governing all uses of the world's oceans and seas including their resources. The MSF Directive was transposed into national laws in 2016[2]. RED II[3] was approved in December 2018 and includes a mandatory target of 32% of the energy generated through renewable sources by 2030. Following the EC directives, Member States were requested to submit their National Energy and Climate Plan (NECP), featuring their national Renewable Energy (RE) targets, by December 2019.

[1] The SET-Plan proposed 11 actions in order to meet the targets proposed in 2016: LCOE of 0,15 EUR/kWh by 2025 and of 0,10 EUR/kWh by 2030 for tidal energy and of 0,20 EUR/kWh by 2025 of 0,15 EUR/kWh by 2030 for wave energy technologies.
[2] Directive 2014/89/EU of the European Parliament and of the Council of 23 July 2014 establishing a framework for maritime spatial planning
[3] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018L2001&from=EN

Now, according to this legal framework, Member States are required to develop long-term national strategies that are consistent with their established targets. It is important to stress the ambitious targets several Member States have already set through their National Renewable Energy Action Plans (NREAPs).

The European Commission adopted a new strategy on offshore renewables containing key provisions on ocean energy, setting deployment objectives for wave and tidal energy: 100 MW by 2025, 3 GW by 2030 and 40 GW by 2050 [30].

2.2 NATIONAL POLICIES AND LEGISLATION

National governments in several Member States are applying a range of policy instruments to promote and accelerate ocean energy deployment in their waters and to enable investment in new technologies. This section covers the operational legal and institutional frameworks applicable in each Member State. The selection of appropriate policies by national governments depend upon the maturity of the ocean energy sector, their national supply/demand balance, energy system resilience and willingness to invest in new technologies [10].

Only a few countries in which ocean energy technologies are currently being developed have specific policies to promote ocean energy uptake. Most of them have ocean energy or ocean renewable electricity generation targets. Except for Denmark, which has a significant wave energy resource and is a pioneer in wave energy but hasn't set any target for the sector. Finland, Portugal, and Spain have included ocean energy technology in their NREAPs but have no dedicated market support system.

2.2.1 DENMARK

Adopted the Energy Agreement in 2018 for the period 2020-2024. Although there are no official agreed targets for wave energy in Denmark, the lack of national framework fostered the development of the Danish WEC developers' partnership for wave power. This partnership developed a strategy in 2012 and efforts were made to have a roadmap implemented within the new Danish government energy plans. However, it has not been accepted or supports by the state. Wave energy is funded through the Energy Technology Development and Demonstration Program (EUDP). The legislation falls under the Energy Agreement (Energy Bill) for the period 2020-2024 and the Promotion of Renewable Energy Act.

2.2.2 FRANCE

The Energy Act (LTECV) defines an ambitious target of 40% renewable energy in the electricity mix by 2030, which to be achieved by the Pluri-annual Energy Plan (PPE) **(offshore renewable energy targets and strategies).** It describes the actions set by the Ministry for the Ecological and Inclusive Transition (MTES) in order to turn France carbon neutral by 2050. The PPE adopted in April 2020 for the 2019-2023 and 2024-2028 periods defines specific objectives in terms of offshore renewable energy. The Hydrocarbons Bill, published in 2018, introduced a new simplified regime for offshore renewable energy deployment. The Program "Investment for the Future" **(technology push),**

managed by the MTES on energy topics, is the major provider of incentives for ocean energy with the support of the Public Bank of Investment, the Environment & Energy Management Agency (ADEME) **(technology push)** and the National Research Agency (ANR).

2.2.3 IRELAND

There is no specific legislation for ocean energy. Rather, the sector is regulated by several legislative acts[4]. An interim review of the **Offshore Renewable Energy Development Plan (OREDP) (ocean energy targets and strategies)** was published in May 2018. Its implementation is being led by the Department of Communications, Climate Action and Environment (DCCAE) which is responsible for the over-arching energy policy in Ireland and have launched the Climate Action Plan in 2019 which includes several actions relevant for Marine Renewable Energy (MRE). The Sustainable Energy Authority of Ireland (SEAI) is central to enabling research and development of ocean energy through the **Ocean Energy Prototype Development Funding Programme (technology push)** and the wave energy test centres on the west coast. DCCAE is currently drawing the new RESS, which sets out a renewable electricity (RES-E) ambition of up to a maximum of 55% by 2030, to be reflected in the final NECP. A briefing was conducted in December 2019 to keep stakeholders updated on the first auction (RESS-1) design and implementation status. Ireland has set targets of 110 MW of installed capacity for 2035.

2.2.4 ITALY

Ocean Renewable Energy (ORE) is regulated by D. Lgs. 387/2003 referring to RE in general. The principles adopted in the transposition of the EU Directive 2009/28/CE into national law are summarised in the country's NREAP. The National Energy Strategy (2013) builds on that action plan and was updated in 2017. The Italian Energy Service Operator (GSE) manages all incentives for renewable energy. *Ricerca di Sistema* is the public research program supporting R&D in marine energy. The cluster "Blue Italian Growth" (BIG), led by the Italian National Research Council (CNR), has continued its progress towards the establishment of an open structure for the aggregation of all the national actors involved in all the different sectors of the Blue Economy, including Marine Renewables. The Ministry of Education, University and Research (MIUR) has recently launched two calls for proposals to grant funding for strategic research activities including the blue energy sector[5]. The Committee of Research Experts for the Electricity Sector (CERSE) plays a strategic role in orienteering R&D activities towards the innovation of the electrical system.

2.2.5 NORWAY

ORE falls under the domain of the Ministry of Petroleum and Energy (MPE) and is regulated by the Ocean Energy Act, published in 2020. A regulation supplementing the Ocean Energy Act and clarifying the licensing process has also been adopted.

[4] Foreshore Act/Maritime Area and Foreshore (Amendment) Bill, Electricity Regulation Act 1999, Planning and Development Regulations 2001, Grid Code, Distribution Code.
[5] Decree N. 1610/3 August 2016 and Decree N. 1735/13 July 2017

Enova supports demonstration of new energy technology provided its implementation takes place in Norway. In addition, Innovation Norway and ENERGIX support ocean energy projects. The joint green certificate market in Norway and Sweden is the market incentive used for ocean energy. The Norwegian government has not implemented a coherent ocean energy program. A "strategy for floating offshore wind" has been published, but it does not contain any specific targets, nor overreaching support and incentive structures.

2.2.6 PORTUGAL

Whilst there is no over-arching dedicated consenting system for ocean energy, all the required consents have been adapted to better suit wave energy developments. The Ministry of the Sea, through the Ocean Office, is responsible for the National Ocean Strategy (NOS) 2021-2030, the current public policy instrument for the sustainable development of the economic sectors related to the ocean [31] which was approved in May 2021. Foundation for Science and Technology (FCT) is the main Portuguese R&D funding body, under the authority of the Ministry of Science, Technology and Higher Education (MCTES). Blue Fund, a national funding scheme launched in 2017 in line with the NOS and managed by the Ministry of Sea, has announced a granting support scheme in 2018, aiming at developing the blue economy including ocean energy [32]. Portugal 2020 framework program was the main instrument for business investment for the period 2014-2020. It was organised in four thematic domains, one of which is dedicated to Sustainability and the Efficient Use of Resources. Ocean energy demonstration projects can also apply to this program which is managed by the National Innovation Agency (ANI) and whose global budget comes from the European Structural Fund. Portugal has set targets of 70 MW of installed capacity for 2030.

2.2.7 SPAIN

There is no specific ocean energy program nor a specific organisation working on its development. In 2019, the Spanish Government presented the Strategic Energy and Climate Framework, which includes the National Integrated Energy and Climate Plan 2021-2030 setting targets of 25 MW of installed capacity for 2025 and 50 MW for 2030for ocean energy. It will fix targets to boost renewable energy in general and, hopefully, ocean energy specifically. The Basque Government's Energy Strategy includes a specific initiative to speed up technology and commercial development for marine energy called **Basque Ocean Energy Fund (technology push).**

2.2.8 SWEDEN

The long-term energy policy relies on economic policy instruments, which provide incentives for renewable energy and do not specifically target a renewable electricity conversion technology. In 2016, the Government agreed on a long-term bipartisan energy policy for Sweden. The agreement includes a target of 100% renewable electricity production by 2040. Furthermore, a new Climate Act was introduced in 2018 which states that each government has an obligation to pursue a climate policy based on the climate goals adopted by the Riksdag. Swedish governmental agencies support academic and private sector R&D at various stages of technology maturity. Funding providers include the Swedish Energy Agency, The Swedish Research Council, and the Swedish Governmental Agency

for Innovation Systems (VINNOVA). A new phase of the Swedish Energy Agency's national ocean energy program is running for the period 2018-2024. – Sweden Ocean Energy Fund **(technology push).**

2.2.9 THE UNITED KINGDOM

The UK Government's department for Business, Energy, and Industrial Strategy (BEIS) is responsible for the over-arching energy policy in the UK although powers related to planning, fisheries and the promotion of energy efficiency are devolved to the governments of Scotland, Wales, and Northern Ireland. A progress update of the UK Government's Clean Growth Strategy was published in 2018 and stresses the potential role of ocean energy in the UK long term decarbonisation targets. To inform budget setting for 2019 onwards BEIS has convened the Energy Innovation Needs Assessment (EINA) that brought together UK Government funding agencies to prioritise and allocate R&D investment between the low-carbon technologies, including ocean energy. In October 2019, the EINA report on Tidal Stream summarising innovation needs, market barriers and business opportunities for the tidal sector was published. However, post elections, a clear policy for 2020 has yet to be set as it will be included in the next comprehensive spending review [33]. UK Research and Innovation (UKRI) was founded in April 2018, is primarily funded by BEIS, and aims at supporting and coordinating research and innovation in the UK. Innovate UK is another relevant funding body for the development of new technologies.

The Scottish Energy Strategy sets out the **Scottish** Government's vision for the future of the energy sector to 2050. The Scottish Government amended its Climate Change Bill to a net-zero greenhouse gas emissions target by 2045 which is reflected in the first Annual Energy Statement published in 2019. The Scottish Government continues to support the ocean energy sector including ongoing funding through **Wave Energy Scotland** and the establishment of the Saltire Tidal Energy Challenge Fund in February 2019 to accelerate the commercial deployment of tidal energy in Scottish waters **(technology push).** Marine Scotland, the body responsible for the integrated management of Scotland's seas for prosperity and environmental sustainability[6], opened a consultation from November 2019 to March 2020 to seek views on a draft Offshore Renewables Decommissioning Guidance document. The Crown Estate Scotland, which manages seabed leasing for renewable energy projects out to 200 nautical miles (nm) will soon operate under The Scottish Crown Estate Act 2019.

The **Welsh** Government has a 70% renewable electricity mix contribution target by 2030, a proportion of which will come from marine sources. To achieve this, significant funds were allocated to the Welsh European Funding Office Marine Energy Fund. Marine Energy Wales is the public organisation coordinating the process. Infrastructure under development includes two wave and tidal stream Demonstration Zones and other test facilities[7]. Skills and innovation are being supported by the Marine Centre Wales, which opened in 2018, and the Marine Energy Engineering Centre of Excellence.

[6] https://www.gov.scot/marine-and-fisheries/ , accessed 17th July 2020.
[7] These include the Marine Energy Test Area, Morlais Tidal Demonstration Zone and Pembroke Dock Marine.

The Marine Energy Plan for Wales was published in 2016 by the Marine Energy Task and Finish Group and describes current status, goals, and recommendations for the consenting process going forward.

The Department for the Economy (DfE) leads the energy strategy in **Northern Ireland**. The Offshore Renewable Energy Strategic Plan (ORESAP) 2012-2020 also applies to ocean energy. Regional development agency InvestNI continues to support the sector, focusing on finding matches between the sector and the Northern Irish supply chain. The Marine Renewables Industry Association (MRIA) supports the development of technology in ocean energy across Northern Ireland and the Republic of Ireland and published a 'Discussion Paper on the Marine Spatial Planning Needs of the Marine Renewables Emerging Technologies' in 2018.

2.3 CONSENTING PROCESS BY COUNTRY

The consenting and permitting process starts at the beginning of the project, as even the preliminary investigations and environmental studies require authorisation from the relevant entity. The process includes other requirements, such as the legal right to use the public domain (seabed, sea area, foreshore) for ocean energy generation, an authorisation to generate electricity, a grid connection license and permission for onshore works. The number of authorities involved in the consenting process depends upon the governance system in place.

The following sections present an overview of each country's regulatory framework including licenses required and process timeline, environmental impact assessment and stakeholder involvement. Table 2.2 presents a summary of the relevant parameters addressed throughout this section.

TABLE 2.2: SUMMARY OF SOME ASPECTS OF THE CONSENTING PROCESS FOR OCEAN ENERGY. ADAPTED FROM [34].

Country	Process time length	Licensing authorities	Number Consents
Denmark	1-2 months (up to several years)	1	3
France	1.-4 years	4	3 in 1
Ireland	4 years	5	6
Italy	>1 year	1	1
Norway	NA	1	NA
Portugal	1-2 years	4	>4
Spain	>2 years	5	>4
Sweden	>1.5 years	>3	>5
England (UK)	1-2 years	4	4
Wales (UK)	1-2 years	5	4
Scotland (UK)	~9 months	1	>3
Northern Ireland (UK)	~15 months	5	>9

2.3.1 DENMARK

The national Danish Energy Agency (DEA) operates as a 'one-stop shop' for the ocean energy project developer, being the single point of contact to streamline the process. It grants all licenses for all projects within 200 nm. In any ORE project, three licenses are required at different project stages: license to carry out preliminary investigations (e.g., seabed surveys), license to establish the offshore site, and license for power generation[8]. The three licenses are given successively for a specific project. The consenting process takes about 1-2 months. There is no license fee for the use for ocean energy.

The DEA conducts hearings with other regulatory authorities and relevant local municipalities at pre-establishment phase of a project to address major concerns. Informal consultation activities can be implemented during the licensing process by direct contact with the authorities.

2.3.1.1 EIA

A decision requiring an Environmental Impact Assessment (EIA) is made on a case-by-case basis by the DEA and the Danish Environmental Agency. The assessment is based on an analysis on the following topics: technical solutions, maritime and environmental safety precautions, organisations planning process and consent to environmental risks, and involvement of and consent by relevant other interests at sea.

2.3.1.2 MARINE SPATIAL SLANNING

The Danish Parliament has adopted the 'Maritime Spatial Planning Act", which establishes the framework for spatial planning in the Danish marine areas. Denmark does not currently have a spatial plan for the sea. However, a range of sectorial plans has been developed, and these plans will provide key input to the coming planning process. It is expected that the Danish MSP will undergo soon public consultations[9].

The plan for the implementation of the Act, which is being developed by a working group consisting of representatives of 12 Danish maritime authorities, will enter into force in 2021. The Danish Parliament and the various Governments of Denmark have in their Energy Agreements focus on offshore and nearshore spatial planning in the long-term goal for Danish energy policy. The latest Energy Agreement (Energy Bill) for the period 2021-2024 has specific focus on offshore wind turbine sea-spaces (Kriegers Flak and Horns Rev) as well as on 6 dedicated offshore coastal areas.

2.3.2 FRANCE

Presently, there is still no dedicated consenting process addressing ocean energy specifically. However, a few legal amendments have been carried out to streamline the licensing process of offshore renewable energy deployment[10].

[8] https://www.ocean-energy-systems.org/ocean-energy-in-the-world/denmark/#licensing
[9] https://www.msp-platform.eu/countries/denmark
[10] Law Grenelle II (Law no 2010-788, July 12th, 2010) and related Law-Decree no 2012-41.

If located in territorial waters (up to 12 nm) and for projects not exceeding 50 MW, developers must request a single permit regarding environmental issues which includes an EIA, and if needed, one focusing on Natura 2000 impacts, and one dedicated to protected species delivered by the Prefect. In addition, a declaration of public entity and a license to occupy the maritime public domain, which considers maritime safety and the use of maritime territories, are required. All permits are delivered by the Regional Prefectures.

The application decree for *envelope permit* was published in December 2018 and grants the obtain an environmental authorization and the legal right to use the public domain for projects with variable characteristic, giving more flexibility to ocean energy developers. The ESSOC (*État au service d'une société de confiance*) law, voted in August 2018, streamlines the legal framework thus significantly reducing delays for the offshore renewable energy sector. This procedure, inspired by procedures put in place in countries such as Denmark and the UK, moves most of the obligations upstream of the actual permit issuance, thereby considerably reducing the risk for project developers and allowing for more flexibility. The government now carries out the impact study before the winners of the call for tenders are designated; until now, it was the latter who did so once they had been designated. Thus, once the public consultation and competitive process is complete, the winners will be able, as soon as they are designated, to apply for the *envelope permit*, which will include the concession to use the maritime domain, the environmental authorisation, and the operating license.

The Prefect operates as a single licensing authority responsible for approvals in the process, which, before the ESSOC law, could take six to nine months to be administered and delivered. For projects selected in a call for tenders, however, additional authorities such as the Préfet Maritime, the Commission of the Public Debates and the Environmental Agency intervene as consultees for other aspects of consenting relating to electrical works and public participation. Developers are not required to apply for any terrestrial planning permission.

2.3.2.1 EIA

As of March 1, 2017, the various environmental procedures and decisions required for projects subject to the regulation of classified installations for the protection of the environment (ICPE) and projects subject to authorisation under the Water Act (IOTA), are merged into a single environmental authorisation. The environmental permit requires that the ocean energy project developer produce an EIA and, where applicable, Natura 2000 impact assessment. EIAs are subject to approval by the environmental authority. Ocean energy installations are now subject to case-by-case examination whereas they were previously subject to systematic impact assessment. The final environmental approval is delivered by the Regional Prefectures, who is obliged to consult the Environmental Agency and other relevant stakeholders on the results of the EIA, although it is not bounded by their recommendations. Both Maritime Domain Consent and Water Resource Protection License will be granted provided an EIA has been positively assessed.

2.3.2.2 MARINE SPATIAL PLANNING

The Ministry of the Ecological Transition is the authority responsible for putting a French MSP in place. However, since the adoption of the latest Energy Bill[11], an objective of 40% renewable energy in the electricity mix by 2030 has been established. Thus, France has focused on its MSP by launching a Maritime and Coastline Strategy (SNML) in 2017. The national strategy is implemented at the sea basins by the mean of Sea Basin Strategy Documents (DSF) for each of the four sea basins[12]. These are the legal solution chosen by France to address the requirements of the MSP and MSF Directives towards the identification of dedicated sites for offshore energy projects. Following debates conducted by the regional local authorities for public consenting, the final DSF was completed in 2019, and macro-zones suitable for the deployment of offshore renewable energies (wind and tidal) have been delineated. The plans will be followed by the development of an action plan and monitoring system by 2021.

Areas of potential development are identified through a process of public consultation organized by the Regional Prefectures in charge of the coordination of Maritime Facades. The consultation is undertaken based on technical and economic studies conducted by the CEREMA and network feasibility studies led by the RTE. The public will now be consulted on the choice and constraints of the location area, prior to the designation of the winners, and no longer on the projects carried by the winners as it was the case up to August 2018.

2.3.3 IRELAND

The deployment of ocean energy projects is governed by existing foreshore and environmental legislation and is managed by several entities. Currently, to deploy a device at sea, the following five permits are required:

- a Foreshore Licence/Lease (for non-exclusive and temporary uses/exclusive and permanent uses, respectively),
- a Planning Permission for onshore development,
- an EIA or an Appropriate Assessment (AA),
- a License to generate and supply electricity and an authorisation to construct or reconstruct a generating station (can be administered at the same time and are issued by the Commission for Regulation of Utilities or CRU[13]) and
- a connection offer by EirGrid and ESB Networks[14]. The Department of Housing, Planning and Local Government (DECLG) administers foreshore licenses and environmental related permits. The local planning authorities and/or An Bord Pleanála[15] grant planning permissions for onshore components development provided an Environmental Statement (ES) is positively assessed.

[11] Loi de Transition Energétique pour la Croissance Verte.
[12] http://www.geolittoral.developpement-durable.gouv.fr/documents-english-version-r549.html
[13] Under the Electricity Regulation Act 1999, generating stations with an installed capacity not exceeding 1 MW are deemed to be automatically authorised and licensed by Order.
[14] EirGrid and ESB are the transmission and distribution operators, respectively.
[15] An independent, statutory, judicial body that decides on appeals resulting from planning decisions made by local authorities.

In 2019, Ireland has adopted a revised General Scheme of the Marine Planning and Development Management (MPDM) Bill. It will streamline agreements on the grounds of a new single State consent to be known as Maritime Area Consent granted by the Minister for Communications, Climate Action, and the Environment (MCAAE), substituting the current consent regimes under the Maritime Area and Foreshore Amendment Bill. This will enable occupation of the Maritime Area and one development consent (planning permission), with a single EIA required for both offshore and onshore works. It provides flexibility to allow for both a 'centralised' and 'decentralised' approach to the development of ORE projects[16]. The Government has approved the MPDM, and it will be complemented with regulations and guidelines to implement it in 2021. Furthermore, the adoption of the MSP will provide the policy context that determines whether a centralised or decentralised grid model will be operated in Ireland for ORE. With the new regime, prior to the application for a MAC, developers will be required to apply to a relevant Minister for a planning interest followed by an application for a planning permission.

A period of pre-consultation with the DECLG is carried out before the application of the Foreshore License. These regulations amend the Foreshore Act and apply to the consideration of foreshore consent applications subject to EIA. These regulations provide an enhanced level of public participation and information sharing on environmental matters.

2.3.3.1 EIA

Foreshore leases and licenses must be accompanied, where applicable, by an EIA prepared by the developer. In such cases, DECLG undertakes a screening exercise and formally decides regarding the project's potential significant effects on the environment. The same decision is taken by the local planning authority (or An Bord Pleanála) for onshore development works. If a project is in or near a site designated for nature conservation purposes, under the EU Habitats Directive, an Appropriate Assessment may also be required. The need to issue an ES for terrestrial development works means the duplication of the EIA process for both offshore and onshore elements.

2.3.3.2 MARINE SPATIAL PLANNING

The spatial planning system, which identifies ORE as one of the existing sectorial activity, is currently going through a significant restructuring under the recent MPDM Bill. It will be set by the National Marine Planning Framework (NMPF), the first major document towards the preparation of the Irish MSP. It is being developed by the Department of Housing, Planning and Local Government (DHPLG) and constitutes a single plan covering the entire maritime area including internal waters (sea area), territorial seas, Exclusive Economic Zone (EEZ) and continental shelf. The draft does not include pre-allocated zones for ocean energy. The MSF Directive was transposed into Irish law through the European Union (framework for maritime spatial planning) Regulations 2016 (or SI No. 352 of 2016[17]).

[16] https://www.housing.gov.ie/planning/marine-spatial-planning/foreshore/marine-planning-and-development-management-bill
[17] http://www.irishstatutebook.ie/eli/2016/si/352/made/en/pdf

2.3.4 ITALY

All ocean energy components of a project are subject to a single authorisation procedure for renewable energy production, issued by a single authority – the Ministry of Infrastructures and Transport (MIT) upon approval by the Ministry of Economic Development and the Ministry of Environment. Nevertheless, such authorisation must comply with the legislation in force as to the protection of the environment, of the landscape, and of cultural heritage, and it must undergo a complex administrative procedure involving a variety of stakeholders, ranging from regions to municipalities, to the marine civil engineering department to the District Customs Bureau. Regions can additionally regulate energy through specific acts[18]. Given the variety of public bodies, administrations and stakeholders involved, the total duration of the authorisation process can be well over a year [35].

The MIT convenes the *Conferenza de Servizi*, an assembly introduced to summon interested parties to examine and evaluate the proposed project. A motivated final resolution is then taken, within 180 days from the application.

2.3.4.1 MARINE SPATIAL PLANNING

There is currently no legally binding MSP for Italy nor has the country declared an EZZ. However, guidelines containing criteria for preparing MSP were published in 2017. The guidelines identify three marine areas and cover several other topics such as strategic goals, multi-level governance, and stakeholder participation. The MIT is the lead authority. MSF Directive has been transposed into Italian law with the Legislative Decree 201/2016.

2.3.5 NORWAY

In Norway, the deployment of offshore renewable energy falls under the domain of MPE and are regulated by the Norwegian Water Resources and Energy Directorate (NVE), which decides on the zoning requirement on a case-by-case basis, under the Ocean Energy Act, published in 2020. A set of secondary legislation under the Ocean Energy Act, setting out details of the licensing process, was enacted on the same day.

Technology demonstration projects may be exempt from the zoning requirement. Licenses for ocean energy need prior governmental process for the identification of suitable areas which is underway. Hence, applications for ocean energy production are not yet being processed.

The Norwegian Water Resources and Energy Directorate (NVE) has made a strategic impact assessment of the areas that are now being opened for offshore wind.

[18] As listed in Appendix 4.2.1.A of the National Action Plan (2010).

2.3.5.1 MARINE SPATIAL PLANNING

Regarding MSP in Norway, 15 areas have been identified potentially suitable for large scale offshore wind power deployment. Decisions regarding license applications for ocean energy projects are currently under process within the MPE.

2.3.6 PORTUGAL

One of the most relevant regulations in the consenting process of Portugal is the recently updated Decree Law 76/2019[19], which sets the legal regime applicable to the exercise of electricity production, transport, distribution and marketing activities and the organisation of electricity markets. Project developers must obtain the following six consents before installing a project: i) concession, license or authorisation for the private use of marine space (TUPEM[20]); ii) Reserve capacity; iii) Production license; iv) Exploration license; v) accessory facilities onshore and vi) Environmental Impact Assessment[21]. A developer can apply for all licenses at the same time, however, the procedure to obtain each of these licenses is sequential and there are legally prescribed time frames for each step of the procedure.

For projects with a power capacity up to 10 MW, the Directorate General for Energy and Geology (DGEG) is the authority in charge of licensing electricity production linking with other authorities for specific permits: The Directorate General for Natural Resources, Safety and Maritime Services (DGRM) for the TUPEM, CCDRs or APA for the environmental license and local city hall for onshore facilities.

The reserve capacity is a title issued by the grid operator (EDP Distribuição), with the requested power capacity on behalf of the applicant and encompasses a production license and an operation license. Obtaining the capacity reserve title is a necessary but not enough condition of the licensing process. After guaranteeing a reserve capacity in the grid, the applicant must submit the Production License application followed by an Exploration License application, to DGEG.

The procedure to obtain the TUPEM will depend on the designation of the use in the area where the project is to be installed, which is established in the Situation Plan (PS), the instrument setting the baseline for the national MSP. If the area to be used by the project is already designated for renewable energy production, the application for obtaining TUPEM is carried out directly by DGRM. If the area to be used by the project is not designated for MRE production activity, the developer may propose the amendment of its designation by submitting an Allocation Plan, which, if approved, automatically changes the PS through Council Minister´s Resolution.

[19] Decree Law No. 76/2019, 3rd June 2019, Presidency of the Council of Ministers. Republic Diary No. 106/2019, Series I, p. 2792 – 2865. Available at: https://data.dre.pt/eli/dec-lei/76/2019/06/03/p/dre.
[20] TUPEM: Permits for Private Use of the National Maritime Space. Information available at: https://www.dgrm.mm.gov.pt/en/web/guest/as-om-tupem.
[21] Decree Law No. 152-B/2017, 11th December 2017, Republic Diary No. 236/2017, Series I, p. 6584-(12) a 6584-(52). Available at: https://dre.pt/application/conteudo/114337013.

Consultation is usually required as part of the legal licensing process. It is usually made after the EIS is delivered to the authorities for approval. Advice is asked by the licensing authority to several statutory consultees namely Institute of Nature Conservation, port authorities and several public authorities responsible for marine resources management. There are informal consultation activities implemented by the developers during the licensing process.

2.3.6.1 EIA

The EIA Directive has been amended by the Directive 2014/52/EU, which was transposed to Portuguese EIA legal system (RJAIA) through DL 152-B/2017. This amendment aims at improving the environmental assessment of projects through procedure simplification. Among other amendments, the new EIA Directive includes the establishment of mitigation measures as well as monitoring programs.

Both the issuance of the TUPEM and production license requires a favourable or conditionally favourable Environmental Impact Statement (DIA) and, when required, a favourable or conditionally favourable Decision on the Environmental Compliance of the Detailed project design (DCAPE) or, if applicable, a favourable or conditionally favourable Environmental Appraisal Statement (DIncA).

Since the scoping phase is not mandatory, the EIA procedure starts with a screening phase to decide whether the project is subject to an AIA. If an MRE project is listed under Annex II of RJAIA, a full AIA is required, and APA is the licensing authority. In the case of MRE projects not listed under Annex II of RJAIA, i.e., with a capacity below 50 MW (or below 20 MW when located in sensitive areas) or wind farm projects with less than 20 wind turbines (or less than 10 wind turbines when located in sensitive areas) a case-by-case screening procedure is carried out.

As per the recent amendment of DL 215-B/2012 through DL 76/2019, the AIncA procedure undergone some changes. The revoked article stated that MRE projects not covered in the RJAIA and to be located within areas belonging to REN, Natura 2000 Network sites or Protected Areas, were subject to an AIncA procedure. The added articles state that MRE projects not covered in the RJAIA are subject to an AIncA procedure only if located within Natura 2000 Network.

If the project is not subject to an EIA or AIncA, the developer may proceed in the licensing procedure provided a favourable advice on the project installation on the proposed location is submitted to the regional authority (CCDR).

2.3.6.2 MARINE SPATIAL PLANNING

The Portuguese MSP was adopted in 2019 and includes zones for ocean energy development. The MSF Directive was transposed into Portuguese law in DL 38/2015 (amended by the DL 139/2015), laying down the basis for the Planning and Management of the National Maritime Space (LBOGEM). It defines the legal framework that allows for the implementation of MSPs in the whole national maritime space, from the baselines until the extended continental shelf (beyond 200 nm). The MSP system consists of a set of instruments developed under two complementary action levels:

1) Strategic instruments of the planning and management policy, from which the National Strategy for the Ocean 2013-2020 stands out and
2) Two legally binding (on public and private entities) MSP instruments: PS and Allocation Plan (AP).

A preliminary baseline for the SP has been developed under the POEM, which has therefore established the situation reference for the MSP in the continent subdivision. DGRM is responsible for the coordination of the MSP. The Allocation Plans are submitted to EIA, whereas a SEA is mandatory for the SP. In 2019, the National Maritime Spatial Plan (PSOEM) was approved establishing the licensing regime for private use of the maritime space including marine renewable energies.

2.3.7 SPAIN

Currently, there is not a specific organisation responsible for the implementation of any ocean energy programme and, regarding the regulatory framework, no dedicated consenting process exists for ocean energy technologies in Spain but there are several legal documents affecting ocean energy projects. There is no pre-application consultation which means project developers directly enter a complex licensing system involving several regulators. Like Portugal, Spain has implemented a parallel processing procedure, but required consents are still interdependent. The Ministry for the Ecological Transition and the Demographic challenge (MITECO) is the central authority responsible for passing the applications to the other regulatory authorities for comment, and for final approval of the 4 main permits: environmental assessment, occupation of the marine space, electrical developments and planning permits. No dedicated consenting process exists for ocean energy and this process is built on four main legal instruments[22]. The Ministry of Agriculture, Food and Environment issues authorisations and concessions regarding the use of marine space and acts as a decision-making tool for the environmental aspects. The Ministry of Industry, Tourism and Commerce is the entity responsible for granting the consents for the electrical elements, which include an administrative authorisation, a project execution approval, and an exploitation authorisation. Terrestrial works must be approved by Local Planning and Port Authorities. Finally, the Ministry of Development must issue a special permit where offshore developments affect maritime safety, navigation, or human life at sea. The total time needed to obtain approval is approximately two years, but this timeframe varies between projects depending on whether an EIA is required or not.

Consultation is usually required after the EIS is delivered to the authorities for approval. During this procedure, advice is requested from entities including the Institute of Nature Conservation and port and other marine resources management authorities. In addition, developers also prepare several informal public consultation and dissemination activities.

[22] Royal Decree 1028/2007, Law 2/2013 of 29 May, Law 21/2013, Coastal Law

2.3.7.1 EIA

All projects subject to the production of energy on the marine environment are subject to a simplified environmental impact assessment process. The EIA law[23] establishes a period of no more than 6 months for obtaining the Environmental Authorization.

2.3.7.2 MARINE SPATIAL PLANNING

At the time of writing, the Spanish government is currently developing the country's maritime space management plans. A first draft has been written, which went through a public consultation process during 2020. The MSF Directive was transposed into national legislation through the Royal Decree 363/2017 of 8 April. The Working Group for the Ordination of the Maritime Space (GT-OEM) created in 2019 by the Interministerial Commission on Marine Strategies (CIEM), is coordinating the drafting, application, and monitoring of the MSP, which includes several related sectorial initiatives (i.e., MPAs, Natura2000, and renewable energy). At the same time, the marine strategies for the five marine sub regions are being developed. MITECO is the MSP authority, sharing maritime and coastal affairs with the regional governments.

2.3.8 SWEDEN

With respect to legislation and regulation of ocean energy projects, Sweden Ocean energy in the Swedish EEZ is regulated by 5 main legislative acts[24]. Under the Environmental Code, permits are granted by one of the six Environmental Courts with input from the Regional and County Administrative Boards [36]. The latter also handles, whenever required, consent regarding the continental shelf act. Additional licenses must be obtained from Svenska Kraftnät, who manages the Swedish national grid, along with several minor consents from regional and national authorities. Instead of a specific authority managing the whole consenting process, there are several authorities involved and they also manage other consenting processes.

Mandatory statutory consultation is done in the beginning of the process, i.e., before the application submission, with the Regional and County Administrative Boards and this process is responsibility of the applicant. A second consultation is held with parties particularly affected by the project. Plans with potentially significant environmental impacts, a larger consultation process is mandatory.

2.3.8.1 EIA

Although an EIA is currently always required, the level of detail and scope of necessary investigations naturally varies depending on the character of the project. This legislation is currently under review. Permits usually contain conditions regarding monitoring the environmental effects of the project.

[23] Law 21/2013, of 9 December.
[24] Environmental Act 1998, National Maritime Policy Bill 2008, Planning and Building Act (1987), the Swedish Economic Zone Act (1992) and the Fishery Act (1982)

2.3.8.2 MARINE SPATIAL PLANNING

Only offshore wind has been identified in the MSP of Sweden and included and allocated a spatial area so far. MSF Directive was transposed into Swedish law by the MSP Ordinance 2015:400. Three national plans covering the territorial sea and the EEZ were submitted by the Swedish Agency for Marine and Water Management (SwAM) to the Government in December 2019. These should be adopted by March 2021.

2.3.9 UNITED KINGDOM

There is legislation and regulations dealing solely with the consenting process for ocean energy[25]. The licensing system is complex since consents are required at several levels of government. Consenting processes are different among the constituent jurisdictions of the UK, varying from dedicated procedures for ocean energy in Scotland to more general procedures for Marine Licences in Wales, England, and Northern Ireland. Before applying for a Marine License, developers of small-scale projects must acquire a seabed lease from the Crown Estate.

In general, the Marine Management Organization (MMO) consents construction and operation of any offshore generating stations with a capacity between 1 and 100 MW. Safety zone consents may also be required. Onshore planning permits are issued by the local panning authority and decommissioning works are regulated by the Department for Business, Energy and Industrial Strategy (BEIS). The MMO has a KPI target of 13 weeks to decide on a marine license application.

In **England and Wales**, the consenting process is carried out based on the size of the proposed project: projects with a capacity under 100 MW require a marine license under the Marine and Coastal Access Act 2009 to construct, extend, or operate any offshore generating stations. In addition, projects in Wales are also required to obtain a European Protected Species (EPS) License in particular cases. Projects greater than 1 MW within 12nm and greater than 50 MW beyond 12nm require Section 36 consent (Electricity Act 1989) to build and operate an energy generation site. In English and Welsh offshore waters, marine licenses, section 36/A consents, and safety zones are determined by the MMO. In Welsh inshore waters, marine licenses are determined by the NRW and section 36/A consents and safety zones by the MMO.

The Department of Agriculture, Environment and Rural Affairs (DAERA) is responsible for issuing permits in **Northern Ireland**. The consenting process is regulated by several laws[26].

Marine Scotland Licensing Operations Team (MS LOT) acts as 'one stop shop' for the consenting process in **Scotland** and is expected to provide responses to consent applications within 9 months of

[25] The Electricity (Offshore Generating Stations) (Applications for Consent) Regulations 2006; The Electricity (Offshore Generating Stations) (Safety Zones) (Application Procedures and Control of Access) Regulations 2007; The Electricity Act 1989 (Requirement for Consent for Offshore Wind and Water Driven Generating Stations) Order 2011.
[26] Marine and Coastal Access Act 2009, Conservation of Habitats and Species Regulations 2010 (as amended), the Offshore Marine Conservation (Natural Habitats, &c.) Regulations 2007 (as amended), and the Water Framework Directive (WFD).

submission. The authority administers the complete licensing process for all Section 36 and marine license applications in Scottish waters, from screening and scoping consultations, the delivery of a Marine License and the final decision by the minister. Its streamlined consenting process simplifies and consolidates the supporting legal framework for wave and tidal stream technologies.

The responsibility to engage stakeholders is on developers in England and Wales. The consultation process is taken on a case-by-case basis and starts early in the procedure. In Scotland, MS LOT ensures appropriate consultation and works closely with several Statutory Nature Conservation Bodies.

2.3.9.1 EIA

When a formal EIA is required, the following documents need to be submitted: ES and/or Appropriate Appraisal, formal section 36 Electricity Act application form and Marine License Application form. The MMO is expected to decide within 13 weeks from the validation of the application during the pre-application stage. Assessment is based on the size, nature, and location of each proposal[27]. MMO is the single entity responsible for providing a decision on whether an EIA is required on a case-by-case basis during the pre-application consultation, or the applicant can voluntarily opt into the process. The ES is submitted at the application stage.

2.3.9.2 MARINE SPATIAL PLANNING

MSP is currently used as a decision-making tool only in East England Inshore and Offshore areas. The UK Marine Policy Statement (MPS) provides the overarching policy framework for developing marine plans. The MPS is a joint UK administrations document, the aim of which is to contribute to the achievement of sustainable development in the UK marine area. The preparation of marine plans is the responsibility of the respective governments within the UK, reflecting the devolution of powers to Scotland, Wales, and Northern Ireland. Eleven marine areas are expected to have a marine plan with a long-term view of activities by 2021, which will be reviewed every 3 years. A first implementation and monitoring report was carried out in 2017 for the East Marine Plans, which contain policies on tidal stream and wave energy, followed by the South Marine Plans in 2018. The Department for Agriculture, Environment and Rural Affairs of **Northern Ireland** is currently developing marine plans for both the inshore and offshore regions, which will be published as a single document, the Marine Plan for Northern Ireland. This will provide more detailed, area specific guidance on marine issues. A draft has been published in 2018 followed by a period of public consultation. A publicly available map-viewer is currently under development and will provide information and assist decision making to proposers and public authorities. In **Scotland**, existing and planned projects are included in the MSP. Scotland's National Marine Plan was reviewed in 2018, and steps are now being taken to prepare marine plans for each of the Scottish Marine Regions established. It contains guidance for offshore wind and marine renewable energy. Part of the Marine Scotland Open Access Data Network, the Marine Scotland Maps interactive tool (National Marine Plan interactive or NMP) has been designed to assist in the development of national and regional

[27] As directed by Annex II of the Marine Works (Environmental Impact Assessment) Regulations 2007 or Schedule II of the Electricity Works (Environmental Impact Assessment) (England and Wales) Regulations 2000.

marine planning. The tool allows the user to view different types of information and, where appropriate, links have been provided to the related parts of Scotland's Marine Atlas, the National Marine Plan as well as links to data sources to facilitate data download. The **Welsh** National Marine Plan was launched in November 2019 to provide significant support for marine energy technologies. To summarize, 4 MSPs are currently in a more advance stage of development: East Inshore & Offshore Plans, South Inshore & Offshore (both in England), Scotland's National Marine Plan and Shetland Islands' Marine Spatial Plan (SIMSP) (both in Scotland).

The marine plan authorities responsible for developing Marine Plans are the MMO, Marine Scotland, the Welsh Government and the DAERA. The Crown Estate carries out periodic tendering processes for ocean energy areas, for which SEAs are carried out.

2.3.10 ADDITIONAL RELEVANT CONSENTING TOPICS

2.3.10.1 STRATEGIC ENVIRONMENTAL ASSESSMENT (SEA)

An EIA is a localised environmental assessment conducted by a developer as part of the licensing process, i.e., the onus is on the developer. Contrastingly, a SEA is a broader assessment conducted by a government in order to manage the use of a specific area. Sometimes this is part of a broader MSP process, which can remove some of the burden from the developers and helps identify suitable locations for development. SEA is a systematic decision support process which identifies the likely significant environmental effects of implementing plans to develop. Its implementation could lead to certain environmental aspects being addressed at a more strategic level, rather than falling to the developer, which is more appropriate for certain environmental concerns e.g., effects on migratory species.

Both **Scotland** and **Ireland** have conducted SEA for all MRE projects. Spain conducted SEA for offshore wind. Others such as Norway have not yet conducted any SEA nor have a specific MRE plan. In **France**, suitable areas for development are identified by the State along with any conflict of use and technical constraints in each area. After information sharing, a call of tender for specific projects on the suitable areas is carried out. In **Spain**, SEA process depends on the proponent – if it is public entity planning an energy production project, the Ministry of Industry considers it as a private operation therefore nor subject to SEA. In **Ireland**, the OREDP was subject to a somewhat inconclusive SEA as it concluded with the identification of significant potential wind and wave energy potential in the totality of the country's waters. This is mainly because the OREDP itself has very limited spatial awareness. Consequently, it remains to be seen whether the SEA work will inform site selection for ocean energy project developments.

In **Portugal**, SEA is mandatory for the SP, for which was already performed and published in 2018. In **Spain**, the scoping process for the SEA of the MSPs is currently being drafted. The **UK** carries out periodic tendering processes for wave/tidal areas. These areas are scoped, and Strategic Environmental Assessments (SEA) carried out. In **Italy**, as statutory MSP plans have not been developed yet, SEA processes have not been implemented. Sweden published SEAs and sustainability appraisals assessments for three national MSP areas.

In **Sweden**, the SEA procedure shall be applied to any strategic document related to offshore wind development e.g., MSPs.

2.3.10.2 GUIDANCE

Guidance on the consenting process exist in few countries to assist developers in navigating the consenting process and in addressing uncertainty when making licensing decisions. In some countries such as Denmark, France, Portugal, and the UK (Scotland published a Consenting and Licensing Guidance in October 2018), regulatory bodies and other entities have produced guidance on the consenting process. Sweden has comprehensive information available on offshore wind consenting developed by the Swedish Energy Agency. Furthermore, information on the consenting process is available on the County Administrative Boards' homepages. In Ireland, DCCAE published in 2017 the Guidance on the EIA and Natura Impact Statements preparation of ORE Projects. SEAI is expected to produce guidance for developers on the consenting process of the Atlantic Marine Energy Site (AMETS). The Ocean Energy Ireland Portal acts as 'one stop shop' to guide developers through the supports available in Ireland for the marine renewable energy sector. Spain has information available, but no guidelines have been produced yet. Norway and Italy do not have any guidance put in place considering its early stage in the process of introducing ocean energy in the country's regulatory framework.

2.3.10.3 LICENSING PROCESS IN OFFSHORE TEST CENTRES

Since open sea test sites are pre-consented, developers do not have to undertake a full consenting application. However, they are still required to demonstrate that they respect pre-defined test site conditions.

In **Denmark**, developers can require a temporary permit in either DanWEC test site or in other Danish waters. There is no specific regulation for offshore test sites in **France**. However, test centres such as SEM-REV or SEENEOH are required to hold several authorisations similar to those for MRE projects: an environmental permit which includes an EIA, a license to occupy the maritime public domain and a power generation permit granted by the Ministry of Energy. In **Ireland**, Galway Bay is a pre-consented quarter-scale test centre whereas the full-scale test centre AMETS requires individual developers to obtain a foreshore consent. In the case of AMETS, it is anticipated that a lease will be granted to the SEAI, and developers will be required to apply for a license to the consenting authority (currently DECLG). In **Portugal**, the regulation applied for the Portuguese Pilot Zone, Ocean Plug (included in the MSP), differs completely from the parallel processing that developers have to go through as there is a desire to trial a one-stop-shop approach. Deployment in BiMEP, **Spain**, is pre-consented. Similar conditions apply in the test centres in the **UK**, such as it is the case of EMEC, one of the most well-known centres, provided that certain initial conditions are met. In **Sweden**, (Lysekil and Soderfors) test centres should go through the whole permit process but in cases where the facility is considered to have limited effect on the environment, only a notification is needed. In **Norway**, Runde Environmental Centre (REC) facilitates operations, licensing, deployment, and monitoring of wave energy devices.

3 ANALYSIS OF LEGAL FRAMEWORKS – BARRIERS AND ENABLERS

In the previous section, the national policies, legislation, and consenting processes currently in place for ocean energy projects, were reviewed for different European countries. However, in order to measure the positive and negative impacts of such frameworks, a questionnaire was conducted amongst targeted stakeholder groups. The questionnaire (original questionnaire form in Appendix-I) aimed at identifying the potential non-technological barriers and enablers to ocean energy, based on experiences and perceptions of key stakeholders in the sector.

The present section details the methodology applied for the development of the questionnaire and presents a thorough analysis of the existing barriers and enablers to the ocean energy legal framework supported by the questionnaires' results. The analysis is divided into the following six topics and subtopics, in a similar structure as the one applied to carry out the literature review:

- International policies
- National policies and legislation
- Administrative and licensing procedures
  - Environmental Impact Assessment (EIA) process
  - Integrated planning
  - Stakeholder consultation

Within each topic, relevant outputs from the questionnaires were incorporated in an in-depth analysis undergone on the perceived situation for each parameter to support the arguments. A certain degree of interpretation was required in the applied methodology in order to analyse and communicate the responses in a simple schematic and narrative form.

3.1 STAKEHOLDER IDENTIFICATION

The stakeholder engagement process started with the identification of wave and tidal technology developers was carried out [37] [38], representing a range of EU countries with active projects during the period 2009-2019 (10 years) and spread across TRL6 and above. This inventory flowed into a narrower list followed by considerable efforts were made by DTOceanPlus project partners to gather the contacts. The questionnaire was then electronically sent to 99 stakeholders representing approximately 14 countries. The questionnaire was also made public to increase response rate.

To capture the insights from technology developers with meaningful operational experience, a minimum technology maturity was defined as TRL6. This stage was selected since it means that it ensures a degree of experience in scale-model testing and operation in sea conditions. Although the TRL of each technology is not always clearly defined, an effort was put into getting the most accurate TRL for each company selected considering the lack of detailed information available. However, it must be noted that such approach has some limitations since this information is mostly based in publicly available data, which, in turn is based on the reported stage of testing (e.g., tank test, scale test, full scale, electricity generation, prolonged operation). However, to obtain the most updated data, respondents were asked to provide more information and suggest the TRL of their technology.

3.1.1 QUESTIONNAIRE STRUCTURE

A questionnaire entitled 'Regulatory and political barriers to ocean energy deployment' was developed, targeting three different stakeholders - regulators, technology developers and test site managers (see Annex 1).

This questionnaire aimed at:

- Providing an overview on respondents' past and present experiences interacting with the regulatory framework concerning their project's deployment and,
- Exploring respondents' perceptions on what they consider to be key barriers and enablers to ocean energy deployment in the marine governance structure.

The questionnaire consists of 3 main sections:

- **General respondent information** – organisation name, role in the organisation, contact and group of stakeholders., latest experiences concerning number of regulators involved, timeline of the consenting process and number of licenses required. This information aimed at assessing systematic preferences/biases of types of stakeholder characteristics towards certain barriers.
- **Detailed respondent information** – the questionnaire was designed to show different questions to respondents, depending on the stakeholder group they belong to. Figure 3-1 shows the different questionnaire routes.
- **Past and present experience** – constitutes the main section of the questionnaire and evaluates respondents' perceptions on barriers in the legal and political framework given a set of parameters such as national policies, administrative procedures, and integrated planning.

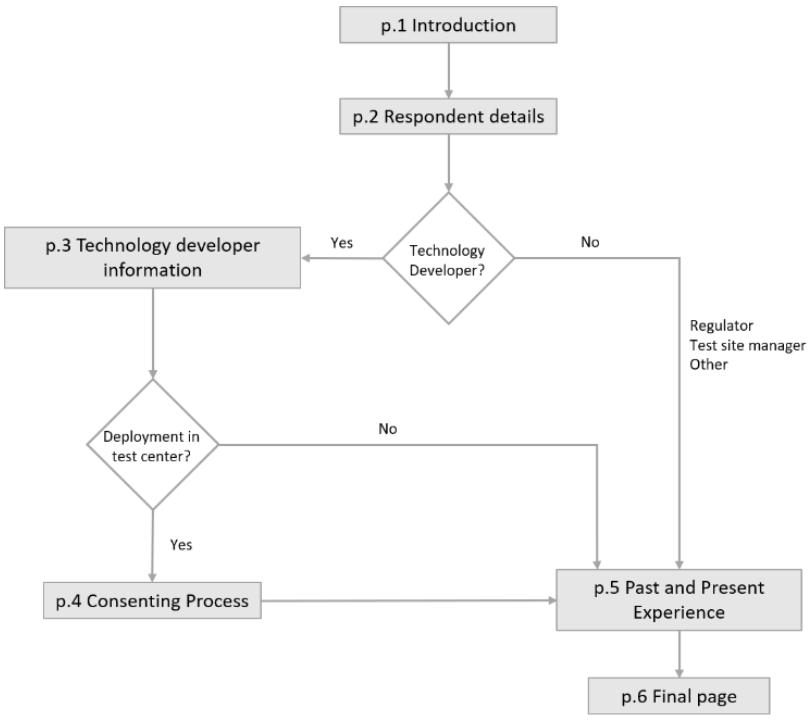

FIGURE 3-1: SURVEY FLOWCHART.

3.1.2 SAMPLE CHARACTERIZATION

Twenty-three valid responses were received from stakeholders, which is considered a satisfactory number when compared with similar qualitative free text reply questionnaires carried out in the past. As Figure 3-2 shows, most of the sample constitutes technology developers (77% from the wave energy sector). Around 71% of the technology developers are on TRL 7 or above, as shown in Figure 3-3. Around 70% of them deployed in test sites. A total of 11 different countries are represented in the sample, either from country of deployment for technology developers or location of test site for test site managers. The 'Other' category comprises mainly consultants working in the sector.

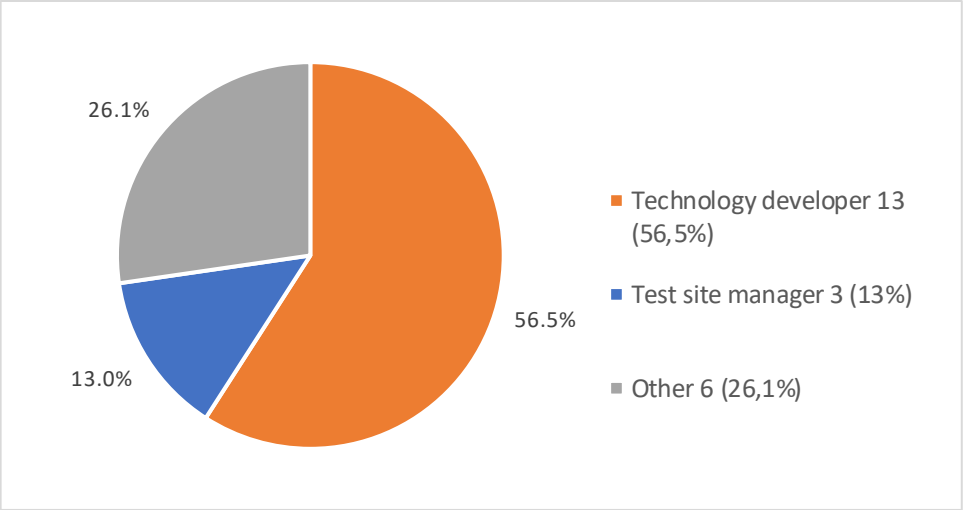

FIGURE 3-2: SURVEY RESPONDENTS - STAKEHOLDER CATEGORIES.

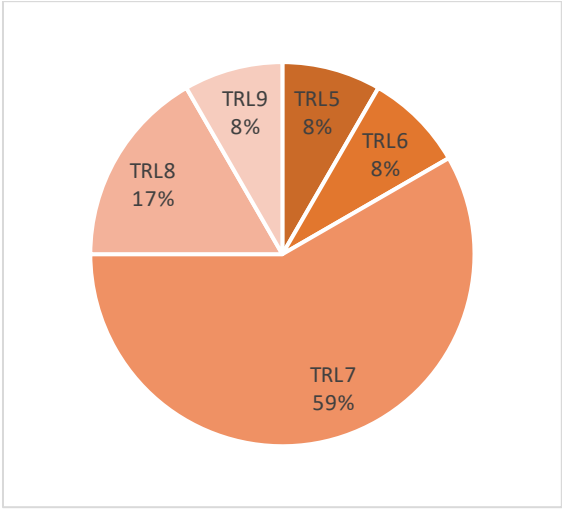

FIGURE 3-3: TRL OF TECHNOLOGY DEVELOPERS.

3.1.3 OVERVIEW

One of the questions looked at prioritising the most urgent factors identified in literature review as perceived by respondents, which were asked to score each one of them. The prioritisation allowed quantitative results to be acquired from a somewhat very qualitative assessment. Figure 3-4 shows the overall perception of the respondents on the level of challenge each of the parameters under analysis pose to project deployment based on their replies to Question 10 (Annex I). Each parameter was ranked on a scale from zero (0) to six (6), for no barrier/enabler and significant barrier, respectively. The results shown are the averaged results from each group of stakeholders, where the 'Others' group includes consultants, regulators and research and technology organisations. Each average result shown in Figure 3-4 is illustrated in the following sections, broken down by type of stakeholder and score, and further interpreted and incorporated in the analysis. The most relevant statements taken from respondents' written responses are shown in the respective topic in boxes framed in green (statements perceived as enabling factors) and orange (statements perceived as barriers).

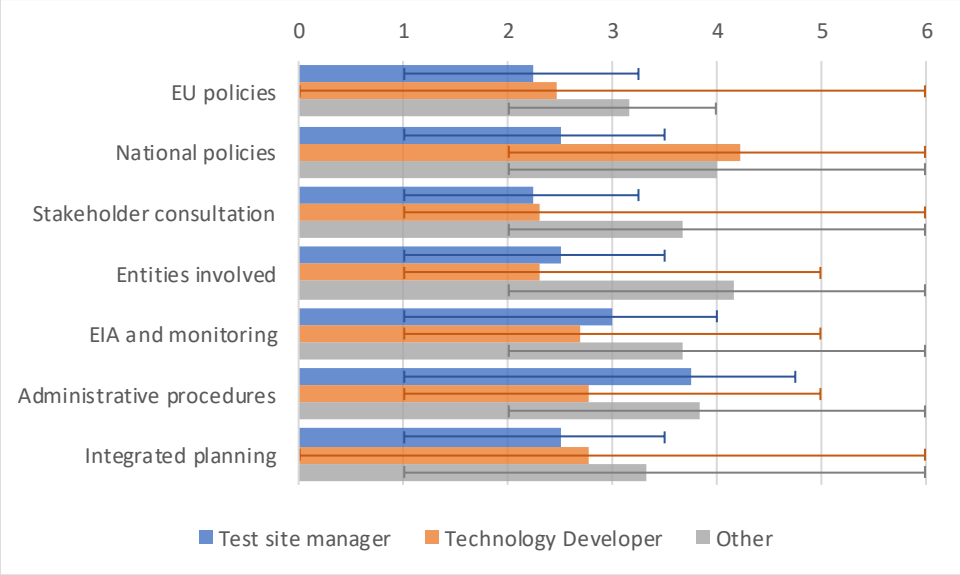

FIGURE 3-4: OVERVIEW ON RESPONDENTS' PERCEPTIONS[28] (0: NO BARRIER/ENABLER; 6: SIGNIFICANT BARRIER). ERROR BARS REPRESENT MAX AND MIN VALUES.

3.2 INTERNATIONAL POLICIES

With respect to international policies, results suggest that there are concerns over the development of the sector being hindered due to too often eroding and not fit for purpose policy support to ORE in particular[29]. Nevertheless, there's a general view that obstacles are being overcome and public

[28] Shaded bars show mean result, error bars show range of responses.
[29] https://ec.europa.eu/international-partnerships/european-consensus-development_en

policies are slowly being put in place at international level to tackle barriers originated from risks and challenges associated to ORE development. Furthermore, several mechanisms continue to be created for the RE sector. As Figure 3-5**¡Error! No se encuentra el origen de la referencia.** shows, international policies are expressively perceived as being an enabler to project deployment. All respondents who considered international policies don't pose any form of barrier (ranked as a 0) are technology developers.

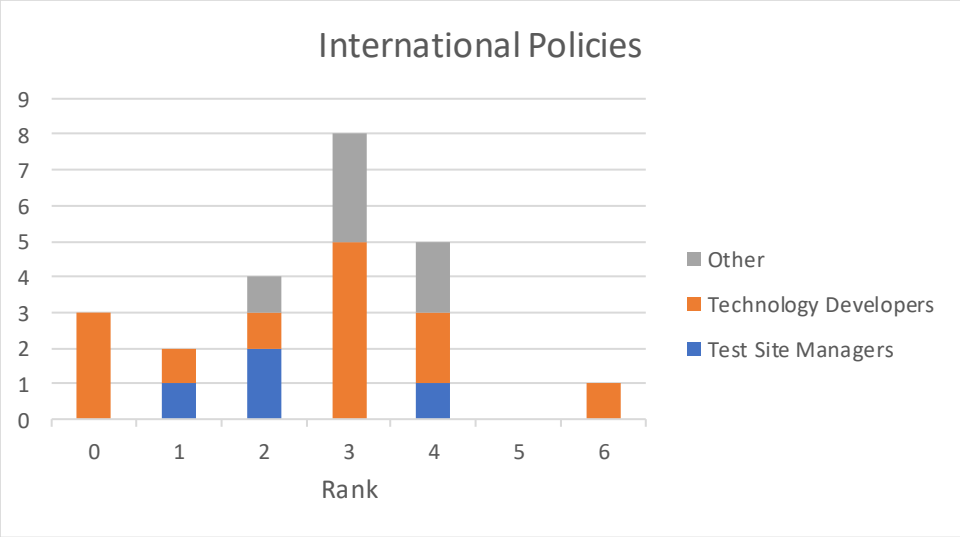

FIGURE 3-5: INTERNATIONAL POLICIES - RESPONDENTS' PERCEPTIONS (0: NO BARRIER/ENABLER; 6: SIGNIFICANT BARRIER).

Figure 3-6 shows the respondents' view on the extent to which each of the main policy mechanisms enable project deployment, based on their replies to Question 14 of the survey (Annex I). Each parameter was ranked on a scale from 0 (no enabler) to 6 (significant enabler). The 'Others' category includes representatives from the consultancy, regulatory and academia sectors.

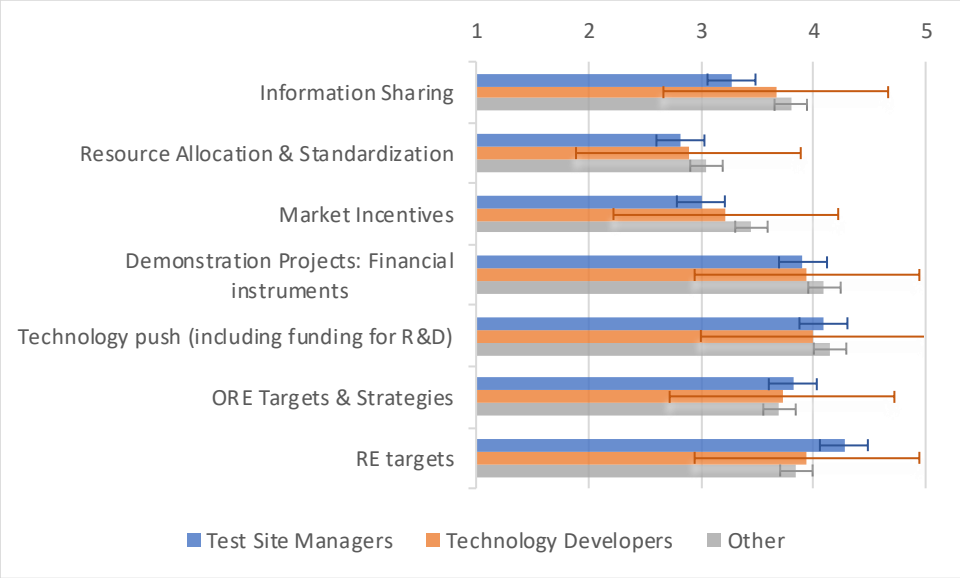

FIGURE 3-6: INTERNATIONAL POLICY MECHANISMS - RESPONDENTS' PERCEPTIONS[30] (0: NO ENABLER; 6: SIGNIFICANT ENABLER). ERROR BARS REPRESENT MAX AND MIN VALUES.

- ***Transposition of EU legislation into national law***: Often the way EU Directives have been translated into national legislation presents hurdles, which can be difficult to surpass where there is a lack of clarity on how these should be applied to ORE. Additionally, its specificities and implementation vary across Member States. Natura Directives promote precaution and can weaken risk-based consenting such as SDM. Requirements from Birds and Habitats Directives are leading countries such as Spain to avoid these designated sites. In France e.g., there are too many designated sites which makes it inevitable to overlap projects in such areas. In the UK, there is a perception that these Directives have been adapted too harshly and regulators' interpretation is too strict especially concerning the precautionary principle. Several developers choose not to move forward when confronted with the requirement to conduct long-term monitoring and mitigation actions in compliance with the MSFD. The newly reviewed EIA Directive does not include considerations on wave and tidal energy (Annex II). EU legislation fails at requiring Member States to report status of receptors such as water bodies[31] and seabed bathymetry (some obligations are in place for seabed mapping but with focus in the presence of particular habitats and species), which hinders information gathering. Improvement in key pieces would in theory help fill national data gaps by making information available for project planning purposes. In France, Ireland, Portugal, Spain, Sweden and the UK, ocean energy falls under the scope of both energy legislation and marine environment legislation. In Denmark, it comes within the scope of renewable energy legislation. On the other hand, in Portugal, all the consents required have been adapted to better suit wave energy developments. This approach of having a specific law or instrument on every topic of the consenting process is seen as a good practice since the laws are then easier to understand.

[30] Shaded bars show mean result, error bars show range of responses.
[31] Under Water Framework Directive (WFD). and Marine Strategy Framework Directive.

> *'With no clear market, through grants or feed-in tariffs from EU or national funds, there will be no projects deployed.'*
>
> Technology developer

- ***Unrealistic ORE targets**:* Although RED II approval was overall considered a success; the new target did not reach the 35% intended by some national governments in the European Parliament (including Portugal) which believes that the approved target is insufficient to reach the desired impact. Survey results back up this as all stakeholder groups perceive RE targets as one of the most significant barriers in international policies (Figure 3-6).

- ***Unsuitability of funding schemes**:* Optimistic deployment forecasts which have pushed the sector to achieve large scale deployments in the short-term, are possibly misaligned with the type, and level, of funding available to the ocean energy sector. There is a widespread concern about the suitability of certain funding mechanisms made available and their ability to realistically meet the level of expectation placed on the sector in terms of deployment capacity and performance., but there is not an allocation of suitable levels of funding support mechanisms to allow initial deployments to take place [39]. Survey results show that technology developers feel Technology push (including funding for R&D) mechanisms to be a significant barrier to project development (Figure 3-6).

- ***Policies dedicated to the RE sector as a whole**:* Where policies and regulatory regimes are applied at an aggregate level, the less developed ocean energy sector cannot compete with e.g., offshore wind. In relation to this, the field investigations point to the notion that tidal and wave each are at different stages of development and would therefore need different models of (financial) support. As an example, a call for support schemes that target tidal/wave, separately from other RES, was applied in France. Positive feedback on the model chosen by Wave Energy Scotland is repeatedly given. In both the cases, the scheme aims to trigger convergence, while spreading support to sustain competition [37].

- ***Pressure into reaching large scale***: Policies do not work well where policy makers and funding agencies have high expectations regarding time and cost (also as a result from unrealistic ORE targets). For developers, this leads to a significant pressure for fast deployment in short timescales, both at an economic and political level, and to a race towards commercial readiness. Consequently, there is an incentive towards the development of end products, rather than engineering results. Financial pressures exist through the requirement to provide returns to investors. Political pressures arise from competition with other renewable energy sectors that may offer a more competitive and attractive cost for policymakers [40].

- ***Opportunities for small and large players**:* While the industry recognises the need for large utility scale deployments as an essential part of meeting the EU ocean energy deployment targets, enhanced technology push support should help address the continued requirement for earlier stage R&D funding in the EU that will facilitate technologies and sub-systems that may play a future role in cost reduction and performance improvement within ocean energy technologies.

However, a bias towards large scale technologies resulting from a pressure into reaching commercial readiness had overlooked smaller players in the industry, resulting in a more challenging access to funding to the latter group. There should be consideration for developers of small-scale technology that may also have array projects in the pipeline, as there is currently not a route to securing similar funding support as for the larger scale projects [39].

- ***Benefits of information sharing***: Openness about results, be it successes or failures, is essential to accelerate the commercial readiness of the sector, hence the crucial role of platforms for information sharing. Policies work well where funding agent policies are flexible (change quickly in response to industry needs (as in Scotland) and others inherent in early-stage techs), agents work closely with industry, there is collaboration with universities, utilisation of local resources (positive for market development). Early international collaboration supports developers in countries with modest wave resources. Shared information and experiences improve investor confidence which in turn accelerates investment and commercialisation. Nevertheless, there seems to be a lack of cooperation within the sector, which concerns public-private cooperation and cooperation amongst industrial actors and amongst national and European funding authorities.

> *'There is a significant number of European projects currently dedicated to marine energy projects.'*
>
> *'At present, EU policies support the industry through capital and operating costs associated with construction and deployment, mainly for tidal energy.'*
>
> Technology developers

3.3 NATIONAL POLICIES AND LEGISLATION

With respect to national policies and legislation, Figure 3-7 shows dispersed opinions regarding the role of national policies as a barrier or enabler to project deployment, which is understandable given the diversified level of development of the ORE sector in the countries represented in the sample. Five main issues were identified, as detailed below.

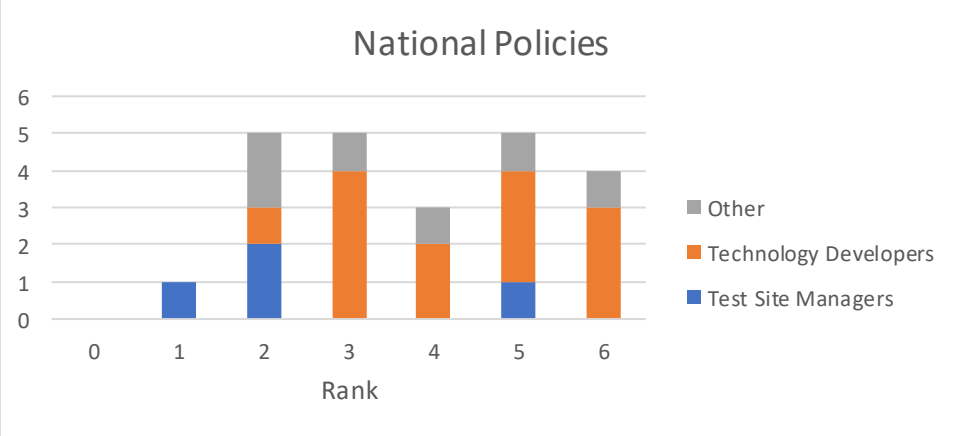

FIGURE 3-7: NATIONAL POLICIES - RESPONDENTS' PERCEPTIONS (0: NO BARRIER/ENABLER; 6: SIGNIFICANT BARRIER).

- ***Unrealistic targets lead to loss of credibility**:* As previously mentioned (Section 2.2), most EU Member States active in the sector have set firm targets which demonstrates their willingness to invest and develop the sector, but very few have specific policies to promote ocean energy uptake. Under the EU27 NREAP scheme, the ambitious targets set for renewable energy 2020 are not substantiated with actual projects as these were driven by the top-level Member States energy policy. With recent alterations to the 2020 deployment targets across various MS, deployment trajectories for the ORE sector have been reduced by an order of magnitude compared to earlier 2020 targets. Ocean energy technology must deliver on the updated targets; otherwise, there is a real risk that the sector could lose credibility amongst supply chain companies and policy makers. On the other hand, some experts argue that NREAP/NECP targets, despite realistic, could be set at a higher benchmark with a more encouraging policy framework.

'At the moment, in Spain, there are no National Policies to push renewables and the governmental lack support tends to hinder this kind of projects.'

Test site manager

'National Policies are constantly changing, especially in the UK, which makes it very difficult for tech and project developers to plan for project and investors.'

'There is no national or investor expectation to wave energy [in Denmark].'

'There are no clear and specific policies on different levels - municipal, governmental, and regional - for wave energy promotion. In some countries, the relevant organizations lack processes and are not able to clearly communicate the steps necessary for project execution.'

Technology developers

- ***Lack of diversity in dedicated policy mechanisms***: A rather insufficient number of governments have national research & innovation, market deployment, and market-based energy policies that are open to ocean energy. Learning costs cannot be funded exclusively by research or innovation grants. Alternative mechanisms currently in place for ocean energy translate in feed-in tariffs but are often absent or are not specific for ocean energy. Few countries use industry or supply chain initiatives specifically for ORE developments. Countries such as France, Ireland, Portugal and the UK have implemented upfront capital and funding programs for the deployment of ocean energy projects [38].

- ***Governance fragmentation**:* Most countries have a fragmented governance structure with responsibilities spread across numerous Government departments, agencies, etc. There is little political appetite for greater integration e.g., in Ireland and Portugal. Moreover, policies may change according to government mandates and parties.

> *'There's a lack of market support for tidal stream energy at national level.'*
>
> *'If consenting and insurance is required as if it was an offshore oil and gas installation, it is a showstopper for young companies.'*
>
> *'Lack of national funds* [in Ireland].'
>
> Technology developers
>
> *'Lack of streamlined national policies.'*
>
> Research & Technology organization

- ***Lack of government ambition:*** The long-term nature of ORE might lead to a lack of political will [41] and ambition regarding prioritisation, strategy and support to the sector. As a result, no bold aims or targets are set, making it more difficult to push for action. Government motivation and investment is critical to making ocean energy technologies viable. Moreover, government commitments also encourage and support the larger contribution from public and private investors. Support from policy makers is crucial for the development of the sector. E.g., in the early 1970s, Denmark made a successful political decision to invest in wind technology while it was a nascent technology, as wave is now. Very few countries have long-term government ambitions regarding prioritisation, development strategy and support.

> *'National policies are very important to implement and/or promote initiatives to support the development of the MRE administrative and regulatory context as well as national financial incentives.'*
>
> Consultant

- ***Insufficient national funding schemes****:* In Ireland, developers highlight difficulties with funding, particularly the cost of testing devices in the lab and at sea. Asking developers to pay upfront is a complete roadblock. Ireland. On one hand, the Irish Government is unwilling to take environmental risk due to previous European Court of Justice (ECJ) rulings against Ireland. On the other hand, national policy has been a significant driver for economic growth in the marine sector and the recent revision of foreshore consenting through the publication of the MPDM Bill[32] presents a significant opportunity to enable the ocean energy sector in the country [42]. The lack of national investments in Italy impairs the participation of Italian actors in co-funded EU programs and their access to co-funded financial instruments. One dampener relates to the unknown impact of Brexit on ocean energy and the general difficulty surrounding tariff supports and policy generally for renewable energy in the UK.

[32] Marine Planning and Development Management Bill (MPDM), General Scheme, Department of Housing, Planning and Local Government.2019.

3.4 ADMINISTRATIVE AND LICENSING PROCEDURES

As Figure 3-8 shows, opinions about the role of licensing procedures are fairly spread among the respondents, which can be justified with the fact that the consenting process varies in great degree from country to country. This was the topic that received more attention from the survey respondents. A first set of seven issues is detailed in this section, followed by a detailed description of barriers and enablers identified for three subtopics that comprise the licensing procedure: Environmental Impact Assessment (EIA), Integrated planning and stakeholder engagement and consultation.

- ***Lack of a streamlined process:*** Overall, there is a lack of streamlined processes for the licensing and permitting of ocean energy projects. On an international level, there is an absence of recognized performance assessment guidelines and standards. Guidance exists in few countries (e.g., in Portugal[33]) to assist developers in navigating the consenting process and in addressing uncertainty when making licensing decisions. In some countries, guidance has been produced for offshore wind, but it is unclear to developers whether it can also apply to ocean energy.

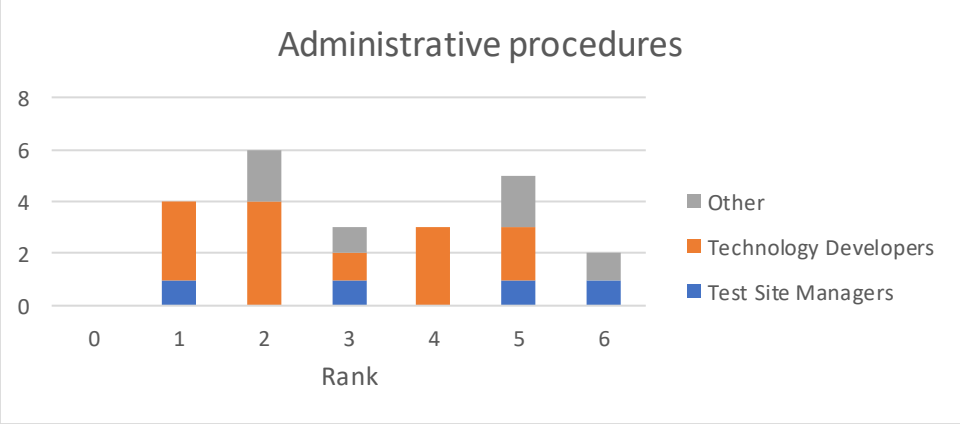

FIGURE 3-8: ADMINISTRATIVE PROCEDURES - RESPONDENTS' PERCEPTIONS (0: NO BARRIER/ENABLER; 6: SIGNIFICANT BARRIER).

- ***Challenging interpretation of legislation:*** Lack of dedicated legislation for ORE leads to unsuccessful attempts to apply existing legislation to MRE developments and responsibilities distributed among entities. This can make it difficult for a developer to interpret legislation and navigate the process. This poses a barrier as getting a clear view on who should be involved, at what stage and for what purpose can be very time consuming. As a result, and as backed up by several respondents (particularly technology developers), technology developers don't move forward with certain projects due to delays and extra costs, and financiers become reluctant to invest. In the Portuguese case, having a specific law or instrument on every topic of the consenting process is seen as a good practice since the laws are then easier to understand.

[33] https://www.wavec.org/contents/reports/wavec-guide-web.pdf

'The licensing procedure [in Spain] is long and hard to follow and, in the end, can last around five years, which could end hindering and even bringing down a project'

'We spent 5 years to obtain the permits for wave energy at BiMEP. And another 5 years to modify them including wind energy.'

Test site managers

- ***Fragmented approach:*** Generally, countries that have complex jurisdictional arrangements and no dedicated legislation for ORE tend to have more entities involved, and a larger number of permits requires. This fragmented approach in most countries suggests there is limited experience with one coordinating authority or a 'one-stop shop' approach [43]. One successful exception could be the UK which seems to be the most streamlined, operating a 'one window' approach to the administration of consents. As an example, the consenting process for a 10-device farm in an EU country required a developer to submit 35 copies of the technical report to be then submitted to 35 different entities. In BiMEP, Spain, the consenting process took almost 5 years because of the number of authorities involved and for many of them it was their first experience processing an application for an MRE. In Ireland, developers point at difficulties obtaining a foreshore license to test their devices in the sea, with a number of government entities involved in a process which can take years [44]. These diverse experiences in the role of entities involved in the consenting process is illustrated by the respondents' dispersed answers when ranking the topic, as shown in Figure 3-9.

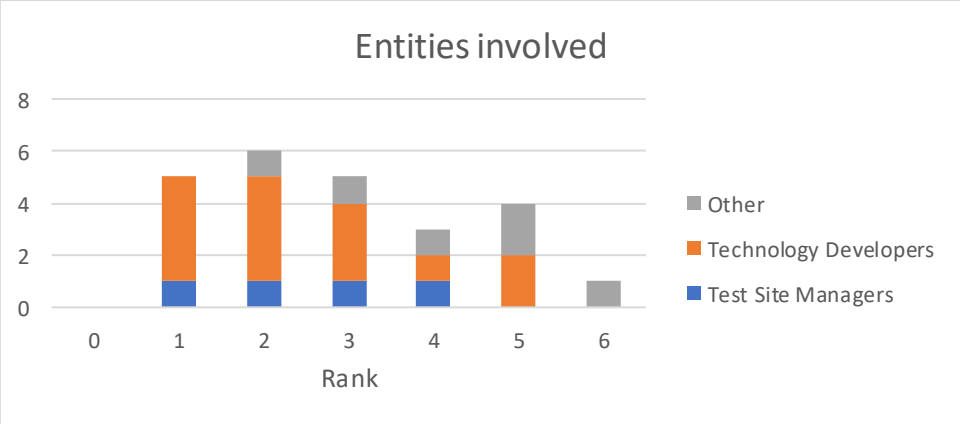

FIGURE 3-9 - ENTITIES INVOLVED - RESPONDENTS' PERCEPTIONS (0: NO BARRIER/ENABLER; 6: SIGNIFICANT BARRIER).

- ***Lack of specified timeframes:*** Lack of specified timeframes for decision making hinders development (e.g. in Portugal, there are fixed timeframes but have been limited success in practice) as it results in a lengthy process. If one stage is delayed, the developer can't proceed to the next. Criteria used to support decision making are unknown to the public and missing in several countries. As an example of good practice, Scotland has a policy target of making a decision on an

application on within a certain timeframe which is helpful to developers as they can plan and budget for their project more precisely.

- ***Consenting process in constant change:*** This is a commonly cited barrier as the survey results show, that leads to hardship in following the updated procedures, which in turn hinders the development of the sector. Changes in government or internal restructuring can result in a loss of knowledge within the consenting authorities.

> *'If consenting and insurance is required as if it was an offshore oil and gas installation, it is a showstopper for young companies.'*
>
> *'We were supposed to install a demo system in a non-test site. Due to a very long consenting process we will probably have to re-locate to another location resulting in delay and extra costs.'*
>
> *'Depending on the country of deployment, the administrative procedures due to paperwork, translations, etc. can delay the whole project plan.'*
>
> *'The lack of streamlined admin between EU countries and UK countries as well as different organizations within one country ads significant administrative burden to our company.'*
>
> *Technology Developers*

- ***Insufficient communication:*** the changing nature of the consenting process coupled with a lack of communication and cooperation between different government bodies, affects the overall process efficiency and duplication of effort.

- ***Licensing process in test centres:*** Usually deployment in designated test centres is already pre-consented so developers do not have to submit a full application comprising all the typical consents providing certain initial conditions are met. Consequently, developers usually don't experience any significant barriers concerning the consenting process [45]. Although literature describes deployment in test centres as an uncomplicated process for technology developers, test site managers that participated in the questionnaire mentioned the complexity of going through distinct and separate processes in order to obtain permits for deployment of each type of ocean energy (wave, tidal, offshore wind).

> *'Complex administrative procedures.'*
>
> Research & Technology organization
>
> *'Administrative procedures maybe compromise the timeline of approval with effects on investment availability.'*
>
> Consultant

3.4.1 EIA

Perceptions on whether EIA poses a barrier or an enabler to project development are highly variable amongst the respondents (Figure 3-10) which is also shown in existing literature and previous studies. On one hand planning environmental monitoring is considered a challenging process. On the other hand, methodologies such as the SDM approach already successfully implemented in Scotland have been drawing attention regarding their potential for implementation in other countries given its effectiveness in addressing the weaknesses in the EIA process.

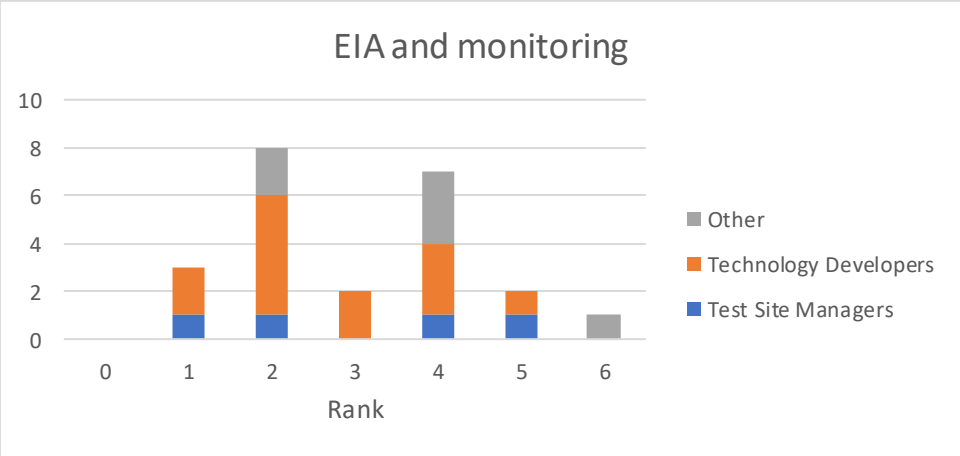

FIGURE 3-10: EIA AND MONITORING – RESPONDENTS' PERCEPTIONS (0: NO BARRIER/ENABLER; 6: SIGNIFICANT BARRIER).

- ***Lack of data from previous experience:*** In other sectors, environmental impact assessments are based upon knowledge and data from past experiences. This allows regulators to put in place rules that protect against established risks, while otherwise allowing activities to go ahead. This knowledge base is still being build up for ocean energy, since there is a lack of 'learning' that could otherwise be applied to subsequent projects. To date there have been few deployments, and environmental monitoring of these projects has focused on different impacts. Therefore, there is still no comprehensive body of evidence that regulators can use as a basis for consenting and licensing decisions. The lack of baseline databases for marine environment along with non-strict monitoring requirements (in amount and length) in countries like Ireland and France requires developers to submit up to 2 years' worth of monitoring data. This poses a barrier to the implementation of risk-based methodologies such as the SDM approach in place in Scotland.

- ***Difficulty in predicting potential impacts:*** There is still a lack of understanding of the interactions of devices with their receiving environment. Monitoring potential impacts of ocean energy is likely to be extremely challenging given the relatively small spatial scale of current sites coupled with natural stochastic variation that will inevitably influence how animals use and respond to the marine environment.

- ***Mismanagement of monitoring requirements:*** As previously emphasized for the consenting process in general, insufficient guidance and legislation that addresses small scale and time-

limited projects such as ocean energy projects is specially felt on EIA matters. Developers are often required to gather what they feel is unnecessary or duplicated information. At the same time, the precautionary and overly risk-averse approach adopted by regulators due to unfamiliarity with the sector [8] leads to EIA specifications according to 'what' a consenting authority wants a developer to assess instead of 'why' these issues need assessment. This results in developers being asked to study the effects of a small project as if it were a full-scale development. Conversely, the more available data there is in the beginning of the consenting process, the easiest it is for the developer to go through the early stages of the consenting process.

- ***Practical utility of EIAs:*** Concern was expressed over the utility of past EIAs and how its long history of application to projects have influenced consenting processes or if they will in future. Developers are sometimes told that a comprehensive EIA will lead to less environmental monitoring in their next development location, but developer opinion would suggest that this has not been their experience.

> *'EIA and monitoring - This usually requires developers to demonstrate that any potential impact is going to be mitigated even though there is no research on that so far.'*
>
> Test site manager
>
> *'According to my experience, the administrative procedure in Spain is long and difficult. In one hand because marine renewable energy projects are not included in the EIA legislation. This forces the administration to undertake a long consultative procedure involving different stakeholders. During this procedure, different entities with different competencies and interests are involved.'*
>
> Research & Technology organization

- ***Excessive EIA studies costs on developers:*** There is a general opinion that public funds are needed to enable deployment but also to partly cover costs associated to EIA studies that are currently entirely paid for by developers. The burden should therefore be shared between developers and governments from EU all member states considering all countries are interested in.

- ***Lack of integration with onshore EIA requirements:*** There's currently no single EIA procedure that includes both onshore and offshore elements. As a consequence, some developers have experienced issues during the project's planning related to the onshore installations which were paused by the local governments.

- ***Pre-application consultation benefits:*** In some countries like Portugal and Spain, scoping phase is not strictly mandatory (in Spain for Annex I projects, decision is left for the developer; for Annex II is mandatory) which means the developer and the competent authority meet for the first time when already submitting application for consenting. In other cases, like France and Ireland, pre-application consultation is compulsory (in Scotland it is only compulsory for marine licenses but not for consenting application, but it is common practice) which allows developers to benefit from regulators expertise early in the process.

- ***Inefficiency of post consent monitoring:*** There is growing evidence that post consent monitoring programs often result in data rich information poor (DRIP) studies that are unable to meaningfully reduce scientific uncertainty and thereby provide information that can give greater confidence to decision makers regarding future project proposals (or meaningfully inform future decision making).

- ***EIA in pre-designated areas:*** EIA occurs late in the project after developer and project's main characteristics have been chosen, which makes it difficult to introduce changes in the project design accordingly.

3.4.2 INTEGRATED PLANNING

Respondents' perception on the role of integrated planning in the development of the sector varies across the spectrum as observed in Figure 3-11 and in the boxes showing some survey responses. A total of four topics were identified as barriers related to this parameter.

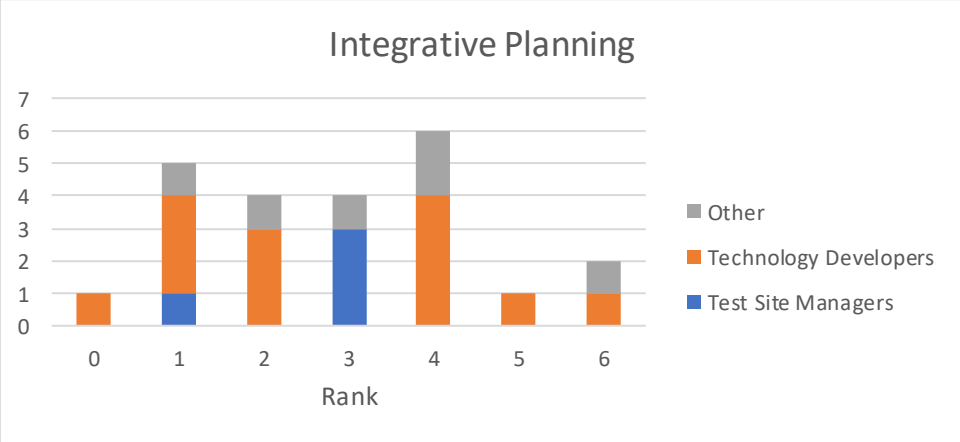

FIGURE 3-11: INTEGRATIVE PLANNING – RESPONDENTS' PERCEPTIONS (0: NO BARRIER/ENABLER; 6: SIGNIFICANT BARRIER).

- ***Early stage of MSP implementation:*** Marine spatial management is a critical issue to regulate potential conflicts with other maritime activities over the use of coastal space. As detailed in Section 2.3, few countries are at an advanced stage of MSP implementation. But those that do rarely reflect ocean energy developments such as reserved and pre-allocated ones, or future needs of the sector. This could be attributed to a lack of communication with ocean energy representative entities.

> *'MSP can help discussions among developers and other users and stakeholders on marine spatial occupation.'*
>
> Consultant

- ***Lack of flexibility***: lack of flexibility in the planning system to incorporate changes in the technology or over-arching project plan.

- ***Incompleteness of information:*** On one hand, information on constraints in the areas proposed for project development is not enough for a technology developer since they feel the need to specify best areas. This approach empowers the developer with a higher level of certainty. Furthermore, there's a general belief that outcomes from the Strategic Environmental Assessment (SEA) process don't give developers enough confidence regarding decision making on most suitable areas for project development. On the other hand, investors don't have access to information in advance on the available areas for project development: differences between areas acceptable and sensitive areas that may pose additional regulatory hurdles.

- ***Effectiveness of pre-allocated zones:*** Technology developers show indecision on the effectiveness and helpfulness of MSP at its current level of development. There are mixed opinions on whether pre-allocated zones (excluding test centers) are advantageous since they have resulted in very fez deployments. Existence of pre-allocated zones could make it more difficult to deploy in other areas of the sea. It a particularly relevant concern since ocean energy has several different technologies, hence differing/distinct operating environments. On the other hand, the designation of dedicated areas for ocean energy can lead to shorter consenting timelines and less risks and thus help advance the development of the sector.

'Marine Spatial Planning tends to over-generalize and be less fit for purpose at the local level.'

Technology developer

'(...) the lack of clear national policies and MSP for future marine renewable energy project developments makes more difficult the consenting procedures of this kind of projects.'

Research & Technology organization

3.4.3 STAKEHOLDER ENGAGEMENT AND CONSULTATION

Figure 3-12 shows most respondents perceive stakeholder engagement as an enabler to de development of the sector. This section however analyses the parameter in deeper detail, identifying both advantages and disadvantages associated to it.

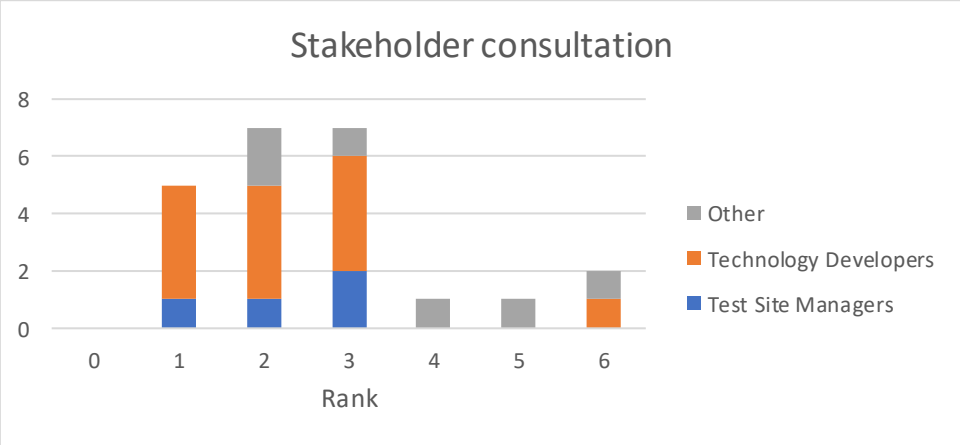

FIGURE 3-12: STAKEHOLDER CONSULTATION – RESPONDENTS' PERCEPTIONS (0: NO BARRIER/ENABLER; 6: SIGNIFICANT BARRIER).

- ***Appropriate stakeholder engagement:*** Ocean energy deployments can experience significant delays resulting from local communities' opposition if stakeholders are not correctly engaged, as mentioned by one survey respondent. This can be specially challenging in regions with strong fishery or tourism sectors tend to be more reluctant to embrace the same marine energy project as it can compete for space with such activities. Issues potentially arise when consultation isn't enough transparent and realistic about the desired achievements regarding effects of the project for the local community, be it employment schemes and local share of profits or potential negative environmental impact. However, it seems to be generally easier to secure participation at regional level than national level. Beyond 12 nm marine users are international therefore more difficult to engage stakeholders in the planning and development process.

- ***Inadequate consultation:*** Informal consultation is seen as more constructive but tends to be focused only on high level groups, often excluding the general public. For example, local government knowledge of relevant environmental impacts is often poor, leading to poorly supported opinions on negative impacts. They need more time and money to become familiar with the scientific state of art of impacts.

> *'Stakeholder consultation and entities involved: may compromise project execution and installation schedule if not done in a proper way (considering all stakeholders - being inclusive - and listen to stakeholders opinions trying to integrate their views in project decisions).'*
>
> Consultant

- ***Effective dissemination of the sector achievements:*** Sharing successes of the sector is crucial to increase stakeholder acceptance. Currently, not enough success stories about ocean energy projects are disseminated on a national level through the public in general and consenting authorities which doesn't help increasing acceptance of this relatively unfamiliar sector. Regulators, for example, are still unfamiliar with the ocean energy sector which leads to a precautionary and 'risk averse' approach to project consenting.

> *'Proper stakeholder consultation at the local level has been an enabler - 90+% of locals are supportive of what we do and the local benefits we bring.'*
>
> *'We see the involvement of entities and stakeholders as a strength and not a barrier, and our technology has the advantage to be invisible, clean and silent so we have no problem.'*
>
> Technology developers

- ***Unsuitability of stakeholder consultation:*** Insufficient attention is often given to the inter-personal elements of stakeholder consultations. Firstly, the inconvenience of timing and location of consultations for stakeholder groups can lead to low attendance and engagement with the process. The unsuitability of the consultation methods to the audiences whose input is sought can be illustrated by e.g., the use of a limited range of communication media or by not selecting suitable people who are respected and trusted by individual target audiences. It can also be revealed through overformal procedures and under-use of informal and interactive consultation methods and lack of opportunities for regulators and developers to listen to stakeholder opinions [46]. Moreover, national strategies for stakeholder engagement are not always accepted at the local level.

4 CONCLUSIONS

The present document reports the findings of the work carried out under Task 8.5 of DTOceanPlus, which aimed to investigate and identify the main legal and political barriers and enablers to deployment of ocean energy. The study was structured in two main parts. Firstly, a literature review on the existing policies, legislation and consenting processes for ocean energy projects was carried out for different EU countries. In a second stage, the positive and negative impacts of the existing national and international frameworks on the ocean energy sector were evaluated. For this purpose, a questionnaire was conducted amongst targeted stakeholder groups to identify potential barriers and enablers and quantify impacts of the established national frameworks. The questionnaire was mostly aimed at regulators, technology developers, and test site managers. Nonetheless, other stakeholders such as consultants and researcher were still welcomed to contribute with their views.

An analysis of the results was carried out and the most important insights were compiled. The results from the analysis suggest that there are several non-technological forces hindering the development of the ocean energy sector.

Firstly, legislation governing ocean energy as a specific sector is rare, both at national and international level. ORE targets are often unrealistic and funding schemes are unsuitable, leading to loss of credibility and turning investors reluctant to invest in the sector. There's also a general governance fragmentation and a lack of political ambition which is illustrated by insufficient national funding.

Moreover, the consenting process appears to be a major source of barriers. Lengthy procedures linked to a lack of clarity, fragmentation of the consenting authority across multiple consenting agencies, and a lack of a streamlined process, are some of the most frequently cited barriers to issuing consent for ocean energy projects. Regarding the environmental impacts, uncertainty resulting from an absence of data from previous experiences, mismanagement of monitoring requirements and lack of integration with onshore EIA requirements are some of the main perceived barriers. Finally, issues also arose regarding the early stage of MSP implementation, and lack of flexibility and incompleteness of information regarding integrated planning as well as doubts as to the effectiveness of pre-allocated zones for the deployment of ocean energy devices.

Conversely, although in a more discrete approach, some topics seem to be considered enabling features depending on the perspective adopted. Among them, the analysis carried out identified the growing supportiveness of the current EU policies and the importance of national policies as enablers to the creation of national financial incentives. Furthermore, MSP is considered a supporting tool for stakeholders involved in the process and the involvement of the most relevant entities in the consenting process is mainly seen as a strength or enabling factor.

There is significant room for future improvement within the legal and regulatory framework of the ocean energy sector. As future work, attention should be given into deepening and exploring in detail the different perceptions about the topics identified in the present analysis. This could be done through e.g., personal interviews or small stakeholder group.

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6 ANNEX I: QUESTIONNAIRE: REGULATORY AND POLITICAL BARRIERS TO OCEAN ENERGY DEPLOYMENT

DESCRIPTION/ Introduction

You are invited to participate in a web-based online questionnaire on the scope of the DTOceanPlus project. This survey is being conducted by WavEC Offshore Renewables on behalf of the DTOceanPlus consortium.

This questionnaire is designed to determine to what extent legal, institutional and political frameworks currently in place in several EU Member States are acting as barriers to wave and tidal energy project deployment. The following questions aim at capturing the views and perceptions of regulators, test site managers and technology developers with projects currently active, based on their past and present experiences. The outcomes will contribute to the analysis carried out under Task 8.5 'Analysis of the effect of the overall legal institutional and political frameworks'. You can respond anonymously (respondent details are optional), but any details you provide will better help us to further understand our users. Your responses will be sent to Online Surveys (www.onlinesurveys.ac.uk), where data will be stored in a password protected electronic format. Online Surveys does not collect identifying personal information as part of the survey; therefore your responses will remain anonymous unless you decide to provide your details. Published responses to the questionnaire will be aggregated and not individually attributable. The questionnaire will be open until Thursday 30 April 2020.

Further details of how the questionnaire responses will be managed are given in this attached informed consent summary. Full report with results from the questionnaire will be disclosed among respondents at a later stage of the project.

I agree with the terms and conditions and consent to participate in this survey.

A. RESPONDENT DETAILS

You can respond to this survey anonymously, but any details you provide will help us to further understand our users.

1. Name:

2a. Email: _____2b. Contact:

3. Organization and Position:

4. Are you a:

Technology developer *(go to B)*

Regulator *(go to D)*

Test site manager *(go to D)*

Other *(go to D)*

If you selected Other, please specify:

B. TECHNOLOGY DEVELOPER INFORMATION

4. Developer/Company name:

5.Technology name:

6a. TRL: **6b. Country of deployment:**

7. Briefly describe the status of your technology.

8.Did you deploy your device in a test centre? ***Yes (Go to D.) /No***

8a. If yes, which one?

C. CONSENTING PROCESS

9.How long does the consenting process last?

Less than 3 months		1-2 years	
3-6 months		More than 2 years	
6-12 months			

9. Which permits were required (e.g. EIA, use of marine space, grid connection)?

D. PAST AND PRESENT EXPERIENCE

10. According to your past and present experience, to which extent do the challenges related to each of the following parameters pose a barrier to project deployment? ***Please, rank each parameter on a scale from 0 (no barrier/enabler) to 6 (significant barrier).***

Parameter	Score	Parameter	Score
EU policies		EIA and monitoring	
National policies		Administrative procedures [1]	
Stakeholder consultation		Integrated planning (e.g. Marine Spatial Planning or MSP, Strategic Environmental Assessment or SEA))	
Entities involved			

[1] Includes licensing for power generation and grid connection, onshore works, use of marine space, etc.

10a. In case you ranked any parameter as 5 or 6 (significant barrier), please provide further details on how it can hinder project deployment.

10b. In case you ranked any parameter as 0 or 1 (not a barrier), please describe how that parameter can enable project deployment.

11. How does the current MSP framework (or its absence) in [COUNTRYDEPLOYMENT] affect project deployment? (E.g., incorporation of ORE in the MSP, integration with other marine uses, integration with environmental components).

12. What is your view on the level of communication between technology developers and regulatory entities?

13.Please give a description on how the current legal framework in [COUNTRYD PELOYMENT] apply to ocean energy (e.g., specific for the sector, administered through existing legislation).

14.To which extent are the following EU policy mechanisms enabling project deployment in [COUNTRYDEPLOYMENT]? *Please, rank each parameter on a scale from 0 (no enabler) to 6 (significant enabler). Please click on More info to consult some examples of each policy field.*

Parameter		Parameter	
Renewable energy targets		Market incentives	
ORE targets & strategies		Resource allocation and standardization	
Technology push[1]		Information sharing	
Demonstration projects: Financial instruments			

[1]Including funding for R&D

15. Are you aware if [COUNTRYDEPLOYMENT] has a national strategy for ocean energy technologies in place? If yes, provide a brief summary and, if possible, a link to more details.

16. Please comment on the following statement, providing examples from your own experience:

Lack of long-term political strategy, lack of cooperation between government, industry and research institutions, unrealistic ORE targets, unsuitable funding schemes. These are among the most relevant barriers associated with the current institutional and political framework for ocean energy.

We appreciate your collaboration. If you have any further questions, don't hesitate to contact us.

DTOcean Plus partner:

Email contact:

CONTACT DETAILS

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Naval Energies terminated its participation on 31st August 2018 and
EDF terminated its participation on 31st January 2019.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 785921