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Abstract

Consenting is still generally regarded as a non-technological barrier to the progress of the marine renewable energy industry, caused by the complexity of consenting processes and the lack of dedicated legal frameworks. Existing consenting systems for ocean energy projects tend to be based on procedures designed for other sectors and are seen as inappropriate for the specific needs of ocean energy. Licensing procedures are also viewed by developers as time-consuming because regulators see ocean energy as a new activity with unknown or uncertain effects and consequently often apply strong interpretation of the precautionary principle. Consenting processes for ocean energy are, nevertheless, evolving throughout Europe, driven by national and European policies and incentives on renewables, changing legal and administrative frameworks to facilitate development and more integrated marine governance. This review compares the consenting processes for ocean energy in different European countries, focusing on aspects thought to hamper operation of the process. It shows that different systems of governance across the EU Member States have resulted in diversity in the design of consenting processes, though common features can also be identified. This evidence-based review enables suggestions for streamlining consenting processes for wave energy.

Keywords

Consenting, EU Member States, marine renewables, wave energy, Environmental Impact Assessment, streamlining.

1 Introduction

Marine renewable energy (MRE – offshore wind, wave and tidal) holds considerable potential for enhancing the diversity of energy sources, reducing greenhouse gas emissions and stimulating the economies of coastal communities. Harnessing this potential nevertheless depends on a variety of factors, including: safe and reliable technology; appropriate policy and regulatory frameworks; stable funding and cost-effective energy production to compete with existing sources of renewable and non-renewable energy; and effective consenting procedures [1]. Under current regulatory frameworks, consenting processes for MRE are still regarded as a non-technical barrier because of the existence of complex consenting procedures and/or the absence of dedicated legal frameworks to support MRE [2, 3, 4].

More specifically, most EU Member States still lack a dedicated consenting process for ocean energy (wave and tidal) projects. Procedures designed for sectors such as oil and gas, offshore wind, and aquaculture tend to be used instead, contributing to ambiguity and delays in consenting [5]. This absence of clear and fit-for-purpose consenting processes for ocean energy can lead to the submission of incomplete applications, the use of inappropriate administrative procedures, and uncertainty over Environmental Impact Assessment (EIA) requirements and procedures, with the latter being further fuelled by limited information on the significance of the environmental impacts of different ocean energy technologies [5].

Consenting processes for ocean energy are, however, gaining increased attention and evolving across Europe as a result of the development of national and European policies on renewable energies and the requirement for more integrated marine governance. Due to the different governance systems operating in EU Member States, consenting systems will always have differences although some requirements are more universal, such as those related to the EU Environmental Impact Assessment Directive and Habitats Directive.

Another factor which may influence consenting processes for ocean energy is Maritime Spatial Planning (MSP), which is already operating in countries like Belgium and Germany, where ambitions to develop offshore wind farms has motivated the design and implementation of MSP [6]. Spatial planning is already recognised as having the potential to make an important contribution to the consideration of proposals for offshore wind developments [7, 8, 9, 10]. Systems to allocate space for ocean energy are still nevertheless required in several EU countries where applications are generally dealt with on a “first-come, first-served” basis with no over-arching national siting or planning policy. Nevertheless, different licensing procedures tend to operate for designated test centres where demonstration ocean energy projects are being installed (e.g. EMEC, Scotland; Bimep, Spain; Ocean Plug, Portugal; Wave Hub, England). In many test centres device deployments are already pre-consented, so developers do not have to submit a full application comprising all the typical consents providing certain initial conditions are met, including an environmental appraisal (usually less comprehensive and onerous than a full EIA).

The requirement for EIA of ocean energy projects varies across Europe, from countries where it is compulsory to those where EIA is dependent on the nature, size and location of the development [5]. Uncertainty over the social acceptability and socio-economic impacts of wave energy developments may also hamper consenting, although public attitudes towards wave energy seem generally to be positive [11].

Despite the importance of these issues and the rapidly evolving nature of the sector and consenting procedures, there remains a paucity of peer-reviewed literature on ocean energy consenting across Europe [5, 12]. Further appraisal of issues affecting consenting processes is thus required to promote discussion on changes to legislation, streamlining of requirements, improvements in administrative procedures, and the broader aim of more consistent interpretation and application of legislation across Europe, whilst nevertheless still taking into account differences in the national policies, energy strategies, regulatory frameworks and administrative entities operating within individual Member States.

This paper compares the consenting processes for ocean energy in different European countries and considers aspects of these processes that may need to be improved with the broader aim of informing the development of good practice in ocean energy consenting. Part of the information presented herein has been collected under the SOWFIA project (www.sowfia.eu/), which aimed to achieve the sharing and consolidation of pan-European experience of consenting processes and environmental and socio-economic impact assessment (IA) best practices for offshore wave energy conversion developments. It should be noted that the term 'consenting process' is used in this paper to describe all of the consents or permissions necessary to deploy a device or array of devices in an area of sea space. The actual name of the consent required is usually determined by the legal instrument governing it and consequently it may be a 'licence', 'permit', 'concession', 'consent' or 'permission' depending on the term used in the governing legal instrument. For ease of understanding, in this paper these terms are generally used synonymously unless otherwise specified.

2 Methods

As mentioned above, since part of this paper has been developed under the EU-funded SOWFIA project partners together with relevant stakeholders (mainly regulators) have compiled information on the consenting procedures for ocean energy in their respective countries: France, Ireland, Portugal, Spain, Sweden and United Kingdom. The assimilation of such information included a review of any pertinent existing national strategy and policies, guidance on consenting or other aspects of development consent, the procedural aspects of the process including the time taken to obtain consent, public participation and involvement of stakeholders in the process and requirements relating to EIA. In some cases, interviews with authorities and other entities involved in the process were conducted to ensure the procedures were fully understood. The information is summarised below by country followed by a section where a comparison across countries is made, taking into account the aspects thought to hamper the efficient operation of the process. In some cases,

interviews with authorities and other entities involved in the process were conducted to ensure the procedures were fully understood. Four workshops were also carried out during the course of the project involving relevant stakeholders those from industry, other marine users and national regulators. The findings from these workshops have been also incorporated into the present review.

3 Results

3.1 National strategy for ocean energy

To support the analysis of the consenting process on ocean energy across Europe a review of pertinent national strategies and policies has been made and is presented in Tables 1 and 2. Table 1 focus on the strategies and policies in Ireland, France, Portugal, Spain and Sweden. Since the United Kingdom has a devolved system of government with parliaments and assemblies in England, Wales, Scotland and Northern Ireland, a dedicated table (Table 2) is presented which lists over-arching and jurisdiction-specific initiatives. It is important to note here that the Department of Energy and Climate Change (DECC) has a UK-wide remit and coordinates the activity of the devolved administrations.

Table 1 NEAR HERE

Table 2 NEAR HERE

3.2 Description of ocean energy consenting

3.2.1 France

There is no specific consenting process for ocean energy technologies. For the development of the SEM-REV full-scale wave energy test site, three main licences were required and obtained. These were: 1) a power exploitation permit granted by the Ministry of Energy; 2) a temporary concession for the occupation of a restricted sea zone; and 3) an approval under the French “Water Act”. Other

consents such as local construction permits are required for coastal construction and land-based infrastructure.

An important part of the consenting process in France is to create a regulatory pathway to accommodate the strategic stakeholders involved in the evaluation of a project proposal and subsequent granting of the necessary consents. As the project advances more frequent communication, in the form of regular meetings with stakeholders, is recommended. For a project's power production and grid connection requirements a specific permitting procedure applies. This involves the French utility distribution grid operator ERDF (Electricité Réseau Distribution de France).

The time taken to licence a project is estimated at 14 months, starting from the date of deposit of the official file. However, an initial consultation process must start one year before this, during which an EIA and a feasibility study are conducted. Studies relating to the EIA may take up to two years with the feasibility study taking three months. A summary of the consenting process in France is presented in Fig. 1.

(Fig. 1 NEAR HERE)

3.2.2 Ireland

There is no specific piece of legislation dealing solely with ocean energy. Consenting of such projects is addressed through existing legislation principally the Foreshore Acts 1933-2011, Planning & Development Acts, 2000-2013, the EC (Environmental Impact Assessment) Regulations and the European Communities (Natural Habitats) Regulations. The electrical elements of an ocean energy development are governed by the Electricity Regulation Act, 1999 described below. There is a need to have proof of a connection offer before either of the consents under the aforementioned Act can be granted. The process relating to the connection offer does not come under that Act, rather it is subject to a separate administrative process which operates outside the scope of legislation [13].

The licensing process in Ireland is currently under review, with a new process expected to become effective later in 2014. The most recent consenting process operates as follows (Fig. 2). For wave

energy developers seeking to develop a site, they must firstly apply for a foreshore licence. This is granted in order to carry out exploration and EIA activities on a site and usually involves collection of data on wind, wave and tidal conditions, as well as the nature of the seabed at the site. If work consists of laying cables an additional foreshore licence is usually required. The developer will meet with the relevant authority to scope the content of the EIA either prior to applying for a Foreshore Licence or once they have obtained the licence as it is usual for the same or similar information to be required. The preliminary stages of the EIA process allows the developer to consult with the adjoining planning authority, for example, as well as other interested parties and relevant regulators with a view to establishing what should be contained in the Environmental Impact Statement (equivalent to EIA in Irish law).

As well as detailed descriptions of the various construction elements of the offshore project, environmental information to be contained in the EIS relates to the bathymetry, hydrography, sediment type, waves and currents, fish and shellfish resources, benthic environment, birds, marine mammals, non-living resources, archaeological features and current uses (recreation, navigation, cables, commercial fisheries). In consultation with the relevant competent authority, a developer may be asked to provide additional information depending on where the development will be situated. However, an EIA is not always required since the decision on whether it is needed is based on a case-by-case evaluation. Consultation involves numerous statutory consultees: the National Parks & Wildlife Service, Bord Iascaigh Mhara (Irish Sea Fisheries Board), Commission for Energy Regulation (CER), Planning Authorities, Office of the Director of Telecommunications Regulation, Commissioners of Irish Lights, Irish Aviation Authority, local Harbour Boards, local Chambers of Commerce, Bord Gáis Éireann (Irish Gas Board) as well as an indicative list of Non-Governmental Organisations (NGOs).

(Fig. 2 NEAR HERE)

Depending on the results of the site investigation works, a developer may subsequently apply for a foreshore lease to undertake further development activities. A foreshore lease conveys rights to exclusive use. It is not possible to enter this phase unless the works referred to above have been completed. Successful completion of site investigation works does not automatically entitle a developer to a foreshore lease. Departmental policy is to issue a lease for a period of up to 35 years. Leases granted are normally subject to regular reviews, on a five year basis, by the relevant Government department. To attain a foreshore lease for the construction phase, a developer must be able to show that other relevant licences, permissions and approvals have been obtained from additional regulators. Currently there are no timelines associated with decisions on foreshore licence and lease applications. At all stages, the Minister reserves the right to reject any application for a foreshore licence or lease, to modify the area sought under licence or to allow others to simultaneously investigate the suitability of the licence area.

Ocean energy developments qualify as electricity generating stations and as such are subject to the requirements of the Electricity Regulation Act, 1999. There is quite a complex licensing and authorisation procedure based on installed capacity (see [13]). Suffice to say a developer requires a licence to generate and a licence to construct or reconstruct a generating station. Both applications can be made separately or together. An application for a licence to generate must be accompanied, where applicable, with an EIS, Planning Permission/Exemption, a connection offer from the relevant operator and a Power Purchase Agreement. Planning Permission may also be required from the adjoining Local Authority (County Council) for the onshore elements of the project. If the development is likely to impact upon a Natura 2000 designated site an Appropriate Assessment may be required.

3.2.3 Portugal

In 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 consents needed are briefly described below and a schema of the consenting process is shown in Fig. 3.

(Fig. 3 NEAR HERE)

The main consent required is the “título de utilização dos recursos hídricos” (licence for the water resources use) and this can be authorised through a licence or a concession. In the case of wave energy the option for one or the other is dependent on the period of time the device(s) will be installed: for devices deployed for less than one year a licence is required and for more lengthy time periods, a concession is mandatory. It also depends on the installed capacity of the development: below or equal to 25 MW a licence will be issued, higher than this value a concession will be required. The actual procedures vary according to whether a licence or concession is necessary, although to initiate the process the applicant must submit the same dedicated pre-application form with the project characteristics and an annex specifying the project location and the site characteristics. The latter includes characteristics relating to navigation, fisheries, leisure areas, water depth and wave climate, water circulation pattern, weather data (wind and storm data), emergency plans and land infrastructure associated with the project. In cases where a concession is required for the project, a competitive public examination must be carried out, starting with a public announcement by the competent authority.

The water resources licence or concession is currently administered by the Portuguese Environmental Agency (APA), which has five decentralised departments within the country corresponding to the hydrographic regions established under the national water law (ARH Norte, ARH Centro, ARH Tejo, ARH Alentejo and ARH Algarve). The applicant must submit the pre-application form to the ARH department that covers the administrative area where the development is to be located. The ARH jurisdiction ends at the limit of coastal waters (one nautical mile offshore or, where applicable, to the external limit of transitional waters). The legal jurisdiction beyond that limit still has to be established in the legislation and in the interim the APA has assumed responsibility.

Environmental licensing is managed by the regional authority “Comissão de Coordenação do Desenvolvimento Regional” (CCDR; Coordination Committee on Regional Development). In a similar way to ARH there are also five regional CCDRs which correspond to the same designated divisions as above.

During the EIA process two main phases usually require the participation of the licensing authority: 1) the screening and scoping phase where the competent authority is defined as well as the scope of the EIA study and 2) after the applicant submits the EIA report which culminates in the issue of an Environmental Impact Statement (EIS) by the Minister of Agriculture, Sea Affairs, Environment and Land Use Management, based on advice from the competent authority for EIA. The EIS can be favourable, conditionally favourable or unfavourable to the project installation depending on the evaluation of environmental impacts.

In addition to the licence for the water resources use of the project, a licence for the power production installation is required. The consenting process begins with a pre-application that is submitted by the applicant to the “Direcção Geral de Engenharia e Geologia” (DGEG, Energy and Geology Directorate-General). This licence does not include grid connection but is needed if the project is to supply power to the national grid. In such a case, a request is made by the developer to the Portuguese Electricity Utility (EDP, Electricidade De Portugal) together with a map of the project location including the geographical position of the connection point. After this, EDP-Distribution informs the developer of the technical solution, budget and other relevant supplementary information to proceed with the installation of the connection infrastructure. If construction of infrastructure on land is required for project implementation (e.g. substation, cable routes) a licence to construct these is also required and is administered by the municipal council of the area where the project is to be installed.

The consenting process for wave energy projects in Portugal generally takes no more than 18 months, however this is a conservative estimate (if the time periods of all intermediate licensing

steps are completed) and does not include the preparation of the EIA report, which can necessitate field work for baseline characterisation.

3.2.4 Spain

In Spain no dedicated consenting process exists for ocean energy technologies. The consenting process is based on three main legal instruments that are briefly outlined here. Royal Decree 1/2008, of 11th January, governs the need for an Environmental Impact Assessment of projects to be located in the natural environment. According to this Decree, an Environmental Impact Statement (EIS) has to be produced and evaluated by the leading agency to determine the decision on project approval (or not) from an environmental point of view.

The Coastal Law (28th July 1988), provides the legal framework for occupation of the territorial sea, as well as governing issues affecting the fishing sector and safety conditions for maritime navigation. Management and surveillance competences relating to the Public Maritime Domain on land (MTPD), which includes the territorial sea, rest with the General Council on Coast and Ocean Sustainability which forms part of the Ministry of Rural, Marine and Natural Environment. Coastal Demarcation Departments are their representatives in each coastal province and Autonomous Community. Therefore, the development of electric power projects in the territorial sea must comply with the legal requirements governing the administrative process for granting titles to territorial occupation (prior to and during project development) and associated arrangements e.g. deadlines, transfers and expiry.

Royal Decree 1028/2007 establishes the administrative procedure for processing applications for electricity generating facilities in territorial waters. Although it focuses on offshore wind, it also includes electricity generation from other marine renewable technologies (Article 32). This Decree foresees a simplified procedure governed by Royal Decree 1955/2000 (from 1st December 2000) regulating energy transport, distribution, commercialisation, supply and the authorisation procedure for electrical power plants. RD 1955/2000 also provides that construction, extension, modification

and exploitation of all electric installations listed (in article 111) require the following administrative procedures and sanctions to be followed:

- Request for Administrative Authorisation (AA): refers to the project's draft installation plan as a technical document.
- Project Execution Approval (AEP): refers to the commissioning of the specific project and allows the applicant to start construction.
- Exploitation Authorisation (EA): allows the installations, once the project is installed, to be powered up and proceed to commercial exploitation.

A simplified scheme of the Spanish consenting process for ocean energy is presented in Fig. 4. The total time needed to obtain approval is approximately two years but this timeframe varies between projects. For instance, consenting of bimep started in July 2008 but some consents have yet to be issued. In contrast, the consenting of the Mutriku wave power plant took less than two years as it is located onshore and consequently was subject to the consenting process applicable to an 'ordinary' renewable energy plant.

(Fig. 4 NEAR HERE)

The reason for such variability in the time taken to obtain the final consent is attributed to whether an EIA is required or not. In Spain the requirement for an EIA of wave and current technologies is decided on a case-by-case analysis. The lack of experience in dealing with offshore renewable energy projects (in the case of the bimep test facility) is another contributory factor. It is expected that, in cases where an EIA is required, the process will take at least two years plus the additional time needed for the other consents to be issued.

The decision on whether an EIA is required is made by the Environmental Authority, after analysing a preliminary document submitted by the developer. This document should describe the project and its main environmental impacts. The decision usually requires the advice of administrations and associations that are considered relevant for project approval. If approved, the Environmental

Authority grants the Environmental Authorisation and establishes project specific conditions. However, since 2013, the new EIA law in Spain (Law 21/2013, December 9th, on Environmental Impact Assessment), has taken account of the potential for delays arising from the environmental aspects of consenting and accordingly it aims to reduce the time scale needed for the obtaining the Environmental Authorisation, establishing a time period of no more than 4 months, or 6 months if there are justified reasons, thus reducing significantly the time needed for this consenting process.

3.2.5 Sweden

Due to the lack of specific legislation for licensing of ocean energy, much of the consenting process is similar to that for wind power projects in Sweden, although its application has been handled differently by authorities. The consenting process normally begins with the applicant making an approach to the regional authorities (Länsstyrelsen, Lst.), of which there are 24 in Sweden who normally manage the licensing procedure. During initial meetings the boundaries of the proposed project are determined as well as the parties that should be consulted during the EIA consultation process, including local, regional and national authorities and organisations and private local interests.

A “consultation document” describing the project, its extent and impacts is prepared as a background discussion document. This document is usually the basis for a subsequent EIA document. EIA baseline studies usually start during this period. Careful documentation of the consultation process, including all consultation meetings, is presented to the regional Authority, or Lst, and a full EIA is performed. Baseline studies might continue and more consultation meetings may have to be performed, especially if alternative locations are discussed or if “new matters” arise. The final EIS (EIA final report) is then delivered to the Lst. but the applicants may have to re-do parts of the document, or further supporting studies, if they are deemed inadequate.

An approved EIA is required in order to make a final application for consent to the Environmental Court. Additional consents, which are less demanding, are likely to be required before an application

is finalised. The consenting process takes about 2.5 (2-3) years but can extend to 9 years, as in certain offshore wind power projects (especially where objections have been raised).

The content of an EIA is predominantly determined by the regional authority in consultation with the project developer and a number of regional and national authorities (statutory stakeholders). All of the procedures are well described in the Environmental Code (SFS 1998:808) and related documentation. Baseline studies include the characterisation of marine oceanography, marine ecology, marine geology, archaeology and identification of other marine uses. The number of stakeholders involved in the process is dependent on the project characteristics e.g. size and location but, generally, a large number of governmental and local/regional authorities are asked for comments. Only the authorities concerned submit formal comments. Considerable emphasis is placed upon the local public and businesses as well as on NGOs (where organisations with more than 2000 members can appeal if the project is presumed to interfere with the interests of their organisation). The developer is expected to disseminate relevant information to the above entities and may be required to re-do the process if they failed to do it properly in the first instance. A summary of the consenting process in Sweden is presented in Fig. 5.

(Fig. 5 NEAR HERE)

3.2.6 United Kingdom

In the UK the consenting process for ocean energy projects varies according to the jurisdiction in question. Here a brief overview of England and Wales, Scotland and Northern Ireland is presented.

3.2.6.1 England and Wales

In England the Marine Management Organisation (MMO) is the entity responsible for granting marine licences in both inshore (territorial) and offshore waters. In Wales, Natural Resources Wales is the responsible entity for granting marine licenses in inshore waters (up to 12 nautical miles). Beyond 12 nautical miles, in offshore waters, the MMO grants such licences. The MMO process consists of four stages. The applicant will first need to register for an online service account through

which an initial enquiry (which does not require pre-registration) is submitted followed by pre-application advice (which may include screening, scoping, Environmental Statement (ES) review) and the licence application. Though no dedicated legislation pertains to ocean energy projects, the MMO has established an Offshore Renewable Energy Licensing Group (ORELG) to assist in the implementation of specific guidelines for licensing such projects. For projects planned in English waters there are two different regimes. The first one is aimed at Nationally Significant Infrastructure Projects (NSIPs), which cover marine renewable energy projects over 100 MW capacity. Section 15 of the Planning Act 2008 sets the threshold for the energy generation of such projects. The application is processed by the Planning Inspectorate, an executive agency of the Department for Communities and Local Government. The second type of licensing process is applicable to projects under 100 MW capacity. The MMO licences the marine elements of the project, namely those beyond Mean High Water Spring (MHWS); other components of the project are licensed under different legal requirements such as:

- Marine licence, required under section 66 of Marine and Coastal Access Act 2009;
- Section 36 consent (required under Electricity Act 1989) to build and operate an energy generation site;
- Safety zones consent (required under section 95 of Energy Act 2004); and
- European Protected Species licence under the Conservation of Habitats and Species Regulations 2010, in addition to the Wildlife and Countryside Act 1981 (as amended).

With regard to the licensing regime in Welsh waters, project developers are required to submit an application for the Marine Licence. In some cases an European Protected Species (EPS) licence is required. In Welsh waters the MMO role is limited to Sections 36 and 36a of the Electricity Act and Section 95 of the Energy Act. DECC is in charge of the decommissioning of projects under the Energy Act 2004 and the local planning authority is responsible for onshore planning for projects in Welsh and English waters. A detailed description of the marine licensing procedure is available for download from the MMO website.

3.2.6.2 Scotland

In Scotland, Marine Scotland is the "one stop shop" authority issuing marine licences incorporating the following:

- Marine Licence under the Marine (Scotland) Act 2010 and Marine and Coastal Access Act 2009;
- Section 36 Consent under the Electricity Act 1989;
- European Protected Species (EPS) licence[3] deriving from The Conservation (Natural Habitats &c.) Regulations 1994 (as amended); The Conservation and Habitats Regulations 2010 and the Offshore Marine Regulations 2007 (as amended); transposed via the Wildlife and Countryside Act 1981 (as amended) and Wildlife and the Natural Environment (Scotland) Act 2011; and
- Basking Shark Licence under the Wildlife and Countryside Act 1981 (as amended) and the Wildlife and Natural Environment (Scotland) Act 2011.

It is also the responsibility of Marine Scotland - Licensing Operation Team (MS-LOT) to streamline licensing and to reduce burdens on applicants. A specific licensing procedure exists in Scotland for marine renewables and a licensing manual has been produced to help developers with the process [14]. A schema of the Scottish consenting process is presented in Fig. 6. Firstly, a developer will have a pre-screening consultation with someone from MS-LOT who will be able to advise the developer on the appropriateness of their selected site, whether an Appropriate Assessment may be needed, information on the type of environmental information required, the stakeholders to be consulted and the likely costs and timeframes associated with the process. Formal EIA screening and scoping will follow this if the developer so requests. MS-LOT can also advise on these aspects or seek the views from other relevant authorities and pass the information on to the developer.

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[3] Unless terrestrial, in which case Scottish Natural Heritage is the licensing authority.

A developer then carries out the prescribed stakeholder consultation and continues with preparation of the necessary EIA documentation. MS-LOT can advise on this but over-arching responsibility for its preparation, accuracy and submission rests with the developer. All relevant documentation, including the EIA, Navigational Risk Assessment, Habitats Regulations Appraisal etc. where appropriate, is then submitted to MS-LOT along with the completed application forms and payment for processing of the consent application.

MS-LOT will then administer the application and consultation process for the consents required as well as coordinate and assess the feedback obtained from consultees. It is during this stage that the developer may be asked to provide clarification or further information which may in turn impact upon the time taken to obtain the necessary consents. MS-LOT does not have the legal competency to deal with decommissioning or navigational risks but they can liaise with the appropriate regulatory authorities on behalf of the developer.

If the application is unsuccessful, the developer will be given reasons as to why this occurred and advice on how to proceed. When an application is successful, the relevant consents will be issued with a set of standard conditions as well as specific conditions which will apply only to that development site and most frequently relate to environmental monitoring requirements. According to Marine Scotland guidance, developers should allow 9 months for receipt of the necessary consents but this very much depends on the completeness and quality of the information submitted [14].

One point that should be noted is the fact that whilst MS-LOT is responsible for the administration and issuing of the necessary deployment consents it has no role in the seabed leasing process which remains the responsibility of The Crown Estate, a UK-wide entity. The developer is therefore required to negotiate separately with them. Decommissioning is not a devolved responsibility either and is the responsibility of DECC, consequently MS-LOT will advise a developer to work with DECC on this aspect.

3.2.6.3 Northern Ireland

The Department of the Environment Northern Ireland (DOENI) with its agency the Northern Ireland Environment Agency (NIEA) is responsible for issuing marine licences and has created guidance documents for EIA and on the licensing procedure. Nevertheless, no specific rules for consenting of ocean energy projects are available at this time. The new Marine Licensing legislation came into operation in April 2011 and replaced licensing under the Food and Environment Protection Act 1985 (FEPA). The DOE published a draft Marine Position Paper in March 2012 for consultation. This sets out the Northern Ireland Executive's objectives for the sustainable development of the marine area and the steps being taken to deliver these objectives. A Northern Ireland Marine Plan (NIMP) is being prepared under Article 51 of the Marine and Coastal Access Act 2009 and equivalent provisions of the Marine Act (Northern Ireland) 2013. This Act provides an over-arching framework for marine planning in Northern Ireland as well as a special procedure for applications relating to generating stations (by adding a new section 79A to the 2009 Act). The latter now enables the application for a Marine Licence and a Generating Station Consent to be considered together.

3.2.6.4 Timeframes

The timescale for consent of ocean energy projects across UK varies widely and is dependent on a number of factors, particularly the complexity of the proposal, the degree of public interest and the nature and number of objections or subsequent appeals taken. Marine Scotland aims to deliver its licence in 9 months but this period of time excludes the EIA Scoping process (which needs to be undertaken prior to the application process). The MMO has yet to process a full application, which for an offshore wind project could last approximately 15 months. The same timeline is expected to apply to ocean energy projects once the MMO and developers gain confidence in the system and its procedures. The only statutory period specified in the legislation is the 42 days allowed for receipt of public comments following formal application. As an indication, applicants can expect a screening and scoping opinion in respect of an environmental statement to be given within 12 weeks of request and an inquiry to be set up within 4 to 6 months of request. A period of around 9 months

from the date of inquiry should be expected before the final decision is made, although this can vary depending on the complexity of the issues involved.

An EIA is likely to be required in the consenting process of all devolved administrations in the UK. In Scotland the EIA document has to be submitted with the licence application. Developers should also provide detailed methodologies for the installation, operation and decommissioning of their proposed device(s) and are encouraged to give full consideration to the identification of potential hazards and risks associated with the whole project.

(Fig. 6 NEAR HERE)

4 Discussion

4.1 Analysis of the consenting processes

Table 3 presents a comparison of the characteristics of the consenting processes across the European countries considered.

(Table 3 NEAR HERE)

In France the main issue is the initial consultation process which starts almost one year before deposit of the official file. The governance structure in France cannot be changed or amended easily as it applies to all maritime sectors not just marine renewables. Three or four consents are required for a marine renewable project depending on its location and thus numerous agencies and ministries are involved in the process. There are no timelines for appeal procedures and this is needed to give certainty to the developers.

The consenting process in Ireland requires a number of consents and involves several authorities following somewhat outdated procedures without defined timelines. Compliance with EIA requirements is viewed as demanding, time-consuming and expensive for developers. Costs and limited resources/personnel in relevant authorities can also slow down the process. This situation is

expected to improve in the near future with the enactment of new legislation and subsequent changes to the administrative system.

Though a consenting process exists for ocean energy in Portugal, namely for wave energy projects, the lack of coordinated mechanisms between authorities to optimise and ensure the efficiency of the process is the main issue. Progress has been made on the creation of a one-stop shop entity for marine licences and a similar mechanism is expected to be implemented in the Ocean Plug – Portuguese Pilot Zone. While an EIA specific regulation exists for wave energy projects to be located in protected areas, it is not applicable to projects located outside of them, with no prescribed typology in the national EIA legislation. This causes some uncertainty in the process rsulting in delays to decision-making and final project approval.

In Spain, until 2012, the EIA may constitute two years of the overall consenting period. However, after the implementation in 2013 of the new EIA law, the timeframe for the EIA process has been reduced to a maximum of 6 months. In addition, a reduction in this timeline can be expected as the consenting process evolves and authorities' experience of managing this kind of project increases.

The EIA process in Sweden seems to be one of the main factors slowing down the timely approval of a project. A smooth process depends largely on the preparedness of the applicant, but most likely better resourced authorities would also reduce time. Significant extra time is required for the number of additional permits that are required in parallel during the process. These include permits for special baseline investigations, permits related to the Electricity Act and the major consent application to the Environmental Court. Several of these permits also require a significant amount of supplementary information to be included, e.g. EIA, but may also require answers to questions beyond their competence.

In the UK, consenting processes are different among the constituent jurisdictions varying from dedicated procedures for ocean energy in Scotland to more general procedures for Marine Licences in Wales, England and Northern Ireland. Some problems have been experienced particularly in

England and Wales. Though the MMO is working on developing marine planning systems to speed up consenting and generate confidence in the process, the industry is still young and there is little evidence on potential environmental impacts, which may result in the requirement for significant environmental monitoring and perceived time consuming discussions with stakeholders and consultees. Moreover, the consenting process is viewed as being rather complex and thus developers would appreciate more flexibility in the process. Given the large number of projects which are planned for UK waters, additional resources for regulators and advisors to appraise the projects may also be necessary. In Scotland there is more experience in consenting wave and tidal projects and procedures have definitely improved since the consenting of the initial projects. Legislation has been amended to streamline the number of consents required and the system is now more flexible and proportional. Appropriate Assessment, under the provisions of the EU Habitats Directive, remains an issue (habitats and species). Each developer has to get a European Protected Species [EPS] licence if there are protected species in or near the site as well as a marine licence.

4.2 Streamlining consenting processes

During this analysis, a number of enabling factors were identified which could help streamline the consenting process or improve its operation. These include integrated planning in the form of Maritime Spatial Planning (MSP) or through increased use of tools like Strategic Environmental Assessment (SEA), changes to administrative procedures ('one-stop shop' versus parallel processing approach), the Environmental Impact Assessment process and its requirements and formal and informal consultation with relevant stakeholders.

Integrated planning may help ensure greater coordination and communication between the authorities involved in wave energy consenting. Strategic plans like MSP can be viewed as sequential tools for more integrated planning but are not yet fully developed and implemented in all Member States under study. In the UK the completion of SEAs for the marine renewable energy sector has helped to inform developers and other stakeholders on the siting of ocean energy developments as

well as raise awareness of potential environmental impacts before development consent is granted. These factors are potential accelerators for the implementation of the planning process which, in turn, will contribute to more timely consenting of wave energy developments.

The implementation of the so called ‘one-stop-shop’ approach for ocean energy consenting is seen by many developers as a panacea to administrative problems. However, full implementation of this is difficult to achieve in practice: even in places where one-stop-shops are understood to exist, they usually address only the marine environmental elements of a project (i.e. EIA process and licence of the sea space but not onshore works, electrical elements etc.). Implementing a ‘one-stop-shop’ in certain jurisdictions would be quite complex given the level of regulatory amendment involved deriving from different governance systems, legislation and different authorities. The implementation of this approach might merely shift the burden from developers to administrators and thus extra resources are likely to be needed. The production of guidance documents on consenting and the responsibilities of different authorities as well as better coordination between these authorities are required to streamline the consenting process.

During this study, opinions from those consulted on Scottish regulation of the sector revealed that Marine Scotland’s ‘one-stop shop’ approach is working well, regarding ocean energy developments but, as with any system, there are some problems. The precautionary principle is applied especially in relation to device specific effects, even in the case of devices with the same generic classification. However, the transition to multi-megawatt projects is expected to be smooth because by that time device specific information from solo trials will already be available.

Several stakeholders consulted during this work (mainly developers and test centre managers) are of the opinion that the EIA screening process can be made more effective by allowing projects to be screened as to the risk of an effect. It is perceived that many small scale projects are unlikely to cause significant adverse effects and thus should not be subject to a full EIA process. The implementation of an adaptive management approach to environmental monitoring can contribute to the

understanding of real project impacts and enables management interventions to be adjusted or mitigation measures implemented. However, this approach may be a 'double edged sword' because there is no certainty as to what monitoring is going to be required and for how long. This means that there is no clarity on the costs of such a programme.

Marine Scotland's 'Survey, deploy, monitor' approach ranks the project risk based on three criteria: project location, device and project size. The level of monitoring required is based on the level of risk associated with the project. Developers, therefore, have an insight into the range of monitoring that is required before the project commences. As a result of the EIA process, if significant impacts are expected then an Environmental Monitoring Plan must be prepared with the aim of mitigating those impacts.

The lack of baseline and environmental impact data has been highlighted a number of times during the course of this work as a barrier which is causing regulators to be overly cautious. Furthermore, public availability of this type of data for regulators and developers has been identified as representing good practice which will improve consenting decisions and, in certain circumstances, may save time on evaluation of environmental impacts. In this context the potential of test centres to contribute environmental data and information is paramount. Test centres are established primarily to test devices in real sea conditions but as devices are deployed at sea this also presents an opportunity to learn about the effects of those devices on the receiving environment and vice versa. Many international efforts are underway to understand these effects and disseminate information on both positive and negative aspects (e.g. the SOWFIA project's Data Management Platform; the International Energy Agency's Ocean Energy Systems Annex IV online knowledge management system; the recently launched ICES Working Group on Marine Renewable Energy).

Improved mechanisms for consultation and active participation of stakeholders can help to avoid problems at a later stage within the consenting process. In almost all Member States the development proposal is submitted, then the EIA is carried out and at the end consultation takes

place. This is despite advice to the contrary given by regulatory authorities, experienced developers and public relations consultants alike who advocate an “early and often” approach to stakeholder engagement. In practice, stakeholders are frequently consulted only once the lease has been awarded and by this stage it may be difficult for developers to present realistic alternative proposals to the project that has been leased. Two main consultation sequential stages were recommended by stakeholders during the course of this work: 1) Informal consultation, to agree on the most appropriate site for the proposal; and 2) Formal consultation, to receive stakeholder observations and comments.

5 Conclusions

The analysis of consenting processes for ocean energy across Europe shows that there is great variation in processes and associated procedures among countries. Dedicated consenting processes for ocean energy projects are available in Scotland and partially in Portugal where a dedicated consenting exists for some licenses (e.g. EIA) although encompassing until 4 different authorities. In Scotland the process is led by an official one-stop shop and in Sweden the process is managed by a regional authority. The implementation of a ‘one-stop-shop’ approach for marine energy consenting is perceived as a means of streamlining the consenting process, however its full implementation is difficult to achieve in practice as it requires not only new legislation in some cases but more commonly large scale administrative re-structuring, which is not viewed as a priority for many countries. In the majority of the analysed countries, there are many different authorities who have a role in the consenting process, and consequently it would seem that the priority should be to better coordinate their composite actions and provide clear rules for communication both between them and to stakeholders.

The EIA process needs to be amended to enable projects to be screened as to the risk of an effect, in a mandatory screening phase. Many small scale projects are unlikely to cause significant adverse effects and thus a full EIA process may be an excessive approach. This is provided that the

environmental effects of one device in different receiving environments are well understood. Such information should be collected and collated now through dedicated monitoring programmes at test centres across Europe. Continued population of existing databases will promote information sharing and learning across countries and enable regulators, developers and stakeholders in general to learn from experience.

Currently the predominant information on environmental effects and impacts of wave energy devices is derived from the deployment and operation of a single device. Whilst information of this kind is useful, its ability to inform future environmental monitoring requirements for wave energy farms is limited. Regulatory authorities are aware of this limitation in some locations and therefore continue to take a precautionary approach to consenting generally and EIA in particular. Effects and impacts identified should help focus future environmental monitoring programmes, ensuring the most relevant parameters are monitored.

Although formal consultation is a legal requirement as part of the EIA process, early and informal consultation can help address contentious issues which could delay project consenting and implementation. Currently this tends to occur on an *ad hoc* basis where developers felt it was necessary to take a less formal approach, or where the formal approach did not work. The main concerns expressed by stakeholders were the potential for conflict to arise where there are shared uses of the same sea space, visual impacts from developments, the potential for adverse environmental effects and the high costs associated with wave energy projects. All of these factors have the inherent ability to reduce public acceptance of a proposed development which in turn could delay the consenting process.

A key purpose of national strategies is to promote action and development of the ocean energy sector. Progress has been made on ocean energy consenting processes in several countries but further refinement is necessary in some instances. An increase in developments will lead to more interaction and involvement with the consenting process. This in turn will highlight where there are problems to regulatory bodies and accordingly it could instigate amendments to the procedures applied. In addition, decision-making relies on experience and evidence of the effects and potential

impacts, which can only be generated through an increase in the number of ocean energy projects deployed and their effects monitored. Data availability and sharing are also key elements in informing both decision-makers and marine users. The knowledge generation may then feed back into the policy cycle enabling better, more scientifically-based, decisions to be made by regulators and managers. This view is supported by the opinions of some regulators who have stated that wave energy developments are only 'beginning to appear' on their desk and the suitability of the existing process to wave energy has not been fully established as yet. At a broader governance scale, MSP and SEA are processes that can inform ocean energy consenting through, for example, clearer site selection policies and administrative procedures.

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Figure captions

Figure 1 – Summary of the licensing procedure in France.

Figure 2 – Scheme of the consenting process in Ireland.

Figure 3 – Summary of the consenting process for ocean energy projects in Portugal.

Figure 4 –Summary of the consenting process in Spain.

Figure 5 – Scheme of the consenting process in Sweden.

Figure 6 – Summary of the marine renewables consenting process in Scotland (adapted from the version available on the Scottish Government website).

Table captions

Table 1 – National Strategies on Ocean Energy in France, Ireland, Portugal, Spain and Sweden.*National Renewable Energy Action Plan required under the EU Directive on Renewable Energy (2009/28/EC).

Dedicated and related policies and actions	

France	• No specific policy has been implemented yet for the sector
	• Related plans:
	  • The Climate Plan (2006): provides direction for renewable energies strategies
	  • The annual electricity investment plan (2009): multi-annual investment programme for electricity production
	• Publication of the NREAP for the 2009-2020 period
	• Establishment of a national research centre "Agence Nacionale de la Recherche" (2005) to provide funding for project-based research
	• Launch of a call for tenders in 2009 by the French Agency (ADEME) to help instigate demonstration projects of marine renewable energy prototypes

Ireland	• Publication of a dedicated strategy for ocean energy in 2005 and of a White Paper on Energy ''Delivering a Sustainable Future for Ireland'' in 2007 • Publication of an Offshore Renewable Energy Development Plan (OREDP) in 2014 which broadly reflects the Ireland's NREAP* • The OREDP introduces an initial market support scheme, funded from the public service levy, equivalent to €260/MWh and strictly limited to 30 MW for ocean energy (wave and tidal) to operate in the country from 2016 onwards • The OREDP reiterates the commitment to introduce in a short/medium term a new planning and consent architecture for development in the marine area • Development of a SEA for the NREAP indicating the potential environmental effects for offshore wind, wave and tidal current energy
Portugal	• Research and development on MRE since 1978, which led to the construction of the 400 kW wave power plant at Pico in the Azores in 1999 • Creation of the Aguçadoura test site in 2004, which hosted to date three demonstration projects • Designation of the Ocean Plug – Portuguese Pilot Zone by the Government in 2008 as part of the National Ocean Strategy established in national law in 2006 • Publication of the NREAP setting a 250 MW target for ocean energy up to 2020 • Implementation of a MSP process in 2008 which includes not only the existing areas used for testing MRE devices but also potential areas for these activities
Spain	• Publication of the NREAP in 2011, which includes targets of 100 MW of installed power of ocean energy projects by 2020; these targets are now more difficult to achieve since the Spanish Government has suspended its feed-in tariff support from January 2012 • The regional governments from several areas (the Basque Country, Cantabria, Asturias, Galicia and the Canary Islands) are continuing to promote and develop the installation of test facilities and demonstration projects on ocean energy • The Basque Country plans the installation of 60 MW of installed power by 2020, and the Canary Islands expects 50 MW by 2015
Sweden	• A target of 50% renewable energy by 2020 was set in the NREAP; the renewable energy share was 48.7% in 2010 and in 2012 was very close to 50% • Introduction of the electricity certificate system in 2003 to promote the renewable energy market for wind power; since then this certificate system has delivered 18 TWh of renewable energy

	• Expansion of the "Green Electricity Certificates" in 2012 to include cooperation with Norway on a mutual certification market to reach a joint production of renewable energy of 26.4 TWh by 2020 • No national strategy is in place for other renewable energy sources but national research support exists for wind, wave, tidal and solar energy programmes at several universities

Table 2 – Strategy on Ocean Energy in UK.

Dedicated and related policies and actions	

United Kingdom (general context)	• A Renewable Energy Road Map was published in 2011.
	• Creation of a strategic group on knowledge transfer networks and establishment of ad hoc funds for the development of ocean renewable energy in the UK.
	• DECC has implemented a Marine Energy programme board comprising a series of key industry stakeholders, advisory bodies and developers to create a Marine Intelligence Network.
	• Marine regulation and licensing has been devolved in Scottish inshore and offshore waters to the Scottish Executive, in Welsh inshore waters to Welsh ministers and in Northern Ireland's waters to the Northern Ireland Executive.
	• Funding and development possibilities:
	  • The Renewables Obligation, implemented by DECC, placed a mandatory requirement on licensed UK electricity suppliers to source a specified and annually increasing proportion of electricity they supply to customers from eligible renewable sources or pay a penalty (known as the buy-out price).
	  • In 2011 DECC announced the application of Renewables Obligations for each 1 MWh generated by these technologies.
	• The White Paper on Energy Market Reform proposes a number of changes through the introduction of 1) Feed-in Tariffs; 2) The Carbon Price Floor for low-carbon generation through the establishment of a firm price for carbon emissions; 3) An Emissions Performance Standard, which establishes an annual limit on carbon emissions (450g CO2/kWh); 4) Capacity Market or Strategic Reserve mechanisms, to manage generation capacity.
	• Creation of the Marine Energy Array Demonstrator project (set by DECC in 2011), the Marine Renewables Commercialisation Fund and the Saltire prize for the first wave or tidal energy project that will deliver 100 GW, both set up by the Scottish Government.

England	• In 2010 the Offshore Energy SEA for England and Wales was published and this included wave and tidal energy; a first review of the SEA was completed in November 2011. • The UK Government established a UK Marine Energy Programme, overseen by DECC, which focuses on enhancing the UK marine energy sector's ability to develop and deploy wave and tidal energy devices at a commercial scale. • The Marine Policy Statement sets the framework for the preparation of Marine Plans which will impact upon the licensing of wave and tidal devices under the Marine and Coastal Access Act 2009. A Renewable Energy Zone was declared under section 84 of the Energy Act 2004, where rights to exploit areas for energy production are exercisable.
Wales	• The Government invested £1 million through the Marine Renewable Energy Strategic Framework which mapped how much energy could be created in Welsh Territorial Waters from current marine technologies over a three year period • Currently the Welsh Government is identifying the infrastructure requirements of the industry.
Scotland	• The Scottish Government set a target of 100% of Scotland's domestic electricity needs to be met by renewable sources by 2020. • In 2007, the Scottish Government published a SEA for Marine Renewables. This was supplemented in 2009 by a Marine Energy Road Map, produced by a dedicated Marine Energy Group, comprising wave and tidal relevant stakeholders. Marine Scotland has been working on the identified barriers and this has involved further development of test centres, the publication of Regional Locational Guidance and related MSP frameworks as well as dedicated funding.

Northern Ireland	• A draft Offshore Renewable Energy Strategic Action Plan (ORESAP) 2009-2020 was published in 2009 and was the subject of a SEA. A final version of the ORESAP was published by DETI in 2012 which includes the SEA findings and the associated Habitats Regulations Assessment. The overall aim of the ORESAP is "to optimise the amount of renewable electricity generated from offshore wind and marine renewable resources in order to (...) contribute to the 40% renewable electricity target by 2020 (...)." The associated development opportunity is for up to 900 MW of offshore wind and 300 MW from tidal resources by 2020".

Table 3 – Summary and comparison of some aspects of the consenting process for ocean energy among European countries (source: [12]). *The timeline does not include time allocated for EIA baseline studies.

Country	Licensing authorities	Dedicated consenting?	Stakeholders for statutory consultation	EIA is mandatory?	Consenting time scale
France	Several	No	28 (in the case of SEM-REV)	Yes	14 months
Ireland	Several	No	Numerous	No	No defined timeline
Portugal	APA (ARH) CCDR DGEG Municipal council	Yes	Generally a large number; depending on project characteristics and location	No	1.5 year*
Spain	OMTPD Ministries of Environment and Industry Port authority	No	36 entities (in the case of Bimep)	Yes	2.5 years
Sweden	Regional authorities (24 departments exists in all country)	No	Generally a large number; depending on project characteristics and location	Yes	2 to 9 years
United Kingdom	A one-stop shop is operational in Scotland (Marine Scotland)	Only for Scotland	Several depending on the devolved administrations	Yes	9 months* in Scotland

					15 months in England and Wales

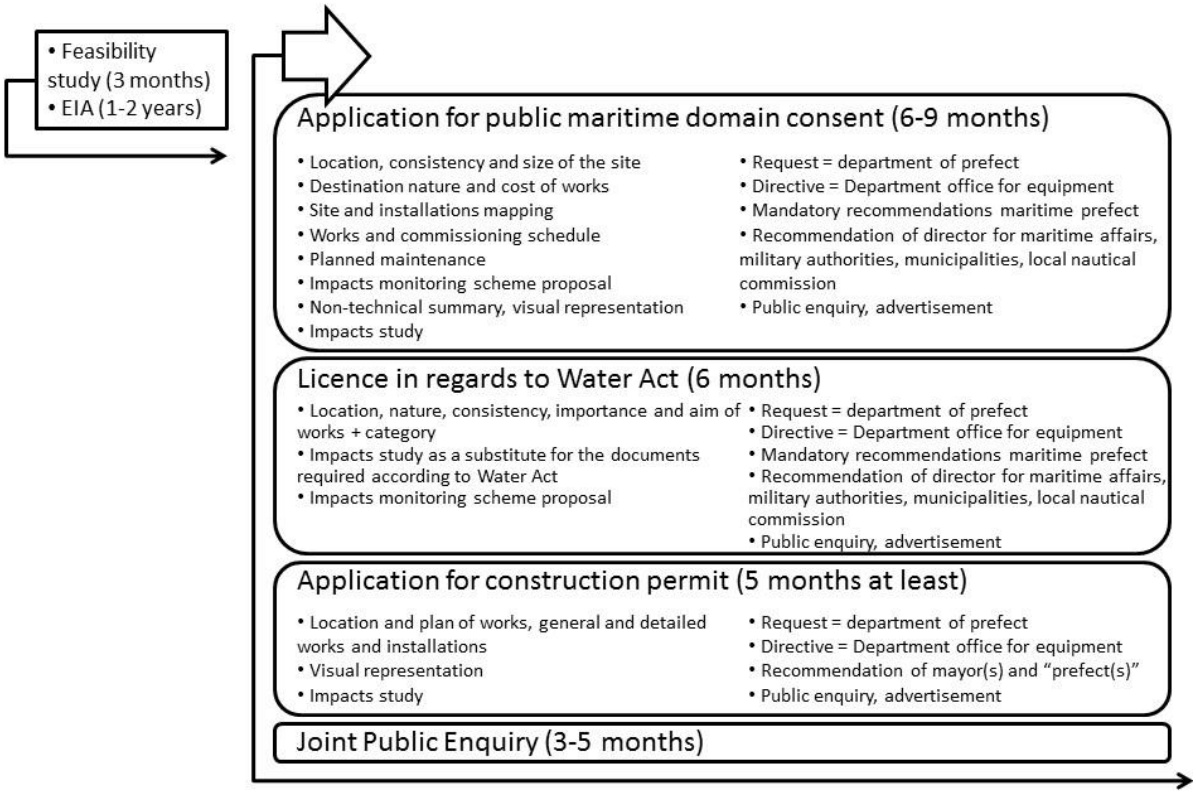
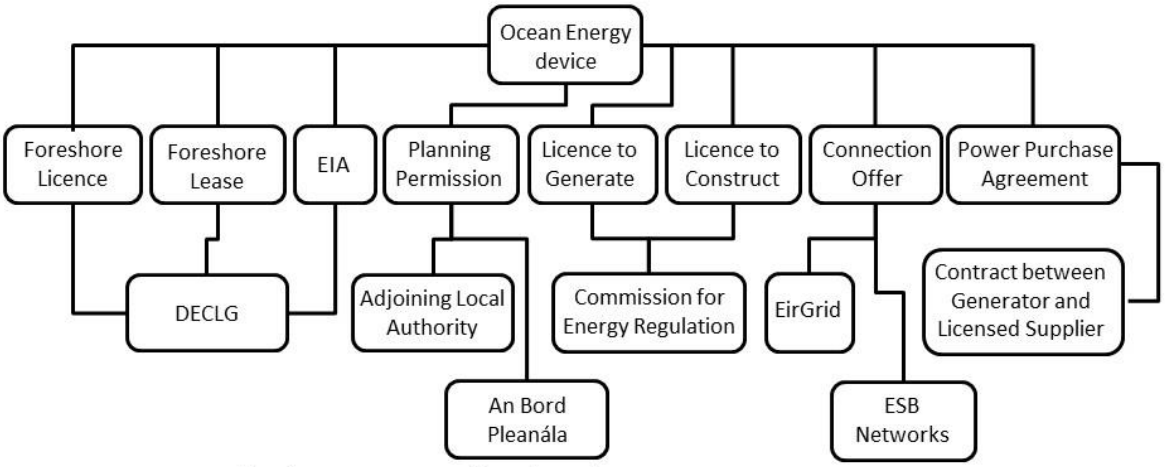


Figure 1 – Summary of the licensing procedure in France.



DECLG: Department of Environment, Community and Local Government
Note an Appropriate Assessment may be deemed in certain locations.

Figure 2 – Scheme of the consenting process in Ireland.

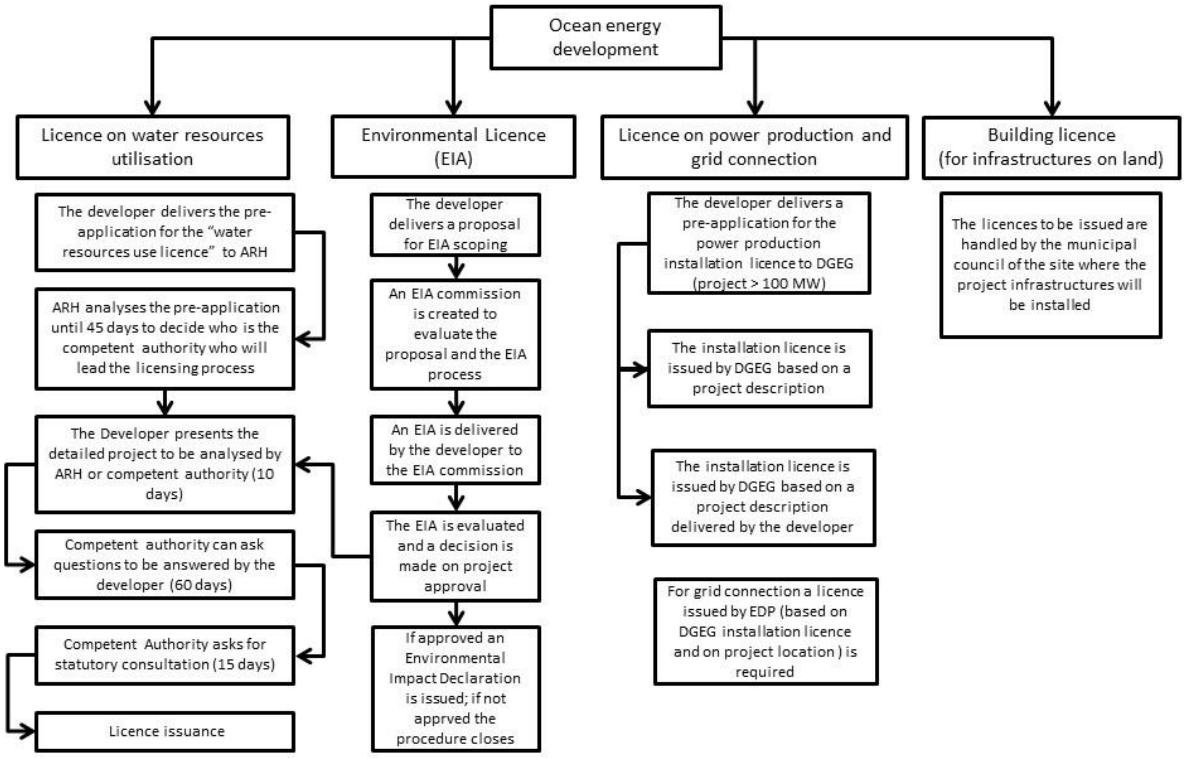


Figure 3 – Summary of the consenting process for ocean energy projects in Portugal.

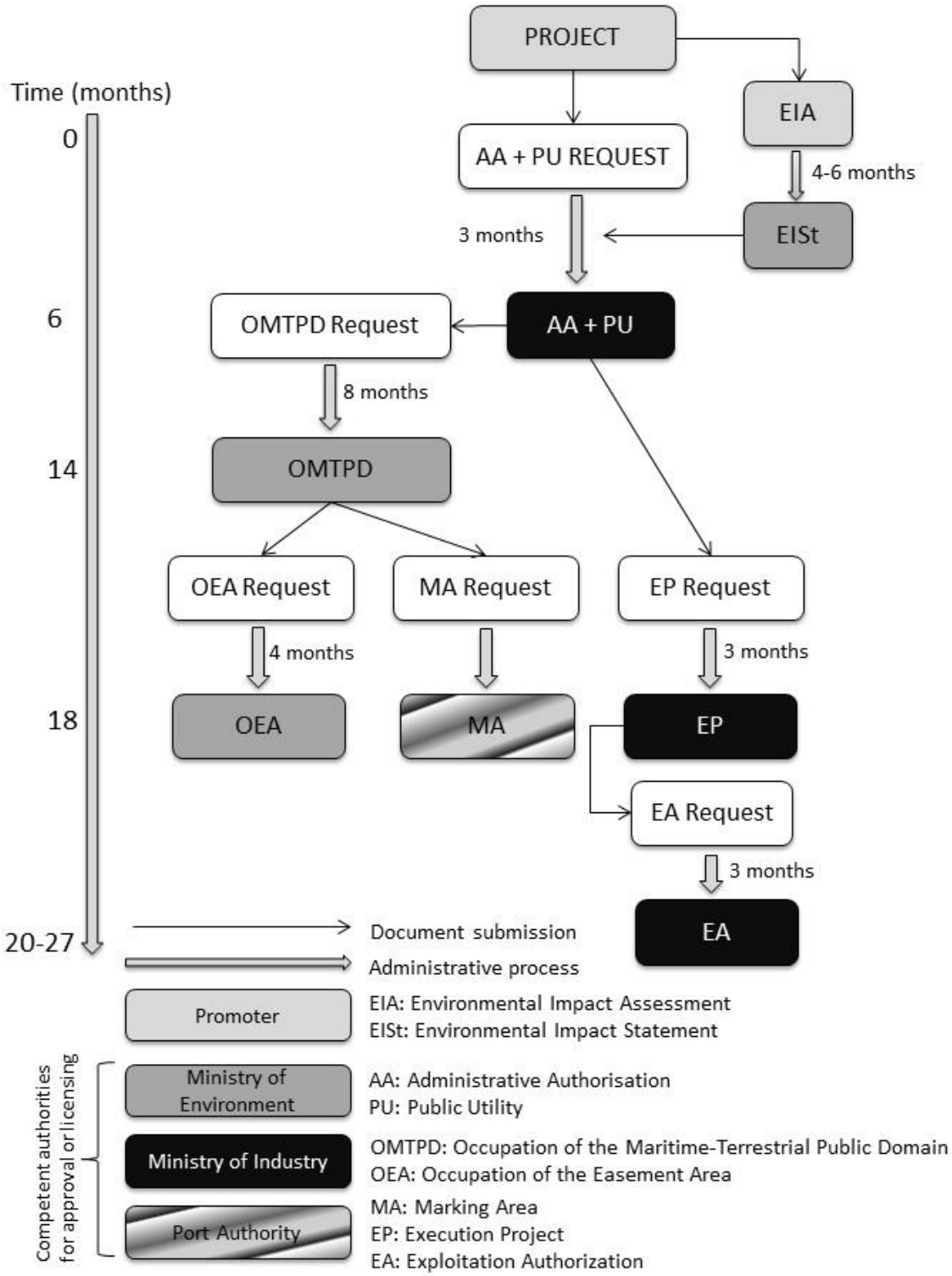


Figure 4 –Summary of the consenting process in Spain.

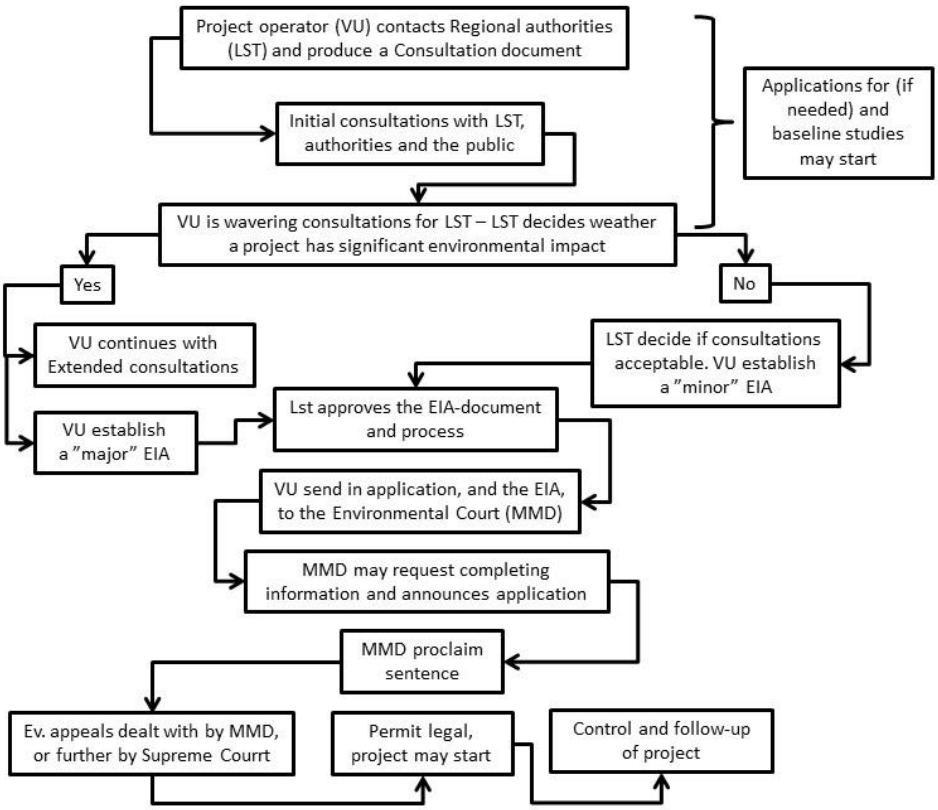


Figure 5 – Scheme of the consenting process in Sweden.

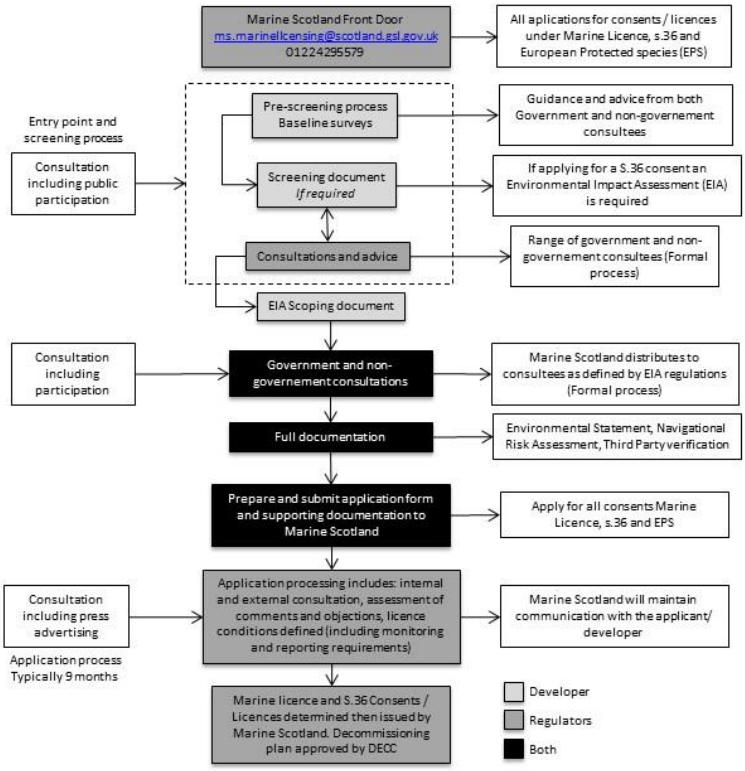


Figure 6 – Summary of the marine renewables consenting process in Scotland (adapted from the version available on the Scottish Government website).