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GWEC
GLOBAL WIND ENERGY COUNCIL

COMMUNITY ENGAGEMENT INSTRUMENTS FOR THE FUTURE OF OFFSHORE WIND IN BRAZIL

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EXECUTIVE SUMMARY

The main goal of this report is **to present strategic instruments for effective stakeholder management and meaningful community engagement in offshore wind energy projects**.

Considering the growing relevance of this technology in the global energy transition and in combating climate change, the proactive engagement of coastal communities, especially artisanal fishers and traditional peoples, is critical for the sustainable success of projects.

The instruments reviewed in this document include:

- *Participatory Marine-Coastal Zoning*
- *Local and Regional Mechanisms for Free, Prior, and Informed Consent*
- *Local Socio-Environmental Monitoring Committee*
- *Participatory Socio-Environmental Diagnosis*
- *Community Benefit Funds with Participatory Governance*
- *Digital Transparency and Communication Platforms*

The absence of robust engagement brings significant risks, such as social conflicts, delays in environmental licensing, organized resistance by impacted communities, local socio-economic damage, and reputational damage to project developers and financiers.

Some industry cases mentioned throughout the document were emblematic of accumulating learnings, where the lack of dialogue led to severe economic losses for communities and required high-cost corrective measures. We present here the actions taken to forward solutions to the communities involved.

In this way, active engagement offers clear strategic benefits, such as early conflict mitigation, strengthening the social and political legitimacy of projects, greater regulatory predictability, and the generation of shared value with local communities.

Success cases in the USA (Block Island), the United Kingdom (Westermost Rough), South Korea, Belgium, among others, exemplify how inclusion and participation have resulted in tangible economic, social, and environmental gains.

To ensure such benefits, decision-makers are recommended to incorporate engagement from the initial design of projects, ensuring adequate budget allocation and the formation of specialized community interface teams.

EXECUTIVE SUMMARY

So, it is recommended that communities get involved and seek to show their participation in all phases of the process. Therefore, investing in active listening practices, transparent management of expectations, implementation of accessible digital platforms, and the adoption of financial mechanisms with participatory governance are essential guidelines that ensure positive and lasting results.

This report provides practical, internationally proven guidance that provides institutional security, social sustainability, and strategic pathways for the offshore energy industries. We strongly encourage business leaders, regulators, and funders to explore in detail the analyses and recommendations presented in this document to ensure the strategic and social success of their projects.

For the communities and their representatives, this document can help guide the discussions and provide basic information to ensure the maintenance of their livelihood and territorial development in accordance with local cultural demands and community values.

The instruments presented were systematized based on existing cases, and do not exclude the possibility of incorporating new approaches or instruments not explored within this material.

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INTRODUCTION

Offshore wind energy is a technology on the rise and in development in different regions of the planet. The world already has 83.2 GW of installed capacity and has been consolidated in the last twenty years as an alternative for the energy transition and the fight against climate change.

In 2024, 8.0 GW of new technology capacity was installed, and some countries, such as China, the United Kingdom, Germany, and the Netherlands, stand out in the technological development process.

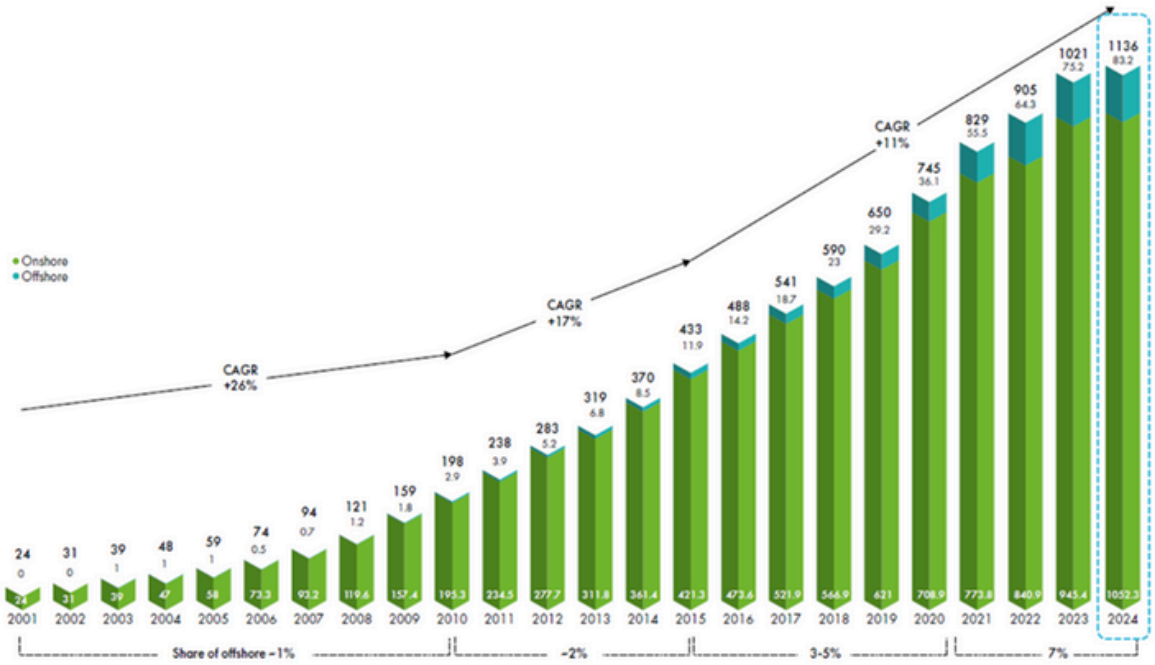
From the same perspective, other countries are moving forward with their structuring of the regulatory framework (e.g., Brazil), holding auctions of areas (e.g., Colombia), and industrial plans for the development of offshore wind (e.g., South Korea) [1].

With the broad development of technology, the need to draw participatory mappings and engage communities in future discussions is essential to avoid conflicts and ensure quality of life for residents and safety in the process of selecting areas, as well as in the evaluation of potential sites for offshore wind development in Brazil and other developing economies.

Brazil is already a global leader in the development of onshore wind energy, with more than 35 GW of installed capacity, and is among the five economies that have developed this technology the most in the world.

Aiming to ensure sustainable, inclusive, and clean social development, the country seeks new frontiers for the development of wind energy and approved the regulatory framework for offshore wind power (Law No. 15,097) in early 2025 [2].

Figure 1: Cumulative Installation History (Onshore and Offshore) in GW



Source: GWEC - Global Wind Energy Council (2025)

INTRODUCTION

The regulatory framework provides institutional security and ensures alignment between the different competent bodies for the maritime area leasing, presenting the necessary guidelines for the development of projects.

In parallel, the maritime area leasing must observe the activities and parts of society that will be indirectly and directly engaged in the future of offshore wind technology.

In this sense, the sustainable development of offshore wind energy on the coast of Brazil requires active engagement of coastal communities near potential regions – especially traditional ones, such as artisanal fishermen, indigenous peoples, and other local populations that depend on the sea.

International experiences prove that robust social participation, transparency, and the distribution of benefits can be key to building shared value, empowering local communities, and reducing the information asymmetry between developers and society.

Thus, social participation throughout the life cycle of offshore wind projects must be implemented from the perspective of meaningful community engagement, that is, one that has meaning for those who participate.

The purpose of this material is to present strategic instruments for effective stakeholder management and meaningful community engagement in offshore wind energy projects.

This guide paper identifies key instruments of community engagement and demonstrates how to integrate them throughout the life cycle of offshore wind projects.

In addition, the document has the potential to serve as a guide for both public and private sectors in implementing best practices, thereby facilitating the active participation of different stakeholders in offshore wind.

The material presents a contribution, international examples, and applications of participatory instruments in discussions on offshore wind.

In addition, it describes lessons learned from each of the instruments that can be considered to promote good sectoral practices or improve existing practices.

Aiming to guide policymakers, development companies, community leaders, and researchers, the systematization of the initiatives with a global approach to meaningful community engagement presented here brings a relevant highlight and learning from the real cases that occurred in countries where technology is already consolidated.

INSTRUMENT 1

Participatory Marine-Coastal Zoning

CHAPTER 1
Participatory Marine-Coastal Zoning

Participatory marine-coastal zoning (PMCZ) is a spatial planning instrument that orders the uses of coastal and maritime spaces in a dialogical way and may or may not be linked to projects.

Instead of isolated decisions about each wind farm, zoning can establish, in an integrated and negotiated way, which areas offshore are most suitable for development (and which areas need to be avoided or designated for other uses, such as fishing, conservation, shipping routes, tourism).

It involves engaging multiple actors – fishing communities, the tourism sector, telecommunications, transport, marine/port authorities, environmentalists, and government – to reconcile interests and minimize conflicts in the use of the sea.

The Brazilian coastline exhibits a diversity of ecosystems—including reefs, mangroves, and seagrass meadows—and traditional uses. Therefore, prior and participatory spatial planning is essential to prevent overlaps, such as placing a wind farm in a critical fishing ground or a sensitive biodiversity area.

In this sense, Brazil presents some participatory coastal planning efforts through the Orla Project (Projeto Orla) [3], State Coastal Management [4], and Marine Spatial Planning (MSP) [5].

For offshore wind, Decree No. 10,946/2022 [6] and Law No. 15,097/2025 [2] (which establish guidelines for the use of maritime spaces for energy) seek to create a legal framework for the assignment of marine areas. The legal instruments (law and decree) mention the alignment of maritime planning for the offshore wind industry in Brazil.

Thus, it is essential that the processes of assignment and licensing of offshore wind farm projects are based on environmental sensitivity analyses, local and/or regional participatory zoning processes, added to the information available in the MSP, currently in the execution phase in Brazil, which is an instrument in constant updating and covers several sectors of the economy of the sea.

Furthermore, it is pertinent to recall that the various levels of government planning constitute a hierarchical sequence: policy at the apex, followed by the plan, then the program, and ultimately the project, with information being exchanged horizontally among sectors. For the mechanism to function effectively, the circulation of information must occur across these levels.

The different zoning instruments will generally be led by government stakeholders such as the Navy and Ministries (e.g., MSP), Environmental Agencies and State Secretariats of the Environment (e.g., Ecological zoning, integrated coastal management), City Halls (e.g., Projeto Orla), and the Energy Sector (e.g., offshore wind areas).

Regardless of the level of execution, it is recommended to seek the involvement of civil society in the process. For example, this is an opportune moment to map the fishing colonies where the main fishing grounds and routes are located (See instrument 4), and thus define restriction areas or mitigation guidelines, such as the obligation to lay out the project providing for fishing navigation corridors.

APPLICATION PHASE: PLANNING AND LICENSING

Participatory zoning, ideally, precedes specific projects – serving as a basis for strategic decisions (specific programs and public policies or auctions of offshore blocks for wind farms, for example).

However, if prior zoning is not possible, the actions can be incorporated into the initial phase of a pilot project's licensing, covering its region of influence through the involvement of as many sectors as possible.

In Europe, maritime spatial planning is already public policy – countries such as Germany, initially through the *Federal Spatial Planning Act* (ROG)[1] and the United Kingdom, based on the Marine and *Coastal Access Act* 2009[2], map preferential zones for offshore wind, also considering contributions from fishing communities.

In the United Kingdom, for example, previous studies include the exclusion of areas very close to regional fishing ports so as not to harm the activity.

It is essential to highlight the recommendation that the zoning process can be carried out through participatory tools. Some examples are mapping workshops with fishermen for collective identification of areas important for fishing, areas of environmental and social risk, public consultations on proposed maps, and scenario tests (Figure 2) [7].

Figure 2: Workshop Conducted to Select Fishing Community Preferred Areas

Source: GWEC (2024) | Exploring coexistence opportunities for offshore wind and fisheries in South Korea

As an expected result, a map and/or a sectoral plan will be generated that delimits suitable and unsuitable zones for the economic activities covered, accompanied by a report justifying the choices based on the contributions of local actors (Figure 3) [7].

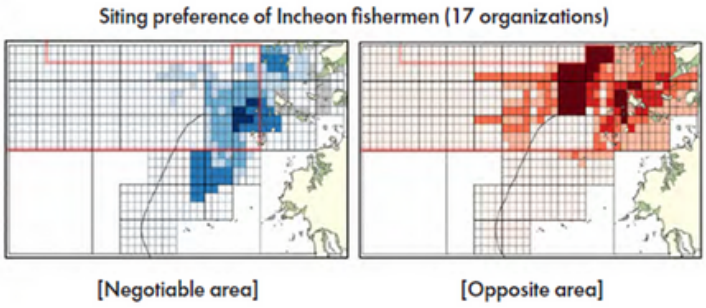
These documents should be consulted to direct government and business actions in the subsequent phases of the project. It is essential to emphasize the need for updating within a specific period or when new territorial demands arise.

In addition, it is essential to consider the synergies and cumulativeness between uses in adjacent sea zones.

Some technological tools can assist in the grouping of data and information for mapping and participatory zoning (e.g., Remote Sensing, GIS-Web Platforms, Online Platforms for Visualization and Communication, Application for Data Collection Collaboratively).

These technologies can help identify communities, areas of inclusion, exclusion, and interference with other activities (see instrument 6).

Figure 3: Sectoral Map and Delimitation of Zones



Source: GWEC (2024) | Exploring coexistence opportunities for offshore wind and fisheries in South Korea

In Brazil, Sea Sketch [8] has been applied by the Ministry of Environment and Climate Change (MMA) as part of the country's Marine Spatial Planning (MSP) efforts.

This includes its use in participatory mapping through the Ocean Use Survey in Brazil, which also has the support of the Integrated Coastal Management Laboratory (LAGECI) of the Federal University of Santa Catarina (UFSC) [9].

Sea Sketch, a free and open-source tool developed by the University of California, Santa Barbara, is a collaborative geodesign platform that acts as an intermediary between coastal and marine managers, data, and society.

It provides strategic and efficient support through public policy tools, human and financial resources, and communication strategies aimed at improving marine governance.

The tool maps ocean uses, identifies priority areas, and supports scenario analysis in Marine Spatial Planning (MSP) [10], covering activities such as artisanal fishing, recreational sports, energy ventures, and aquaculture.

By engaging stakeholders, it expands social participation and awareness about offshore wind and biodiversity conservation, as well as strengthens strategic communication between government and society, and facilitates data collection and dissemination.

CASE STUDY

Rhode Island Case (USA) – Participatory Spatial Planning

In Rhode Island (USA), a participatory spatial planning known as Ocean SAMP (Ocean Special Area Management Plan) [11, 12] involved residents and fishermen in defining the appropriate site for the Block Island wind farm, helping to avoid ecological conflicts[3].

It is the first offshore wind farm in the US (start of operation in 2016) – it has become a key example of community engagement. The Block Island had a high energy cost (dependence on diesel generators), and the local community was involved in the planning of the project.

The state conducted participatory spatial planning (Ocean SAMP) to define the appropriate location for the turbines, avoiding ecological conflicts. For example, based on participatory data collected from local fishermen and universities in the region, it was possible to reconstruct the history of transformations in fishing.

The Ocean SAMP report[4] describes how, between 1920 and 1930, the overfishing of Menhaden fish led to the collapse of industry and the closure of factories.

Fishermen migrated to other species, driven by rod trawling and diesel engines, which extended the range of fishing in the 1970s (Figure 4)—the intensive use of trawling generated conflicts with artisanal fishermen, who denounced the drop in stocks.

Initially focused on industrial fish species such as white and red hake, the fishing effort began to value sole, previously considered low-value fish.

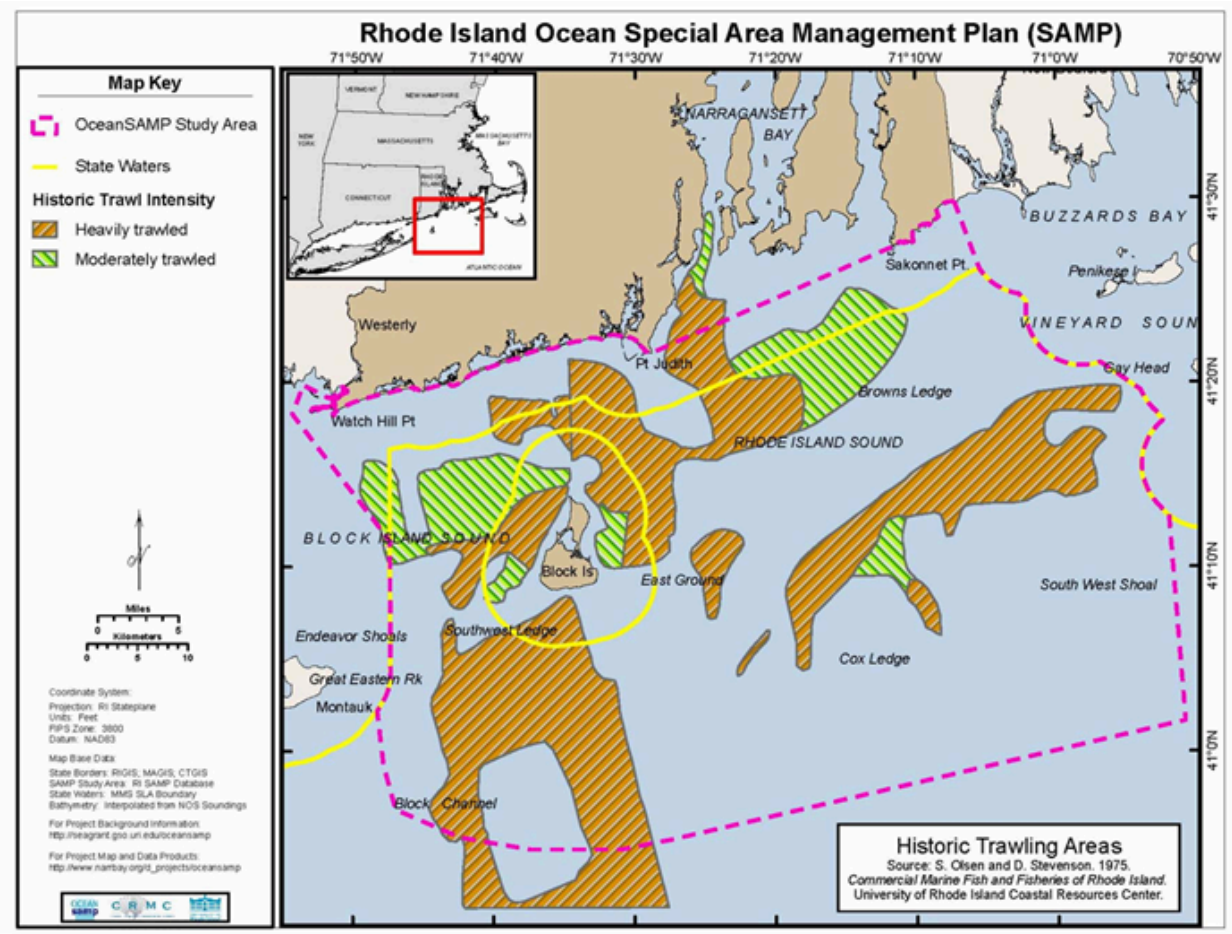
Another critical case was that, during the permitting process for the offshore wind farm on Block Island, the company Deepwater Wind financed independent technical consultants to advise the community and explain the technical aspects of the project, ensuring that residents could make informed decisions.

In addition, it hired a local representative as a communication link – a resident of the island who answered questions daily and took the demands of the community to the company.

In a series of public meetings on the island, residents negotiated important community benefits: the developer agreed to include a fiber-optic cable alongside the submarine power cable, bringing high-speed internet to the island, and to connect Block Island to the mainland power grid, reducing electricity bills by about 40 percent.

During the consultations, artisanal fishermen expressed concern about possible impacts on fisheries; in response, the state demanded independent scientific research into the effects of the wind farm on fisheries after construction, funded by the company. Thanks to this transparent and inclusive process, the project gained wide acceptance – unlike the Cape Wind (Massachusetts) case that failed due to local opposition[5].

Figure 4: Offshore areas used for trawlers during the 1970s



Source: Ocean Samp (2010) | Rhode Island Ocean: Special Area Management Plan

Lesson Learned

In the case of Rhode Island (United States), the region benefits from an effective process: clean and reliable energy, high-speed internet, and local economic development. It serves as a benchmark demonstrating that community inclusion and the creation of tangible benefits foster sustained social acceptance.

Participatory Marine-Coastal Zoning can be one of the instruments that ensures the alignment of activities in a participatory way, understanding the main concerns of local communities, indicating areas of exclusion and restriction, as presented in countries such as South Korea, the United States, and the United Kingdom.

Thus, the choice of technological mechanisms for the implementation of zoning should consider the facilitation of the process to ensure effectiveness in the analysis of environmental sensitivity in data collection, based on initiatives that engage society. It is imperative to consider data validation to ensure accuracy and security in the designation of the proposed zones.

INSTRUMENT 2

Local and Regional Mechanisms for Free, Prior, and Informed Consent

CHAPTER 2

Local and Regional Mechanisms for Free, Prior, and Informed Consent

Free, Prior, and Informed Consent (FPIC) is a right guaranteed by the Federal Constitution (Articles 231 and 232) [13] that recognizes the social organization, customs and original rights of indigenous peoples and Convention 169 of the ILO (International Labor Organization) for indigenous and tribal peoples[1] – in Brazil it encompasses indigenous peoples and traditional communities (e.g. quilombolas and traditional artisanal fishermen).

This instrument involves consulting communities in an appropriate and culturally respectful manner before implementing undertakings or administrative measures that may impact their territories, livelihoods, and cultures.

The formal obligation lies with the Brazilian State (Union, states, or municipalities) in the sphere of decisions that cause impact. The entrepreneur will have the duty to cooperate in the FPIC process, without necessarily conducting it on behalf of the communities.

In the context of offshore wind farms, FPIC mechanisms should operate at both the local (directly affected coastal communities) and regional levels (e.g., consultation with fishing colonies from a more expansive coastline, or with coastal indigenous peoples/marine region if any).

In practice, this instrument involves several steps – prior disclosure of accessible information (in an understandable language/place, promptly) and verification of community consultation protocols, meetings and dialogues where communities can ask questions, raise concerns, influence decisions (e.g. location of turbines and compensatory measures), and subsequent negotiation of formal agreements, documenting consent or conditions for the progress of the project.

According to the World Wildlife Fund (WWF) [14], the FPIC process is not a one-off event, but rather an ongoing consent process throughout the entire project life cycle. To exemplify the steps, WWF adopts a work plan for the FPIC that begins with the project and only ends with the decommissioning of the asset.

Although the material is not directly related to the implementation of offshore wind projects, Table 1 describes the stages of execution of the FPIC, the actors involved in each phase, and the appropriate time for its realization. For an application in the Brazilian context, there will be a need to verify the performance of public entities, especially in the initial stages.

Table 1: Work plan of the Free, Prior and Informed Consent (FPIC) process throughout the project life cycle.

Activity	Actors	Moment / Periodicy
Capacity assessment for FPIC and training	Project proponent and partners	During the preparation of the complete proposal, it is subsequently updated annually.
Preliminary consultations	Project proponent, partners, and members of the affected local communities	During the preparation of the complete proposal.
FPIC Consultation	Project proponent, partners, and representatives of affected communities	Year 1 of the project.
Annual follow-up appointments	Project proponent, partners, and representatives of affected communities	Annually on the anniversary date of the first year of the FPIC
Third-Party FPIC Monitoring	Project proponent, partners, independent monitor, representatives of affected communities, and affected Indigenous Peoples and Local Communities.	Annually.
FPIC Process Documentation	Project proponent and partners	Solid base; Annual updates as needed.
Dissemination of FPIC reports to affected parties	Project proponent, partners, independent monitor, representatives, and members of affected Indigenous Peoples and Local Communities	Annually.
Feedback on FPIC	Project proponent, partners, independent monitor, representatives, and members of affected Indigenous Peoples and Local Communities	Continuous basis.

Source: WWF (2024) | Strengthening ecological and livelihood resilience in the Southern Belize Reef Complex - Free, Prior and Informed Consent (FPIC) Protocol.

In addition, it is recommended to have active listening with the post-consultation communities. Active listening work, such as the creation of ombudsperson offices, bases in the places to serve communities, has already been discussed in previous works, such as the Guide to Good Socio-Environmental Practices for the Wind Sector, produced by ABEEólica in partnership with Gaja Consultoria Ambiental [15].

For this purpose, tools for social impact management are considered and have been evaluated in the context of the national situation and the ongoing evaluation of onshore projects. Figure 5 shows the flowchart that can be adopted for active listening and participation of society in the process of social impact management.

It is relevant to highlight that the term "free" implies the absence of coercion or intimidation; "Prior" means that it occurs before the final decision is taken, e.g., before the concession of an area; and "informed" requires complete information about impacts and alternatives.

In the Brazilian context, many artisanal fishing communities have characteristics of "traditional communities" and require a similar approach to the FPIC – that is, genuine consultation and robust social dialogue before any intervention at sea that affects their activities.

On the other hand, international experience (e.g., Vietnam – below) shows that moving forward with the development of offshore wind farms without the structuring of prior consent can lead to misalignment and potential conflicts.

Figure 5: Tools for Social Impact Management (FGIS)

Source: ABEEólica (2024) | Guide to Good Social and Environmental Practices for the Wind Sector

Vietnam Case – Mekong Wind Farm and FPIC's attention

Vietnam is a country with vast potential for offshore wind energy production. There are approximately 599 GW of potential to exploit the technology from fixed (261 GW) and floating (338 GW) foundations, with winds that can reach speeds of up to 10 m/s along its coastal region (Figure 6) [16].

According to data from the Global Wind Energy Council (2025) [1], the country is among the ten countries with the highest installed capacity of offshore wind power (874 MW) and has had an upward growth in installed capacity in recent years, identifying new challenges associated with the harmonization between coastal activities and the development of offshore wind projects.

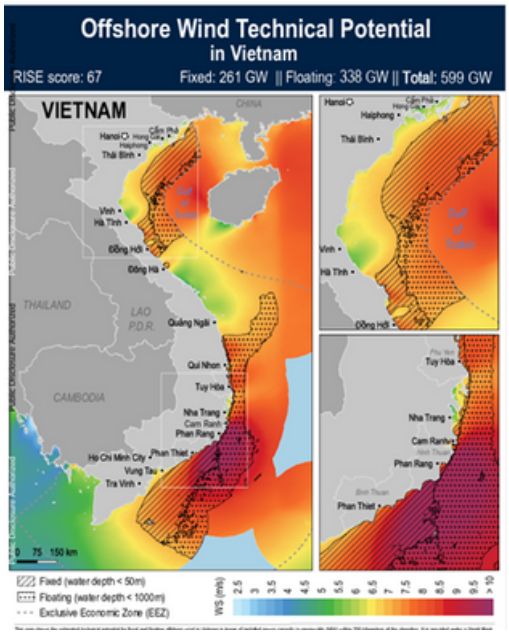
In the offshore wind project in Mekong Delta (southern region of Vietnam), the lack of engagement of local fishermen led to the imposition of fishing exclusion zones in the turbine areas, harming the livelihoods of fishing communities; Nets began to get caught in the cables and towers, causing loss of equipment and income, and more than 60% of fishing vessels were affected [17].

There were protests and criticism that the development was not inclusive. Local authorities had to respond with promises of compensation and alternative livelihoods, but faced financial and implementation challenges.

The provincial government announced immediate initiatives involving financial compensation to affected fishers, especially for damage to nets and reduced fishing, which include emergency support and compensation for affected families. Programs for alternative livelihoods have also been outlined, encouraging the transition to larger vessels or activities such as aquaculture and ecotourism, although implementation is delayed due to budget constraints.

As part of a more structural correction, Vietnam's environment ministry has postponed the evaluation of new nearshore wind projects, requiring revision of environmental guidelines and mandatory inclusion of the community in impact studies before approval. This moratorium sought to prevent future projects from repeating the same mistakes by incorporating participatory evaluation and clear delimitation of fishing zones.

Figura 6: Technical Potential of Offshore Wind Power | Vietnam



Source: World Bank Group (2021)

APPLICATION PHASE: PLANNING AND LICENSING.

The FPIC mechanisms should first focus on the planning phase with initial dialogues, even before the Environmental Impact Assessment (EIA), and be formalized during the environmental licensing process, when the required public hearings and official consultations take place. However, as already seen, its application may extend throughout the life cycle of the enterprise.

In the context of Federal Environmental Licensing, Brazil is gradually consolidating its consultation and social participation procedures. The Federal Constitution (art. 231, §3) [13], ILO Convention 169 (Decree No. 10,088/2019), and CONAMA Resolutions No. 01/1986 [18] and No. 09/1987 [19] establish the obligation of public consultation and FPIC in processes that may impact traditional and indigenous communities.

In addition, instruments such as Interministerial Ordinance No. 60/2015 [20] and FUNAI Normative Instruction No. 02/2015 [21] define specific procedures to ensure due participation and socio-environmental safeguards, conferring legitimacy and legal certainty to environmental licensing.

Below, we present a "Checklist" for the proper implementation of FPIC:

- Identify traditional communities in influence
- Activate the responsible bodies (e.g., FUNAI, Fundação Palmares, Fishing Colonia)
- *Prepare informative material that is culturally appropriate and guided by consent protocols*
- *Conduct meetings in accessible places and times, especially considering the calendars of fishing activities*
- *Document the demands and incorporate them into the plans/projects whenever possible*
- *Formalize agreements with the signatures of community representatives and the entrepreneur*

Considering and evaluating gender-related factors can bring richness to the collection of information and the efficient use of oceans and maritime spaces. Studies carried out in regions such as the Azores, Maldives, and Belize indicate that regional differences can influence community contexts and their representativeness in the maritime economy.

The capture of this data can contribute to the formation of more appropriate public policies, supporting various sectors.

CASE STUDY

Vineyard Wind Case (USA) – Consultation with the Indian tribe according to the principles of the FPIC

Although the legal framework of the United States of America is different, the principle of the FPIC was applied in the Vineyard Wind project (Massachusetts) [22]. The developer company entered into a historic benefits agreement with the Mashpee Wampanoag Indian tribe, establishing a relationship path between the tribe and the company.

In this agreement, called the Tribal Benefit Agreement, Vineyard Offshore committed to respecting the sovereignty and ancestral territories of the tribe and created a specific community fund for priority indigenous projects (education, sanitation, cultural revitalization).

The president of the tribe stressed that the agreement guarantees the indigenous community a "seat at the table" and protection of their way of life for future generations.

This first tribal agreement of the U.S. offshore wind industry has become a model for the inclusion of traditionally marginalized groups, demonstrating that ensuring and respecting traditional rights and sharing benefits results in these communities' support for the project..

Another important program, the Resiliency and Affordability Program (RAP), materializes the commitments made in the Tribal Benefit Agreement by allocating US$ 15 million for energy storage and community solar systems (Joe-4-Sun) projects, so that the benefits go directly to low-income families in the host municipalities and, emblematically, to the two Wampanoag nations – from the Mashpee and Aquinnah regions.

In the first year, RAP enrolled 82 consumers and opened new opportunities for the coming years for the Joe-4-Sun sub-program. Among the participants, eight belonged to tribal communities, as shown in Chart 2.

Each contemplated household will save about US$600 annually on the electricity bill, half of which comes from the resources of the RAP itself, converting the principle of the FPIC into a tangible economic benefit.

Thus, Vineyard Wind consolidates itself as an international reference for energy justice and social inclusion — not only for its speech, but for putting a real discount on the bill of those who have historically been on the sidelines.

Table 2: Joe-4-Sun Program and Participation

Community	# Participants	# In Process of Enrolling	Total
Barnstable	1	0	1
Martha's Vineyard	9	5	14
Nantucket *	0	0	0
New Bedford	64	53	117
Somerset	2	26	28
Tribes**	6	2	8
Total	82	86	168

* Nantucket is not currently eligible for J4S program due to no Citizens Energy solar projects in Nantucket territory
** Tribes includes Mashpee Wampanoag Tribe and Wampanoag Tribe of Gay Head (Aquinnah)

Source: VW1 Monitoring - Impact on Jobs and Economic Outputs (2022; pag 18)

Lesson Learned

To avoid conflicts, it is recommended that prior consultations be carried out with local traditional communities, proposing efforts to map their essential areas and, thus, seek solutions of company-community compromise (relocate turbines, allow controlled fishing between wind turbines – if allowed, recognize spaces with symbolic and ancestral value, define fair compensation together).

In addition, it is relevant to highlight that prior consultation may allow the provision or adequate sharing of benefits (see instrument 5). Therefore, no project should move forward without listening to potentially affected communities.

INSTRUMENT 3

Local Socio-Environmental Monitoring Committee

CHAPTER 3

Local Socio-Environmental Monitoring Committee

The **Local Socio-environmental Monitoring Committee (LSMC)** are permanent commissions or forums that bring together representatives of the local community, the developer company, public authorities (e.g., IBAMA, state environmental agencies, city halls) and other relevant actors to closely monitor the social and environmental impacts of the offshore wind project, also monitor compliance with mitigating and compensatory measures.

This instrument works as an instance of continuous dialogue and participatory supervision, increasing the accountability[7] of the project to local society, that is, building a culture of trust and transparency.

A typical LSMC involves community leaders, such as fishermen, local associations, indigenous representatives, *quilombolas*, project technicians, environmental authorities, and, when relevant, representatives of the Public Prosecutor's Office or academia.

The meetings are regular (monthly or quarterly) and serve to share the results of environmental and social monitoring, discuss any problems (e.g., impacts on fishing, effectiveness of compensatory measures, nautical safety), and forward joint solutions.

LSMC can also support the management of the Community Fund (Instrument 5) and evaluate the implementation of the FPIC agreements (Instrument 2).

A significant highlight is that by giving residents an active voice in the follow-up, this type of approach helps to anticipate conflicts and deal with complaints quickly.

In the United Kingdom, for example, engaging fishermen is a consolidated practice already in the planning phase of the offshore wind project to maintain dialogue throughout the project.

In July 2020, South Korea announced a plan to foster coexistence between offshore wind ventures and fishing communities and residents, known as the *"Offshore Wind Power Development Plan for Coexistence with Residents and Fisheries"* [23].

This plan presents a strategy to align the development goals of offshore wind technology and the selection of areas with different stakeholders, especially fishing communities. The plan relies on the application of the LSMC to give voice to local representatives and ensure transparency in effective communication.

Thus, this local commission institutionalizes this engagement on an ongoing basis, acting almost as a community *"ombudsman"*[8] [24] for the project. This proximity tends to reduce mistrust and prevent organized resistance, as the community is no longer a passive spectator and becomes part of the project's governance, promoting co-management of the directions in specific demands.

Case of Japan: Engagement of Fishing Communities in the Development of Offshore Wind in Japan

Japan, as an archipelago with a vast coastline and heavy dependence on imported fossil fuels, envisions offshore wind energy as a strategic solution to diversify its energy matrix, promote decarbonization, and revitalize local economies.

However, the country also has a long fishing tradition, with coastal communities heavily dependent on the sea for their livelihoods and culture. In this context, the engagement of fishing communities has become one of the fundamental pillars for the sustainable advancement of wind energy at sea.

Since the enactment of the Law for the Promotion of the Use of Marine Areas for Renewable Energy in 2018 [25], it has been established that no project can move forward if there is evidence of direct damage to fishing activity. The legislation also requires the creation of statutory councils composed of representatives of fisheries, local governments, and other interested actors, as a prerequisite for the official recognition of offshore wind promotion zones.

However, practice has revealed shortcomings: the fragmented approach of developers, the lack of standardization in impact studies, and the difficulty in identifying all potentially affected fishers have led to tensions and delays in projects. To respond to these challenges, several measures are being proposed and implemented.

One of the first steps is the early identification of stakeholders, with emphasis on active fishermen, including those registered under different forms of licensing (cooperatives, individual permits, "free" fishermen).

The proposal for the so-called "Fishermen Map" aims to gather integrated data from sources such as AIS (automatic identification systems), smartphone applications, and local government records, allowing a clear visualization of fishing areas.

Another fundamental advance is the standardization of fisheries impact studies. Traditionally, these studies were carried out by the developers themselves after the auction of the projects, which limited the depth and comparability of the data. Currently, a more robust approach is sought, initiated from the initial phases and conducted by independent institutions, such as experimental fishing stations of the municipalities [26].

Scientific techniques such as biologging, acoustic telemetry, and remote satellite monitoring have been used to understand the impacts on migratory species, shoal behavior, and the possible effects of artificial reefs created by turbine bases.

In addition to data generation, the national government has encouraged the creation of joint fisheries promotion funds, funded by operators and intended to compensate for unexpected impacts, support the technological adaptation of fishermen, or finance improvements in coastal communities.

There is also a concern about the governance of the projects. City Halls such as Yamagata have started to centralize the contact between developers and fishermen, creating a transparent and unique coordination model, which avoids isolated and disorganized approaches.

At the community level, the Japanese model advocates that the fishermen themselves actively participate in the formulation of promotion measures, with the administrative support of local governments.

These actions may include the participation of fishermen in environmental monitoring activities, the use of their vessels for the installation and maintenance of wind farms, as well as the incorporation of clean energy into the fishing production chain, such as refrigeration or transportation.

In addition, studies coordinated by the government, with scientific evaluation committees, are recommended to ensure the credibility of the data and avoid conflicts arising from misinformation or opacity in the processes [27].

In summary, Japan has sought to build an energy transition model that respects local logic and artisanal fishing traditions. The Japanese experience demonstrates that the engagement of fishing communities cannot be treated as a secondary step, but rather as a central axis of an inclusive, fair, and lasting offshore wind policy.

For countries like Brazil, with a similar coastal profile and fishing tradition, these lessons can offer valuable ways to ensure that the advancement of clean energy is also a project of territorial justice and local development.

APPLICATION PHASE: LICENSING, CONSTRUCTION, OPERATION, AND DECOMMISSIONING.

Ideally, the LSMC is established as soon as the licensing is obtained (before the start of the work). In the context of environmental management and monitoring, it remains active throughout the operational phase (monitoring impacts and effectiveness of compensation).

It extends to decommissioning planning, ensuring that the closure of operations and the destination of structures (removal or reuse) are also discussed with the community.

In the Basic Environmental Plans (PBA), the creation of a Local Monitoring Committee (CAL) can be inserted as a measure, defining its composition, frequency of meetings, as well as the frequency of reports directed to LSMC.

For effectiveness, LSMC must have access to updated information (see Instrument 5 – digital platforms) and be able to request clarifications. It is recommended that the company maintain a periodic public report on social and environmental compliance to support the meetings, based on Key Performance Indicators (KPIs) that can monitor the LSMC processes.

Some of the suggested KPIs for monitoring LSMC may include: ·

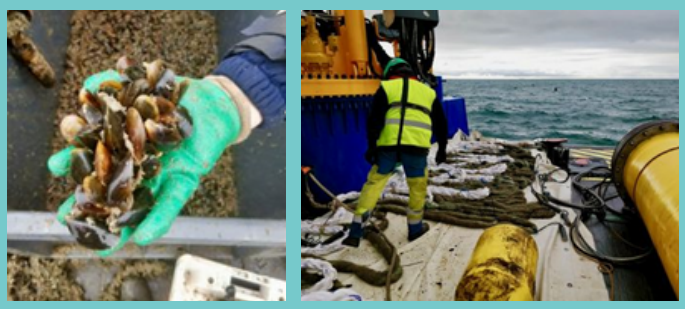
- *Number of meetings held vs. planned*
- *Percentage of participation (quorum of members and segments present)*
- *Number of communities' demands registered*
- *Percentage resolved within a specific period*

CASE STUDY

Belgium Case – Mussel Cultivation and Partnerships between Communities and Universities

Some examples of innovative approaches to co-management of maritime space have been tested in some countries, which show potential for mutual benefits. In Belgium, where commercial fishing also competes with wind farms in the North Sea, a consortium of universities, energy companies, and fishermen has launched the *Noordzee Aquacultuur*[9] project to integrate mariculture into offshore wind farms [28].

Figure 7: Aquaculture - Mussels and Cultivation



Source: Gust Lesage, DEME Group | Blue Agent – Edulis Offshore Mosselkweek in Windmolenparken

In 2017, they installed the first mussel farming systems on the foundations of C-Power Offshore Wind Power (Thornton Bank)[10], assessing the biological and economic feasibility of raising mussels on a large scale between the turbines.

This initiative included fishermen and fishing companies as partners, suggesting positive results about the coexistence between traditional activities and offshore wind energy, transforming exclusion areas into productive areas in new ways.

Such an approach requires shared governance, i.e., agreements in which organized fishing communities cooperate with companies and authorities in the management of maritime space and project influences on activities.

Lesson Learned

The application of LSMC should be adopted by economies seeking the planned and aligned development of offshore wind farms, as it involves communities in stages that can yield results and benefits while avoiding impacts.

The creation of planning, as in the case of the United Kingdom, Japan, and South Korea, ensures prior involvement and dissemination of information that will help create public opinion in the communities.

The key lesson is that flexibility and innovation in co-management – whether through fish farming, community tourism (tours to see turbines), or involving fishermen in environmental monitoring – can generate reciprocal wins. This can reduce resistance, as traditional communities can see cultural and economic benefits that align with their way of life.

INSTRUMENT 4

Participatory Socio-Environmental Diagnosis of Marine-Coastal Territories

CHAPTER 4

Participatory Socio-Environmental Diagnosis of Marine-Coastal Territories

The Participatory Socio-Environmental Diagnosis (PSD) is the initial stage of mapping and understanding the local context, carried out with the direct participation of the community. The proposal is to direct the diagnosis to coastal and marine environments, seeking to understand in a synergistic and integrated way the interrelations between society, nature, and territories.

Thus, PSD is understood as the tool to involve the local public in the production and collection of information on traditional uses of the sea — fishing areas, fish stocks, artisanal shipping routes, cultural, socioeconomic, and environmental aspects — aiming to integrate scientific data and local knowledge in an ethical, transparent way and under rights safeguards [29].

As a precondition for the execution of PSD, clear data governance rules must be agreed upon — ownership, confidentiality, informed consent, access, use, sharing, and the possibility of withdrawal by participants. It is recommended that the participants themselves be the subjects of data, especially about traditional knowledge and fisheries information, with properly established mechanisms for return and access control.

It is essential to highlight that scientific knowledge is not superior to traditional knowledge, or vice versa, but that both complement each other to direct decision-making that is more aligned with the local context and with the interests and ways of life of local stakeholders, as will be shown in the example presented below.

The implementation of a PSD will make use of multiple participatory methodologies that can be executed separately or jointly. The central objective of the methodologies is the construction of a shared panorama of coastal and marine territories. Among the existing methodologies are:

- *Community workshops*
- *Priority matrices*
- *Community Participatory Maps – Interactive Maps*
- *Social Cartography*
- *Interviews with residents and fishermen*
- *Specimen captures for record*
- *Temporal evaluation of the stock of a particular species*

The main objective of the PSD instrument is the identification of sensitive areas of socioeconomic importance and essential elements for the activity, such as target species, fishing nurseries, sacred sites, spawning areas, and fishing transport corridors.

With this information, the PSD should provide bases for the recognition of potential conflicts of use and opportunities for synergy and, thus, anticipate social and environmental impacts even before the definition of the project.

It is worth mentioning that all community stakeholders should be present (i.e., women, youth, the elderly) as they may have different perspectives than the 'fishers'. In addition, the participation of fish traders and processors is crucial because they are an integral part of the value chain of fishing activity. Perceptions from different audiences will be incorporated.

APPLICATION PHASE: PLANNING AND LICENSING.

Ideally, the PSD occurs before or at the beginning of project feasibility studies for permitting purposes. It can be a source of data for certain types of participatory zoning (see Instrument 1). However, depending on the project planning, the PSD can also be executed throughout other phases of the project, depending on the need in the operation of the asset.

Their results should be documented and shared openly, and measures should be taken to provide transparency throughout the process – for example, simplified reporting channels or community maps should be shared with participants, due to collaborative participation and provision of information.

The centrality here is to ensure public access (see Instrument 6 on digital platforms) and to provide a sense of belonging to the process, to generate what is recognized in the literature as Meaningful Community Engagement[11].

Meaningful Community Engagement is presented as a management concept and approach that privileges directly affected rights holders, i.e., local communities, integrating risk-based due diligence [30].

Acting in a meaningful way in community engagement is not limited to informing or consulting only. However, it implies the execution of bidirectional, continuous processes with real power to influence decisions and results, guided by global regulatory frameworks and applied in sectoral contexts, where the quality of involvement determines the ability to identify/mitigate harm and co-create lasting benefits.

STUDY CASE

United Kingdom Case – Diagnosis and Monitoring with Local and Scientific Knowledge

In operation since 2015, the Westermost Rough Wind Farm, located in the North Sea ~8 km off the coast of Yorkshire in England, is situated in one of the most productive lobster fishing areas in Europe [31]. During the licensing, local fishermen expressed concern about the possible impacts of the work on the populations of lobsters and crabs – vital resources for their livelihoods.

Although the official environmental studies indicated minor impacts, the developer (Ørsted) co-designed with the fishermen a long-term environmental study to address these concerns. In 2013, the company collaborated with the Holderness Fishing Industry Group (HFIG) fishermen's association, independent scientists, and the University of Hull to design research before, during, and after the construction of the offshore wind farm.

The study used HFIG's research boat, manned by local scientists and fishermen, to diagnose and monitor the catches and sizes of lobsters inside and outside the wind farm area. This pioneering approach – the first of its kind in the world – incorporated the knowledge and direct participation of fishermen in the environmental diagnosis and monitoring of the project.

After six uninterrupted years, the data did not indicate significant adverse impacts of the wind farm on lobster populations. Maintenance of density and size was observed, with an increase in the number of lobsters within the wind farm area and a modest reduction in the surroundings of the energy export cable (Figure 8).

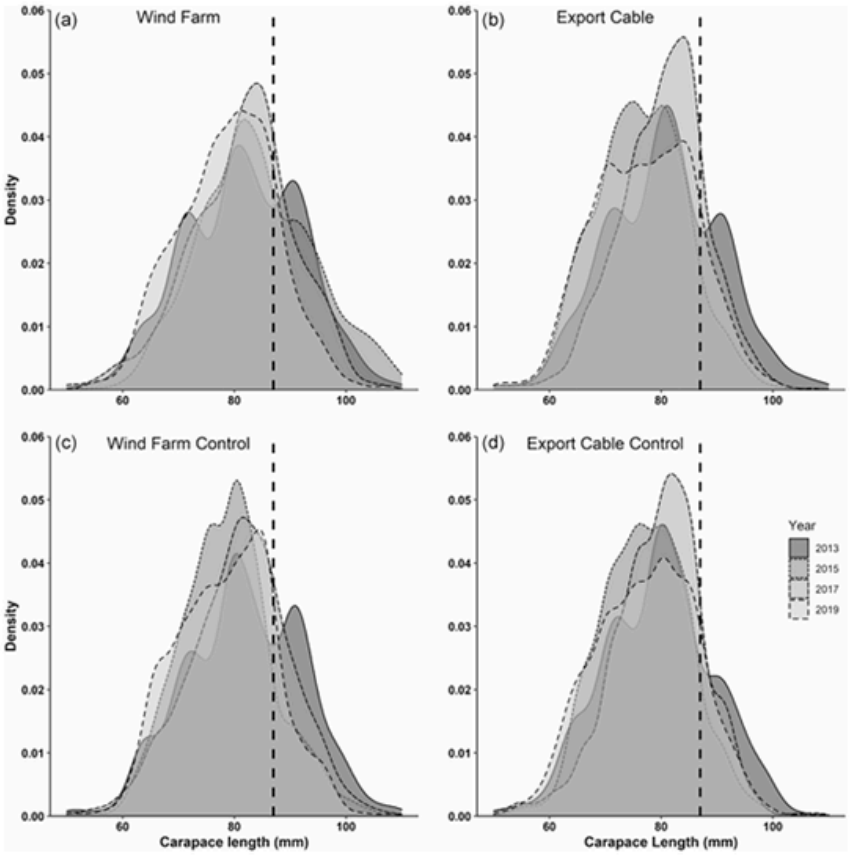
It is essential to highlight that the reduction around the cable is also perceived in the control area, which allows us to conclude that the change may have occurred for natural reasons and not due to the insertion of the cable power.

The results also pointed out that there were no worrying effects on the crabs, and the fishermen maintained consistent economic returns. These findings have alleviated the concerns of the fishing community and demonstrated that commercial fishing can coexist with the operation of the asset.

The process also generated adaptive measures: for example, during the construction work, the fishermen agreed to temporarily pause fishing in certain areas, which turned out to show potentially beneficial effects (greater abundance of lobsters due to the "rest" of the area).

This case has become an international reference for collaboration between the wind farm and the fishing activity, highlighting the importance of involving local communities in the generation of knowledge and environmental decisions of the enterprise.

Figure 8: Density of lobster size distribution by year (2013, 2015, 2017, and 2019) at the wind farm (a) and export cable (b) sites and their respective control sites (c and d).



Source: Roach; Revill &Johnson (2022)

Lesson Learned

The application of diagnostics provides security for society, companies, and government, enabling them to anticipate fundamental information to be shared in engagement with local communities and throughout the other phases of the project. With the help of the communities, the identification of potential areas for the enterprise, as well as the generation of information on the stock of species, can prevent possible future conflicts.

In the case of Westermost Rough (Ørsted, UK), the use of local vessels and crews as a data collection platform, remunerating fishermen and acknowledging their empirical knowledge, was a key strategy as the turbines would be installed within one of the most productive lobster fishing zones in the country.

By adopting co-design actions of the research program, using the association's boat and mixed teams of scientists and fishermen to monitor lobster catches and biomass before, during, and after the work, the diagnostic and monitoring study allowed the community to be involved throughout the process. This strategy allowed for greater legitimacy in the results.

INSTRUMENT 5

Community Benefit Funds with Participatory Governance

CHAPTER 5

Community Benefit Funds with Participatory Governance

Community Benefit Funds (CBF) are financial mechanisms by which offshore wind development can allocate resources to projects and improvements in affected local communities.

These funds materialize the principle of shared benefit, ensuring that part of the gains from the wind farm is reinvested in local development. Prioritization should reflect the local demands raised in PSD (See instrument 4).

In this sense, the differential of this instrument is in the participatory governance of the fund – the decision on which projects will be financed is made together with community representatives, ensuring alignment with local priorities.

In the Brazilian context, CBFs can finance, for example, improvements in schools, health centers, basic sanitation, income generation projects, and professional training in fishing villages, or infrastructure such as fish markets, fish cooling chambers, and improvements in access roads to beaches.

APPLICATION PHASE: LICENSING AND OPERATION

The constitution of the fund is usually a compensatory measure through the issuance of conditions or even voluntary, defined during environmental licensing (e.g., inserted in the Basic Environmental Plans).

The operationalization of the fund and selection of projects takes place throughout the operation phase, with periodic disbursements. It is suggested to include in the social and environmental plans a specific community benefits program, with goals and KPIs such as:

- Annual amount invested in the fund
- Number of local projects supported
- Number of beneficiaries
- Degree of community satisfaction (measured by surveys)

CASE STUDY

Scotland Case – Beatrice Community Fund and the Involvement of Fishermen

In the UK, while offshore wind farms are often far from the coast, local engagement and benefit practices have also evolved. The Beatrice project, located in the North Sea in Scotland, 13 km off the coast of Caithness, stands out for having established a £6 million community investment fund during the construction phase [32].

The fund was allocated to communities in the nearby coastal counties (Caithness, Sutherland, and Moray), and throughout the years 2016–2023, supporting 361 local initiatives, which include: infrastructure improvement (revitalization of a community shipyard), youth education and training, local clean energy projects, and strengthening of community organizations.

An impact report[12] showed results from these initiatives in coastal counties: 73 rural jobs created, and 64 community facilities improved, leaving a positive socio-economic legacy in the region (Figure 9).

The management of resources was participatory – an independent panel with residents evaluated the proposals, ensuring alignment with local priorities.

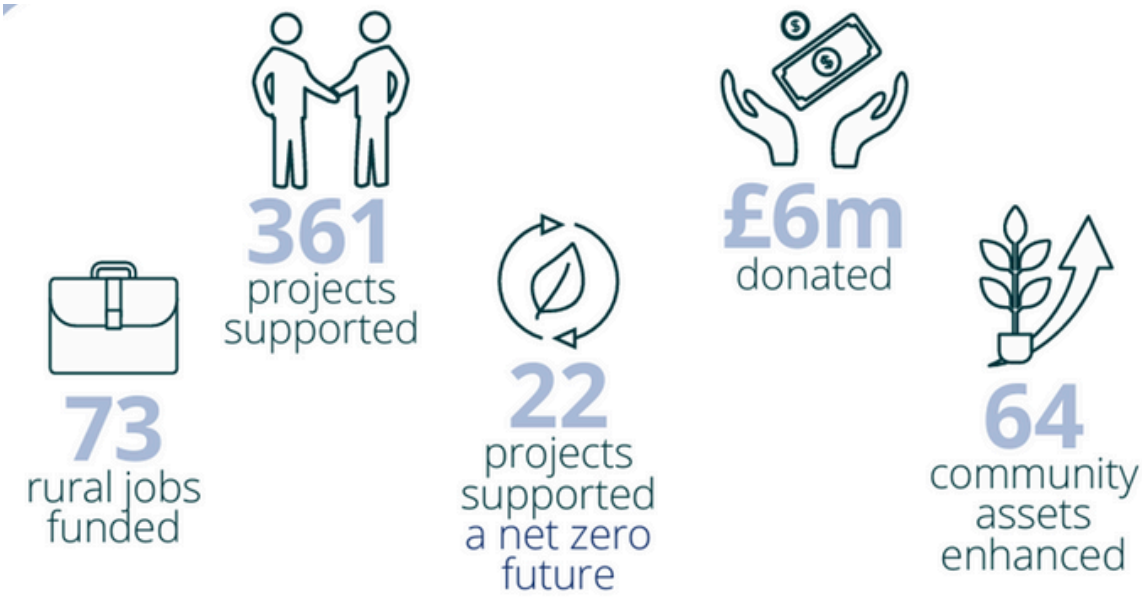
In addition to the fund, there was a dedicated dialogue with fishermen throughout the planning, in line with established British practice.

Research shows that climate funds around the world can bring assertiveness when identifying the needs and social characteristics of the communities around the projects.

Data for Progress' report "Community and Labor Benefits in Climate Infrastructure: Lessons for Equitable, Community-Centered Direct Air Capture Hub Development" presents the percentage of responses associated with the trend of favorability of programs and funds that can support local infrastructure and result in social benefits for voters in the United States [33].

The percentages presented for the funds associated with public transport, social housing, and support for local commerce demonstrate that the different social groups are in favor of the construction of funds that can help the local infrastructure, providing social benefits.

Figure 9: Investments in the Beatrice project fund – United Kingdom



Source: Beatrice Offshore Windfarm Ltd (2023) | Sharing the benefit of offshore wind

Lesson Learned

It is essential to formalize the agreements in writing, that is, to prepare a document that can be called the Mutual Benefits Agreement, with the participation of the local government, to provide security of compliance with the actions and build trust with residents. Communities that have felt targeted by constant promises in the past, without corresponding actions, tend to resist unless they see tangible benefits.

In addition, it is recommended to highlight that even communities that do not see the turbines because they are far from the coast should also be included in the analysis to contemplate the benefits provided for in the funds.

Another factor to be observed is that the implementation of a well-structured voluntary fund must observe several key principles: substantial values to the local reality, time planning in several years, with participatory governance, symmetry of powers among participants, equitable sharing of benefits, and focus on sustainable and local territorial development.

Engagement with traditional sea users from the beginning of the fund's implementation is recommended to avoid unmitigated impacts. Actions aimed at this sector have a relatively low cost given the benefits. The CBF will require the institution of a Term of Commitment or formal agreement, providing for transparent governance through a community management council and result indicators

INSTRUMENT 6

Digital Transparency and Communication Platforms

CHAPTER 6

Digital Transparency and Communication Platforms

Active transparency is a pillar to reduce information asymmetry. Digital platforms, such as internet portals, mobile applications, or interactive systems, make it possible to make project information available in an accessible way and in real time to the whole society.

The adoption of this instrument aims to ensure that data on the offshore wind farm, from environmental studies, zoning maps, to monitoring results, underwater noise emissions, and compensation paid, are readily available and understandable to the public.

Listed below are some examples of typical applications and functionalities of digital platforms in the context of offshore wind farms:

Open Data Portal – publication of key documents (e.g., studies, reports, licenses obtained, conditions, environmental plans, periodic monitoring reports), ideally, in open formats and with user-friendly visualizations: interactive charts and maps.

Communication and Ombudsman Channel – a tool for the community to send questions, comments, and complaints directly to the entrepreneur, with a guaranteed response. You can plan to include a chatbot if communities are adept at this tool, or an online forum moderated by the enterprise and community members.

Alerts & News – section with project news, notices of activities (e.g., schedule of maritime works that affect fishing or navigation so that fishermen can plan themselves), and disclosure of agendas of public meetings.

Education and Transparency – educational materials on offshore wind energy, Answer Forums and Questions (FAQs), explanatory videos on possible impacts and measures taken to empower the community to understand the project and participate in an informed way.

Platforms of this type increase trust by showing that there is no "black box"; that is, everything is transparent and up to date. According to international guidelines , transparency in offshore wind involves public forums and accessible data platforms, as well as clear communication channels with stakeholders. The use of digital technology can enable broader engagement, as online and offline activities complement each other.

In this sense, an example that can be cited is public dashboards, whose online functionalities allow you to monitor environmental and social indicators in real time. This promotes informed engagement and reduces rumors of misinformation circulating in the community.

It is worth noting the need to pay attention to digital inclusion. Platforms should be user-friendly and establish seamless face-to-face communication for individuals with limited internet access.

APPLICATION PHASE: FROM PLANNING TO DECOMMISSIONING.

Communication and transparency platforms, for example, should go live, preferably, before the start of the licensing process to enable prior communication with local communities. It is necessary to give space for questioning the plans built and opening to a dialogue that also allows the debate on the design of the offshore wind farm project.

Once environmental studies are available for public consultation, digital communication channels and mechanisms (e.g., alert and news applications) should expand the capacity to build the relationship and be fed continuously during construction and operation.

In the decommissioning phase, the platforms can be used to disseminate the plans for the removal of infrastructures and the results achieved at each stage.

Another relevant point is that the adoption of digital platforms will not necessarily be associated with or will be developed exclusively by the proponent of the offshore wind project.

On the contrary, due to the versatility of application and definition of the scope of digital tools, public agencies, civil society organizations, representative and community associations, and universities can adopt strategies to build their tools, managing communication and actions according to their objectives.

Some suggested KPIs in the adoption of digital platforms are:

- *Porcentagem de documentos do projeto divulgados publicamente*
- *Percentage of publicly disclosed project documents*
- *Number of monthly accesses to the portal*
- *Average response time to community questions*
- *Number of meetings or consultations announced via the platform*
- *Index of public understanding measured by online polls on the information disclosed.*

CASE STUDY

European Cases – Adoption of Open Data for Improved Communication

Countries that have already matured offshore wind energy have standardized the availability of raw data and performance reports on open data portals, allowing any interested party, whether a fisherman, researcher, investor, or civil society organization, to access the content.

The experience of these countries proves that digital transparency can reduce conflicts, improve the quality of licensing, and speed up investment decisions. Some examples of better consolidated digital hubs are:

Case: Marine Data Exchange

An initiative of the UK's Crown Estate [34, 35, 36], the portal hosts more than 250 terabytes of data collected by all offshore wind farms in English and Welsh waters since 2013, covering bathymetry, benthos, bird radar, and noise campaigns.

The main differentials are a GIS-Web interface (Geographic Information System hosted online) with permission to download files in multiple formats (Figure 11); an open data license; and an obligation through a contractual process for each operator to upload the information of the offshore wind farm within six months after the respective collection.

Caso: Sofia Offshore Wind Farm

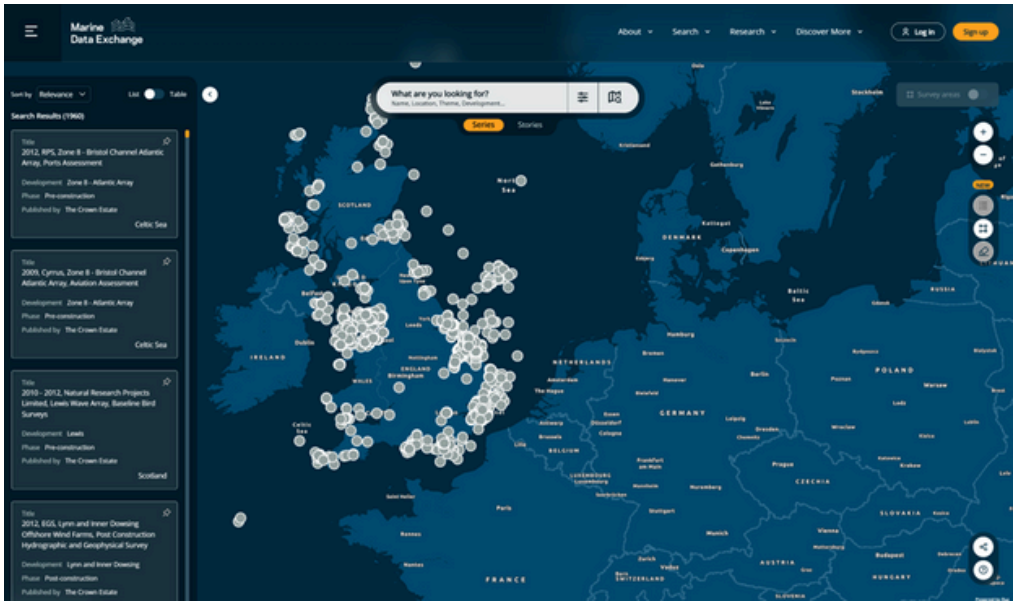
The online portal of the Sofia Offshore Wind Farm asset is also one of the platforms used to support the use and collection of data to spread technology knowledge [37].

Owned by RWE UK, the portal combines newsrooms, a document library, fishermen's panels, a real-time contact form, and offshore wind education guidance for early grades, among other things.

Some of the main features of the portal are:

- *Ease for the community to find microfinancing notices*
- *Training opportunities through a dedicated dashboard, containing rules, eligibility, schedule, and a link for submission of proposals*
- *Repository of documents with the availability of environmental studies, monitoring reports, public presentations in different formats, allowing fishermen, researchers, and local governments to download the raw information to carry out their analyses and direct communication channel, through a form, and periodically through subscription to a Newsletter.*

Figure 10: GIS-Web application of the UK Marine Data Exchange



Source: Marine Data Exchange (2025)

Lesson Learned

International experience with digital transparency and communication platforms in offshore wind farms highlights three key lessons. First, the simplicity and clarity of the information are crucial. Successful platforms, such as the Sofia Offshore Wind Farm project (UK), make technical documents available in user-friendly formats and use language accessible to different audiences, reducing information asymmetry and preventing conflicts.

The second lesson highlights the importance of constant updates and effective communication channels. Projects such as Vineyard Wind (United States) demonstrate that creating frequent newsletters, sending quick alerts via SMS or WhatsApp, and utilizing direct contact forms can increase community trust. This approach enables a swift response to questions and complaints, thereby minimizing local tensions.

Finally, digital inclusion emerges as a key factor for the success of these platforms. Countries such as Denmark and the United Kingdom have demonstrated that multiple formats and access points need to be made available, such as lightweight apps for mobile devices or physical terminals in coastal communities, to ensure that artisanal fishers and other traditional populations can access and contribute to participatory processes.

Another factor to be considered is the adoption of management portals in the issuance of licenses. These portals provide access to information, educational resources, and project details (e.g., Sofia Offshore Wind). Portals can serve as more than just mechanisms for issuing declarations or licenses; they also operate as a repository to democratize access to information about the areas offered for bidding stages.

Thus, effective digital platforms are those that facilitate communication, interaction, and promote wide accessibility.

NEXT STEPS AND RECOMMENDATIONS

Directions and the future of offshore wind energy and engagement with communities

NEXT STEPS AND RECOMMENDATIONS

This report presents recommendations for creating a strategic vision integrated into effective stakeholder management and meaningful community engagement in offshore wind projects. The suggested implementation of the instruments described is recommended to mitigate socio-environmental risks and enhance shared benefits, thus ensuring sustainability and legitimacy of the projects with the impacted communities and other stakeholders.

Below, we present a suggestive table with the synthesis of the moments of adaptation and execution of each instrument throughout the life cycle of offshore wind projects (Table 3).

It is recommended that these instruments be observed as interdependent and used together to maximize results. The application of these instruments throughout the life cycle has the potential to bring communities together and involve them in offshore wind debates, providing access to information on technology and its associated positive and negative externalities.

In addition, the instruments presented serve as facilitation vectors for public and private authorities, requiring consideration of local and regional factors for effective implementation, including cultural, social, and geographical issues in their applications.

The international cases of the United Kingdom, Vietnam, South Korea, and other countries encompass peculiar characteristics of each of the places. Some countries contemplate more flexible regulations than others, as well as development goals, plans, and planning of activities at sea.

In this sense, the application of the instruments must consider the regulatory and strategic environment of the country in which the communities are inserted, optimizing the use of the instruments presented in this document.

The approach to the effective implementation of each of the instruments must go beyond fishing communities and encompass different fields of society (e.g., indigenous tribes, sports practitioners, and tourism), considering activities that need to be engaged and consulted to share information and mitigate impacts on the daily lives and social lives of individuals.

Figure 12 below illustrates how each instrument can be operated seamlessly. The integrated analysis of the instruments demonstrates strong strategic interdependence in the participatory governance of offshore wind projects.

Table 3: Stages of execution of each instrument

Instrumento	Planejamento	Licenciamento	Construção	Operação	Descomissionamento
Zoneamentos Marinho-Costeiros Participativos	✓	✓			
Consulta Prévia, Livre e Informada (CPLI)	✓	✓			
Comissões Locais de Acompanhamento Socioambiental (CLAS)		✓	✓	✓	✓
Diagnóstico Socioambiental Participativo (DSAP)	✓	✓			
Fundos de Benefícios Comunitários (FBC)		✓	✓	✓	
Plataformas Digitais de Transparência e Comunicação	✓	✓	✓	✓	✓

Source: Authors

Additionally, Figure 12 indicates that although the instruments are employed in specific phases, as demonstrated in Table 3, there is no sequential order among the instruments. The vacant squares represent applicability, while the arrows illustrate integration based on queries, data, and guidelines that are executed.

The Participatory Socio-Environmental Diagnosis provides essential data for Participatory Marine-Coastal Zoning, guiding spatial guidelines that prevent socioeconomic and environmental conflicts.

The Local and Regional Mechanisms for Free, Prior, and Informed Consent use information from the PSD to legitimize decisions with communities. Digital Platforms ensure transparency and interaction at all stages, enabling continuous monitoring of socio-environmental constraints.

The Local Committee for Social Monitoring oversees impacts and compliance with agreements from licensing to decommissioning, supported by Digital Platforms. The Community Benefits Fund, on the other hand, implements actions aligned with the demands identified in the PSD through local participatory processes.

These instruments form a coherent ecosystem, starting with participatory data collection, followed by the definition of guidelines, ongoing dialogue with communities, unrestricted digital transparency, and benefits aligned with genuine local needs.

Moving forward, it is recommended that developers, regulators, and funders incorporate these practices into all phases of the enterprise, ensuring specific budget and specialized technical teams for community interface.

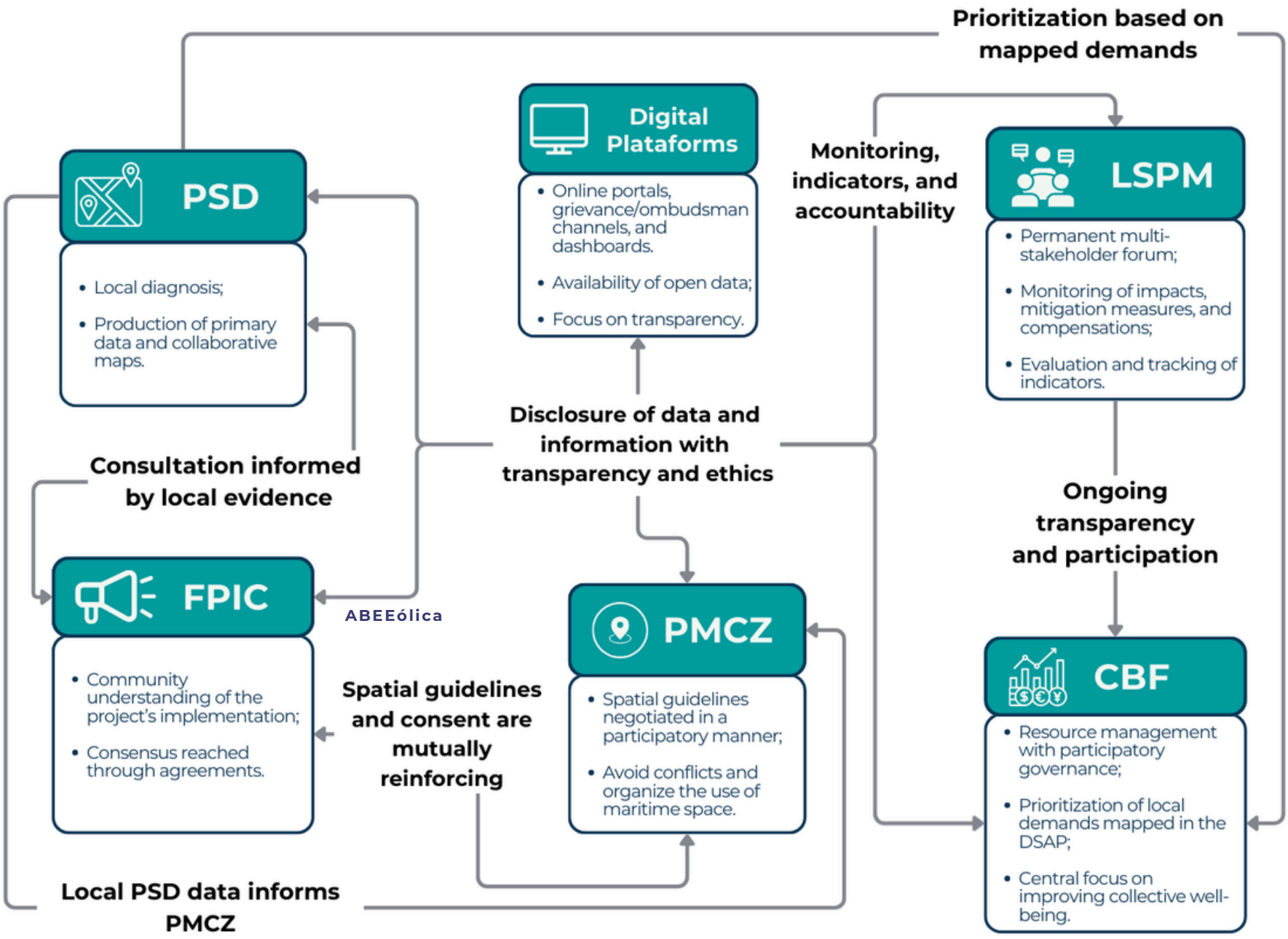
Taking a proactive and integrated approach from the beginning of the project is crucial to avoid conflict, improve social acceptance, generate benefits aligned with the interests of communities, and create shared value with local stakeholders.

The organization and systematization of instruments based on the document's results can help and guide various sectors of society, including policymakers, community leaders, and developer companies, to foster adequate engagement with technology.

In this way, it is possible to avoid the noise of understanding, and false information about offshore wind power can be shared without integrated and transparent consent from society.

Visualizing the main directions of the study, five recommendations are suggested for the practical application of the instrument systematized and explored in the material, without prejudice to the incorporation of new possibilities that contemplate the social, economic, and environmental conjuncture in the development of the project.

Figure 11: Integration Diagram of Community Engagement Instruments



Source: Authours

The recommendations presented do not prevent the contemplation of new instruments and other methodological approaches. The work systematized instruments that are already implemented in international markets, but had the limitation of not delving into other instruments that can be explored in the future.

In addition, the recommendations provide technical suggestions that consider cultural, social, economic, and environmental factors in Brazil and the region of each country, making the evaluation process of the instruments described accessible and inclusive.

It is suggested to utilize these instruments as dynamic and evolving entities, capable of improvement throughout the application and learning process, in line with the development of offshore wind energy assets worldwide, while always considering the sociocultural and economic aspects of each country.

The incorporation of good practices and lessons learned in the application of the instruments will ensure sectoral sustainability, efficient engagement, and preservation in the relationship with the environment and society

Table 4: 5 recommendations for practical application of the presented instruments

5 RECOMMENDATIONS FOR PRACTICAL APPLICATION OF THE PRESENTED INSTRUMENTS
Recommendation 1: The tools presented should be applied in an integrated manner, considering regional, cultural, and social factors.
Recommendation 2: Instruments should consider the resilience of each region's regulatory environment and legislation.
Recommendation 3: For the involvement of local communities and their representatives, it is essential to consider the logistical needs and access to information of each region.
Recommendation 4: Coordination processes with fishing communities should be conducted based on objective and accessible scientific data, produced from the early stages of the project, ensuring transparency, predictability, and trust between fishers, authorities, and developers.
Recommendation 5: Mechanisms for compensation and fisheries promotion should go beyond the logic of compensation and prioritize models of active coexistence, integrating fishers into the economic, technological, and territorial opportunities generated by offshore wind projects.

Source: Authors

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