

# RENEWABLES

## SECTORAL SHEET



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This sectoral sheet is part of a series covering five key sectors of the MSP4BIO Project: **Aquaculture, Fisheries, Marine Non-Living Resources, Renewable Energy, and Tourism.**



It guides MPA managers in addressing activities through an integrated approach and helps blue economy stakeholders understand sector impacts on ecosystem services.

**The sheets outline Good Management Practices to mitigate impacts and promote sustainable sector development.**

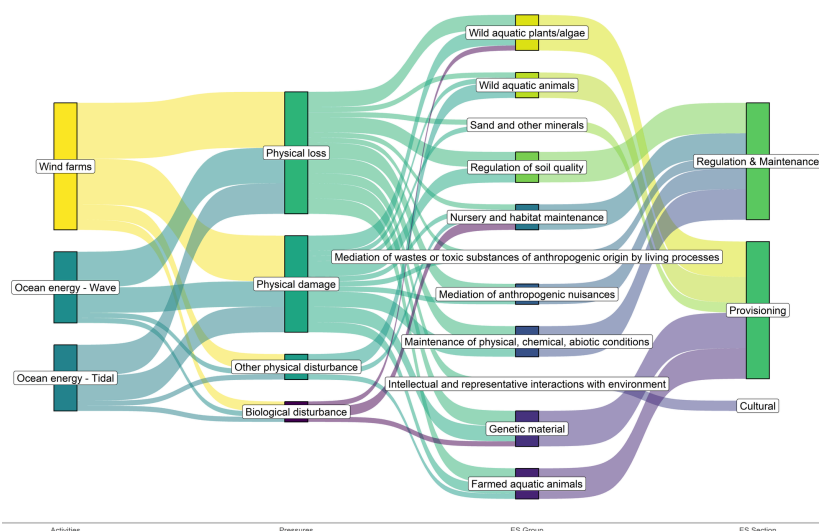


Designed as a resource for policymakers, they support trade-off analysis and address user conflicts.

## Area-based marine conservation

Climate change threatens marine ecosystems, with rising sea levels and warming oceans endangering biodiversity. Transitioning to a zero-carbon energy future is crucial, and offshore renewable energy is leading this shift. Simultaneously, well-managed MPAs are key to building resilience, restoring ecosystems, and supporting a Sustainable Blue Economy. This document highlights the ecosystem services affected by the sector, associated pressures, and best practices to minimize impacts and foster sustainable development.

### Sector characteristics



## Ecosystem Services main dependencies:

- **Non-mineral substances or ecosystem properties used for energy (i.e., wind, solar).**
- **Water used for energy (i.e., tidal power).**
- **Cultivated aquatic plants for energy (i.e., biomass).**

*The Sankey Chart shows how human activities exert pressures like physical damage and loss, impacting key ecosystem services such as aquatic plants and ecosystem maintenance. Adopting multi-use practices in renewable energy is essential to protect these services, ensuring marine ecosystem health and the sustainability of Blue Economy sectors.*

## Activities



Wind Farms



Ocean Energy Tidal



Ocean energy Wave

The graphs below highlight key Good Management Practices (GMP) that should be considered during the planning stages of various activities associated with renewable energy, specifically wind farms and ocean energy (tide and wave). Whenever feasible, the examples provided pertain to areas either under some form of protection or in close proximity to marine protected areas. Brief descriptions are included, with sources for more details



Offshore  
Wind Farms

## Planning and site selection:

- Design buffer zones on a case-by-case basis, taking into account the specific technical and ecological characteristics of the protected area.
- Plan and share grid connections between multiples OWFs creating appropriate routes for cable trenches to optimize the use of available infrastructure, minimizing environmental impact.
- Alternative installation methods should be explored to minimize environmental impact. Example: tripod, jacket, gravity foundations or nature-inclusive design approach for infrastructures.
- Sensitivity maps in the MSP process can be used to inform the selection of suitable sites.



## Environmental impact mitigation:

- Minimize sediment resuspension and noise during construction using techniques like horizontal drilling and bubble curtains.
- Use eco-friendly materials like Econcrete for cable shielding to support habitat regrowth.
- Explore spill solutions and eco-friendly antifouling alternatives, such as vegetable-based hydraulic fluids.
- Plan turbine layouts to avoid barrier effects by aligning with migration routes, creating safe corridors, and increasing rotor blade clearance for birds.



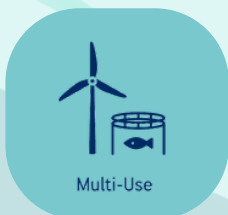
## Decommissioning:

- It should be considered leaving some windfarm infrastructure in place during decommissioning if it has led to the development of a significant ecological community on the hard substrata.



## Multi Use sector-sector and sector-environment Sector-Environment

- Nature enhancement: Hard substrates and exclusion of benthic disturbances (e.g., bottom trawling) aid habitat recovery. Example: Oyster restoration in Dutch North Sea wind farms.
- Inclusive design: Underwater turbine designs can support marine life colonization and accommodate aquaculture.



Multi-Use

## LEGEND

- ORIENTED TOWARDS LIMITING THE ACTIVITY
- ORIENTED TO THE ACTIVITY DEVELOPMENT
- ORIENTED TO PROCESS MANAGEMENT
- ORIENTED TO THE SOCIO ECOSYSTEM
- GOOD PRACTICES FOR MPAS
- GOOD PRACTICES FOR MSP



## GOOD MANAGEMENT PRACTICES



The graphs below highlight key Good Management Practices (GMP) that should be considered during the planning stages of various activities associated with renewable energy, specifically wind farms and ocean energy (tide and wave). Whenever feasible, the examples provided pertain to areas either under some form of protection or in close proximity to marine protected areas. Brief descriptions are included, with sources for more details



Multi-Use

### Sector-sector

- **Wind-farm and fishery:** Define zone areas that is preferred site for large-scale renewable energy projects, at and create conditions to ensure that other activities such as habitat protection, tourism, fisheries, and research are not impeded, but promoted. Example: In Rhode Island, commercial fishing occurs within the wind farm on fair weather days.
- **Wind-farm and aquaculture:** Inclusive design combining the development of deep-sea floating wind energy and aquaculture. Example: The European project, Aquawind, aims to achieve a practical demonstration of a multi-use (MU) integrated solution to offshore renewable energy developments, joining an existing marine renewable energy production prototype with an innovative finfish aquaculture solution.
- **Wind-farm and Tourism:** Offshore wind site used for tourism and recreation. Example: In Denmark, the local cooperative that owns and manages the wind farm offers guided tours in collaboration with boat companies, organizing 30 to 40 trips every year.



### Long-term Biodiversity

- Structures can offer long-term protection by remaining in place after decommissioning.



### Socio economic for both:

#### Optimize Land Use

- Allocate space to balance energy installations and protected areas, minimizing socio-economic impacts.



#### Effective Monitoring

- Conduct pre-construction surveys and routine site monitoring to improve management.



#### Stakeholder Engagement

- Engage stakeholders and developers to promote sustainability and best environmental practices.



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SCAN



### LEGEND



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ORIENTED TO PROCESS MANAGEMENT



GOOD PRACTICES FOR MPAS



ORIENTED TO THE ACTIVITY DEVELOPMENT



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GOOD PRACTICES FOR MSP