



**HAL**  
open science

## Multi-Frame. Case Study Brief: France. Results overview

Josselin Guyot-Téphany, Brice Trouillet

► **To cite this version:**

Josselin Guyot-Téphany, Brice Trouillet. Multi-Frame. Case Study Brief: France. Results overview. Nantes Université. 2023. hal-04660828

**HAL Id: hal-04660828**

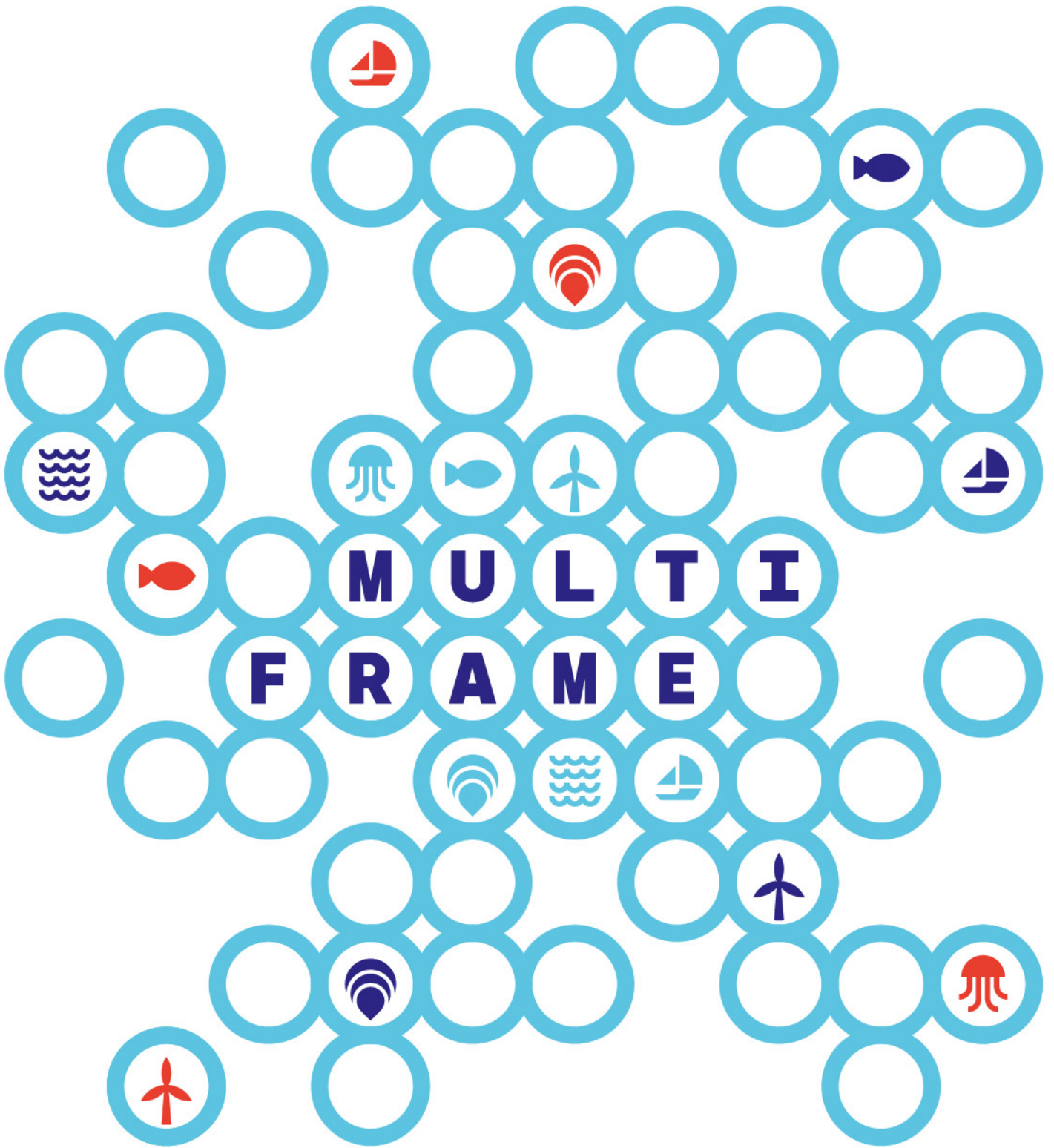
**<https://hal.science/hal-04660828v1>**

Submitted on 24 Jul 2024

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Public Domain



# CASE STUDY BRIEF: FRANCE

RESULTS OVERVIEW





## Introduction to the French case study:

### Location and description

MULTI-FRAME's French case study consists in assessing two distinct multi-use scenarios in the Bay of Biscay. The study area covers the Atlantic Territorial Waters, Contiguous Zone and Exclusive Economic Zone of France. It is home to numerous and diverse activities such as fishing, aquaculture, sea salt harvesting, naval bases, shipyards, maritime transport, tourism, etc. It is one of the most important fishing grounds in France. The species targeted and techniques used are very diverse, but most boats are owned by small-scale fishers (about 80%). The Atlantic coast also plays a very important role in aquaculture, especially for oyster production. There are several aquaculture hotspots, among which the bays of Arcachon, Marennes-Oléron, Bourgneuf or Morbihan. These marine uses have historically shaped local communities' identities, landscapes, as well as rural areas and coastal cities located all along the Atlantic coast.

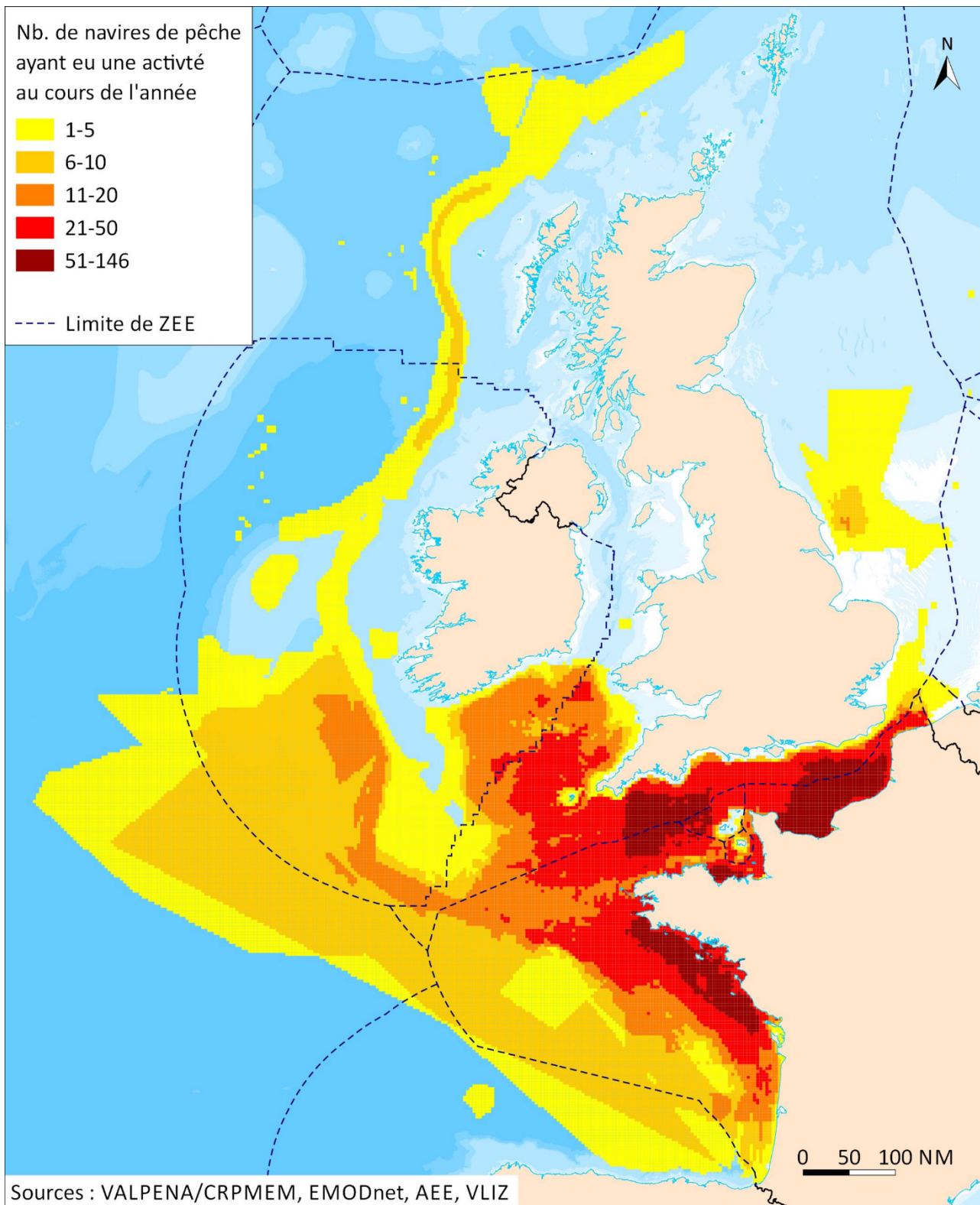


Figure 1: Geographical distribution of fishing activities in France in 2017 (Rollo, 2018)

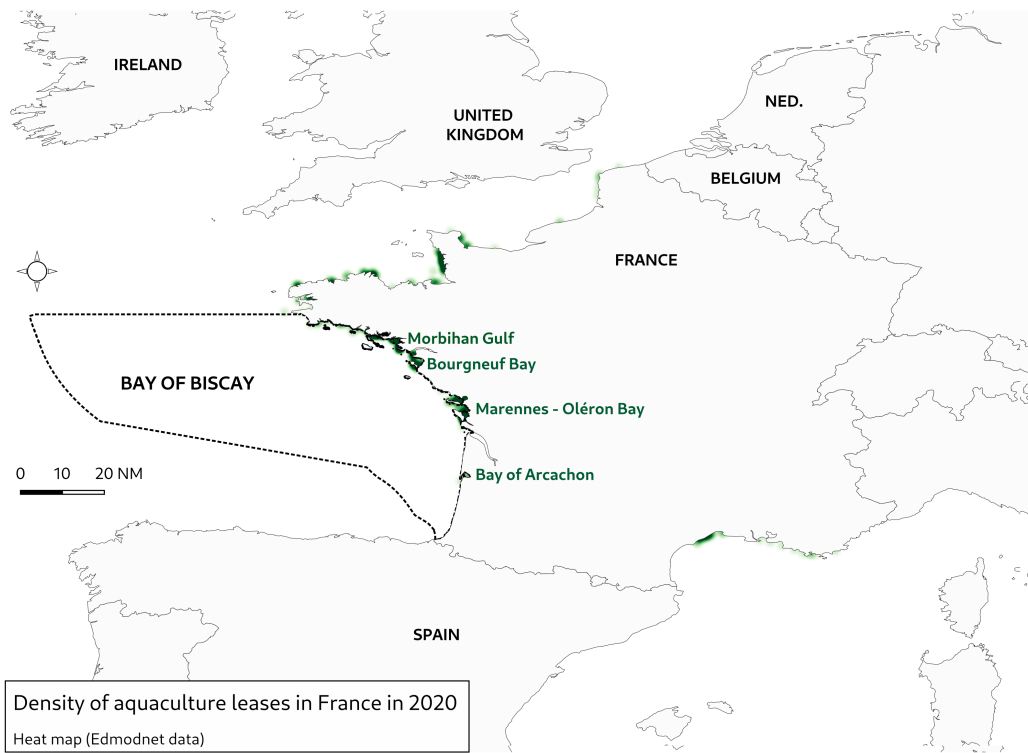


Figure 2: Geographical distribution of aquaculture in France (Guyot-Téphany J. 2022)

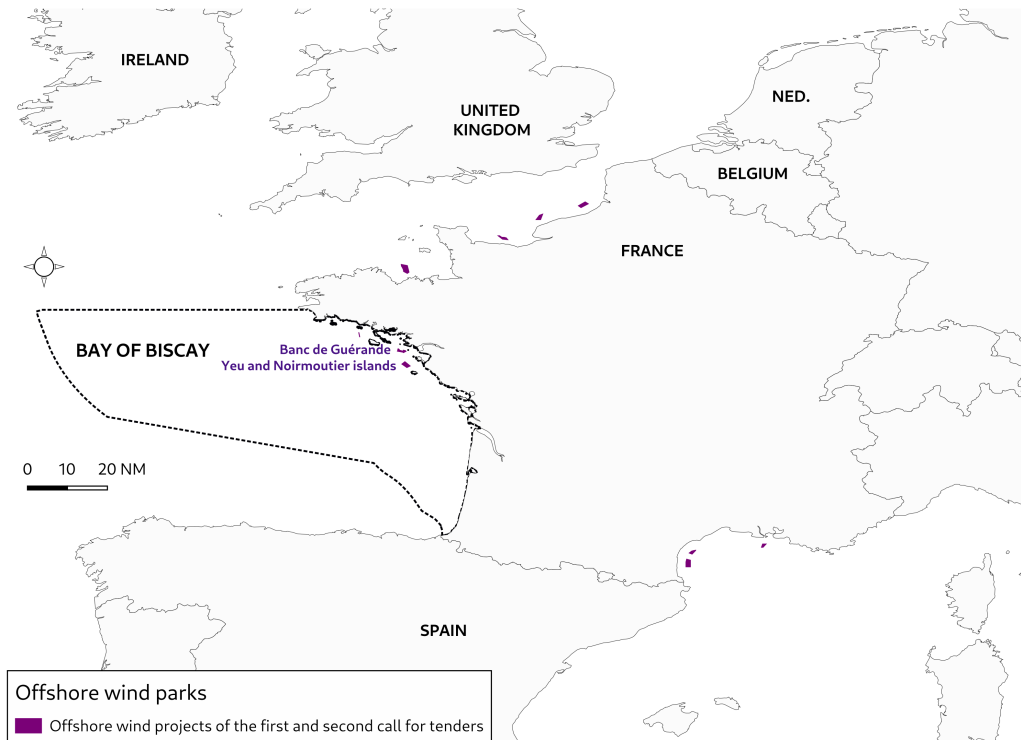


Figure 3: Geographical distribution of the main offshore wind farm projects in France (Guyot-Téphany J. 2022)

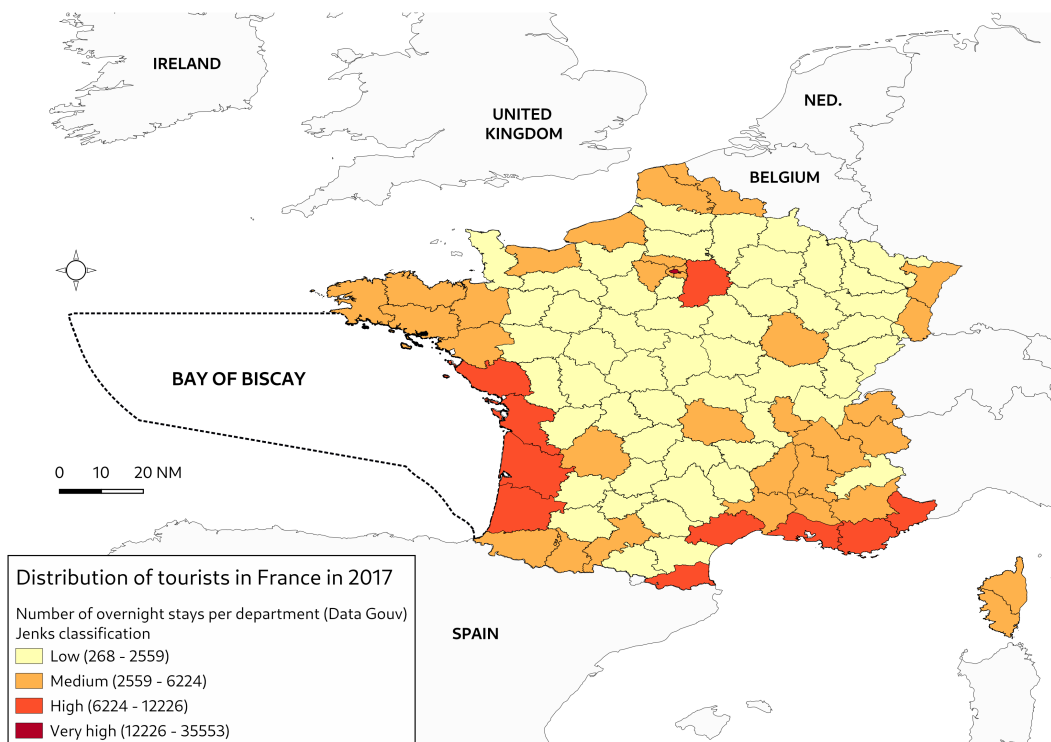


Figure 4: Geographical distribution of tourist stays in France (Guyot-Téphany J. 2022)

Over the last decades, the Bay of Biscay’s maritime economy has undergone significant changes. On the one hand, some of the well-established sectors such as the fishing, aquaculture and shipbuilding industries have shown signs of weakness, despite their political weight. Coastal territories economies are now driven by services activities among which tourism plays a very important role. In fact, the Atlantic coast is one of the most touristic territories in France, especially Loire-Atlantique, Vendée, Charente-Maritime and Landes. On the other hand, new ocean functions or uses like nature conservation and marine renewable energies have emerged. Although offshore wind development is still very limited compared to other European countries, France is looking increasingly offshore to achieve ambitious energy targets. Offshore wind is supposed to provide 5 GW by 2028<sup>1</sup> and even 40 GW by 2050 according to recent announcements<sup>2</sup>. The first offshore wind farm was put into service near Saint-Nazaire city in 2022 and four other projects are already planned in the Bay of Biscay. The French State recently passed a bill<sup>3</sup> aiming to facilitate and accelerate the development of offshore

<sup>1</sup> Loi de programmation pluriannuelle de l’énergie 2019 - 2023: [https://www.ecologie.gouv.fr/sites/default/files/20200422\\_Programmation\\_pluriannuelle\\_de\\_l%27e%CC%81nergie.pdf](https://www.ecologie.gouv.fr/sites/default/files/20200422_Programmation_pluriannuelle_de_l%27e%CC%81nergie.pdf)

<sup>2</sup> See President Macron’s discourse on September 12 2022: <https://www.elysee.fr/emmanuel-macron/2022/09/22/inauguration-du-premier-parc-eolien-en-mer-francais-a-saint-nazaire>

<sup>3</sup> Loi relative à l’accélération du développement de la production d’énergies renouvelables: <https://www.legifrance.gouv.fr/dossierlegislatif/JORFDOLE000046329719/>

wind projects to catch up with pioneering countries and even become a leader in the field of floating offshore wind.

## Multi-use rationale and drivers

The emergence of new marine uses and functions often leads to mistrust and sometimes to antagonisms between stakeholders, but rarely to cooperation. On the one hand, the deployment of offshore wind energy generates tensions with established marine uses, notably with commercial fishing. Formal consultation processes were created at the national, regional, and local levels to involve fishermen in wind farm development, zoning, and design. However, the massification and acceleration of offshore wind development in the Bay of Biscay generate tensions between developers and fishers. On the other hand, the development, diversification, and expansion of tourism put seasonal pressures, especially on shellfish farming. While some stakeholders take advantage of tourism to diversify, most of them remain indifferent to tourism.

In this context, public authorities are seeking, through marine spatial planning, to find a middle ground between secular and emergent marine uses. In this respect, the National Strategy for the Sea and Coastline aims to:

*“better organize a reconciliation of uses which takes account of the fact that activities may coexist or follow on from each other in time in the same place, in accordance with good ecological status” (MTES 2017)*

Beyond co-existence, the State also looks at developing synergies between activities at sea, as it is the case of *pescatourism and multi-use offshore platforms*.

*“synergies between tourism, fishing, and aquaculture sectors need to be deepened” (MTES 2017).*

*“the infrastructure sector needs to take a greater interest in the new prospects opened up by multi-use offshore platforms. They would allow the development of activities zones at sea facilitating the establishment of facilities dedicated to the exploitation of marine resources” (MTES 2017).*

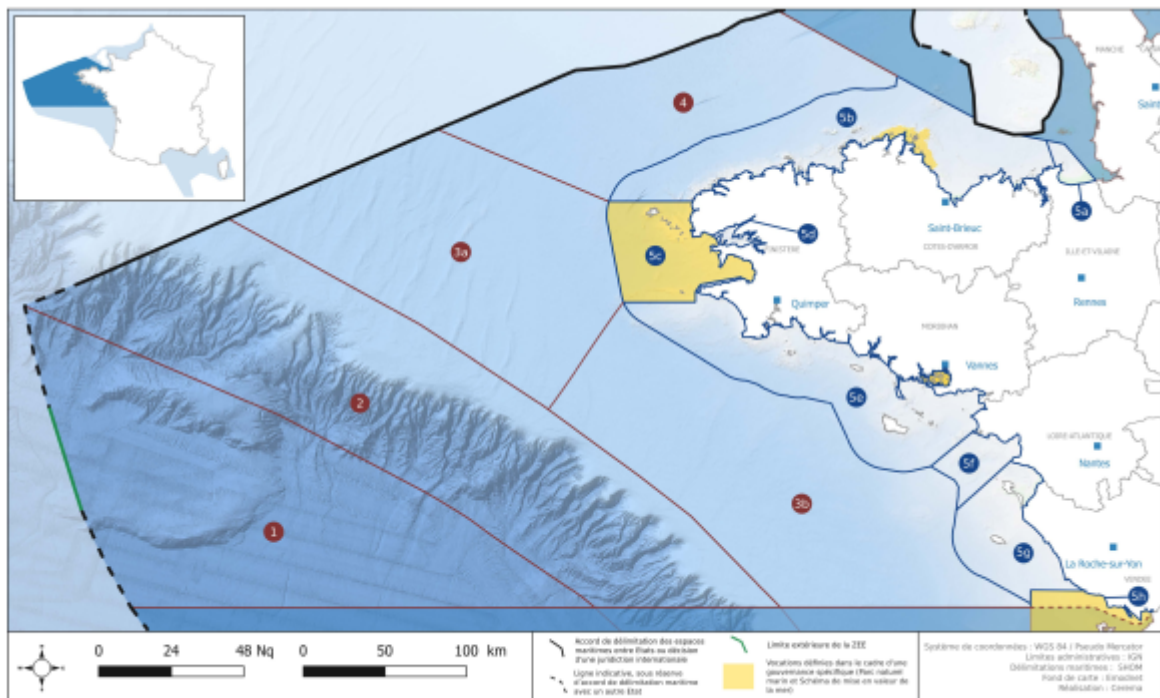
But unlike other European countries, marine spatial planning in France does not explicitly focus on multi-use – except in the case of multi-purpose offshore platforms – but is seeking the long-term co-existence of diversifying activities at sea. This is reflected in the maritime spatial plans implementing the national planning strategy at the regional level. For instance, the purpose of the North Atlantic West English Channel is to:



*“promote, through marine spatial planning, the cohabitation of multiple uses in time while maintaining access to resources, preserving marine habitats, maritime security, and developing the blue economy” (MTES 2019)*

The focus on co-existence is reflected in the “maps of vocations”, i.e. general large-scale planning map divided into large zones allocated to priority marine uses in combination with a series of secondary activities. As explained in the NAMO master document, in each zone:

*“The priority is given to one or several activities or environmental requirements in cohabitation with other activities. It is therefore not a question of excluding but to foster marine uses cohabitation while achieving strategic objectives” (MTES 2019).*



**Figure 5: North-Atlantic West-English Channel "map of vocations"**

Although the plans do not explicitly refer to multi-use, it mentions the possibility of going beyond basic co-existence in order to foster:

*“the social acceptance of activities, projects, and stakeholders, particularly with regards to activities involved in the allocation of dedicated spaces or in the search for synergies (MRE, aquaculture, marine aggregates extraction, ports creation or extension, land and nautical events) (MTES 2019).*

However, the NAMO plan of action does not explain how these intentions can be translated into practice. In the South Atlantic district (i.e. the other MSP unit located in the Bay of Biscay), there are even no strategic nor practical recommendations for increasing synergies between maritime industries. The lack of recognition of and support for multi-use and related concepts can be explained by the French approach to maritime spatial planning and offshore wind development. The will to ensure to long-term co-existence of marine uses results in efforts to maintain, as much as possible, fishing (including based on active gears) and other activities within the perimeter of offshore wind parks. Therefore, the need to integrate other activities or functions is not as important as in other countries where marine users were a priori excluded or displaced.

Although multi-use may not be a necessity in France and the Bay of Biscay, marine users, planners, and policy-makers have an interest in exploring how this concept can be integrated into the region's transforming maritime economy. In the context of increasing constraints and uncertainties at sea (environmental changes, high fuel costs, geopolitical conflicts, etc.), secular activities such as fishing and aquaculture may take advantage of emerging sectors to diversify and thereby become more resilient. At the same time, the acceleration of offshore wind developers encourages developers to collaborate with other users and more broadly with coastal communities to foster the social acceptance and territorial integration of their projects.

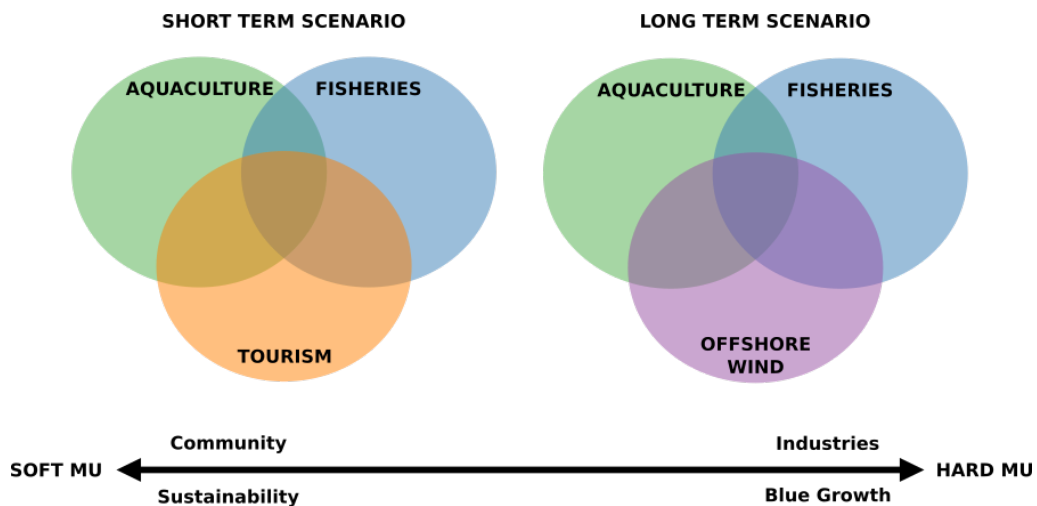
#### **Fishing and aquaculture-based tourism**

Fishing and aquaculture-based tourism developed informally at the beginning of the 2000's. But after E. Michelin, director of the Michelin company, died together with a professional fisher next to Sein Island in 2006, pescaturism was banned. A new regulatory framework was set up in 2011 and European institutions as well as local organizations assisted fishers and shellfish farmers interested in diversifying through tourism. However, regulations are too restrictive, and procedures to obtain permits are too complex to impulse the development of fishing and aquaculture-based tourism. In this context, the number of fishers taking tourist onboard declined over the last decade. Public authorities as well as professional representatives did not give up the idea to promote fishing and aquaculture-based tourism. Aquaculture and even more fishing are facing numerous challenges. Despite their significant economic and cultural importance, both aquaculture and fishing have become less appealing to younger generations due to their arduous physical demands. Aquaculture is challenged by environmental changes. Although many fish stocks recovered over the last decades, small-scale fishing is hampered by increasing fuel costs, environmental changes, emerging uses (i.e., marine conservation, marine renewable energies), Brexit, etc. Therefore, tourism represents an opportunity to diversify to better resist economic, political, and environmental changes.

### Fishing within offshore wind parks

Regarding offshore wind farms, the French State decided not to exclude systematically fishing activities, as opposed to most pioneering European countries. For instance, passive fishing gear will be allowed in the first operational park located off Saint-Nazaire city. In some other projects under construction or planned, it is even expected that active gears will be allowed thanks to adaptations in the parks' design and connection to the grid. This was and will be achieved through the local consultation process. Fishers who won't be able to fish within offshore wind farms anymore or who are impacted by their construction will receive financial compensation. However, public authorities and offshore wind developers are interested in innovative multi-use solutions to secure positive relationships with fishers and explore synergies with other users like shellfish farmers.

## Multi-use scenarios



### Short-term scenario: fishing, aquaculture and tourism

The short-term scenario consists in the combination of fishing and / or aquaculture with tourism, which are also referred as “pescaturism” by scholars and practitioners (Piasecki et al. 2016). They represent a specific form of multi-use as they involve a single user, as opposed to most other marine uses combinations. Besides, they emerged before and independently from multi-use concept (i.e. in the late 1980's in Mediterranean countries, especially Italy and Greece). It is only during the past decade, under the work of scholars involved in multi-use projects, that pescaturism practices were labeled as multi-use (Bocci et al. 2019).

Pescaturism falls into the “symbiotic use” category of Schupp et al.’s classification (Schupp et al. 2019). Fishing or aquaculture and tourism are based on temporal, spatial and functional relationships. Commercial fishers or shellfish farmers take tourism onboard so they can discover their job, techniques, traditions, etc. They carry on both activities at the same time and at the same place.

However, tourists can not directly participate since they are not allowed to manipulate gears and products. Despite the limited functional integration between activities, fishing or aquaculture-based tourism can be considered a true win-win multi-use system. On the one hand, tourism is an opportunity to diversify and thereby to better resist external shocks. It contributes to decreasing pressures on fish stocks as fishers can make money out of a non-extractive activity. Although it generates direct revenues for fishers and shellfish farmers, indirect benefits are more important. It is a way to promote unknown professions, their history, territories, challenges, etc. Perceptions of fishing and aquaculture are often changed after tourists spent a day at sea. On the other hand, this new touristic offer meets a new demand. It is often part of a larger strategy aiming at attracting tourists, generating additional income for other local companies, and promoting coastal territories.

### **Long-term scenario: fishing and/or aquaculture within offshore wind farms**

The long-term scenarios consider the integration of fishing and/or aquaculture activities into offshore wind farms located in the Bay of Biscay. Opening wind farms at sea to secular activities is supposed to foster their social acceptance and territorial integration. However, the two considered combinations are quite different as they involve distinct functional and spatial relationships.

Taking advantage of offshore wind development to expand aquaculture toward open waters corresponds to the original multi-use concept (B.H. Buck, Krause, and Rosenthal 2004; B. H. Buck et al. 2008; B. Buck, Krause, and Rosenthal 2004) and its industrial archetype. This combination falls into Schupp et al.'s type 1 (multi-purpose/multifunctional use) or 2 (symbiotic use) (Schupp et al. 2019) depending on the level of effective integration between both activities. Nevertheless, producing seafood offshore requires overcoming numerous technical, environmental and economic challenges as evidenced by the plentiful literature on the subject (Wever, Krause, and Buck 2015; Sander W. K. van den Burg et al. 2020; Jansen et al. 2016; B.H. Buck et al. 2017). Moreover, the few existing operational cases (i.e. Netherlands, Belgium, etc.) are located in shallow water and were made possible thanks to strong political support (Steins et al. 2021), which is not (yet) the case of France. In sum, there are clear potential synergies between aquaculture and offshore wind, but this combination remains very uncertain.

By contrast, it is expected that fishing will be allowed within offshore wind farms although mutual benefits between both activities are very limited, not to say inexistent. The French Maritime Spatial Planning approach aims to maintain, as much as possible, fishing activities within offshore wind farms, as opposed to most pioneering European countries. For instance, some passive fishing gear are allowed in the first operational park located off Saint-Nazaire city. In other words, this combination corresponds to the Schupp et al.'s type 3 (co-location) (Schupp et al. 2019). However, public authorities and offshore wind developers are interested in innovative multi-use solutions to secure relationships with fishers and explore synergies with other users like seafood producers.

## Key actors

The Multi-Frame project and its different case studies relied on a common strategy to consult actors potentially concerned by and interested in multi-use scenarios. Beyond information produced to assess the potential, benefits, and challenges of each combination, the objective was to raise awareness about multi-use opportunities and foster multi-use developments. The stakeholder engagement strategy was based, in each case study, on the following three-step process:

1. Desk research was conducted in 2021 to gather the background information needed and to identify the stakeholders to consult and engage
2. Semi-structured interviews (20) were carried out between late 2021 and mid-2022 to produce the information and data needed to assess the multi-use scenarios
3. Two-panel group sessions were organized in late 2022 to validate, deepen and disseminate the main findings

In the French case study, the second step has been split in two: a first phase of 7 exploratory interviewees and a second one during which 19 interviews were conducted based on Multi-Frame's interview guide. It should also be noted that most case study leaders followed different approaches for the panel groups. In France, it was decided to engage stakeholders in a participatory mapping exercise in order to capture possible spatial relationships between activities involved by 2050. All this information produced served as a basis for the implementation of the Multi-Use Assessment Approach<sup>4</sup> (MUAA), a guide for practitioners interested in fostering multi-use solutions. But it was first and foremost used to analyze the French multi-use scenarios in relation to the other case studies.

Stakeholders potentially concerned by and interested in the two multi-use scenarios are numerous and diverse. The initial stakeholder identification exercise conducted in early 2021 listed about 30 different entities falling into 7 main groups: regulatory stakeholders, policy stakeholders, influential organizations, investors, research and integration actors, information providers, and media channels. The resulting map provides a clear overview of relevant actors in different spheres and on different geographical scales.

---

<sup>4</sup> See <https://www.submariner-network.eu/multi-frame-news/89-multi-frame-news-and-events/1055-ocean-multi-use-assessment-framework-muaa-published-by-multiframe-project>



This map was used to identify **primary (PS)** and **tier-two (T2S)** stakeholders to engage into the assessment of the two multi-use scenarios. 19 different stakeholders were selected based on their knowledge and interest in combining marine uses as well as their availability for **exploratory (EI)** and **common interviews (CI)**.

### Fishing (F):

- Regional Fishing and Marine Breeding Committee of Bretagne (PS, CI)
- Regional Fishing and Marine Breeding Committee of Pays-de-la-Loire (PS, EI)
- Departmental Fishing and Marine Breeding Committee of Charente-Maritime (PS, CI)

### Aquaculture (A):

- Shellfish Farming Committee of Arcachon (PS, CI)
- Shellfish Farming Committee of Pays-de-la-Loire (PS, CI)
- Shellfish Farming Committee of Charentes-Maritime (PS, CI)
- Syndicat Mixte pour le Développement de l’Aquaculture et de la Pêche en Pays-de-la-Loire (T2S, CI)

### Offshore wind developers and operators (E):

- Electricité de France – Renouvelables, EDF-R (PS, EI)
- WPD offshore France (PS, CI)
- ENGIE (PS, CI)
- Réseau de Transport d’Electricité, RTE (T2S, CI)

#### Political institutions (P):

- Ministry of the Sea (T2S, CI)
- Inter-regional Direction of the Sea of Nouvelle-Aquitaine (T2S, CI)
- Bretagne Region (T2S, CI)
- Pays-de-la-Loire Region (T2S, CI)

#### Lobbies and influential organizations (L):

- France Energies Marines (T2S, CI)
- Pôle Mer Bretagne Atlantique (T2S, EI)
- Association du Grand Littoral Atlantique, AGLIA (T2S, EI)

#### Research and Innovation (R):

- Cellule Mer, Capacités (T2S, EI)

Although this list is not comprehensive, it includes representatives of the economic sectors concerned with multi-scenarios, with the notable exception of tourism. This is explained by the specificity of fishing and aquaculture-based tourism, an activity that involves a single user (i.e. fishers and shellfish farmers).

### Trust and Collaboration Between Key Actors

The overall level of trust and collaboration between key stakeholders is average. However, there are significant differences according to the economic sectors involved. For instance, it is very low between commercial fishers and offshore wind developers, while the latter is supported by political institutions and influential organizations. As a rule, there is a structural antagonism between secular temporary mobile activities at sea like fishing, and new permanent fixed one such as offshore wind. This opposition is reinforced by the fact that traditional marine uses are in crisis whereas the offshore wind industry is supported by political institutions to fight climate change. But this general picture reflects the limitations of basic compatibility matrices in understanding the complex relationships between stakeholders (Daniel and Guyot-Téphany 2021). Not it is difficult to define complex interactions using such general categories, but these interactions can also evolve both in space and time. In this respect, the Saint-Nazaire and Saint-Brieuc wind farms projects show how versatile and different relationships between developers and fishers can be (Oiry 2017).

Power–interest matrices provide a better view of the nature of relationships between actors. The engaged stakeholders fall into two groups out of four possible. First, fishers and shellfish farmers’ representatives belong to the “crowd”: they both have low power and interest in multi-use. Second, the rest of the stakeholders correspond to the “players”: they have a medium-high power and interest in multi-use. Although this situation is favorable to the engagement of stakeholders in multi-use scenarios, care must be taken to ensure that skepticism or even critics of traditional sea users regarding this new concept are properly taken into account.

	Fishing	Aquaculture	Offshore wind	Political institutions
Fishing		Medium	Low	Medium
Aquaculture	Medium		Medium	Medium
Offshore wind	Low	Medium		High
Political institutions	Medium	Medium	High	
Influential organizations	Medium	Medium	High	Medium

Low
Medium
High

Figure 6: Sectoral compatibility matrix

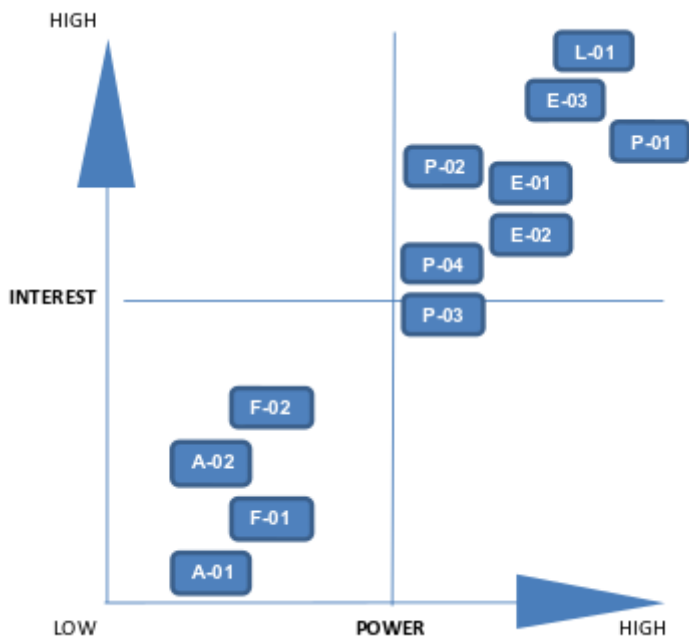


Figure 7: Power - interest grid

### Examples of coordination:

#### OFFSHORE WIND & FISHING:

The development of offshore wind energy in the Bay of Biscay, as well as in the rest of France, generated tensions with professional fishers. Creating wind farms can limit fishing activities and consequently weaken small-scale fisheries which are already facing numerous challenges such as declining stocks, increasing fuel costs, and the Brexit. Fishers are not necessarily opposed to offshore wind energy and their relations to the wind industry depend on the circumstances in each of the projects. For instance, the Pays-de-la-Loire Regional Fishing and Marine Breeding Committee already reached agreements with the developers of the Saint-Nazaire wind farm regarding the farm design and financial compensations for the authorization of passive fishing gear.



**OFFSHORE WIND / AQUACULTURE:**

Some shellfish farmers consider the deployment of wind energy at sea as an opportunity to expand offshore. However, even though Regional Aquaculture Committees and organizations such as the SMIDAP are pushing forward pilot projects, marine aquaculture is still in an early development stage. Many technical and financial challenges need to be addressed before developing aquaculture within wind farms. Moreover, participating in such projects require large investment capacities while family and small-scale business, which are the majority in the Bay of Biscay, fear that they may not be able to compete with bigger companies.

## Risks, constraints, and opportunities for multi-use development

### Multi-use concept understanding and perceptions

The exploratory interviews showed that multi-use concept was not properly understood in France or even contested. This result was confirmed during the second series of interviews which opened with a section dedicated to evaluating the level of knowledge about multi-use.



Figure 8: Level of knowledge of the second series of interviewees regarding multi-use concept

In fact, only 7 interviewees out of 19 defined it as synergistic marine uses combinations (1 during the exploratory interviews and 6 during the common ones). Not surprisingly, most of them work for the offshore wind industry or public institutions involved in marine spatial planning, where multi-use has become a fashionable concept. Most interviewed stakeholders refer to similar, yet different, terms such as “co-activity”, “multi-activity” or “co-use”. For instance, a member of a public institution used to first word defining it as:

*“Several activities co-exist within the same territory. It is the opposite of reserving space for a single activity”.*

A member of an influential organization made a similar comment stating that multi-use is:

*“the co-existence of various economic stakeholders within the same area considering that they will have to share it with marine renewable energies”*

The gap between the original definition of multi-use and the way it is perceived in France can be explained by two main factors. First, this concept is relatively new, and, like many buzzwords, its definition is not always very clear. Second, the idea of combining different activities at sea to achieve synergies does not really fit the co-existence-based approach to maritime spatial planning and offshore wind development in France:

*“Everyone knows about multi-use; it’s already implemented. The Document Stratégique de Façade [MSP plan] includes a map of existing activities at sea. There are many different activities such as fishing, marine energies, and marine protected areas. So multi-use is something common.”*

This is a view shared by representatives of traditional activities, particularly by professional fishermen, who state that multi-use is the rule rather than the exception:

*“Many activities co-exist at sea, within the same areas, in contiguous areas. For instance, fishing is taking place in zones where marine aggregates are being exploited or on major shipping routes. So multi-use is an already existing practice”.*

This opinion expresses the experience of secular sea users in sharing marine spaces and resources as well as fears of being deprived of these rights due to the development of emerging activities:

*“Fishers are afraid of further developing [multi-use] within specific projects because they already know the terrain and see every day what is happening there. They know that sharing space with professional or leisure activities is not easy.”*

In summary, the multi-use is mainly defined by interviewees in light existing practices and the co-existence concept which currently guides marine and energy policies in France. Differences in the way multi-use is understood echo tensions or even antagonism between secular activities, especially fishing, and new functions or uses such as marine protected areas and offshore wind development.

Explaining engaged stakeholders, the way multi-use is defined within the MultiFrame project, and presenting the two multi-use scenarios made it possible to clarify this concept, partially at least. A few stakeholders met this new definition with skepticism or even stated that combining marine uses was “science fiction”. Additionally, most stakeholders involved in fishing or aquaculture-based tourism were reluctant to refer to these practices as multi-use. Not only they highlighted the fact that they involve a single user, but also that the term “pescatourism” better describes the combination of fishing, aquaculture, and tourism.

Difficulties in moving from co-existence to exploring synergies between human activities at sea represent the key outcome of the French case study. Although engaged stakeholders agreed to continue the interviews to assess the two multi-use scenarios, discussions were shaped by the fact that co-existence better describes existing practices or at least represents an ideal to strive for. Surprisingly, this was also the case for offshore wind developers and operators. Even if they are aware of what the multi-use concept means and even interested in multi-use solutions, they are currently busy reaching compromises with other sea users, especially fishermen.

## PESTEL

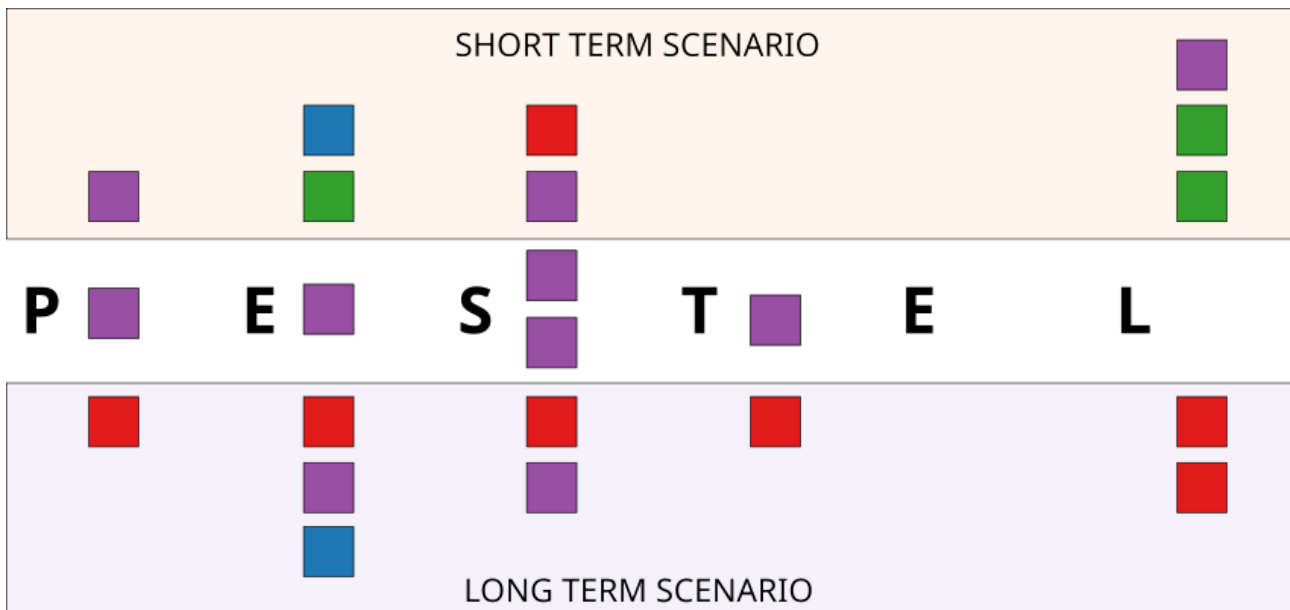


Figure 9: Identification of priority PESTEL categories across the short and long-term multi-use scenarios

Among the PESTEL categories<sup>5</sup>, economic, social, policy and legislation aspects were identified as the most important ones. This distribution echoes common issues identified in the scientific and gray literature such as blue growth field (S.W.K. van den Burg et al. 2020; 2019; Abhinav et al. 2020; Dalton et al. 2019), technical feasibility (B. H. Buck et al. 2006; S. van den Burg et al. 2016; Sarmiento et al. 2019; Jansen et al. 2016) and governance (B. Buck, Krause, and Rosenthal 2004; Gesche Krause and Stead 2017; Stuiver et al. 2016). Although social aspects are also covered by multi-use experts (Stelzenmüller et al. 2016; G. Krause and Mikkelsen 2017; Michler-Cieluch, Krause, and Buck 2009; Lacroix and Pioch 2011), their perceived importance contrasts with how multi-use is usually apprehended. Interviewees who selected this category stated that the two proposed scenarios should first and foremost strive for societal goals and rely on a socio-political process including all marine users and coastal communities. In this respect, the spatial dimension of multi-use, which was not considered in the PESTEL categorization, emerged as a central issue. Several interviewees questioned

<sup>5</sup> Policy and governance; economy; society; technology; environment and legislation.

the idea that it represents a radical change from exclusive rights to the inclusive sharing of space and resources. This shows that multi-use is more than technical and management solutions to address the problem of intensifying and diversifying human activities. Finally, it is striking that no interviewee decided to focus, at least directly, on environmental aspects. This result confirms that the sustainability of multi-use system is not a hot topic despite the lack of knowledge regarding their potential ecological impacts on marine ecosystems.

Although most interviewees remain skeptical about transposing the concept of multi-use to France, they perceived the importance of considering overlooked synergies between marine uses in the Bay of Biscay, especially between fishing or aquaculture and offshore wind. In fact, co-existence may not be enough considering the accelerated development of marine renewable energies.

### Short-term scenario: fishing and aquaculture-based tourism

#### Positive Scenario:

The development of coastal tourism represent an opportunity for fishers and shellfish farmers to diversify and promote secular activities. Taking tourists onboard generates direct benefits, especially during low activity periods, while reducing pressures on marine ecosystems in the case of fishing. It is also a way to reverse pre-conceived ideas about fishing and aquaculture and thereby to gain new customers and attract workers. More broadly, pescatourism aim to promote activities, territories and challenges relatively unknown to the general public. Beyond fishers and shellfish farmers, combining fishing or aquaculture with tourism benefit to coastal communities and territories.

#### Negative Scenario:

Initiatives combing fishing or aquaculture with tourism are hampered by difficulties in obtaining permits, low profitability, and a lack of political and financial support. Missed opportunities to take advantage of tourism to strengthen small-scale fishing and aquaculture resulted in a lack of interest regarding pescatourism.

Fishing and aquaculture are seasonal activities governed by the cycle of species fished and farmed and cadenced by the tides. As such, seasonal changes as well as poly-activity are part of these professions. Tourism is also a seasonal activity that takes place between April and October and

reaches its maximum in July and August. Combining fishing or aquaculture with tourism can be a way to generate additional revenues during low-activity periods. For instance, oyster farmers have more time to interact with tourists in summer compared to autumn and winter. At the same time, daily rhythms can be a constraint: fishers use to leave early in the morning and shellfish farmers depend on the tide.

Fishing and/or aquaculture-based tourism targeting social rather than environmental or economic goals. They represent opportunities to promote professions relatively unknown to the general public and often suffering from a negative image. Many people do not know much about aquaculture (i.e. species farmed, techniques used, constraints, etc.), although it is taking place on the seashore. It is even worse regarding fishing since fishing grounds are located offshore. Fishing is often reduced to an extractive activity producing environmental impacts (i.e. resource depletion, accidental captures, destruction of seabed's, etc.) while the Bay of Biscay is home to small-scale fishing fleets. Taking tourists onboard can contribute to decreasing pressures on marine ecosystems, especially in the case of fishing. It is also supposed to generate new sources of income and indirect economic benefits by gaining new customers. But it first and foremost achieves social goals: change pre-conceived ideas about aquaculture and fishing. It is a way to promote unknown professions, sites, and techniques unknown to the general public. Pescatourism is often part of broader strategies developed to promote secular activities and the way they shape local territories.

Although pescatourism is a true "win-win" combination, its potential is constrained by a series of barriers. First, obtaining permits to take tourists on board is still complicated despite the new regulatory framework adopted in 2011. Moreover, the experience is limited by the fact that tourists are not allowed to manipulate fishing gear and products. Second, investments required to adapt boats are high, especially for small-scale fishing or aquaculture businesses. Even more so as pescatourism is not always as profitable as other forms of diversification through tourism. In this respect, pescatourism proved to be too dependent on incentives and subsidies provided by European, regional, and local institutions. This is the reason why many initiatives were abandoned, especially in the field of fishing-based tourism, and why pescatourism declined over the last decade. Finally, even if aquaculture-based tourism is developing locally (i.e. the Bay of Arcachon), it is *per se* limited to the main shellfish production areas. Therefore, the possibility of further developing pescatourism and scaling up this combination seems quite limited. In other words, this multi-use scenario may belong to the past rather than the future.

**Opportunities, benefits, constraints, and constraints crossed with PESTEL**

- Policy & governance aspects**
- Economic aspects**
- Social aspects**



Technology aspects

Environmental aspects

Legal aspects

### Opportunities:

- **Strong post-pandemic rebound in tourism** – over the past three years, local tourism has increased significantly, especially in coastal areas.
- **Growing interest in fishing and aquaculture** – French and foreign visitors are increasingly interested in discovering and experiencing “traditional” activities such as fishing and aquaculture.
- **Better resist external shocks** – diversifying through tourism can increase aquaculture’s resiliency to economic and environmental hazards.
- **Promote fishing and aquaculture** – diversifying through tourism can change the way the general public perceives fishing and aquaculture, make the challenges these activities face better known, and sometimes attract new workers

### Benefits:

- **More steady revenues** – pescatourism provides limited yet additional sources of income, which gets interesting regarding the rise of fuel costs.
- **Develop the clientele** – visitors who discover shellfish farms and oysters can become new clients and ambassadors.

### Constraints:

- **Investments** – investments need to be made to adapt boats to tourism’s needs and standards.
- **Permitting procedures** – even though the regulatory framework was clarified in 2011, getting permits is still difficult as well as resource and time-consuming.
- **Local dynamics** – since aquaculture-based initiatives rely on local interests and dynamics, they are difficult to scale up.
- **Declining interest in pescatourism** – during the last decade, European, national, and local institutions supported fishers interested in diversifying through tourism, but since results were disappointing the interest in pescatourism significantly declined over the past years.

### Risks:

- **Low profitability** – pescatourism may not be as profitable as expected, especially considering the high investments needed, especially with fishing-based tourism.

- **Safety risks** – ensuring visitors’ safety is a major concern since it can impact the business and lead public authorities to suspend licenses or even ban fishing and aquaculture-based tourism.

## Long-term scenario: fishing and aquaculture within offshore wind farms

### Positive Scenario:

The acceleration of offshore wind development encourages developers, fishers, and shellfish farmers to collaborate with each other and thereby to move from basic co-existence to multi-use. On the one hand, trust established and agreements achieved between the offshore wind industry and fishers could serve as a basis for increased cooperation or even synergies. On the other hand, the deployment of offshore wind farms in general and floating wind technologies in particular provides opportunities for shellfish farmers to expand offshore. Beyond fishing and aquaculture, offshore wind can also be combined with other activities or functions like tourism, recreation or environmental monitoring.

### Negative Scenario:

The acceleration of offshore wind development and the deployment of floating wind parks broke trust and stopped all forms of collaborations between developers and fishers. Wind farm projects are contested by sea users and coastal communities, resulting in major delays in meeting energy targets. The wind industry is driven by an economic competition between wind developers at the expense of innovative solutions to integrate other sea users.

Offshore wind development exacerbates tensions regarding the appropriation, occupation and exploitation of maritime spaces and their resources. The creation of wind farms leads to new enclosures disrupting, displacing or even excluding other activities (Weir and Kerr 2019). This results in an antagonism between developers and other sea users, especially fishers. To avoid, or at least, mitigate conflicts, the French State decided established co-existence as a pre-condition of offshore wind projects. To that end, negotiations between offshore wind developers and commercial fishers were and are carried on within four different arenas. First, fishers’ representatives contribute to the discussions aiming at setting up national energy policies and renewable energy objectives. Second,

they are involved in the *Conseils Maritimes de Façade* which were created to implement MSP policies and define zones allocated to offshore wind production. Third, they participate in public debates organized before developing offshore wind projects. Finally, they meet frequently with offshore wind developers within the *Commissions Nautiques* to define the navigation and fishing rules of each wind park. Developers of the Saint-Nazaire project and fishers agreed upon safety rules so boats using passive gears can fish with the wind farm. This set a precedent for projects under development such as the Yeu-Noirmoutier wind farm. Allowing active fishing gear is being considered a feature of the future Oléron project.

The will to accelerate offshore wind development puts to the test trust and agreements between the offshore wind industry and fishers who already facing an existential crisis. All the more so as, this process is expected to rely on the deployment of floating wind parks whose mooring systems make co-existence with fishing activities more difficult.

Despite a very tense and versatile context, stakeholders realize they will have to further cooperate in the future. The offshore wind industry is aware it must make compromises with fishers and coastal communities to foster the social acceptance and territorial integration of its projects. Fishers do not envision direct synergies with offshore wind, but they are not against the idea of working on new form of collaborations with the wind industry. Although producing seafood offshore still raises numerous technical, economic, and social challenges, some companies are interested in and even looking at taking advantage of offshore wind development to expand offshore. This is especially the case for future floating wind parks where fishing activities may be restricted. Ongoing experiments in Pays-de-la-Loire have not been successful, showing the importance of further experiments to test the feasibility, profitability, and sustainability of this combination.

In summary, not only the long-term scenario is very dependent on the socio-political context (especially the state of relations between wind developers and fishers), but it also includes a series of combinations based on very different spatial and functional relationships. In this respect, fishing and aquaculture within wind farms need to be distinguished. On the one hand, fishing activities are already taking place in wind farms at sea, but relationships between both activities are defined by trade-offs rather than synergies, even if future collaborations cannot be excluded. On the other hand, the integration of aquaculture in offshore wind farms could benefit both sectors, but it is not realistic at the present time due to too many challenges and uncertainties. The offshore wind industry is considering the possibility of integrating other marine uses or functions like tourism, biodiversity protection, or environmental monitoring. In other words, the long-term scenario might be implemented at the end, but based on overlooked synergies.

A participative mapping exercise was carried on during two-panel group sessions with stakeholders interviewed as well as actors interested in multi-use. The objective was to reflect on the future of offshore wind, fishing, and aquaculture in the Bay of Biscay, namely their potential geographical distribution and relationships by 2050. Most stakeholders highlighted difficulties in representing the evolution of these three activities considering the many uncertainties. For instance, many participants, including fishers, stated that it was impossible to predict how fisheries would adapt to existing and



future constraints or even if they will survive them. Similarly, they did not know what form will take offshore wind development due to the lack of information regarding planning and technological choices. However, the mapping exercise ended up each time in two geographical models. First, a general distribution based on several groups of wind farms sharing a common connection to the electrical grid, where aquaculture could be developed, around which large areas would be allocated to fishing. Second, an alternative distribution expressing a decreasing intensity of use gradient from the coasts toward the open ocean: while stakeholders would have cooperated and develop multi-use solutions in near-shore waters due to the density of marine uses, they would co-exist further offshore. Interestingly, both models include further cooperation and even multi-use, especially between offshore wind and aquaculture. While the first one clearly tends to spatial efficiency, the second one is closer to the actual spatial diffusion situation.

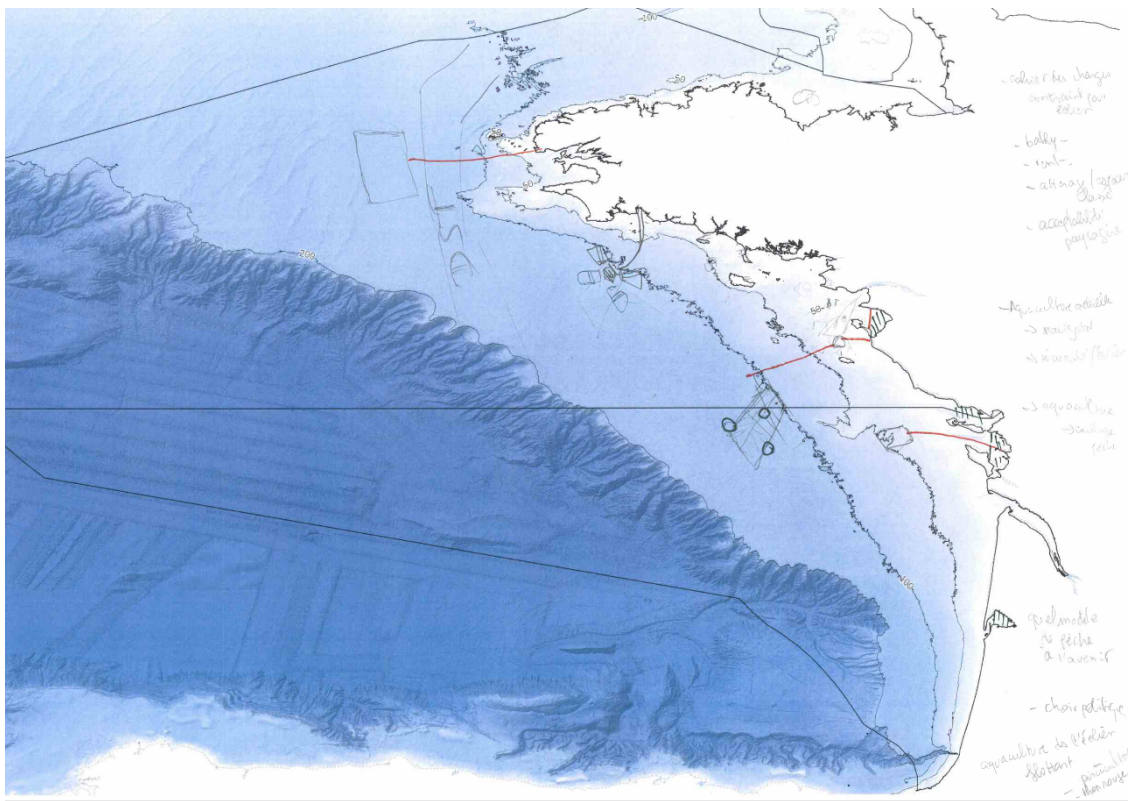


Figure 10: Model 1 - spatial efficiency / cooperation

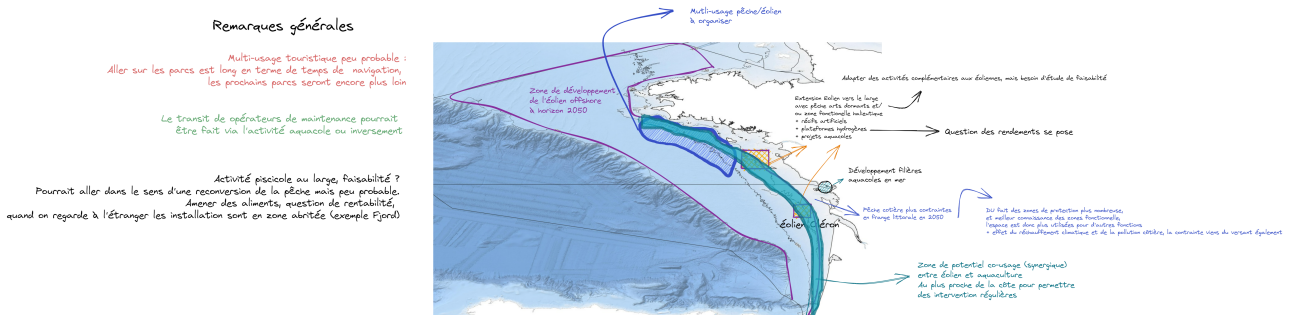
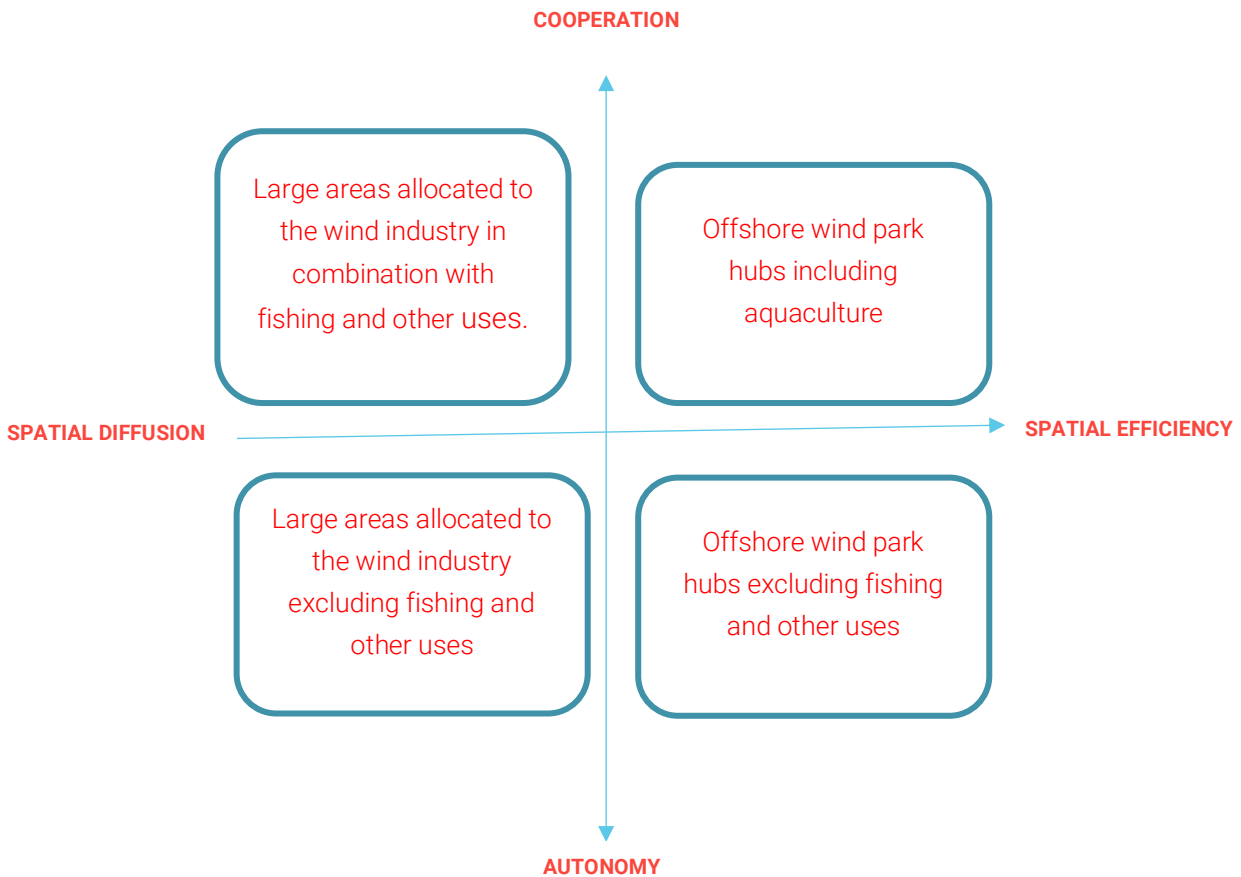


Figure 11: Model 2 - spatial diffusion / cooperation



Opportunities, benefits, constraints and constraints crossed with PESTEL

Opportunities:

- **Trust and dialogue** – the first offshore wind park projects were an opportunity to establish trust and dialogue between fishers and developers.
- **Consultation processes** – offshore wind development relies on consultation arenas established under the framework of marine and energy policies to include fishers in the process of designating, zoning and designing wind parks at sea.
- **Going further than co-activity** – fishers are aware that the accelerated expansion of offshore wind parks will require going from co-activity to multi-use.
- **National and regional support** – the national marine planning strategy as well as regional maritime spatial plans encourage the integration of aquaculture into offshore wind farms.
- **Interest in multi-use** – some aquaculture farmers perceive offshore wind development as an opportunity to expand offshore and thereby address factors limiting their activity on the seashore (i.e., pollution, conflicts, etc.)
- **Increased production** – expanding offshore may increase seafood production thanks to marine environments’ high productivity, low pollution, and lower conflict probability.



- **Floating offshore wind technologies** – despite technical, economic, and environmental challenges floating offshore wind parks seem more suitable for aquaculture than bottom-fixed ones since fishing activities would be restricted.

#### Benefits:

- **To be determined**

#### Constraints:

- **Harsh environmental conditions** – offshore aquaculture experiments in offshore wind farms have failed so far due to the harsh environmental conditions.
- **No mature business models** – producing seafood in offshore wind farms may not be as profitable and riskier as expected due to the high investments needed and the rise of fuel costs
- **Co-activity** – the French planning approached more focused on co-existence and co-activity (spatial integration) than multi-use (functional integration)
- **No clear political leadership** – even if the State publicly supports multi-use, there is no clear guidelines and framework regarding how it can and should be achieved.
- **No incentives** – there are no economic incentives so far to further integrate fishers and other marine users into offshore wind developments.
- **Floating offshore wind** – this technology is less suitable for fishing activities than bottom-fixed parks.
- **No successful multi-use pilot projects** – no project (in France) demonstrated that integrating fishing and foremost aquaculture in offshore wind farms is feasible nor profitable.
- **Competitiveness and profitability** – offshore wind developers are mainly concerned about reducing costs to compete with other companies and to attract shareholders.

#### Risks:

- **Uncertain and tense political context** – fishers' concern about offshore wind energy's expansion and acceleration threatens the trust and dialogue established with developers and public authorities
- **Consultation processes changes** – probable changes regarding how fishers are consulted and involved in offshore wind development may lead to increased difficulties in reaching agreements.

- **Conflicts between fishers and seafood producers** – aquaculture in offshore wind parks would represent an additional constraint to fishing activities and thereby lead to increased tensions with fishers.
- **Conflicts between seafood producers** – only big companies would be able to invest in offshore aquaculture, which may lead to unfair competition and thus tensions with small businesses located on the seashore.
- **Insurance** – it is still not clear whether insurance companies will deliver permits if aquaculture is integrated to offshore wind farms.

## Solutions and actions

---

**Understanding of MU** – Multi-use is mainly understood in France as the long-term co-existence of human activities at sea. This reflects the French approach to maritime spatial planning and offshore wind development which aims to ensure the long-term cohabitation of different uses of marine spaces and resources and to maintain fishing activities within offshore wind farms. Therefore, combining marine uses other than fisheries with wind farms to achieve synergies does not make much sense, at least for now, as opposed to other countries in Europe. This is due to the fact that the combination with fisheries is already taking place and appears to be of most interest, given the pre-existing fishing grounds and active fisheries. In this respect, imposing other multi-use combination concepts and their rationale to stakeholders in France may appear out of touch with reality or even counter productive. However, it can be used to frame discussions regarding the future of human activities at sea, especially relationships between the offshore wind industry, other sea users, and coastal communities. It can help to encourage stakeholders to consider and develop overlooked synergies.

---

### Establish a permanent network for multi-use.

Build upon the network of engaged stakeholders to strengthen discussions about multi-use opportunities and challenges, and to explore, design or even experiment new functional relationships with the offshore wind industry. Beyond existing negotiations with commercial fishermen and possible collaborations with aquaculture businesses, cooperation between offshore wind developers, sea users and coastal communities could be developed, especially in fields of tourism, recreation, education, research or environmental monitoring. These overlooked synergies could provide opportunities for marine users, including commercial fishermen, and thereby foster a greater social acceptance and territorial integration of offshore wind parks. For this to work, this network should be decoupled from existing formal discussion and negotiation arenas and be based on open, informal and inclusive discussions in order to foster trust, creativity and new forms of collaboration. Participatory mapping workshops can be used (as they were during the panels) to work on multi-use scenarios and envision possible future spatial and functional relationships between the offshore wind industry and other marine uses.

## Better articulate multi-used with marine and energy policies

Most engaged stakeholders agree on the idea that the French State and its deconcentrated services should further support multi-use to encourage synergies between offshore wind and other sea uses. This is particularly evident in the case of marine policies: although the national strategy and regional maritime spatial plans mention a possible integration of aquaculture and other marine uses to offshore wind farms, they don't explain how. Not only other combinations need to be considered, but engaged stakeholders should be supported in the process of identifying existing challenges in combining different activities at sea (i.e., incentives, regulatory adaptations, permit and insurance issues, etc.) and possible solutions to address them. This also applies to energy policies, especially to the offshore wind tendering calls.

## Encourage multi-use experiments and feedback on successful multi-use initiatives.

Allow small as well as large-scale multi-use experiments to get information about the feasibility, profitability, governance, and sustainability of different marine uses combinations. Create a network of multi-use initiatives to build upon this information and share it to stakeholders interested in developing multi-use solutions.

**Table 1. List of recommendations**

Solution	Key action and responsible actor	Level of urgency
<b>Social:</b> Establish a permanent network for multi-use	Structure a community of stakeholders interested in multi-use to foster discussions about synergies between marine uses	●
<b>Policy:</b> Integrate multi-use in marine spatial planning	Give multi-use political recognition and support by integrating this concept and promising combinations to future marine spatial processes and discussions	●
<b>Policy:</b> Integrate multi-use in energy policies	Encourage the State to include multi-use criteria into offshore wind tendering calls	●
<b>Economy:</b> Encourage stakeholders interested in multi-use	Support stakeholders willing to experiment and implement multi-use solutions by providing economic incentives	●
<b>Regulation:</b> facilitate multi-use experiments	Give flexibility to stakeholders willing to test and experiment innovative multi-use solutions (e.g. easier permitting procedure in designated research areas for multi-use)	●

## Final remarks

Assessing the two defined scenarios in the Bay of Biscay, showed that the multi-use concept cannot be easily transposed to the French context. Not only stakeholders do not always understand properly this concept, but they are influenced by the current coexistence-based approach to marine spatial planning and offshore wind development. Combining different marine uses to achieve synergies does not make much sense considering the will to ensure the long-term cohabitation of human activities at sea, including in offshore wind parks. In this respect, coexistence, which echoes multiple uses management, can be considered as an alternative to multi-use.

Despite major differences, multi-use and coexistence should not be necessarily opposed as reflected by the French case study. The acceleration of offshore wind development increases tensions between sea users, especially offshore wind developers and professional fishers and thereby puts to the test coexistence. In this context, reflections on the future of the main uses of maritime spaces and their resources are emerging. Even if there are no evident synergies between offshore wind and fishing, stakeholders are starting to consider possible adaptations and new forms of cooperation. This is where the interest of multi-use lies: it can be used as a framework to foster open discussions and collaborations between users, planners and policy makers to design, experiment and implement innovative marine uses combinations.

## Resources

Abhinav, K.A., Maurizio Collu, Steven Benjamins, Huiwen Cai, Adam Hughes, Bo Jiang, Simon Jude, et al. 2020. "Offshore Multi-Purpose Platforms for a Blue Growth: A Technological, Environmental and Socio-Economic Review." *Science of The Total Environment* 734: 58. <https://doi.org/10.1016/j.scitotenv.2020.138256>.

Bocci, Martina, Stephen Joseph Sangiuliano, Alessandro Sarretta, Joseph Onwona Ansong, Bruce Buchanan, Andronikos Kafas, Mario Caña-Varona, et al. 2019. "Multi-Use of the Sea: A Wide Array of Opportunities from Site-Specific Cases across Europe." Edited by Karyn Morrissey. *PLOS ONE* 14 (4): e0215010. <https://doi.org/10.1371/journal.pone.0215010>.

Buck, B. H., A. Berg-Pollack, J. Assheuer, O. Zielinski, and D. Kassen. 2006. "Technical Realization of Extensive Aquaculture Constructions in Offshore Wind Farms: Consideration of the Mechanical Loads." In Volume 1: Offshore Technology; Offshore Wind Energy; Ocean Research Technology; LNG Specialty Symposium, 691–97. Hamburg, Germany: ASMEDC. <https://doi.org/10.1115/OMAE2006-92663>.

Buck, B. H., G. Krause, T. Michler-Cieluch, M. Brenner, C. M. Buchholz, J. A. Busch, R. Fisch, M. Geisen, and O. Zielinski. 2008. "Meeting the Quest for Spatial Efficiency: Progress and Prospects of Extensive Aquaculture within Offshore Wind Farms." *Helgoland Marine Research* 62 (3): 269–81. <https://doi.org/10.1007/s10152-008-0115-x>.

Buck, Bella, Gesche Krause, and H. Rosenthal. 2004. "Multifunctional Use, Environmental Regulations and the Prospect of Offshore Co-Management: Potential for and Constraints to Extensive Open Ocean Aquaculture Development within Wind Farms in Germany." *Ocean & Coastal Management*, 95–122.

Buck, B.H., G. Krause, B. Pogoda, B. Grote, L. Wever, N. Goseberg, M.F. Schupp, A. Mochtak, and D. Czybulka. 2017. The German Case Study: Pioneer Projects of Aquaculture-Wind Farms. [https://doi.org/10.1007/978-3-319-51159-7\\_11](https://doi.org/10.1007/978-3-319-51159-7_11).

Buck, B.H., G. Krause, and H. Rosenthal. 2004. "Extensive Open Ocean Aquaculture Development within Wind Farms in Germany: The Prospect of Offshore Co-Management and Legal Constraints." *Ocean and Coastal Management* 47 (3–4): 95–122. <https://doi.org/10.1016/j.ocecoaman.2004.04.002>.

Burg, Sander van den, Marian Stuiver, Jenny Norrman, Rita Garção, Tore Söderqvist, Christine Röckmann, Jan-Joost Schouten, et al. 2016. "Participatory Design of Multi-Use Platforms at Sea." *Sustainability* 8 (2): 127. <https://doi.org/10.3390/su8020127>.

Burg, Sander W. K. van den, Christine Röckmann, Jennifer L. Banach, and Luc van Hoof. 2020. "Governing Risks of Multi-Use: Seaweed Aquaculture at Offshore Wind Farms." *Frontiers in Marine Science* 7 (February): 60. <https://doi.org/10.3389/fmars.2020.00060>.

Burg, S.W.K. van den, J. Aguilar-Manjarrez, J. Jenness, and M. Torrie. 2019. "Assessment of the Geographical Potential for Co-Use of Marine Space, Based on Operational Boundaries for Blue Growth Sectors." *Marine Policy* 100: 43–57. <https://doi.org/10.1016/j.marpol.2018.10.050>.

Burg, S.W.K. van den, Maximilian Felix Schupp, Daniel Depellegrin, Andrea Barbanti, and Sandy Kerr. 2020. "Development of Multi-Use Platforms at Sea: Barriers to Realising Blue Growth." *Ocean Engineering* 217: 107983. <https://doi.org/10.1016/j.oceaneng.2020.107983>.

Dalton, Gordon, Tamás Bardócz, Mike Blanch, David Campbell, Kate Johnson, Gareth Lawrence, Theodore Lilas, et al. 2019. "Feasibility of Investment in Blue Growth Multiple-Use of Space and Multi-Use Platform Projects; Results of a Novel Assessment Approach and Case Studies." *Renewable and Sustainable Energy Reviews* 107: 338–59. <https://doi.org/10.1016/j.rser.2019.01.060>.

Daniel, Valentin, and Josselin Guyot-Téphany. 2021. "Matrice d'interactions Des Usages de La Mer." *Chaire Maritime de Nantes Université*. <https://hal.science/hal-04075406/>.

Jansen, Henrice M., Sander Van Den Burg, Bas Bolman, Robbert G. Jak, Pauline Kamermans, Marnix Poelman, and Marian Stuiver. 2016. "The Feasibility of Offshore Aquaculture and Its Potential for Multi-Use in the North Sea." *Aquaculture International* 24 (3): 735–56. <https://doi.org/10.1007/s10499-016-9987-y>.

Krause, G., and E. Mikkelsen. 2017. *The Socio-Economic Dimensions of Offshore Aquaculture in a Setting*. [https://doi.org/10.1007/978-3-319-51159-7\\_8](https://doi.org/10.1007/978-3-319-51159-7_8).

Krause, Gesche, and Selina M. Stead. 2017. "Governance and Offshore Aquaculture in Multi-Resource Use Settings." In *Aquaculture Perspective of Multi-Use Sites in the Open Ocean*, edited by Bela H. Buck



and Richard Langan, 149–62. Cham: Springer International Publishing. [https://doi.org/10.1007/978-3-319-51159-7\\_7](https://doi.org/10.1007/978-3-319-51159-7_7).

Lacroix, Denis, and Sylvain Pioch. 2011. "The Multi-Use in Wind Farm Projects: More Conflicts or a Win-Win Opportunity?" *Aquatic Living Resources* 24 (2): 129–35. <https://doi.org/10.1051/alr/2011135>.

Michler-Cieluch, T., G. Krause, and B.H. Buck. 2009. "Marine Aquaculture within Offshore Wind Farms: Social Aspects of Multiple-Use Planning." *Gaia-Ecological Perspectives for Science and Society* 18 (2): 158–62. <https://doi.org/10.14512/gaia.18.2.14>.

MTES. 2017. "Stratégie Nationale Pour La Mer et Le Littoral." Décret 2017-222 du 23 février 2017. Paris: Ministère de la Transition Ecologique et Solidaire. [https://www.mer.gouv.fr/sites/default/files/2020-11/17094\\_Strategie-nationale-pour-la-mer-et-le-littoral\\_fev2017.pdf](https://www.mer.gouv.fr/sites/default/files/2020-11/17094_Strategie-nationale-pour-la-mer-et-le-littoral_fev2017.pdf).

2019. "Stratégie de Façade Maritime. Document Stratégique de La Façade Nord Atlantique - Manche Ouest." Ministère de la Transition Ecologique et Solidaire. <https://www.dirm.nord-atlantique-manche-ouest.developpement-durable.gouv.fr/strategie-de-facade-maritime-nord-atlantique-a1070.html>.

Oiry, Annaig. 2017. "Une Transition Énergétique Sous Tension ? Contestations Des Énergies Marines Renouvelables et Stratégies d'acceptabilité Sur La Façade Atlantique Française." Thèse de doctorat en géographie, Paris: Université Paris 1 Panthéon - Sorbonne.

Piasecki, Wojciech, Zbigniew Głąbiński, Patrice Francour, Pawel Koper, Gianna Saba, Agustín Molina García, Agustín Ünal, et al. 2016. "Pescatourism—A European Review and Perspective." *Acta Ichthyologica et Piscatoria* 46 (4): 325–50. <https://doi.org/10.3750/AIP2016.46.4.06>.

Sarmiento, J., A. Iturrioz, V. Ayllón, R. Guanche, and I.J. Losada. 2019. "Experimental Modelling of a Multi-Use Floating Platform for Wave and Wind Energy Harvesting." *Ocean Engineering* 173: 761–73. <https://doi.org/10.1016/j.oceaneng.2018.12.046>.

Schupp, Maximilian Felix, Martina Bocci, Daniel Depellegrin, Andronikos Kafas, Zacharoula Kyriazi, Ivana Lukic, Angela Schultz-Zehden, Gesche Krause, Vincent Onyango, and Bela H. Buck. 2019. "Toward a Common Understanding of Ocean Multi-Use." *Frontiers in Marine Science* 6 (APR): 1–12. <https://doi.org/10.3389/fmars.2019.00165>.

Steins, N.A., J.A. Veraart, J.E.M. Klostermann, and M. Poelman. 2021. "Combining Offshore Wind Farms, Nature Conservation and Seafood: Lessons from a Dutch Community of Practice." *Marine Policy* 126. <https://doi.org/10.1016/j.marpol.2020.104371>.

Stelzenmüller, V., R. Diekmann, F. Bastardie, T. Schulze, J. Berkenhagen, M. Kloppmann, G. Krause, B. Pogoda, B.H. Buck, and G. Kraus. 2016. "Co-Location of Passive Gear Fisheries in Offshore Wind Farms in the German EEZ of the North Sea: A First Socio-Economic Scoping." *Journal of Environmental Management* 183: 794–805. <https://doi.org/10.1016/j.jenvman.2016.08.027>.

Stuiver, Marian, Katrine Soma, Phoebe Koundouri, Sander van den Burg, Alwin Gerritsen, Thorbjørn Harkamp, Niels Dalsgaard, et al. 2016. "The Governance of Multi-Use Platforms at Sea for Energy Production and Aquaculture: Challenges for Policy Makers in European Seas." *Sustainability (Switzerland)* 8 (4): 333. <https://doi.org/10.3390/su8040333>.

Weir, Stephanie, and Sandy Kerr. 2019. "Property, Power and Planning: Attitudes to Spatial Enclosure in Scottish Seas." *Marine Policy* 108: 103633. <https://doi.org/10.1016/j.marpol.2019.103633>.

Wever, Lara, Gesche Krause, and Bela H. Buck. 2015. "Lessons from Stakeholder Dialogues on Marine Aquaculture in Offshore Wind Farms: Perceived Potentials, Constraints and Research Gaps." *Marine Policy* 51: 251–59. <https://doi.org/10.1016/j.marpol.2014.08.015>.

## Imprint

**Title: CASE STUDY BRIEF: FRANCE**

**Authors:**

(1) Josselin Guyot-Téphany; Nantes Université

(2) Brice Trouillet, Nantes Université

(3) UMR CNRS LETG

**DOI: 10.5281/zenodo.8091770**

**Date published:** June 2023 @MULTI-FRAME project.

**Multi-Frame project funding disclaimer:** This research has been done as part of the Multi-Frame project – Assessment Framework for successful development of viable ocean multi-use systems (Oceans 2018 call, Belmont Forum, Future Earth and JPI Oceans), granted by the Agence Nationale de la Recherche (ANR-20-BFOC-0002-01)

**M U L T I**  
**F R A M E**

