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Marine Renewable Energies and Maritime Spatial Planning: different national proposals for their legal and spatial context

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Abstract— Maritime spatial planning (MSP) and the development of marine renewable energies are vital components towards sustainable use of ocean space, its governance, and the transition to a low-carbon economy. This paper provides a comprehensive comparative analysis of national maritime spatial plans and marine renewable energy (MRE) strategies of, France, Ireland, Portugal and Spain. The study examines various key aspects, including the legal framework, responsible authorities, public involvement, current implementation status, data availability, types of uses included in the plans, compatibility with national energy and climate targets, quantitative production objectives for MREs, identified zones, limiting factors and challenges, interactions between MSP and MRE consenting, compatibility with marine protected areas, and the integration of environmental risk analysis in MSP. The findings highlight both similarities and differences in approaches and strategies adopted by these countries, contributing to a better understanding of their respective maritime governance practices.

Keywords— Marine and Maritime Spatial Planning, Marine Renewable Energy, Ocean Energy, Legal Framework

I. INTRODUCTION

In the context of the European Green Deal [1] and the REPowerEU objectives [2], the European Commission raised the EU's binding renewable energy target for 2030 to a minimum of 42.5%, up from the current 32% target and almost doubling the existing share of renewable energy in the EU [3]. Moreover, the EU Offshore Renewable Energy Strategy [4] proposes an installed capacity of at least 60 GW of offshore wind and at least 1 GW of ocean energy by 2030, reaching 300 GW and 40 GW of installed capacity,

respectively, by 2050, which would require less than 3% of the European marine space. National strategies for marine renewable energy (MRE) in Europe vary between countries but share common objectives in terms of promoting sustainable energy development, reducing dependence on fossil fuels, and mitigating climate change impacts and diversifying energy sources. The development of MRE, particularly offshore wind, plays a significant role in achieving renewable energy targets. Continued advancements in technology, supportive policies, and international collaboration are expected to further accelerate the deployment of marine renewable energy across Europe.

The marine environment is an ecosystem that supports a set of uses and human activities, contributing to economic and social development. Most of the uses and activities require the use of maritime space, either temporarily or permanently, increasing the potential for conflict with existing and traditional marine uses. Convoluted sentence. Please rephrase. The EU Directive 2014/89/EU [5] establishes a framework for maritime spatial planning (MSP) and requires the competent authorities in each Member State to develop national maritime spatial plans. MSP analyses and organizes human activities in marine areas, applying an ecosystem-based approach and involving stakeholders to achieve ecological, economic, and social objectives. Moreover, this MSP framework not only intends to mitigate possible present spatial conflicts but also contemplates emerging

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sectors and technological development to ensure future conflicts are prevented or minimised.

In this context, the aim of this study is to analyse how marine renewable energy (MRE) has been incorporated into various National Maritime Spatial Planning (MSP) frameworks across Europe. The paper has been structured in the following sections: II-Review of Maritime Spatial Planning and Renewable Energies in Europe, III-Comparative Analysis of National Maritime Spatial Plans and Marine Renewable Energy Policies and IV-Conclusions.

II. REVIEW OF MARITIME SPATIAL PLANNING AND MARINE RENEWABLE ENERGIES IN EUROPE

In the context of the EU-funded SafeWAVE project [6] an analysis has been conducted to examine the integration of marine renewable energy (MRE) within the different National Marine Spatial Planning (MSP) frameworks in Europe. Specifically, the countries of Spain, France, Ireland and Portugal have been the focus of this analysis. For this analysis, a questionnaire was designed, circulated, and completed by different national experts from the SafeWAVE project consortium. There were two experts per country involved in Blue Economy, Marine Environment Assessment, Maritime Spatial Planning and Marine Renewable Energy Engineering.

The survey incorporated questions on key aspects of this topic, including: the legal framework, responsible authorities, public involvement, current implementation status, data availability, types of uses included in MSP, compatibility with national energy objectives, quantitative production objectives for MREs, identified zones for MRE development, limiting factors and challenges, interactions between MSP and MRE consenting, compatibility with marine protected areas (MPAs), and the integration of environmental risk in MSP. An outline of the questionnaire used in this research is shown in Table I.

III. COMPARATIVE ANALYSIS OF NATIONAL MARITIME SPATIAL PLANS AND MARINE RENEWABLE ENERGY POLICIES

A. Legal Framework and Responsible Authorities

The EU's MSP Directive was transposed into Spanish law through the Royal Decree 363/2017, of 8 April, which establishes a framework for Maritime Spatial Planning, and included an obligation to draw up five sub-regional marine plans for each of Spain's maritime zones. These were published in February 2023, when the Spanish Council of Ministers approved Royal Decree 150/2023, and first Maritime Spatial Plans, known as *Planes de Ordenación del Espacio Marítimo* (POEM). The responsible authority for POEMs is the Ministry for the Ecological Transition and the Demographic Challenge (MITECO), specifically the Directorate General of the Coasts and the Sea.

TABLE I
QUESTIONNAIRE REGARDING THE NATIONAL MARINE SPATIAL PLANS
IN EUROPE AND INCLUSION OF MARINE RENEWABLE ENERGIES

General information of the National Plans
Plan name - denomination
Relevant Statute
Agency or authority in charge
Public involvement in MSP [mandatory according to EU MSP Directive (Directive 2014/89/EU)]
National Marine Spatial Plan-current implementation status
Expected date for adoption (approval) of the plan
Data availability
Type of uses included in MSP
National Plans and Marine Renewable Energies (MREs)
Compatibility with national energy objectives-National Strategy
Quantitative production objectives defined? Which ones?
Type of polygons identified in MSP
Type of polygons identified in MSP for MRE
Total area designated for MRE (include wind, waves, current and tidal, other)
Technical, socio-economic and environmental factors considered for MRE polygons identification (include all type of MRE: wind, waves, currents, etc.)
Highlighted or prioritised limiting factors (social, economic, technical and environmental) and challenges for the implementation of MREs
Interactions of MSP and consenting for MRE
MRE projects and Marine Protected Areas (compatible/incompatible in the plan). Under which conditions?
MSP and Risk-Analysis (i.e., related to Adaptive Management approach)

In France, the EU MSP Directive was transposed through the entry into force of article 123 of law n° 2016-1087, which modified the French Environmental Code. The law provides that MSP will be primarily implemented through dedicated *Documents Stratégiques de Façade* (DSF, Sea basin strategy documents). The law also introduced a new National Strategy for the Seas and Coast into French legislation and simplifies policy governance on biodiversity. The Ministry for the Sea (Ministère de la Mer) is the competent authority for MSP in France, but there is a significant amount of decentralization, with other public bodies and agencies involved in implementation at the regional level. Currently, there are four sea-basin strategies (DSF) in place. Each of these is comprised of an initial assessment and strategic objectives for MSP (2019) and a monitoring and action plan (finalised in 2022).

Portugal was one of the first EU countries to have legislation on MSP, with a basic law introduced in 2014 and further legislation introduced in 2015 (Decree-Law No. 38/2015). The latter provides for the development of both Situation and Allocation Plans. The Situation Plan identifies areas of maritime space that should be protected and preserved and outlines the temporal and spatial distribution of current and potential uses and activities. Allocation Plans enable private uses of some marine areas

or other (new) uses that are not included in the situation plan. MSP is the responsibility of the Directorate-General for Natural Resources, Safety and Maritime Services (DGRM), part of the Ministry of the Sea.

Ireland first transposed the EU MSP Directive by statutory instrument in 2016 but this has since changed and a stronger legal basis is now given by the Maritime Area Planning Act, 2021. Ireland's first maritime spatial plan, known as the National Marine Planning Framework (NMPF), was published in July 2021. The competent authority for MSP in Ireland is the Department of Housing, Local Government and Heritage. The NMPF takes a policy-based approach to MSP and covers sixteen different maritime uses, one of which is Offshore Renewable Energy.

B. Public Involvement

All the countries reviewed adhered to the mandatory requirement for public participation as required by Article 9 of the EU MSP Directive (Directive 2014/89/EU).

Spain conducted a public consultation from July 2021 to September 2021, along with a Strategic Environmental Assessment study, with 118 submissions received. MITECO has collaborated bilaterally with Portugal, France, and Italy, in the cross-border consultations that were carried out in the framework of the elaboration of the management plans of these countries, as well as other initiatives such as informative workshops and seminars.

Portugal and France also have provisions for public consultation and engagement from April to July 2018 and from May to August 2021, respectively.

Ireland conducted public consultations during the development of their respective MSP frameworks. All elements of NMPF development were consulted upon publicly. Firstly, a Baseline Report was published in December 2018, and this was open for public consultation, with over 170 submissions received. This was supplemented with five regional consultation events that people could attend to find out more and ask questions. Due to the number of submissions received this added to the time taken to produce the first NMPF. A draft version of the Plan was also open for consultation from November 2019, again supplemented by seven scheduled public events. Alas this coincided with the outbreak of the global pandemic, meaning two of the public events had to take place online. In response to the crisis the Minister also extended the public consultation period for another two months. The Department received 225 submissions in response to this consultation on the draft NMPF. At the outset of the process, the Department also established a National Marine Planning Framework Stakeholder Advisory Group. This had representatives from a large number of maritime and marine sectors, marine environmental groups, public sector organisations including academics and researchers. The Group met 11 times and provided guidance to the Department on various aspects of the NMPF's development. Given the

timing of the plan, the Department also used social media channels and had an email newsletter to raise awareness of the plan.

C. Current Implementation Status

Spain's POEMs were recently approved after public consultation. France has an established MSP framework, while Portugal is in the process of updating its National Maritime Spatial Plan, previously implemented in 2019. Ireland is currently implementing its Plan in various ways. The over-arching legislation allows for the preparation of sub-regional (more local level) plans, to be known as Designated Maritime Area Plans and these are foreseen as a critical way of progressing marine renewable energy.

D. Data Availability

Geographic information on MSP plans is accessible through online platforms. Spain provides access to POEMs data through the INFOMAR viewer [7]. France has the GEODIRIS portal [8] for accessing MSP-related data, while Portugal's data availability is made through the GeoPortal of the Portuguese Sea [9].

Ireland's marine data is accessible through several different platforms including Marine Plan portal [10], with other information available through the Marine Institute's Marine Atlas [11] and Seabed Survey data portal [12]. There is a policy ambition to have a fully digitised system for marine planning and consenting applications in place by 2028.

E. Types of Uses Included in MSP

Article 8 of the EU's MSP Directive provides a list of possible activities, uses and interests that Member States can include in their Maritime Spatial Plans. This includes "aquaculture areas, fishing areas, installations and infrastructures for the exploration, exploitation and extraction of oil, of gas and other energy resources, of minerals and aggregates, and for the production of energy from renewable sources, maritime transport routes and traffic flows, military training areas, nature and species conservation sites and protected areas, raw material extraction areas, scientific research, submarine cable and pipeline routes, tourism, and underwater cultural heritage". The countries reviewed to demonstrate this approach having incorporated a range of maritime uses in their MSP frameworks. These include maritime activities, such as aquaculture zones, anchoring areas, areas for military use, sand extraction zones, navigation corridors, and marine protected areas (MPAs). Wind, wave, and tidal energy projects are also included as potential uses. Ireland's NMPF for example shows the ocean energy test sites.

F. Compatibility with National Energy Objectives

Some countries (i.e., France, Portugal, and Spain) align their MSP policies with national energy objectives. These objectives include increasing renewable energy

generation, reducing greenhouse gas emissions, and transitioning to a low-carbon economy. Member States set and update specific targets for renewable energy production and capacity [13]. In this sense, MSP needs to remain flexible enough to reflect changing energy priorities.

G. Quantitative Production Objectives for MREs

All the countries reviewed have established quantitative production objectives for marine renewable energy (MRE) generation, except France for wave and tidal. These objectives vary across countries and are subject to updates and revisions based on evolving national energy strategies [13]. In France, no quantitative production objectives for wave and tidal have been defined.

H. Identified zones for MREs

The countries employ various approaches to identify zones for MRE development. Spain has defined specific areas within its POEMs, while France designates zones for different uses through its Coastal Planning Scheme. Portugal identifies areas suitable for MRE deployment based on technical assessments and is currently studying the increase of dedicated areas for offshore wind deployment. In parallel to implementation of the NMPF, Ireland has recently published a new (draft) Offshore Renewable Energy Development Plan. The Plan essentially outlines a methodology which could be used to propose future areas suitable for the development of offshore wind (fixed and floating), wave and tidal energies. This is currently open for public consultation and has not been finalised yet.

I. Limiting Factors and Challenges

Countries face common limiting factors and challenges in implementing MSP and MRE policies. These include the need to balance competing uses and interests, address environmental concerns, ensure stakeholder participation, manage spatial conflicts, and provide regulatory certainty for developers. The designation and compatibility of MPAs with MRE projects is a significant challenge across the countries.

J. Interactions between MSP and MRE Consenting

MSP frameworks interact with the consenting process for MRE projects, ensuring compatibility and adherence to MSP policies. Each country establishes specific regulatory processes for MRE project development, including environmental impact assessments, public consultation, and permitting.

K. Compatibility with Marine Protected Areas (MPAs)

The reviewed countries are exploring the compatibility of MSP and MRE policies with MPAs. They consider the designation of MPAs, ecological sensitivity, and the conservation of marine biodiversity when identifying zones for MRE development. Ongoing efforts to expand MPAs may require updates to existing MSP frameworks.

L. Integration of Risk Analysis in MSP

Risk analysis plays a crucial role in MSP to assess potential impacts and inform decision-making. In Portugal, the implementation of the MSP has no Risk Analysis procedures implemented. In Spain, the POEMs can be altered by public or private initiative if deemed necessary and viable by regulatory authorities. Moreover, in Spain and in France, MSPs have been proposed based on the philosophy behind the risk-based approach and Adaptive Management. The theoretical concept has been incorporated, but case-studies for classification and for ordering are lacking.

IV. CONCLUSION

Comparing the integration of marine renewable energy (MRE) into national marine spatial plans (MSP) can inform and guide management strategies, legislation, and policies to support management actions and efficiently plan future MRE deployments. The outcome of this analysis has identified: (i) the MSP implementation approaches vary by country and sometimes within countries; (ii) differences in the stakeholder or public involvement in MSP; (iii) different strategies and priorities for raising the issue of MRE within the national MSP; (iv) conflicts with other uses (i.e. Marine Protected Areas), and mechanisms to solve them; (v) the development of national MSP requires a review of the authorization or concession procedures for the allocation or reservation of areas for MREs.

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