How is offshore wind (re)shaping marine spatial planning?

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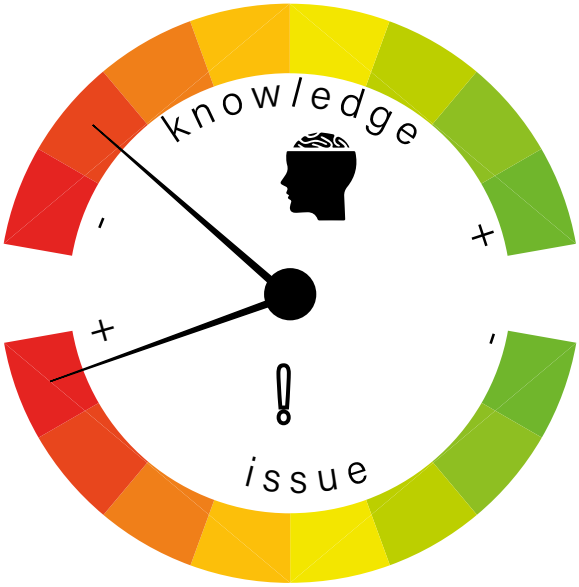

Question deemed by the experts to be "a major issue given the significant environmental and socio-economic challenges in the marine environment and the low level of knowledge on existing interactions between the environment and human activities"

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Acronyms

APER (law)	French law on the acceleration of renewable energy production
ASAP (law)	French law on accelerating and simplifying public action
CFP	Common Fisheries Policy
CMF	French Sea Basin Maritime Council
CNDP	French National Commission for Public Debate
CNML	French National Council for the Sea and Coast
DSF	French Sea Basin Strategy Document
ESSOC (law)	French law for a State serving a trusted society
IMP	Integrated Maritime Policy
LPEC (law)	French Energy and climate programming law
MSP	Marine/Maritime Spatial Planning
MSFD	Marine Strategy Framework Directive
MSPFD	Maritime Spatial Planning Framework Directive
OECD	Organisation for Economic Co-operation and Development
ORE	Offshore renewable energy
PCET	French Territorial Climate and Energy Plans
PNACC	French national adaptation plan for climate change
PPE	French Multi-Annual Energy Plan
SAGE	Water Development and Management Plan
SAUM	French Marine Aptitude and Utilisation Scheme
SFEC	French Energy and Climate Strategy
SNBC	French National Low Carbon Strategy
SNML	French National Strategy for the Sea and Coast
SRADDET	Regional Plan for Land Use, Sustainable Development and Territorial Equality
SRCAE	Regional Climate, Air, and Energy Action Plan
UNESCO	United Nations Educational, Scientific and Cultural Organization
WFD	Water Framework Directive

Introduction

The sea and coastline are areas where numerous maritime uses and activities coexist (maritime transport, defence activities, fishing, shellfish farming, subsea cables, tourism, pleasure boating, offshore wind farms, etc.). Given the increasing presence of these activities and the pressure they exert on the marine environment, it is essential to concurrently ensure both the preservation of the marine environment and the sustainable management of maritime activities. Certain activities (such as offshore wind energy) also require medium- and long-term visibility to support their development. This is where **marine spatial planning (MSP)** comes into play.

After a brief presentation of the principles of **marine spatial planning** and their application in France, the specific context surrounding the **development of offshore wind energy** and how it fits in with MSP is presented. MSP, a complex and constantly evolving process, is then addressed via a series of questions and answers intended to improve the understanding of the various issues inherent to its implementation: participation, land-sea interactions, etc. The limits of its **implementation** are outlined in the final section.

In short

The marine spatial planning process appeared in the 2000s and aims to reconcile economic development, social well-being and the good ecological status of the seas. Its operational implementation raises a number of questions and reveals major methodological obstacles. The aim of this bulletin is to re-examine marine spatial planning with regard to offshore wind energy development: how should MSP be defined, how is offshore wind energy (re)shaping its contours, and what are its limits?

What is marine spatial planning?

Marine spatial planning is a public process that involves setting out long-term objectives in order to organise the spatial and temporal distribution of human activities at sea, from ecological, economic and social perspectives. The goal of MSP is to achieve these objectives through a concerted political process. At European level, MSP aims to foster a participatory approach and to be in line with the principles of ecosystem-based management. This form of management can be defined as a strategy for managing land, water and living resources that promotes their conservation and sustainable and equitable use through an integrated approach, considering humans as part of this ecosystem [1].

MSP is therefore a **dynamic** process which evolves over time and space and an **iterative** process, as it is revised on a cyclical basis. MSP thus seeks to take into consideration current changes in society and in uses of the ocean, while attempting to anticipate future developments: technological innovations, development of new activities, new issues relating to the protection of marine biodiversity, climate change, etc. While MSP sets out a more or less long-term vision for the development of maritime activities and the preservation of the environment, it must nevertheless consider very different timeframes: the time required to implement the different sectoral policies, to acquire knowledge, to organise public participation, etc. It can be implemented in a wide variety of ways, but is always correlated with two fundamental and complementary dimensions **(Fig. 1)**:

- **Strategic planning (what? why?)** implies a medium/long-term vision of the organisation and development of socio-economic activities at sea and on the coast, that must be compatible with the preservation of marine ecosystems. This can involve setting out quantitative objectives for the development of an activity or for the preservation of the marine environment: what do we want to do with our maritime area?
- **Spatial planning (where? how?)** generally implies the establishment of different zones: which activities take place in which zones?

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Fig. 1 *Two fundamental dimensions of MSP: spatial planning and strategic planning*

A look back at the origin of MSP and the related issues

MSP was brought to the fore by various international organisations (such as UNESCO and the OECD) and the European Union through its Integrated Maritime Policy (IMP) and has became established as a governance tool for managing human activities at sea with a view to sustainable development.

This is a relatively recent policy partially stemming from changes in uses of marine areas (intensification, decline and/or appearance of new uses), the need to define specific areas for biodiversity protection (marine protected areas) and the economic interest generated by the development of new activities (offshore aquaculture, wind farms, etc.) and future opportunities (deep-sea mining, etc.).

In France, interest in MSP has recently grown as a result of a strong political move to define dedicated areas for (i) one type of activity, offshore wind, and (ii) the protection of marine biodiversity by establishing highly protected areas, thereby reshaping the interactions between existing activities and uses.

Implementing MSP: the French case

In 2017, France set out its **National Strategy for the Sea and Coast** (SNML) to define its maritime ambitions. This strategy provides a framework for defining and implementing the strategic aspects of the various sectoral policies (fisheries, maritime transport, etc.). This strategy is revised on a cyclical basis and the second version of the SNML, adopted in June 2024, presents a set of objectives to be achieved by 2030. These objectives come under six themes:

- Protection of environments, resources, biological and ecological balances, as well as the conservation of sites, landscapes and heritage;
- Risk prevention and coastline management;
- Knowledge, research and innovation, as well as education and training for maritime professions;
- Sustainable transition of economic, maritime and coastal activities and development of the use of natural mineral, biological and energy resources;
- Participation by France in the development and implementation of integrated international and European policies for the protection and promotion of maritime areas and activities and the contribution of overseas France to these policies;
- Governance associated with this strategy, the resources available for its implementation and monitoring and assessment procedures [12].

In mainland France, the National Strategy for the Sea and Coast (SNML) is implemented in each of the four maritime sea basins (Eastern Channel-North Sea, North Atlantic-Western Channel, South Atlantic, Mediterranean) through **Sea Basin Strategy Documents** (DSF). The national strategy is also incorporated into the French Environment Code, in order to establish environmental, social and economic strategies that take into account local specificities.

The SNML and Sea Basin Strategy Documents are built on specific governance implemented through consultation bodies: the **National Council for the Sea and Coast** (CNML) and **Sea Basin Maritime Councils** (CMFs). These State-led bodies bring together various national and local maritime stakeholders, divided between the five colleges defined for the Grenelle environment summit: the State, local authorities, non-governmental organisations, and representatives of employers and employees. The CMFs are consulted throughout the DSF drafting process. These documents, like the SNML, are updated every six years and are required to give visibility to local stakeholders. DSFs are legally enforceable, structuring documents, meaning that they compile the issues at stake in the various sectoral and environmental protection policies. In this respect, France is rather atypical in the implementation of its MSP strategy: in addition to adapting the SNML to each sea basin, the DSFs also implement two European Directives (the Marine Strategy Framework Directive - MSFD and the Maritime Spatial Planning Framework Directive

- MSPFD) by defining environmental and socio-economic objectives.

Implementing MSP: around the world

The first examples of marine spatial planning date back to the 1970s, notably in France with the first Marine Aptitude and Utilisation Schemes (SAUM) and in Australia with the Great Barrier Reef Marine Park Act [9,10].

Within the European Union, under the MSPFD, Member States are required to establish maritime spatial plans, although they are free to determine the format and content of their plan and to make it legally binding or not. The implementation of MSP should fit with four other directives aimed at preserving natural heritage (Birds Directive and Habitats Directive), the quality of marine waters (Marine Strategy Framework Directive - MSFD) and water bodies (Water Framework Directive - WFD), as well as with various sectoral policies relating to different sectors, such as fisheries (Common Fisheries Policy - CFP) and energy (Renewable Energy Directive).

With a few exceptions, the planning documents in place in Europe are mainly spatial planning documents aimed at establishing zoning. In this respect, France is an exception, having established "vocation maps" that set out the spatial distribution of the main priorities for each sea basin, yet without excluding other uses [1]. In cross-border contexts, MSP is of particular importance given that ecosystems and most maritime activities are not confined within geographical boundaries (as in the case of historical fishing authorisations between the United Kingdom and France in the Channel, for example).

Compare and contrast: marine spatial planning and offshore renewable energy planning

The commitments made under the 2015 Paris Agreement and the objectives of the European energy policy have been translated into the French Energy and Climate Strategy (SFEC), which promotes the development of offshore renewable energies **(Fig. 2)**. In 2022, France produced 1249 TWh of primary energy (i.e. energy naturally available before transformation), of which 326 TWh, i.e. 26%, was from renewable energies [3]. Offshore energy represents only a tiny fraction of this primary energy production from renewable sources, amounting to 0.2 TWh or 0.06% [4].

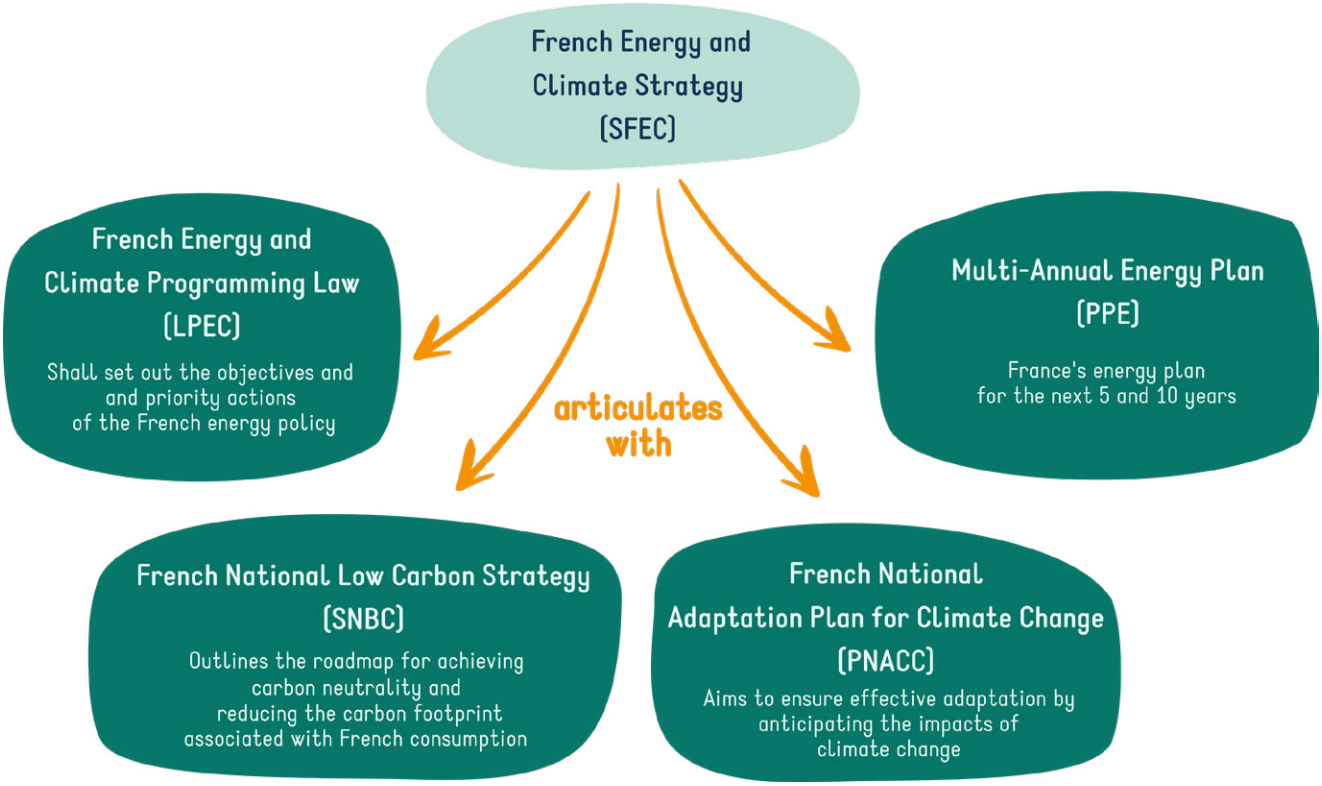

Fig. 2 *General framework supporting the development of offshore renewable energies*

Where does offshore wind energy stand among offshore renewables?

While the European Union and France are encouraging the development of offshore renewable energies, the different technologies are at very different stages of development.

Offshore wind is now at the most advanced stage of development, “commercialisation", with a cumulative installed capacity of almost 16 GW in Europe in 2022 [7]. Floating wind technology, which is nearing commercialisation stage, consists in installing wind turbines on floating structures deployed at depths exceeding 50 metres. Tidal stream and wave energy systems are still at the technology development stage, with research and development projects being carried out at numerous sites (prototypes and demonstrators in the test phase). Tidal systems at sea mainly remain in the early stages of development and the only French example is an estuarine system: the Rance tidal power station **(Fig. 3)**.

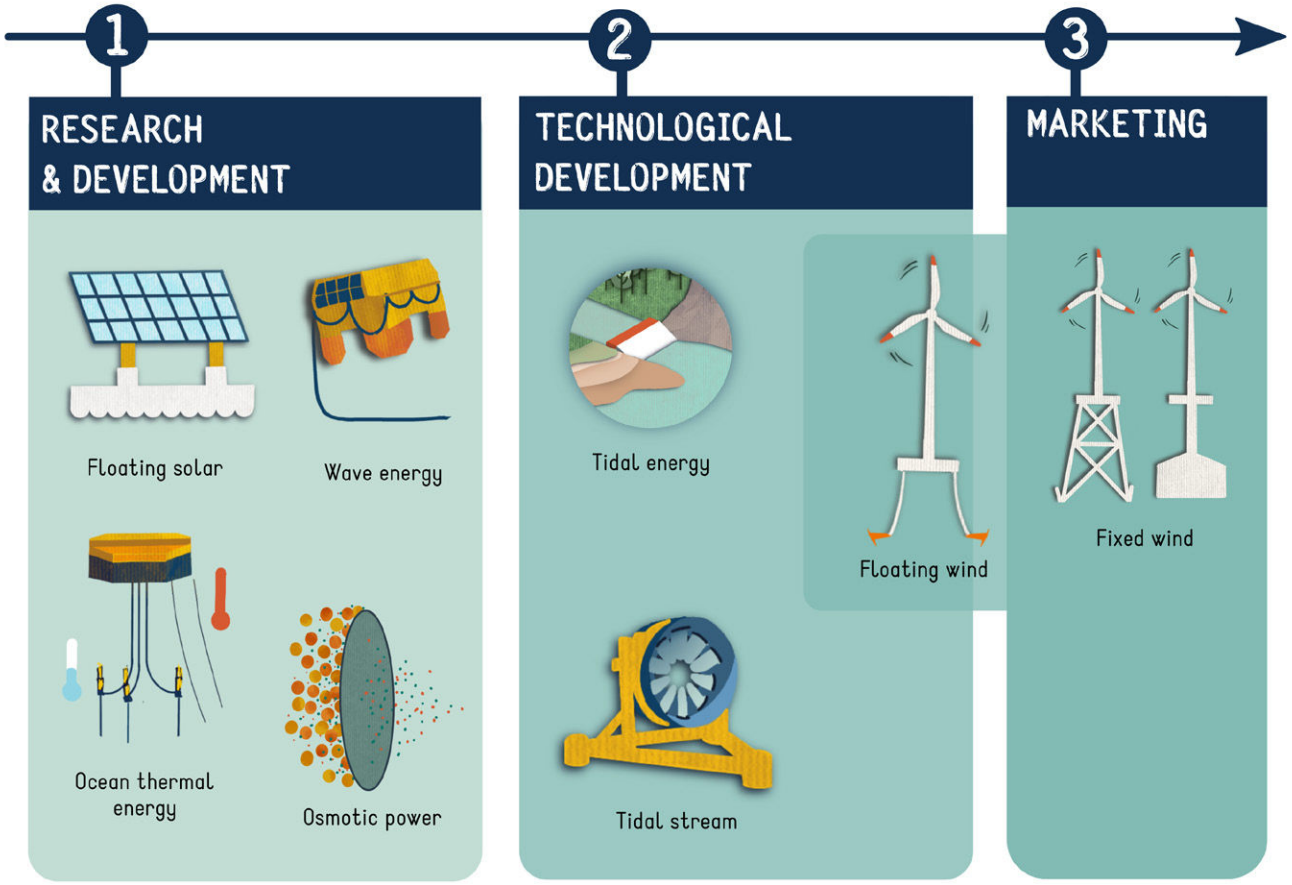

Fig. 3 *Different stages of maturity of offshore renewable energies at European scale. Based on the EU strategy on offshore renewable energy and the European Court of Auditors*

Today, offshore wind has reached a stage of development where it can be commercially deployed. Recent technological developments (turbine configuration, float architecture, reduction in the weight of materials, etc.) have helped to tip the balance in favour of offshore wind energy. It is therefore strongly promoted by public policies and benefits from strategic targets set by the French government.

How do the offshore wind targets affect MSP?

This strong political ambition to develop offshore wind energy is leading to the emergence of a "new" player in the landscape of maritime activities and uses, which had thus far required little or no space. With the development of offshore wind energy, a certain form of exclusivity is emerging in defined maritime areas.

As far as other users of the sea are concerned, wind farms form unprecedented physical obstacles at sea for a relatively long time period (estimated at 25 to 30 years). As a new stationary activity in a dynamic environment, offshore wind is therefore disrupting the spatial and temporal distribution of certain historical activities and can potentially give rise to new conflicts of use. The MSP model in place in France, with its zoning approach, is particularly well suited to offshore wind, which requires suitable zones to be identified.

The similar case of highly protected areas

In line with European commitments, France aims to designate 10% of its maritime space (belonging to mainland France and overseas territories) as highly protected areas by 2030. This will lead to the restriction, or even prohibition, of activities at sea that interfere with the functioning of marine ecosystems within these areas. Like wind farm development zones, defining highly protected areas is one of the key objectives of the second cycle of sea basin-level strategic planning.

How has the development of offshore wind gradually become built into the legislative framework?

Over and above MSP, in France legislative changes over the last decade have also contributed to the development of offshore wind energy **(Fig. 4)**. The main aim of these changes is to boost the development of offshore wind farms and to define a long-term strategic vision in order to (i) shorten the time required for administrative procedures; (ii) minimise disputes; (iii) secure the tender award timeline; and (iv) provide the industry with visibility on future offshore renewable projects. By integrating sectoral planning for offshore wind into marine spatial planning, France's 2023 APER law is a key milestone for the sector.

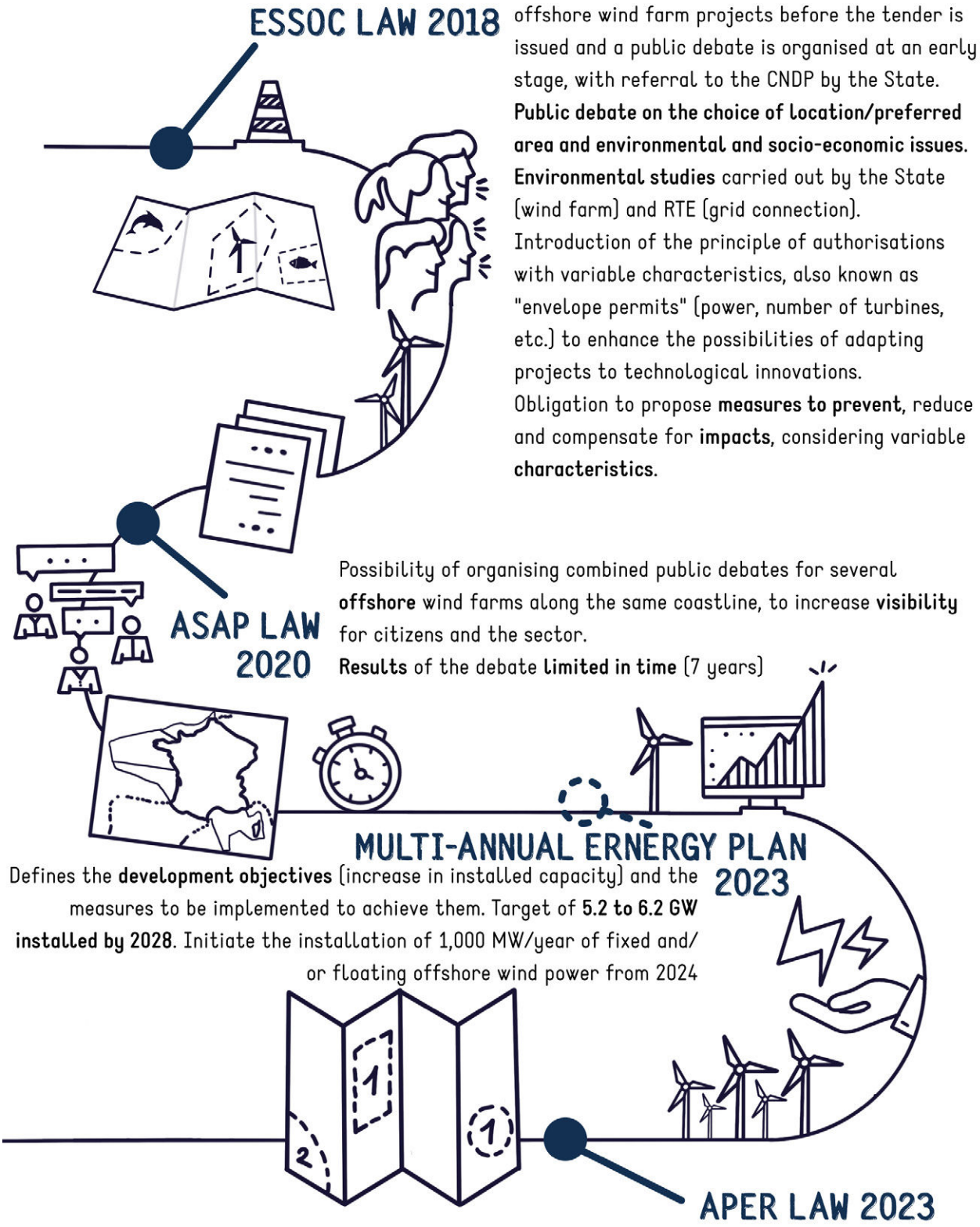

Fig. 4 *Main changes in France's regulatory landscape for the development of offshore wind farms due to four major laws and programmes.*

What are the key challenges of marine spatial planning?

Understanding how MSP is implemented and how it fits with offshore wind energy planning is complex, especially as MSP has to take into account several different timeframes: the timeframe for the various planning processes (energy, environmental, etc.), for organising public participation, for acquiring knowledge, etc. The meshing of marine spatial planning and offshore wind farm planning raises a number of questions, including the four listed below, for which some insights are put forward:

- How does marine spatial planning, implemented in France through DSFs, fit with the development of offshore wind?
- How do marine and land planning fit together at the land-sea interface?
- How are stakeholders and the general public involved in the planning process?
- Can the data used for MSP help to support decision-making?

How does marine spatial planning, implemented in France through DSFs, fit with the development of offshore wind?

The implementation of marine spatial planning must take into account the environment, all existing uses as well as all other forms of planning. The need to define zones for offshore wind development in each Sea Basin Strategy Document (DSF) means that these marine planning documents must take into account the national energy policy, which in France is set out in the Multi-Annual Energy Plan. When the DSF is revised, this involves mapping out the zones suitable for offshore wind development (within 10 years and by 2050), with a vision primarily focusing on the development of this sector. However, MSP seeks to coordinate all sectoral policies, whether they require the identification of specific zones (aquaculture, wind farms, etc.) or not (commercial and recreational fishing, pleasure boating, water sports, etc.).

In France, the development of offshore wind energy will help to (re)shape MSP by defining precise zones via a spatial planning approach as yet relatively undeveloped. In an open space characterised by highly mobile maritime resources and activities, defining spatial planning, and therefore areas conducive to the development of certain maritime activities and the preservation of marine ecosystems, is a complex exercise that can lead to the issues relating to stationary activities being given fuller consideration. We can therefore legitimately question whether MSP influences offshore wind or vice versa in the definition of zones for offshore wind farms, as set out in the DSFs. As things currently stand, the MSP established in 2024 through the revision of the DSF is largely influenced by the objectives of sectoral policies, and in particular of offshore wind energy. The consultation carried out in 2024 as part of the public debate entitled "Debating the sea" aimed to identify areas suitable for the development of offshore wind energy and highly protected areas. Beyond the development of offshore wind energy, there is also the question of how MSP meshes with other public policies, particularly those with their own decision-making bodies. This is the case, for example, for the Common Fisheries Policy (CFP), which lays out the framework for commercial fishing activities at European and French level, as well as for land use plans and programmes [1].

How do marine and land planning fit together at the land-sea interface?

When we think about offshore wind, marine spatial planning generally comes to mind. However, the development of offshore wind can also be considered from a land use planning perspective, as its development at sea necessarily involves onshore operations (cable connection, infrastructure construction and maintenance, onshore substations, etc.).

This is the case, for example, in port areas that host specialised facilities to support the development of offshore wind: ORE terminals (in the ports of Brest, Cherbourg and Saint-Nazaire, for instance) for the assembly or storage of structures (foundations, turbines, etc.), maintenance stations, etc. These new coastal facilities may increase artificialisation of the coastline, particularly in ports, and go against the objectives of France's "Zero Net Artificialisation" law. It is important to note that this law does not put an end to the artificialisation of new areas in the case of so-called "national-scale" projects (projects developed by the State, in consultation with the regions). In addition, the development of offshore wind farms must take into account a series of existing land use planning documents: Regional Climate, Air, and Energy Action Plan (SRCAE), Regional Plan for Land Use, Sustainable Development and Territorial Equality (SRADDET), Territorial Climate and Energy Plan (PCET), Water Development and Management Plan (SAGE), etc. **(Fig. 5)**.

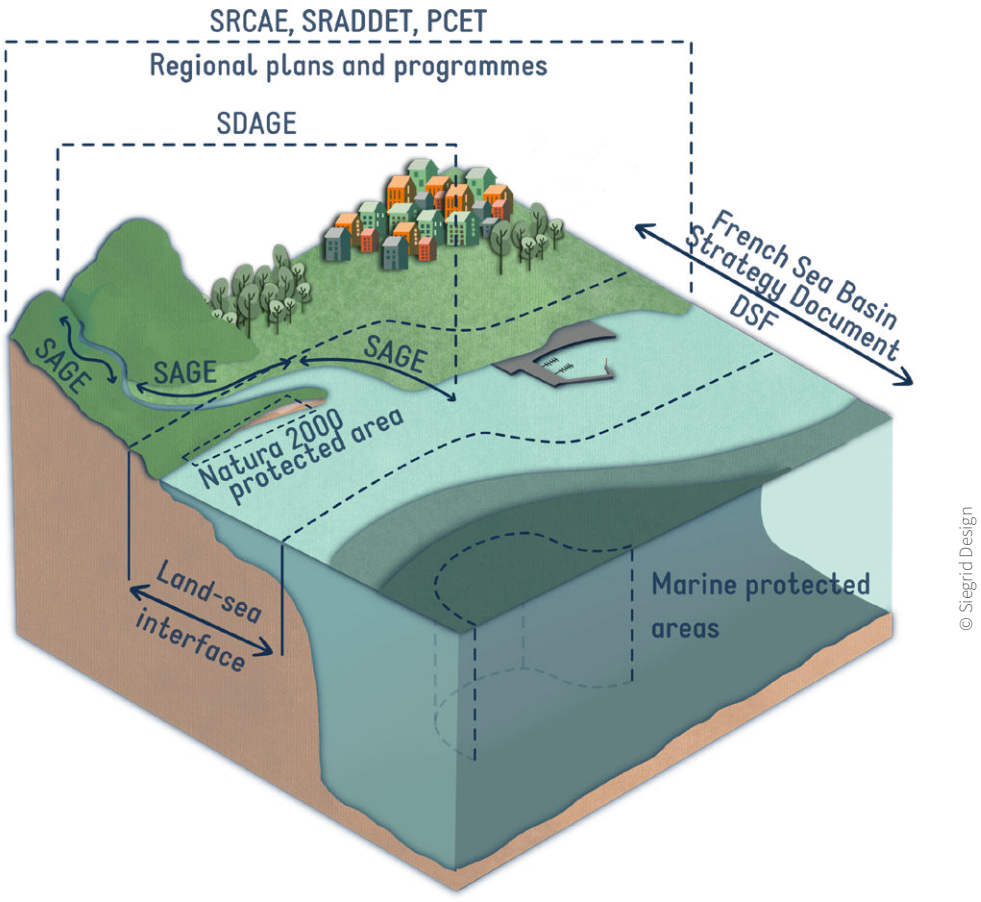

Fig. 5 *Coordination of various land use and marine planning documents implemented at catchment scale*

Coordinating the various planning documents for land (port strategy, SRCAE, etc.) and sea (DSF in particular) with the development of offshore wind is therefore a complex exercise. Planning documents are structured around their own objectives and spatial and temporal scales. The main difficulty lies in overlaying all the planning initiatives in which the areas of application can sometimes be overlapping and different stakeholders are involved (State, Regions, local authorities, port authorities, prefectures, etc.). Yet coordination between the various planning initiatives is crucial in order to address environmental and socio-economic issues, particularly those relating to the land-sea continuum [1].

How are stakeholders and the general public involved in the planning process?

Participation encompasses all the mechanisms that enable stakeholders and the public to directly influence the creation, updating, adoption, content and implementation of public policies [6, 8]. The public authorities are required to organise public participation in advance in order to produce communication and information documents presenting the issues involved in the project and the relevant area [11].

In France, the two main forms of participation generally employed are **"consultation"** (stakeholders and the general public are informed and can express their opinions, but there is no guarantee that these will be taken into account) and **"concertation"** (stakeholders are consulted and have some decision-making power). At the time of the first revision of the strategic sections of the DSFs, public consultation was organised via a public debate at the scale of the sea basin. Through this public debate, any interested person had access to information about the project and was able to express their point of view in an informed manner. The debate was organised by CNDP, "the independent authority that guarantees the right to information and public participation in the development of projects and public policies with an impact on the environment". The arguments put forward are treated equally by CNDP, which publishes a report at the end of the debate and presents it to the State. The State will then have to justify whether or not the arguments are taken into account and respond to the various recommendations arising from the public debate.

What do we mean by "stakeholders"?

Stakeholders refers to public, community or private interest groups concerned by a project and whose interests may be affected by its implementation. On the basis of these interests, they are entitled to take part in discussions and influence the roll-out of the project [11].

As part of the public debate on the sea organised by CNDP in 2023-2024, stakeholders and the general public were invited to express their views on the choices and objectives of maritime planning (coexistence of industrial activities, energy production, transport, fishing, etc.), environmental protection and the development of offshore wind energy. The focus here was mainly on discussing the location of future offshore wind farms and possible offshore alternatives (wave, tidal, etc.) rather than on the broader question of energy choices (nuclear, renewable, etc.). Involving the general public in MSP is particularly complex given that the general public in fact generally has little knowledge of the marine environment beyond the shoreline and very coastal areas. With the exception of maritime professionals (fishermen, seafarers, etc.) and people who engage in water sports, most people tend to have a mental representation of the sea rather than actual experience of it. On top of this comes the specificity of the ocean, which is divided into three dimensions (air, sea surface and underwater). The underwater dimension is particularly inaccessible to the general public beyond available representations (films, photos,

drawings, stories, etc.). Furthermore, the influence of the various stakeholders within decision-making bodies can vary and bias MSP. Indeed, it is clear that certain economic and/or environmental issues are propelled by strong public policies and specific targets (this is the case for instance of offshore wind or highly protected areas), while certain "historical" stakeholders (maritime transport, fishing, etc.) tend to garner particular attention from decision-makers.

Can the data used for MSP help to support decision-making?

The data available for MSP will support decision-making by being utilised to (i) gain insights into the issues and objectives of MSP, (ii) identify the management measures to be implemented and (iii) assess the effectiveness of these measures.

For the purposes of MSP, different types of data are mobilised, in particular geographical data (for instance spatial data on maritime activities). The associated issues can vary considerably at each stage of the data life cycle **(Fig. 6)**. Although a large amount of data exists, MSP requires diverse types and sources of data (such as spatial data on fishing activities, maritime transport or sensitive marine habitats, seasonal data on species numbers, etc.), which complicates their comparative analysis. Certain types of data may be lacking, meaning that a topic has to be addressed on the basis of incomplete datasets. Such datasets often result from a series of technical and methodological choices at each stage in the data life cycle, which can bias MSP. In addition, there may be a lack of knowledge of the ecological and socio-economic issues involved, and above all insufficient awareness of the research institutes that could provide additional data useful for planning (data that is not used due to a lack of awareness or is misused).

In this context of incomplete data, informed MSP requires the "best available knowledge" to be collected and formatted, while being aware of the limits inherent to other uses (i.e. for unintended purposes at the time of its production). This data may be derived from (i) processing and analysis of available source data, and (ii) knowledge provided by maritime stakeholders, in particular in relation to the assessment of socio-economic issues. It is important that this data is correctly interpreted and used and that the various stages in developing the available knowledge are transparent and debated. The presentation of the data must also be tailored to the target audience (general public, professionals, administrations, local councillors, etc.). It is worth noting that the development of offshore wind requires the acquisition of knowledge and data that can support MSP and vice versa.

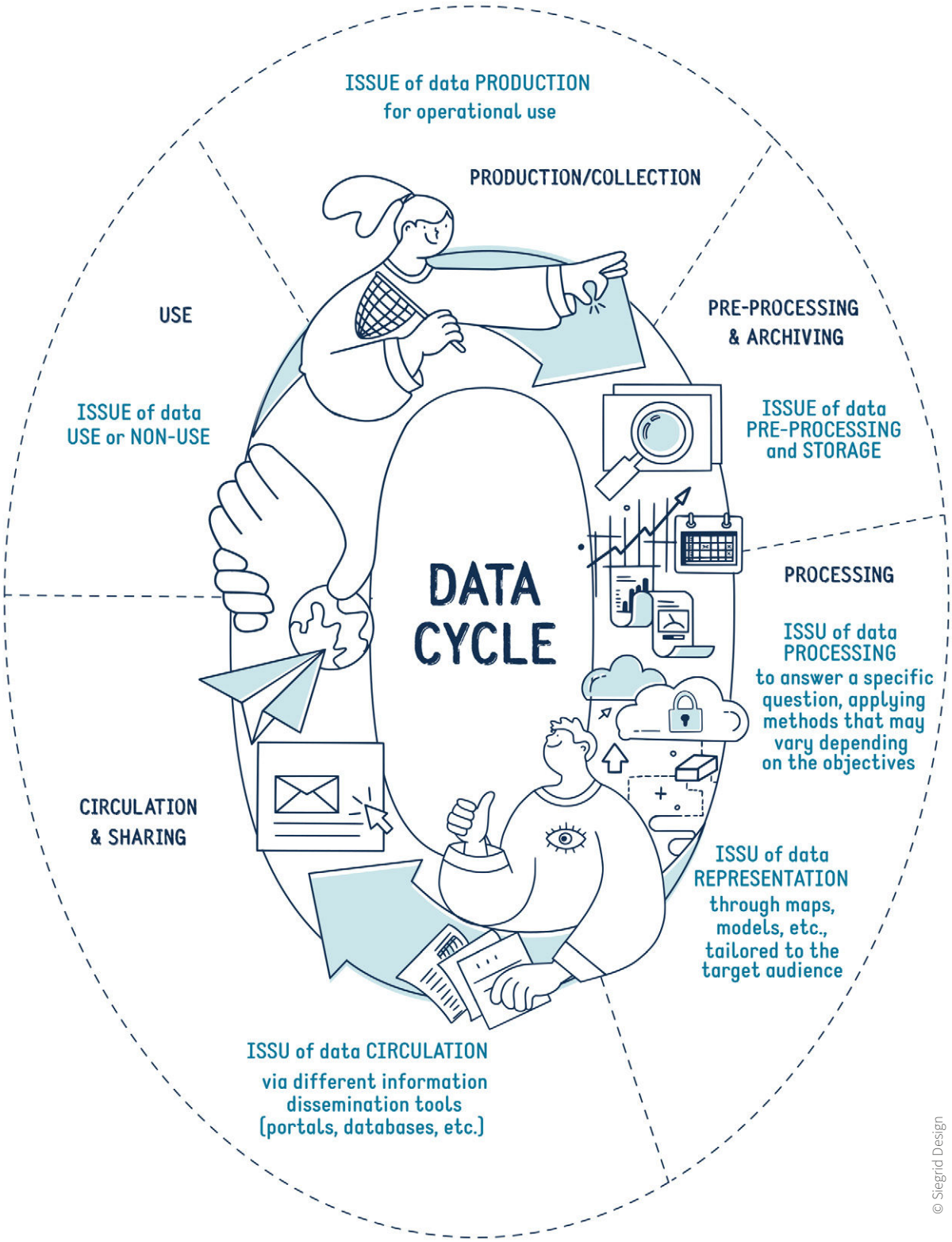

Fig. 6 *Conceptual diagram of the data life cycle. Adapted from Davret &Trouillet, 2023 [5]*

Discussion & conclusion

The MSP process must take into consideration ambitions relating to ecosystem preservation and the sustainability of maritime activities for the future. This comes against a backdrop of great uncertainty over future technical and technological innovations, climate change (which affects the distribution of certain marine species), as well as changes in existing and future activities. MSP is a cyclical process that is not set in stone but rather must be continually updated with each new planning exercise. This was also the case, for instance, in France with the update of the Sea Basin Strategy Documents (DSFs) in 2024 to incorporate energy ambitions and the mapping of areas suitable for offshore wind.

While MSP promotes the coordination of different sectoral policies, its purpose is not to resolve all conflicts of use, although it can greatly contribute to this. MSP aims to involve all those with an interest in the sea and coastline through a stakeholder engagement process. However, the definition of zones for different maritime activities contributes to a form of hierarchical ranking of activities, with priorities that are not all open to discussion, such as military zones or shipping lanes.

While zoning is a conventional decision-making tool, it can exacerbate the notion of winners and losers in MSP, with activities such as offshore wind or marine protected areas, for instance, appearing to be advantaged because they are particularly well suited to this method of dividing up space. This is less the case for certain historical activities such as fishing and pleasure boating, which are highly mobile over vast areas. Nevertheless, the definition of zones for specific activities helps certain activities to co-exist and contributes to the assessment of potential impacts. Following the revision of the DSFs in France in 2024, the ranking of activities should be more explicit than in the previous planning cycle. During the first cycle, the “vocation maps” produced for each sea basin were the result of a compromise between stakeholders. The zones identified were allocated very generic strategic priorities, without the environmental and socio-economic objectives within each zone being clearly identified, and gave the impression of being unchangeable over time. However, the revision process is strongly influenced by the State's objectives for offshore wind and highly protected areas, effectively ranking the different activities.

Furthermore, in the case of stationary objects (a specific marine habitat, an offshore wind farm or a dredging zone, for example) in MSP, the use of a mapping tool can be useful to cross-reference information and help to prioritise issues and activities. This prioritisation process is essential because, given their specificities, it is not possible for each zone to benefit all activities and the marine environment.

Further reading

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COME3T is an initiative that brings together a panel of national and regional stakeholders (universities, industrial firms, consultants, regions, State services, etc.) within a steering committee that puts forward questions, based on public concerns and key environmental and socio-economic issues identified by the stakeholders, to committees of neutral, independent experts. For each topic, a committee of experts is established following a call for applications and provides information, summaries and recommendations on the environmental and socio-economic issues associated with offshore renewable energy.

https://www.france-energies-marines.org/projets/come3t/

An initiative coordinated by France Energies Marines.

France Energies Marines is a research and innovation centre devoted to offshore wind energy with a recognised industrial, economic and societal impact in France and internationally. Its mission is to overcome the barriers facing the offshore wind sector. Supported by the French State, the Institute, driven by a 90-strong multi-disciplinary team and a network of international experts, underpinned by one-of-a-kind infrastructures, conducts excellence-oriented multi-partner research projects. The results of these projects are transferred to the sector in the form of research and expertise services, operating licences, know-how transfer and participation in expert committees and networks. One of its four key research programmes is devoted to the environmental and social integration of offshore wind farms.

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