ESPON

Co-funded by the European Union
Interreg

European Research Project "Territorial cooperation for blue renewable energy (CoBren)"

Presentation of results

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Introduction to CoBren

The CoBren project

Objectives of the European research project

The CoBren research is part of the ESPON 2030 Cooperation Programme – Thematic Action Plan (TAP) “Climate neutral territories”.

- The study aims to contribute to unlocking the potential of Offshore Renewable Energy (ORE) by providing evidence on the current and future use of European seas in relation to blue energy deployment and the extent to which maritime spatial planning practices can support this.
- Its aim is to provide territorial evidence to facilitate effective cooperation between European regions and tackle potential sea-use conflicts when producing and providing ORE in support of reaching European climate and energy goals.
- The research provides a common knowledge base for policy makers across Europe on the current use of European seas as well as insights on maritime spatial planning practices.

Introduction to the CoBren project

The ORE potential of European seas, the role of maritime spatial planning, and of EU instruments & cooperation mechanisms have been at the core of the CoBren research

CoBren focuses on the analysis of key aspects of blue renewable energy

- **Offshore Renewable Energy (ORE)**: Exploiting ORE resources while navigating sea-use conflicts, negative externalities, barriers, and finding synergies with other sea uses.
- **Maritime Spatial Planning (MSP):** Enabling integrated ORE development, resolving sea-use conflicts, and considering social, economic, and environmental impacts while incorporating stakeholder positions.
- **EU Instruments & cooperation mechanisms**: Importance of sea basin plans, regional sea conventions, and cooperation mechanisms like territorial cooperation programmes in supporting regional collaboration for ORE development.

The research has been conducted by focusing on three key activities*

1. **Mapping of the use of European sea space**: Assessment of the use of European seas to evaluate ORE's potential to contribute to the EU's renewable energy goals.
2. **Reviewing of maritime spatial planning practices**: An examination of current maritime spatial planning practices and available EU instruments and cooperation mechanisms to identify their role in unlocking ORE potential.
3. **Conducting of case studies**: Seven dedicated case studies covering the geographical scope of the CoBren project to illustrate concrete findings.

* For more information about the project methodology please consult Annex 1

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Presentation of results

ORE potential in European Seas

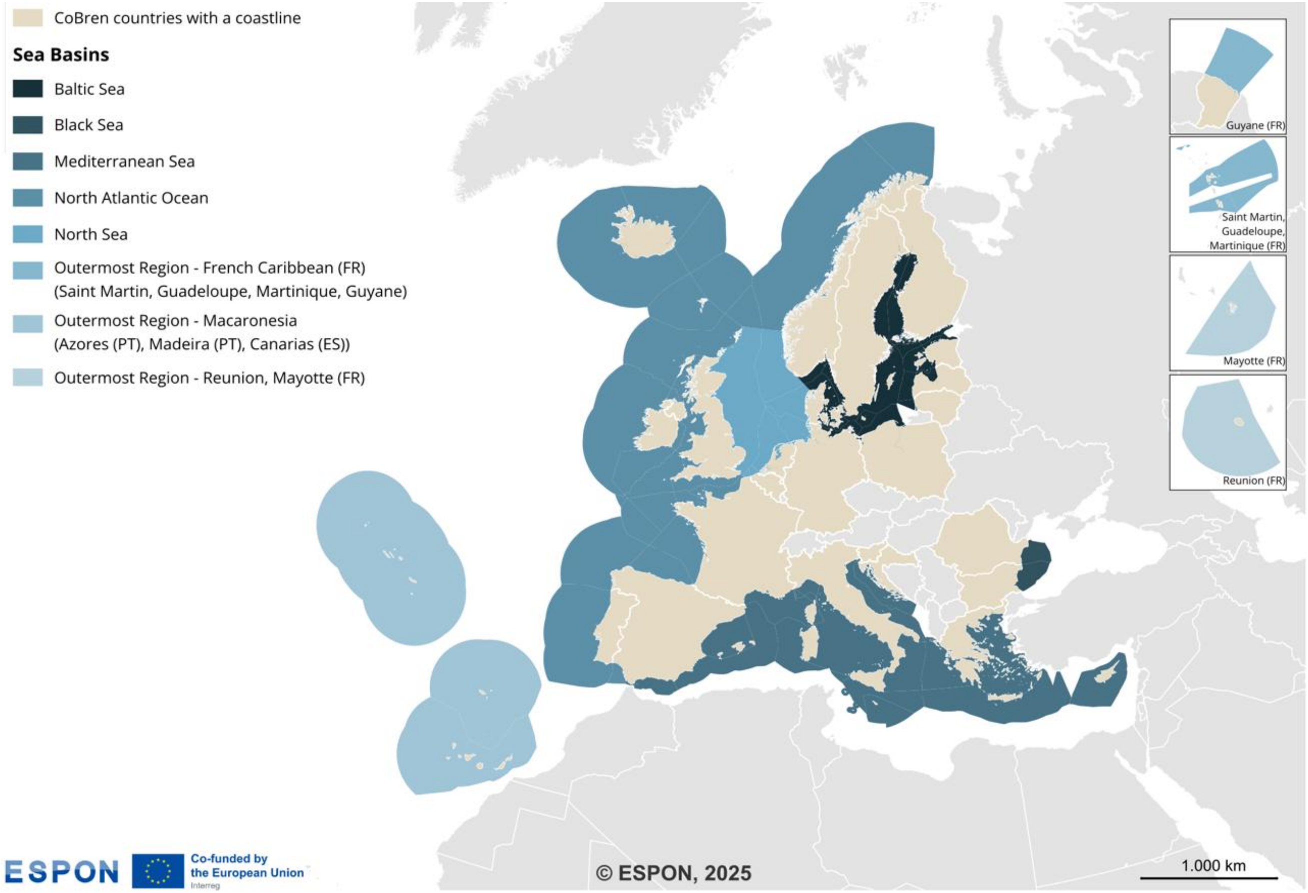
ORE potential in European Seas

Exploiting the European seas ORE potential is key to achieving the EU's 2050 climate-neutrality goal, supporting renewable energy, biodiversity, and growth

Key observations

- The CoBren study area encompasses all 5 European sea basins, outermost, island and coastal regions.
- Offshore Renewable Energy (ORE) can decarbonize energy and boost economic opportunities while balancing priorities.
- EU policies like the Green Deal support ORE with a focus on biodiversity and cooperation.
- Sea basins—Atlantic, Baltic, Black, Mediterranean, and North Seas—face unique deployment challenges.
- Current use of sea space and land-sea interactions are pivotal for ORE deployment. Understanding existing marine space utilisation, pressures, and multifunctionality is essential to realise the EU's substantial ambitions for ORE.
- Efficient planning, synergies, interconnected grids, shared infrastructure, and territorial cooperation can maximize ORE potential.

Study area & sea basins



Territorial level: Exclusive economic zone (EEZ)
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ORE potential in European Seas

EU policy frameworks drive the development of ORE in concert with environmental, socio-economic and sustainability considerations

Key directives and strategies supporting ORE development focus on integrating ecosystems and biodiversity goals alongside energy ambitions.

- The **Green Deal** aims for climate neutrality by 2050, highlighting renewable energy's role in decarbonization while promoting biodiversity, economic growth, and resource efficiency. Strategies include ambitions targets for offshore wind, wave, tidal, and solar energy.
- The **Biodiversity strategy for 2030** seeks to protect marine environments with nature-inclusive designs for ORE projects. Additionally, the **Marine Strategy Framework Directive (MSFD)** ensures ORE activities do not compromise marine ecosystems. Under MSFD, Member States monitor and mitigate the environmental impact of ORE projects.
- The amended **Renewable Energy Directive II under the 'Fit for 55' package** sets targets for renewable energy consumption and aims to reduce dependency on fossil fuels. It promotes faster ORE deployment through streamlines permitting processes and cross-border collaborations.
- The **Habitats and Birds Directives** protect habitats and species affected by ORE, requiring environmental impact assessments and adaptive management practices.
- Socio-economic dimensions, such as job creation, regional development, and energy security, are integrated into ORE policies, supported by frameworks like the **EU Energy System Integration Strategy** and **Blue Economy Strateg**y. These policies ensure ORE projects support local economies and include compensation schemes for affected fishing communities.

ORE potential in European Seas

Comparing the current contribution of deployed ORE to national, regional and EU objectives highlights that more progress is needed

The EU's frameworks set the foundation for Member States to align their strategies with overarching EU goals. However, each sea basin reflects unique geographical, economic, and policy contexts:

Atlantic Ocean

France and **Ireland** both have very ambitious offshore wind targets.

Portugal and **Spain** also have ambitious targets for offshore floating wind and marine energy, positioning them as frontrunners in the sector.

Baltic Sea

The only countries that already have remarkable capacities of offshore wind are **Denmark** and **Germany**.

Over 100 GW of offshore wind projects are actively being developed across **Sweden**.

Black Sea

Currently, there is no operational offshore wind capacity in the region.
While the lack of established offshore infrastructure and the geopolitical complexities of the region remain challenging, both **Bulgaria** and **Romania** are making legislative progress.

Mediterranean

Its deep waters limit the feasibility of bottom-fixed offshore wind farms, resulting in no operational installations to date.
Countries like **Greece** and **Italy** have set ambitious targets to harness offshore wind energy.
Malta launched its first offshore wind tender for a floating wind farm.

North Sea

It is one of the most promising regions for ORE due to its vast resource potential and strategic importance.
Countries like the **Netherlands** are pioneering other technologies, such as offshore solar to diversify their portfolios and efficiency.

Analysis of potential trajectories is needed to address significant gaps

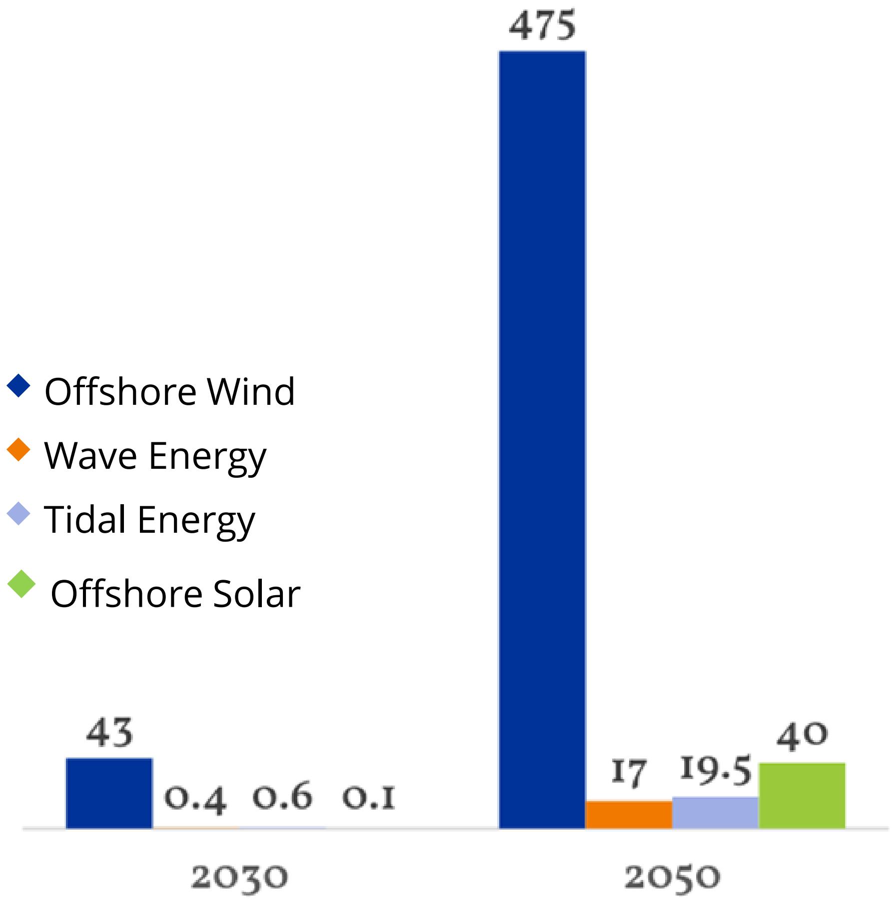
ORE potential in European Seas

Forecasts show significant growth in offshore wind, wave, tidal, and solar by 2050, with offshore wind leading the way

- **Offshore wind**, the most established technology, is projected at 43 GW by 2030, 105 GW by 2040, and 475 GW by 2050, exceeding long-term EU targets despite near-term challenges.
- **Wave energy**, in pre-commercial phase, is expected to grow from 13.2 MW to 17.9 GW by 2050.
- **Tidal energy** could reach 600 MW by 2030 and 19.5 GW by 2050, still below EU targets.
- **Offshore solar** shows substantial potential, rising from 107 MW by 2030 to 41.2 GW by 2050.

By 2050, non-wind ORE could account for 20% of total capacity, up from less than 10% currently. Achieving these targets requires restructured policies, financial incentives, regulatory streamlining, international collaboration, efficient marine space use, and addressing overlaps.

Forecasted Deployment of ORE



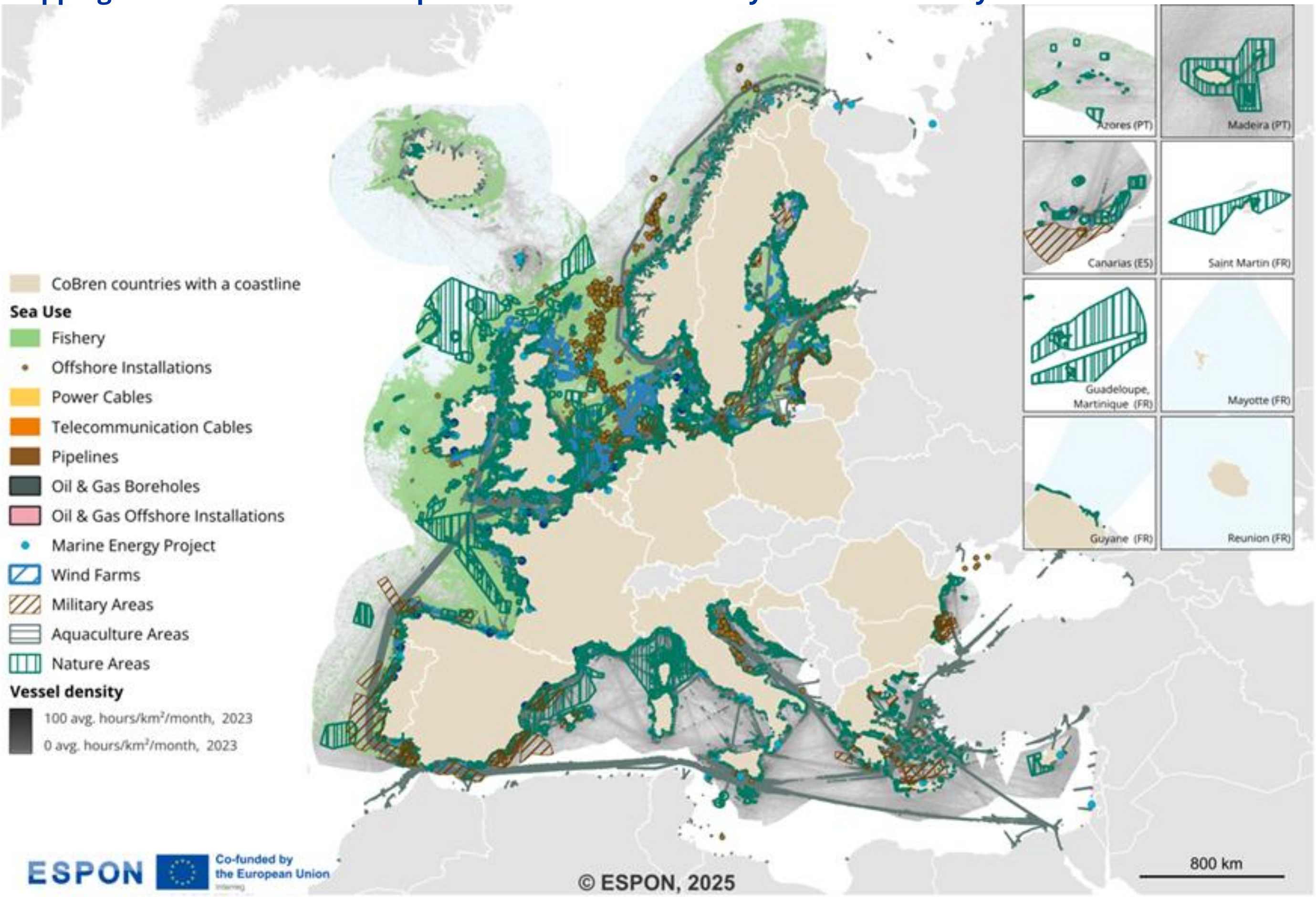
ORE potential in European Seas

Europe’s marine space is under pressure from overlapping uses, requiring strategic planning

Key observations

- Europe's marine spaces are under substantial and growing pressure from **dense and overlapping activities** like shipping, fisheries, conservation, and energy installations.
- Offshore wind farms have become **prominent in the southern North Sea, Irish Sea**, and parts of the Baltic, but their placement is constrained by existing maritime activities and planning designations.
- ORE development increasingly co-locates with other uses, presenting opportunities for spatial efficiency but also **complex planning challenges** without clear governance frameworks.
- The Mediterranean Sea faces spatial competition limiting ORE deployment, whereas the **Atlantic coast and Black Sea offer emerging opportunities**.

Mapping of sea uses for the European sea basins covered by the CoBren study



Territorial level: Exclusive economic zone (EEZ)
ESPON Project: COBREN, 2025
Origin of data: EMODnet, 2024 and World Database on Protected Areas (WDPA), 2024 sea use and vessel density;
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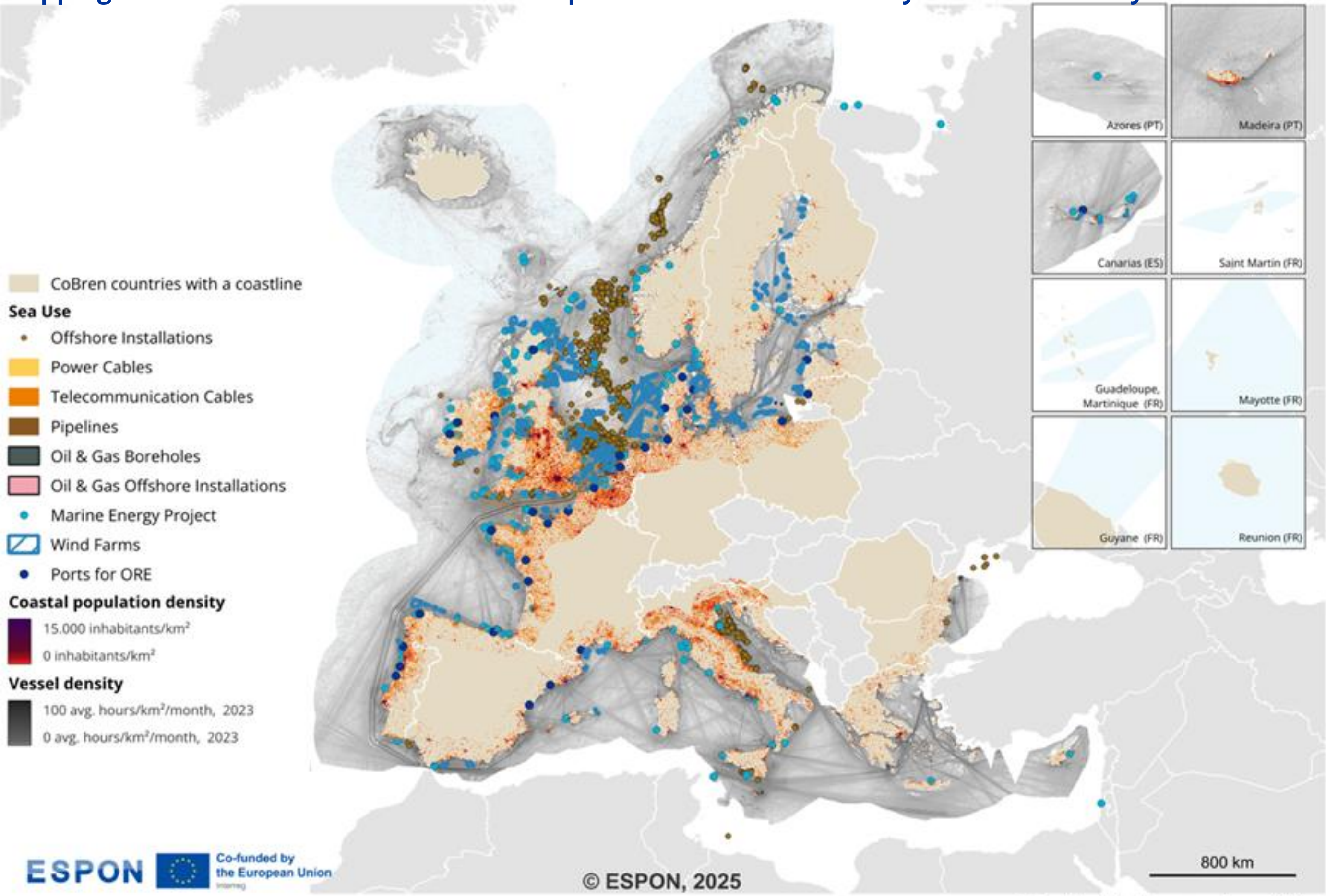
ORE potential in European Seas

Offshore spaces demand addressing grid and port infrastructure, coastal population density, and environmental impacts at the land-sea interface

Key observations

- The viability of ORE is influenced by the **land–sea interface**, where offshore structures connect to ports, grids, and industrial systems.
- **Grid connectivity and cable landings** are crucial, but limited by competition for suitable sites, especially in densely populated coastal regions.
- **Port infrastructure and industrial readiness** are vital; Europe requires significant port investments to meet offshore wind targets.
- **Coastal population density** presents advantages and challenges, with public acceptance crucial for nearshore projects.
- **Recreation, tourism, and environmental interfaces** must be balanced, as cable landings and substation construction can impact sensitive habitats.

Mapping of land-sea interaction for the European sea basins covered by the CoBren study



Territorial level: Exclusive economic zone (EEZ)
ESPON Project: COBREN, 2025
Origin of data: EMODnet (2024) for sea use and vessel density; Eurostat / GEOSTAT (2021) for EU population density; UK gridded population data (1 km²) from the Environmental Information Data Centre (2025), based on Census 2021/2022 and Land Cover Map 2021; WindEurope report A 2030 Vision for European Offshore Wind Ports: Trends and Opportunities (2021) for ORE ports.
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ORE potential in European Seas

Mapping ORE potential reveals that significant capacity and efficiency gains are achievable through colocation of ORE

Forecasts show potential progress but also reveal gaps between growth and the EU's climate and energy goals.

- Bridging this gap requires accelerating deployment and efficiently using available marine space.
- The first step is mapping untapped ORE potential across Europe's sea basins, focusing on resource availability and theoretical capacity for each technology.
  - The analysis examines potential with and without co-location options and accounts for exclusion zones.
  - Provides a high-level overview of potential capacity by sea basin, forming the foundation for strategic planning to maximize resources.

The Mapping shown in on the following pages spans all European sea basins and outermost regions, including the Baltic Sea, Black Sea, Mediterranean Sea, North Atlantic Ocean, North Sea, and regions like Macaronesia, Reunion, Mayotte, and the French Caribbean.

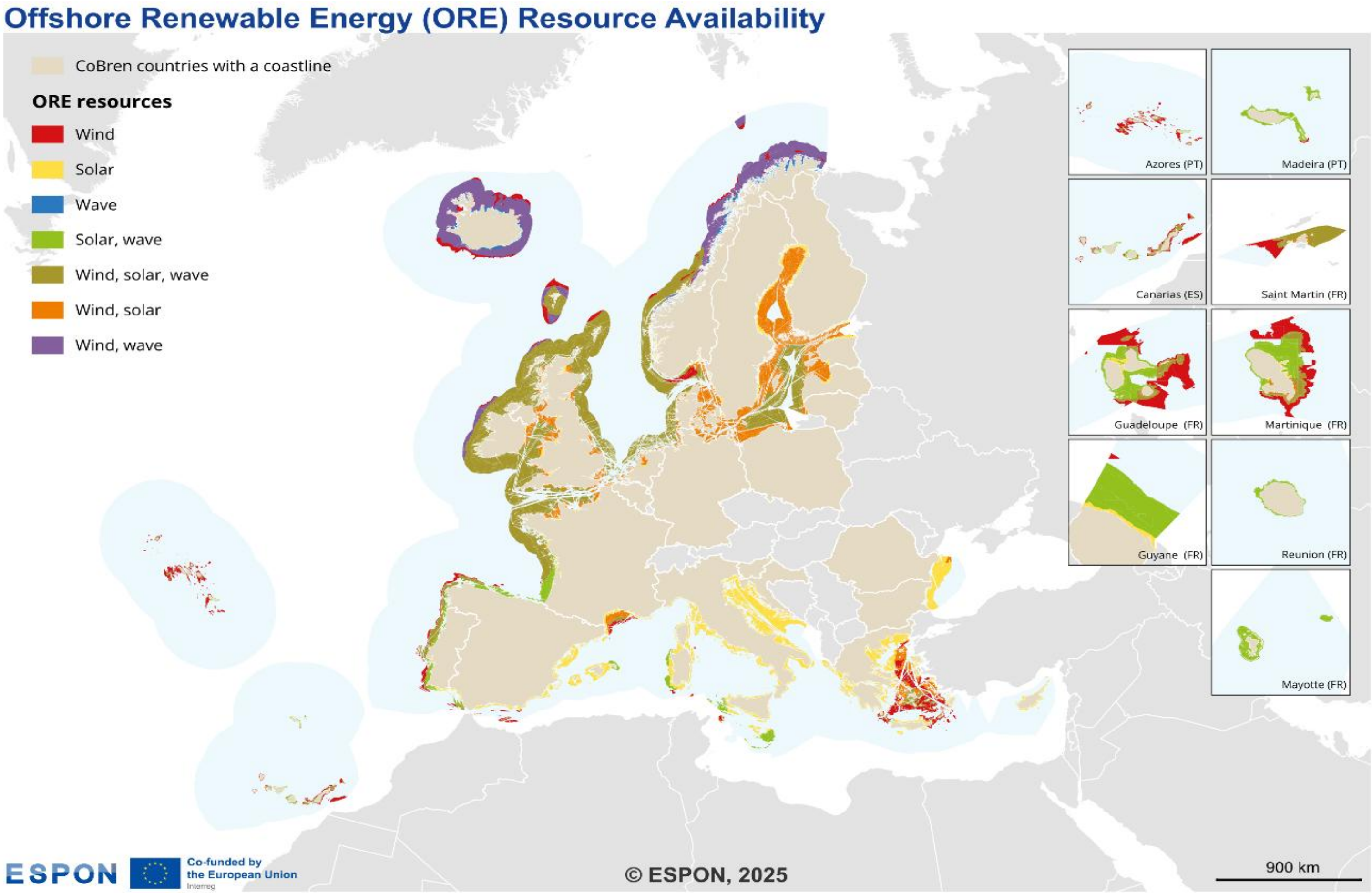
ORE potential in European Seas

Significant variation in offshore wind, wave, and solar potential across Europe's sea basins

Key observations

- Sea basin characteristics were analysed for offshore wind, wave, and solar capacities.
- Tidal energy projections are included, but mapping is limited by data gaps.
- The absence of tidal mapping shows the need for better datasets and dedicated efforts.
- Improving data is crucial for identifying tidal energy deployment areas and integration into ORE mix.

The following pages present the mapping of ORE potential for each sea basin and region covered by the CoBren research.



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Origin of data: Copernicus Climate Change Service ERA5, 2024 for resource data; ©Marine Regions EEZ, IHO Areas Intersection v11, and EuroGeographics for boundaries

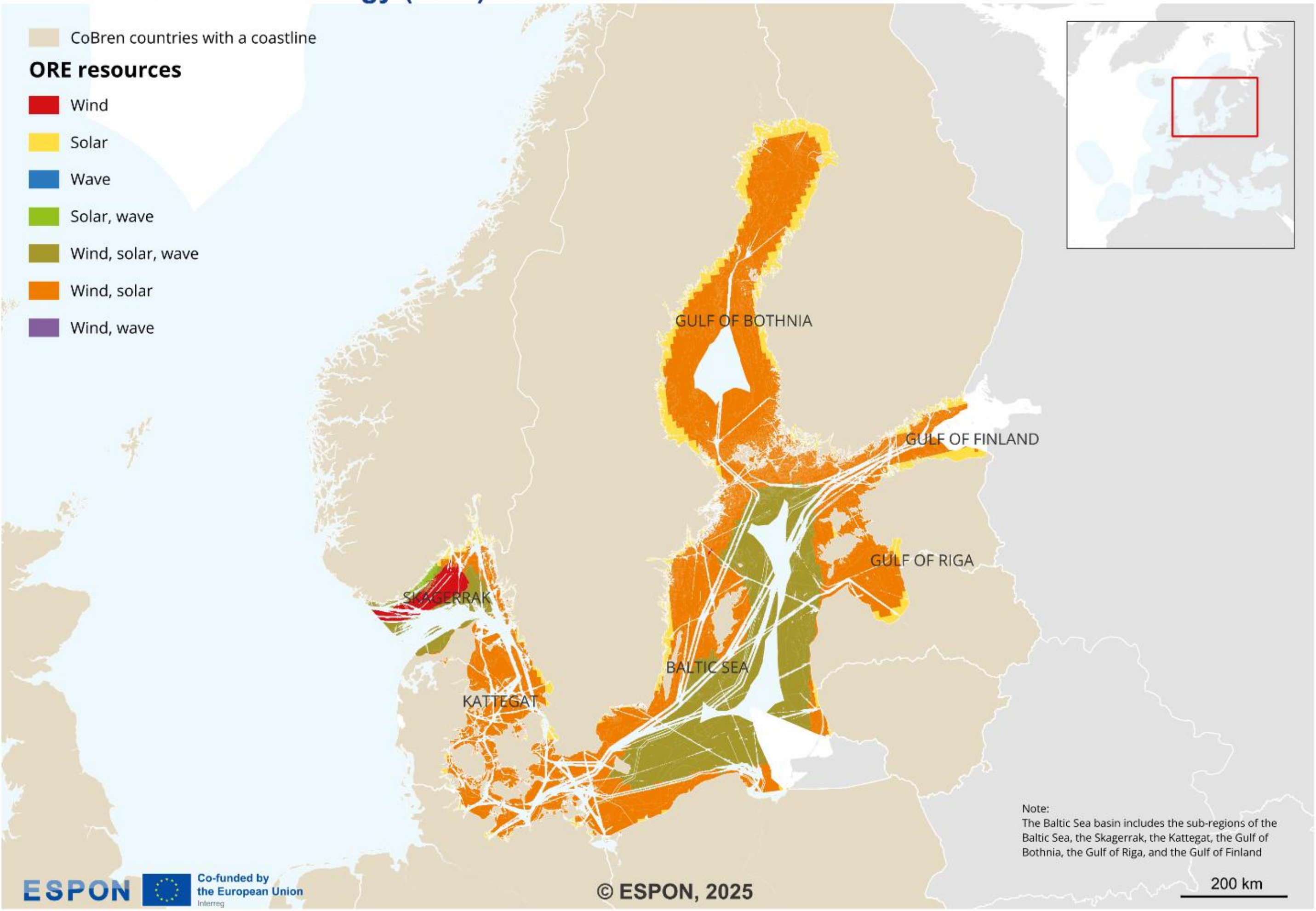
Mapping ORE potential

*Offshore Wind dominates the **Baltic Sea** with widespread availability*

Key observations

- Offshore Solar is the second most prominent due to low wave height, but faces higher costs and challenges related to ice coverage.
- Stark seasonal sunlight variations and winter ice layers require efficient sea space use.
- Without co-location, offshore wind comprises 93.7% of potential, with offshore solar at 6.3%.
- Wave energy potential overlaps with favourable offshore wind and solar conditions; co-location can enhance viability and optimize energy output.

Offshore Renewable Energy (ORE) Resource - Baltic Sea



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Origin of data: Copernicus Climate Change Service ERA5, 2024 for resource data; ©Marine Regions EEZ, IHO Areas Intersection v11, and EuroGeographics for boundaries

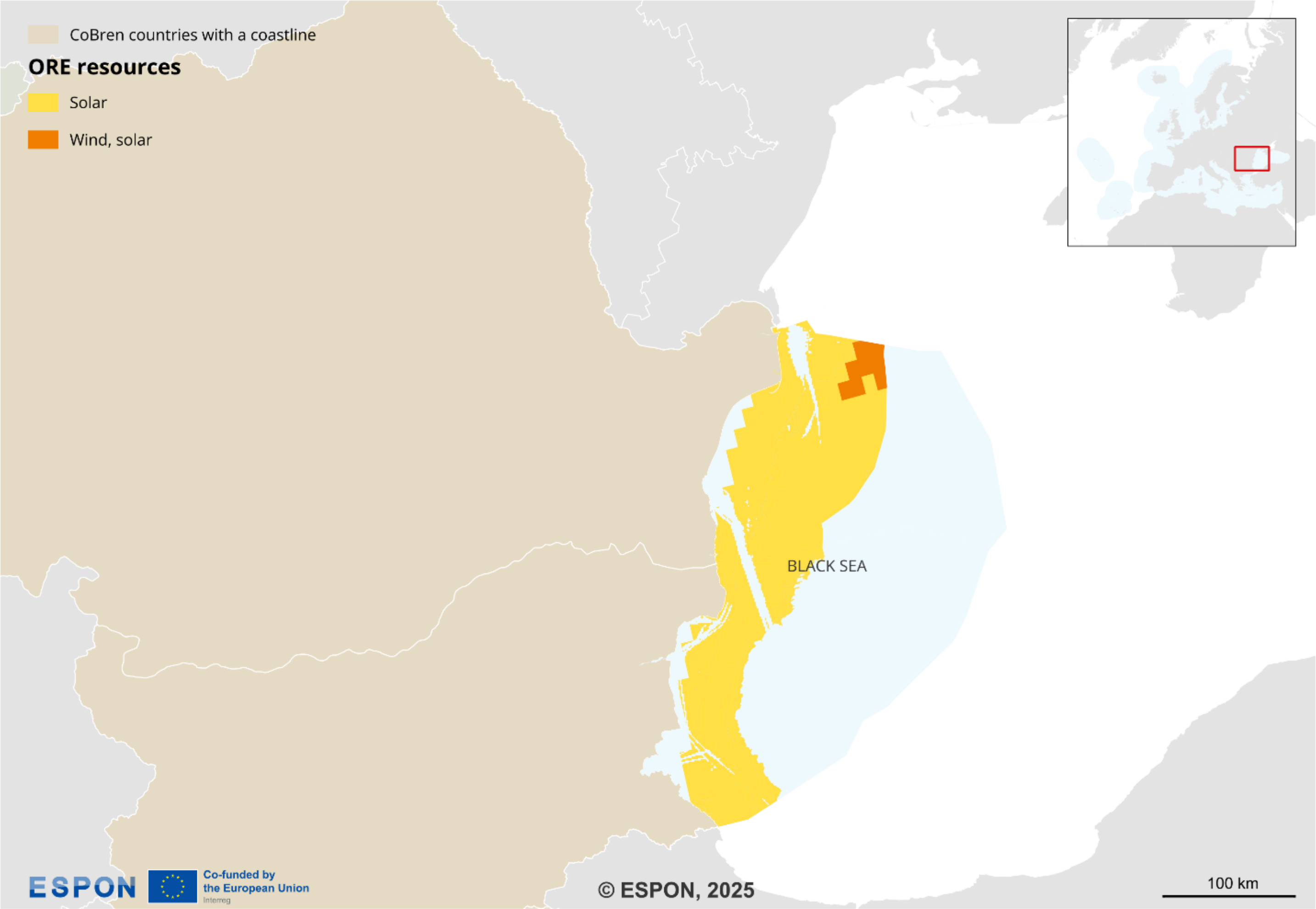
Mapping ORE potential

*Offshore Solar is the dominant ORE resource in the **Black Sea***

Key observations

- European marine space in the Black Sea is limited to Romania and Bulgaria.
- Offshore Wind has small potential in Romania.
- Low wind speed and minimal wave heights make offshore wind and wave energy deployment largely unfeasible.
- Limited availability of resources reduces the potential for ORE co-location.
- Only 19% of the available area is suitable for the co-location of ORE resources.

Offshore Renewable Energy (ORE) Resource - Black Sea



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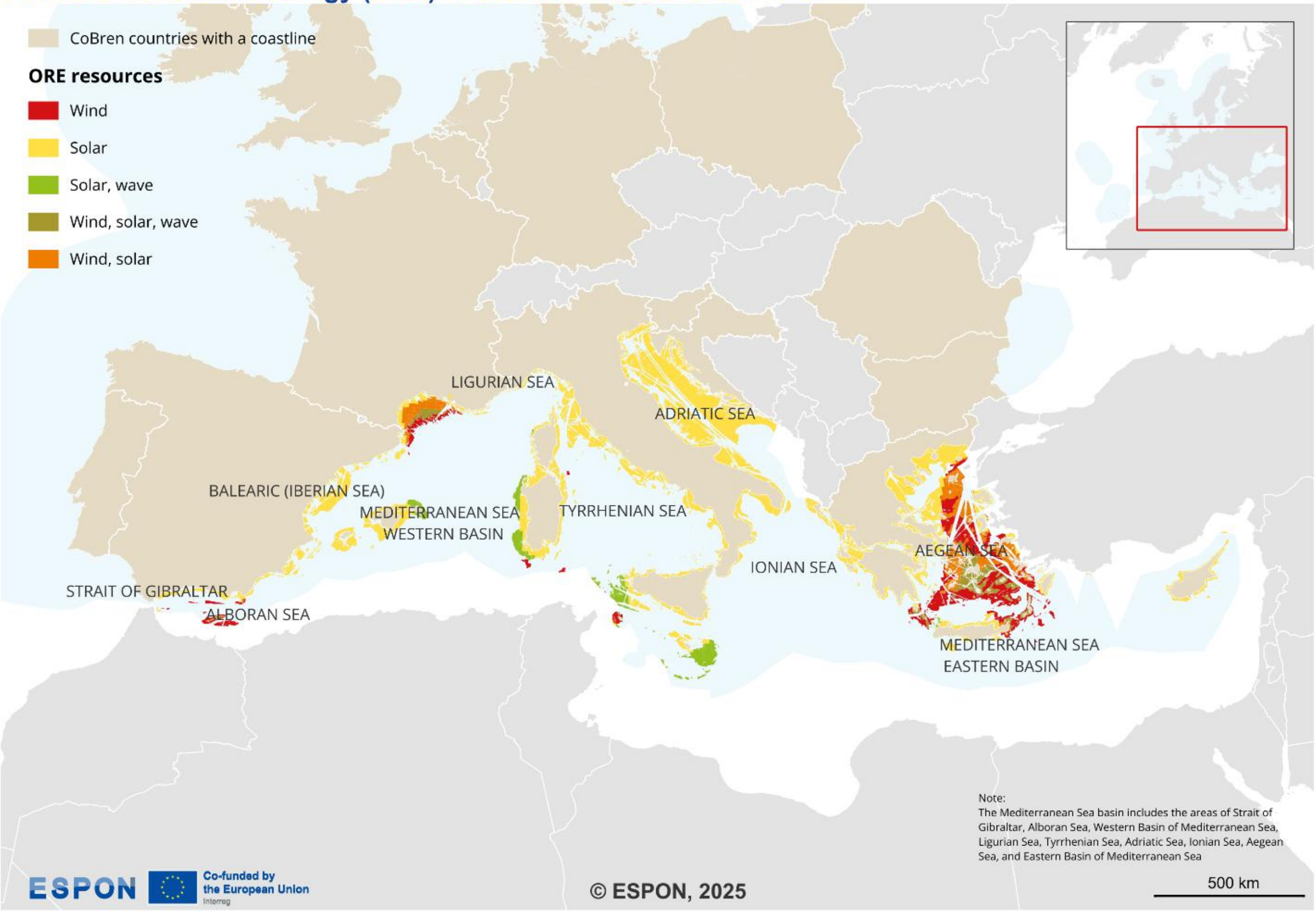
Mapping ORE potential

*Solar dominates ORE potential due to substantial availability in the **Mediterranean Sea***

Key observations

- Significant portions are excluded due to distance from coast and water depth, but remaining areas still offer high ORE potential.
- West Mediterranean: Balanced potentials for offshore wind (Spain, France) and wave energy (Italy), while co-location is most prominent along the French coast.
- East Mediterranean: Offshore solar remains dominant and enhanced co-location potential in Malta and Greece.
- Allowing co-location across the Mediterranean Sea results in a 21% increase in total ORE capacity.

Offshore Renewable Energy (ORE) Resource - Mediterranean Sea



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Origin of data: Copernicus Climate Change Service ERA5, 2024 for resource data;
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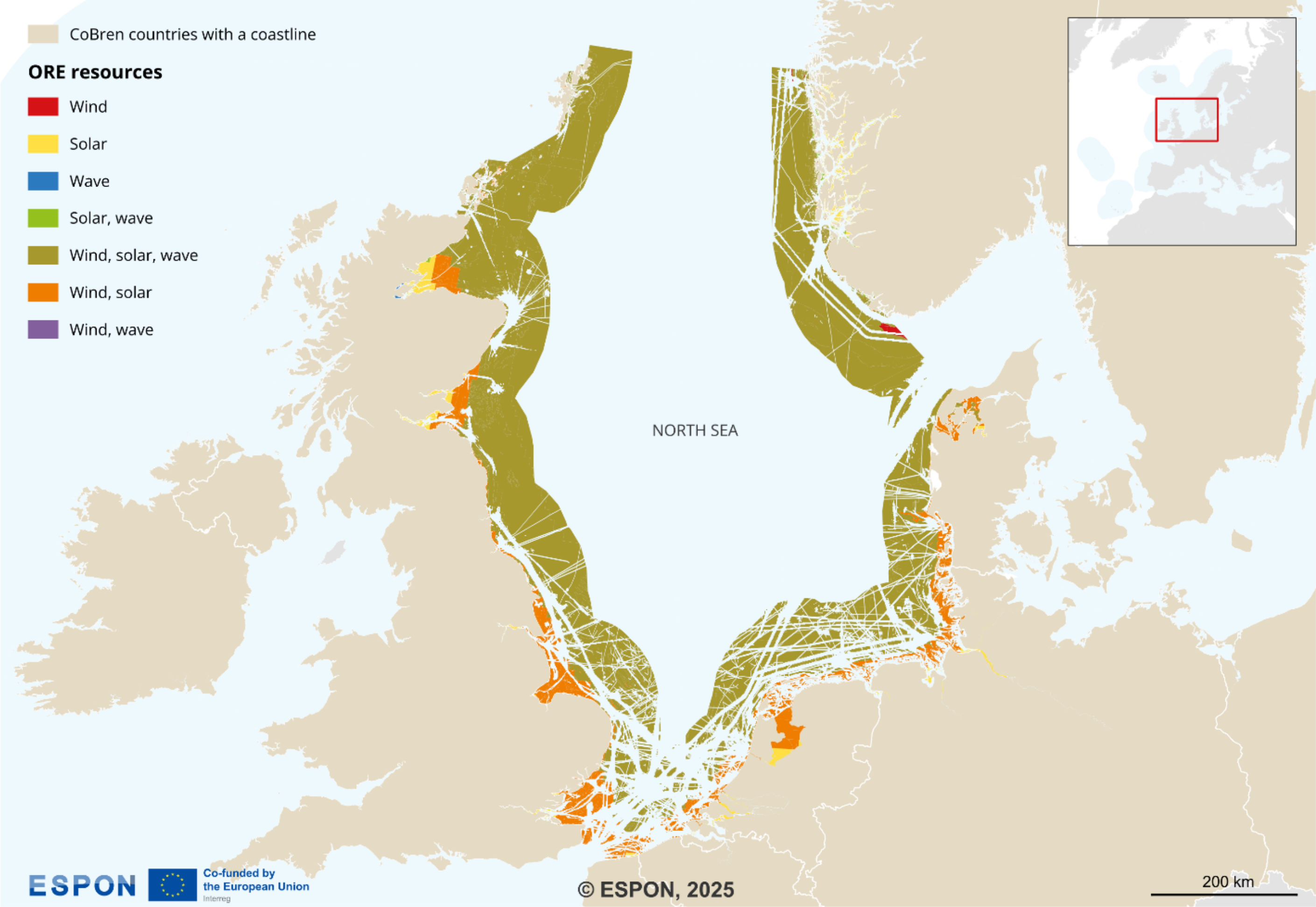
Mapping ORE potential

*Offshore Wind dominates the **North Sea**, which has a long-established offshore wind industry*

Key observations

- Offshore solar and wave energy potential can mainly be found in areas with favourable conditions for other ORE resources.
- Co-location of ORE resources can enhance energy generation, creating significant opportunities.
- Integration into multi-use energy parks could unlock more than 2.2 TW of additional capacity.
- This would effectively double the standalone capacity of 1 TW, resulting in a more resilient and efficient offshore energy system.

Offshore Renewable Energy (ORE) Resource - North Sea



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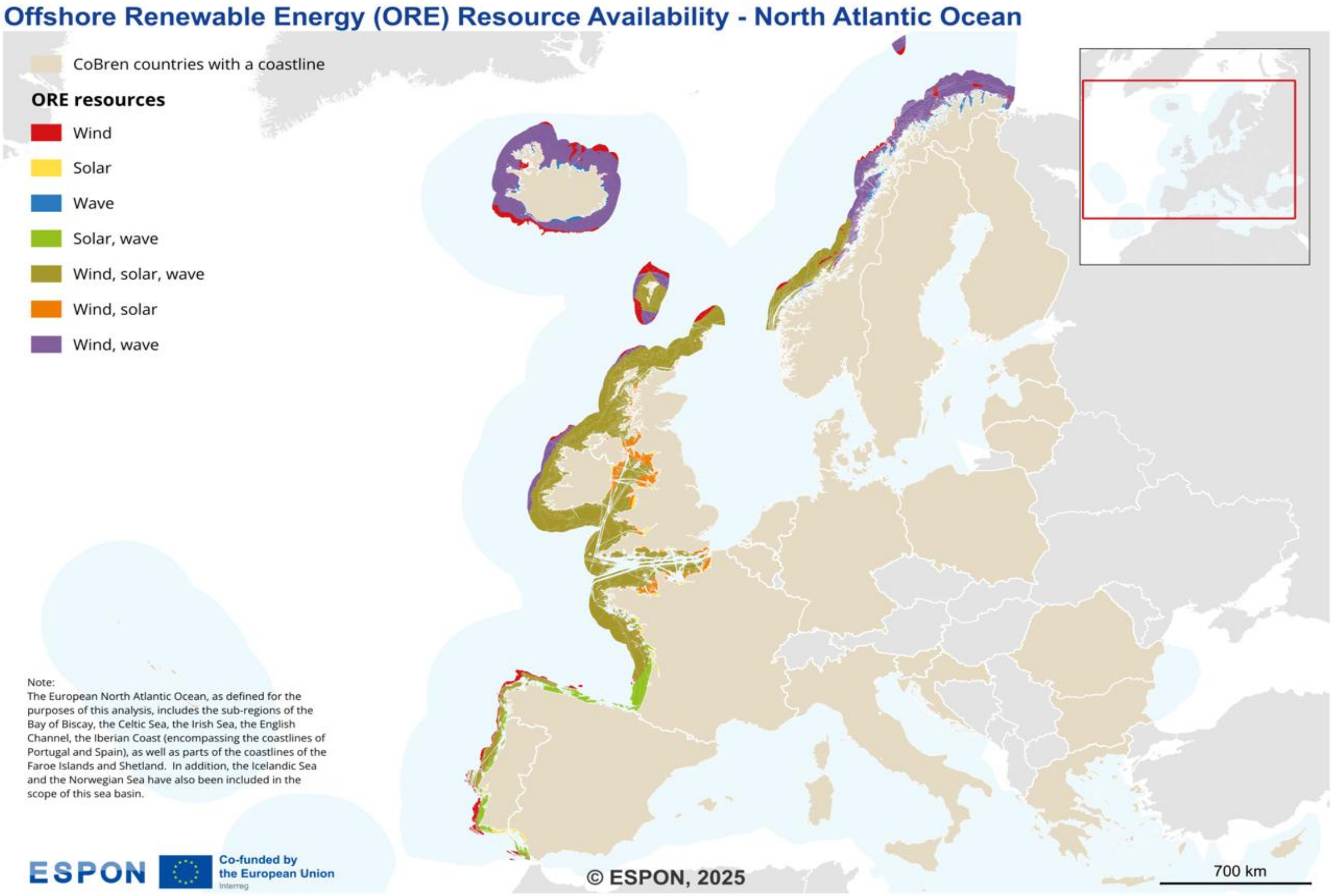
Origin of data: Copernicus Climate Change Service ERA5, 2024 for resource data; © Marine Regions EEZ, IHO Areas Intersection v11, and EuroGeographics for boundaries

Mapping ORE potential

Offshore Wind dominates standalone scenarios in the ***North Atlantic Ocean***

Key observations

- Large areas are excluded due to distance and water depth, like in the Mediterranean Sea.
- Allowing co-location increases wave energy potential, surpassing offshore wind.
- There is high wave energy potential along the Spanish and Portuguese Iberian coast.
- Overlapping areas for offshore wind and wave energy potential indicate that co-location will significantly increase ORE yield.
- Southern Norway offers offshore floating solar potential; however, the capacity is relatively low compared to offshore wind and wave potential.



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Origin of data: Copernicus Climate Change Service ERA5, 2024 for resource data; © Marine Regions EEZ, IHO Areas Intersection v11, and EuroGeographics for boundaries

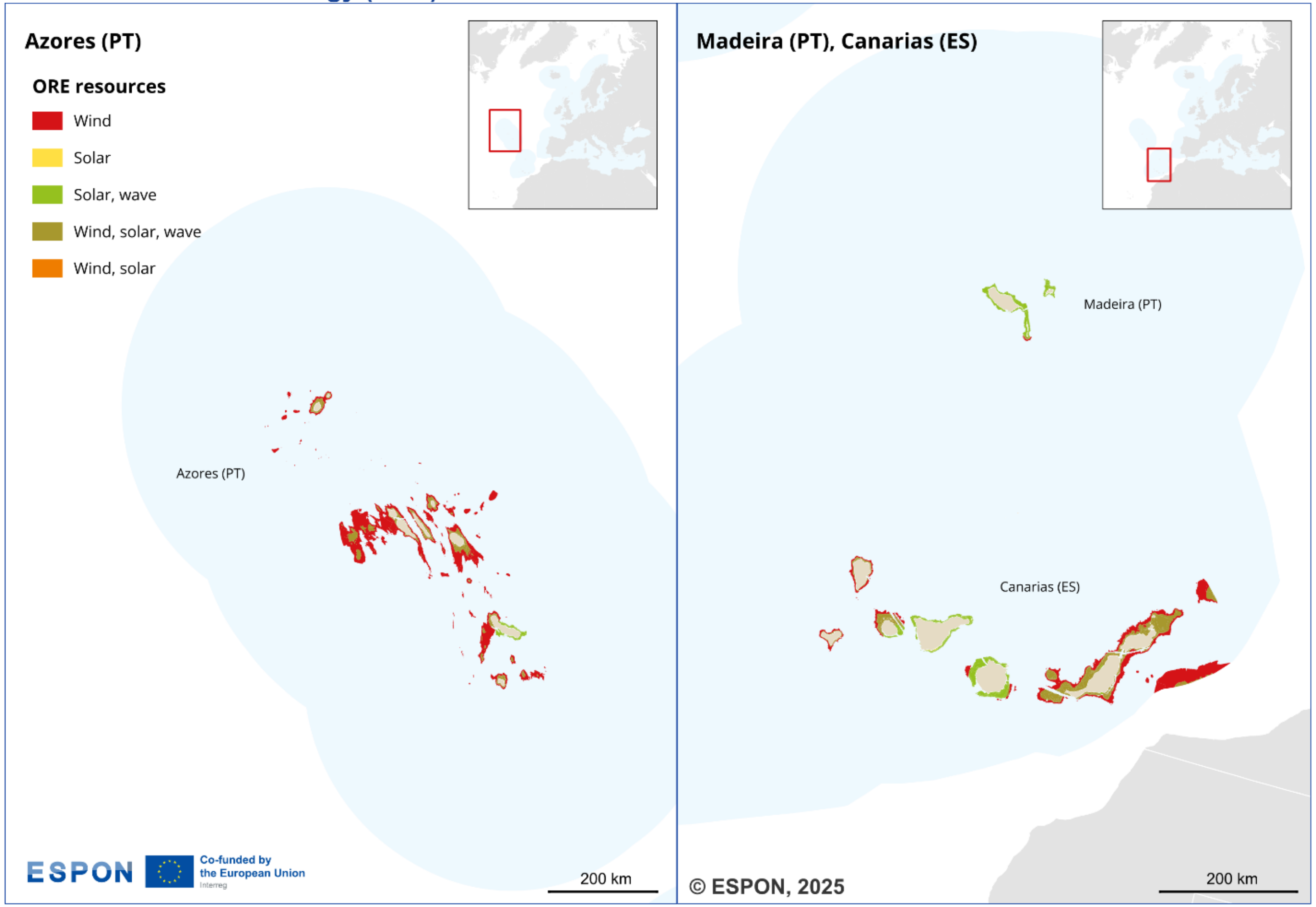
Mapping ORE potential

Macaronesia (Azores, Madeira, Canarias) has predominant offshore wind potential

Key observations

- Offshore Wind: Total theoretical potential of 170.40 GW.
- Offshore Solar: Potential of 46.84 GW, with 69% capacity overlapping with other ORE sources.
- Wave Energy: Total wave potential of 134.66 GW.
- Significant potential for wave energy in areas favourable for other ORE resources.
- Multi-use energy parks can maximize the yield of wave energy resources in Macaronesia.

Offshore Renewable Energy (ORE) Resource - Macaronesia



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Origin of data: Copernicus Climate Change Service ERA5, 2024 for resource data;
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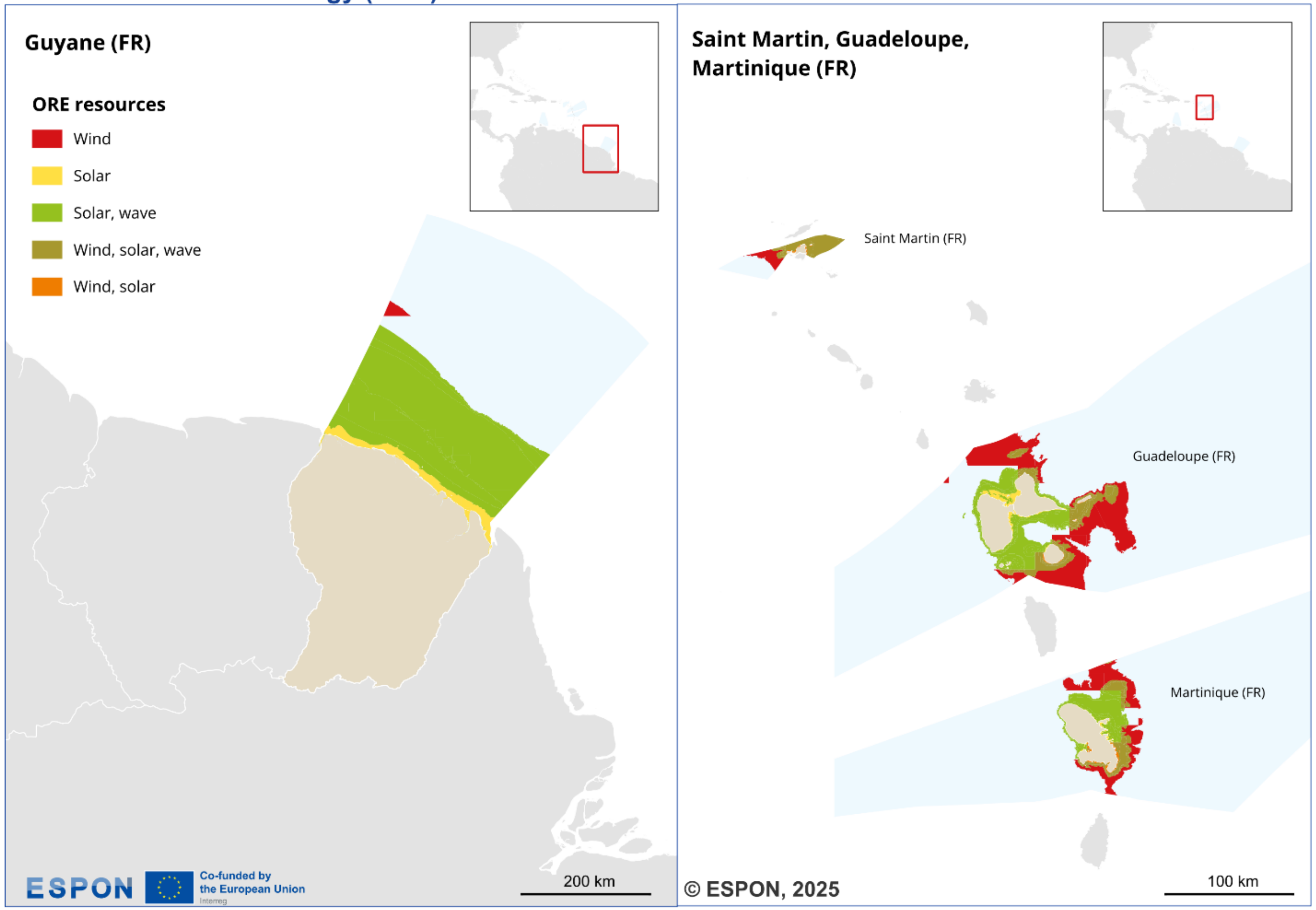
Mapping ORE potential

French Caribbean *(Guyane, Saint Martin, Guadeloupe, Martinique) has predominant offshore solar potential*

Key observations

- Offshore Solar: Dominant resource with a total capacity of 225.86 GW, 4.2% overlapping with other ORE sources.
- Wave Energy: Total potential of 604.50 GW, mainly overlapping with favourable conditions for other ORE resources.
- Offshore Wind: Limited to 49.54 GW due to lower wind speeds.
- Co-location opportunity to unlock wave energy capacity and complement the strong solar resource in the French Caribbean.

Offshore Renewable Energy (ORE) Resource - French Caribbean



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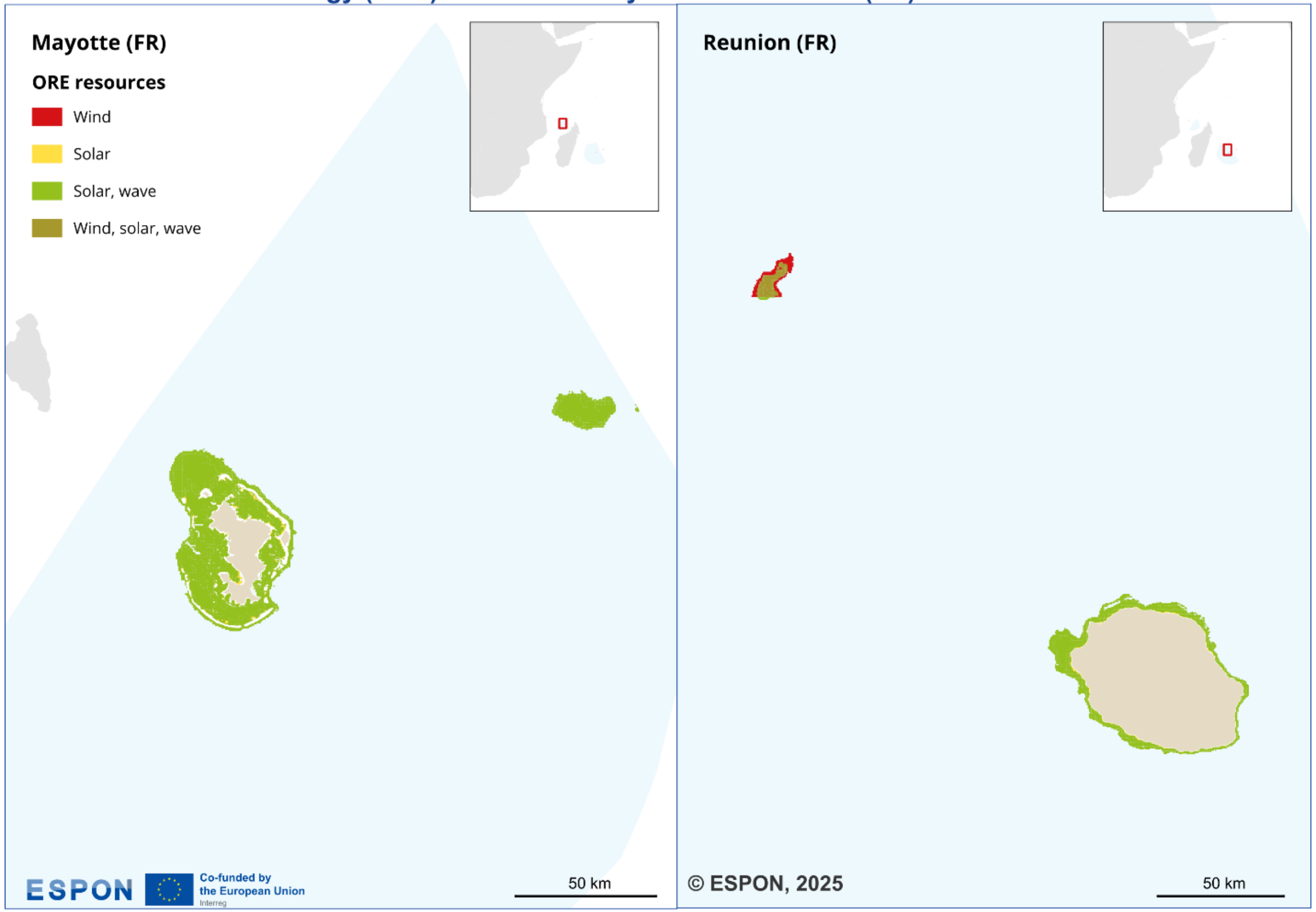
Mapping ORE potential

La Réunion, Mayotte have predominant offshore solar potential

Key observations

- Offshore Wind: Limited potential of 0.90 GW.
- Offshore Solar: Primary ORE resource with a total capacity of 8.90 GW, 3.4% overlapping with other ORE sources.
- Wave Energy: Potential of 26.11 GW when co-located with other ORE sources.
- Co-location opportunity by Integrating solar and wave energy resources to enhance energy generation efficiency in Réunion and Mayotte.

Offshore Renewable Energy (ORE) Resource - Mayotte and Reunion (FR)



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Synergy and barrier analysis

To unlock the full potential of ORE, synergies and barriers with other sea use activities need to be considered in an integrative manner, while considering national regulation

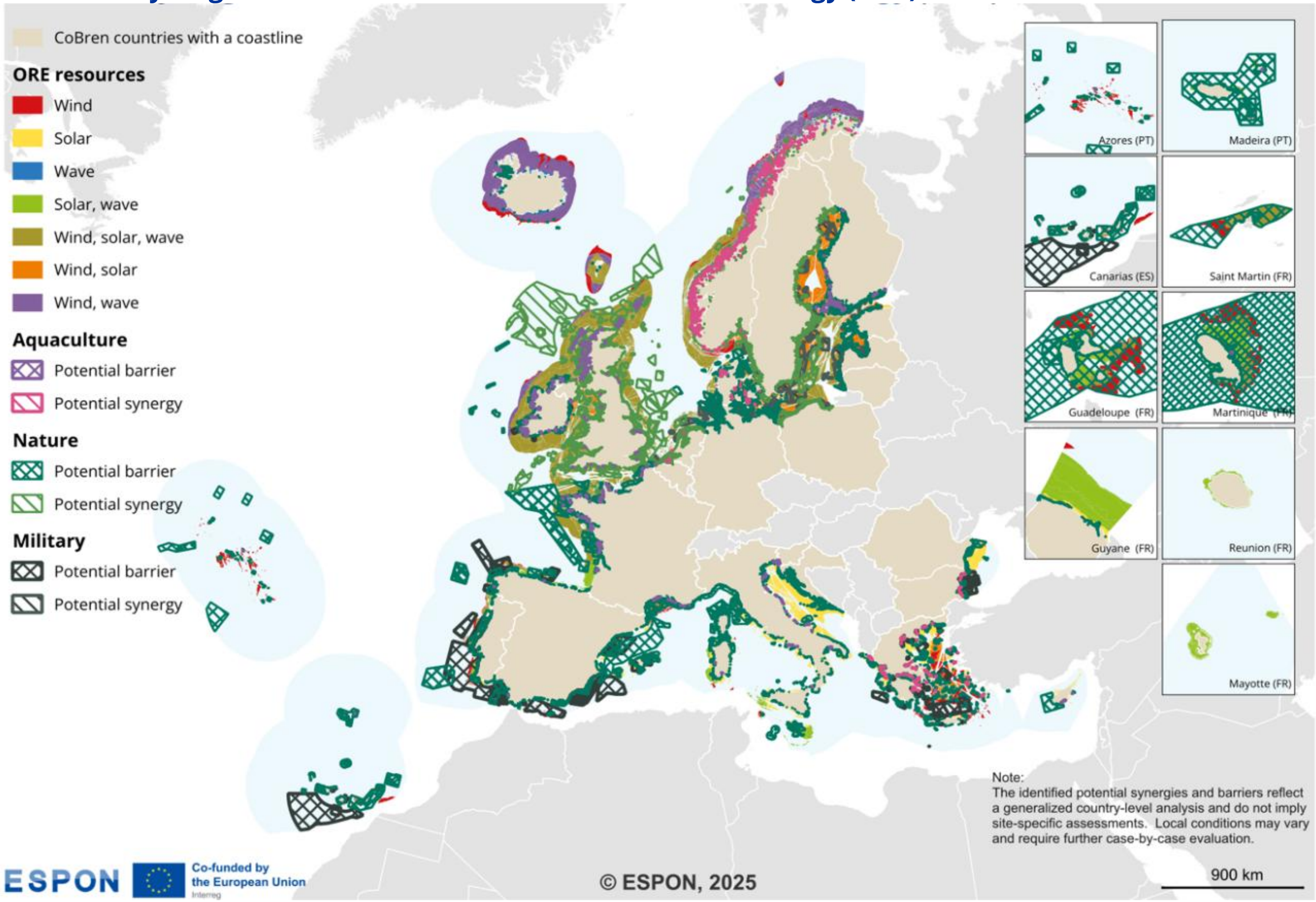
Other uses of sea space

- Maritime traffic flows
- Other energy sources (oil & gas)
- Nature protection areas
- Military areas
- Aquaculture
- Cultural heritage sites
- Tourism and recreation
- Seabed obstructions (pipelines, cables)
- Disposal areas
- Fishing areas
- …

Please note that whether an area is considered a synergy or barrier depends on national regulation

The following pages present the synergy and barrier analysis for each sea basin and region covered by the CoBren research.

Potential Synergies and Barriers for Offshore Renewable Energy (ORE)*



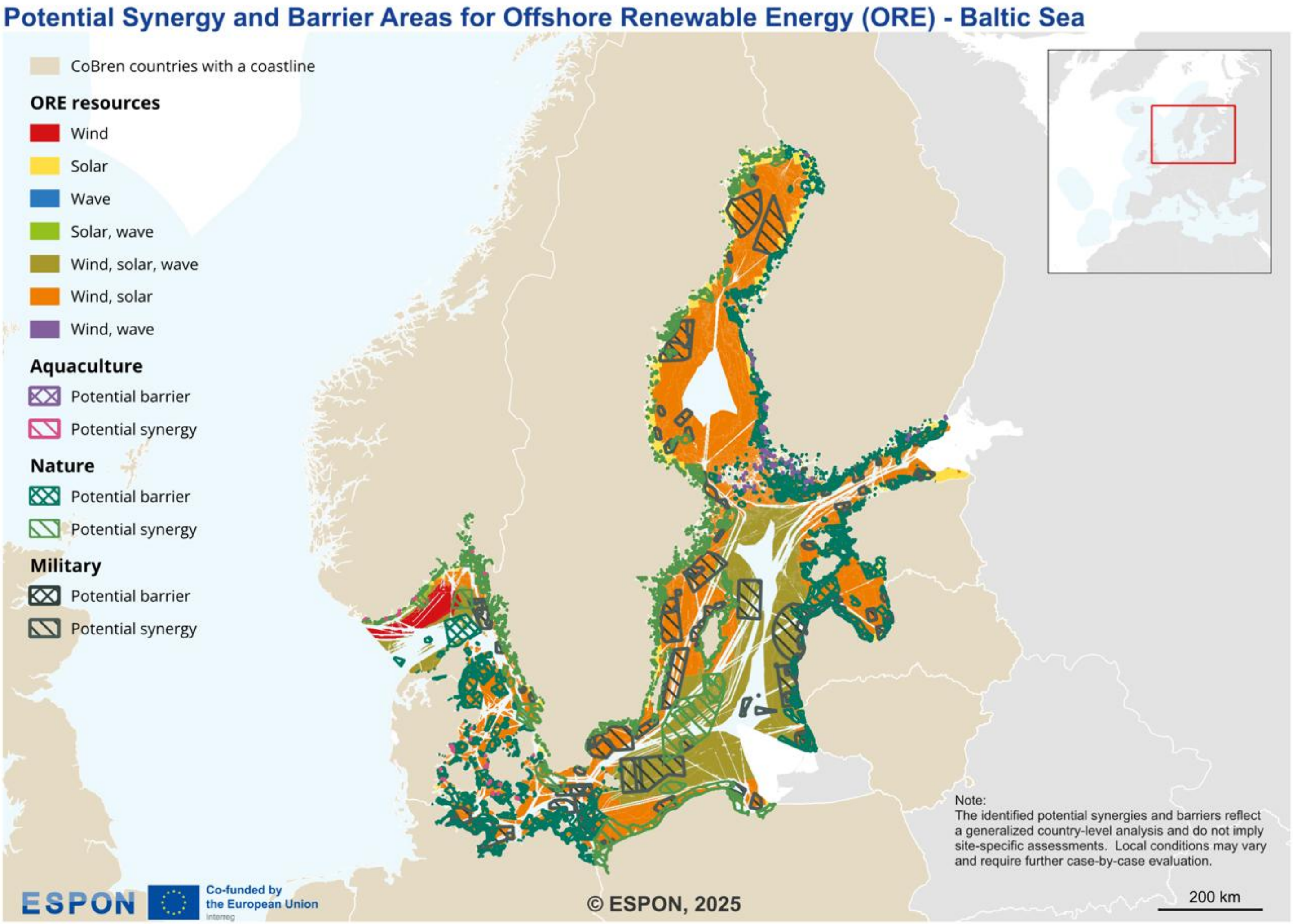
*Note: The representation of synergies and barriers in this and following maps is based on a qualitative, country-level analysis and is intended to provide an indicative overview of potential interactions between offshore renewable energy and other maritime uses. These classifications do not reflect detailed, site-specific assessments. Actual conditions may differ significantly depending on local context, spatial planning, and regulatory frameworks.

Synergy and barrier analysis

Baltic countries face overlapping nature, military, and aquaculture areas with ORE, demanding co-existence strategies

Key observations

- **Nature**: Significant overlap between nature and ORE resources are found in Denmark and Germany, although the legal status of 'overriding public interest'* for renewables may present a solution.
- **Military**: Baltic countries pledged to speed up ORE post-Nordstream explosions. Military areas may provide indirect obstacles or synergies.
- **Aquaculture**: Poland's ORE overlaps with aquaculture; needs co-existence strategies. Denmark and other Baltic countries have fewer conflicts.
- **Other ORE**: The Baltic Sea's seasonal solar and wind complementarity offers potential but lacks policy initiatives. Challenges include sea ice, alternatives, seasonal demand, and industry focus.



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Origin of data: Copernicus Climate Change Service ERA5, 2024 for resource data; EMODnet, 2024 and World Database on Protected Areas (WDPA), 2024 for synergy and barrier; © Marine Regions EEZ, IHO Areas Intersection v11, and EuroGeographics for boundaries

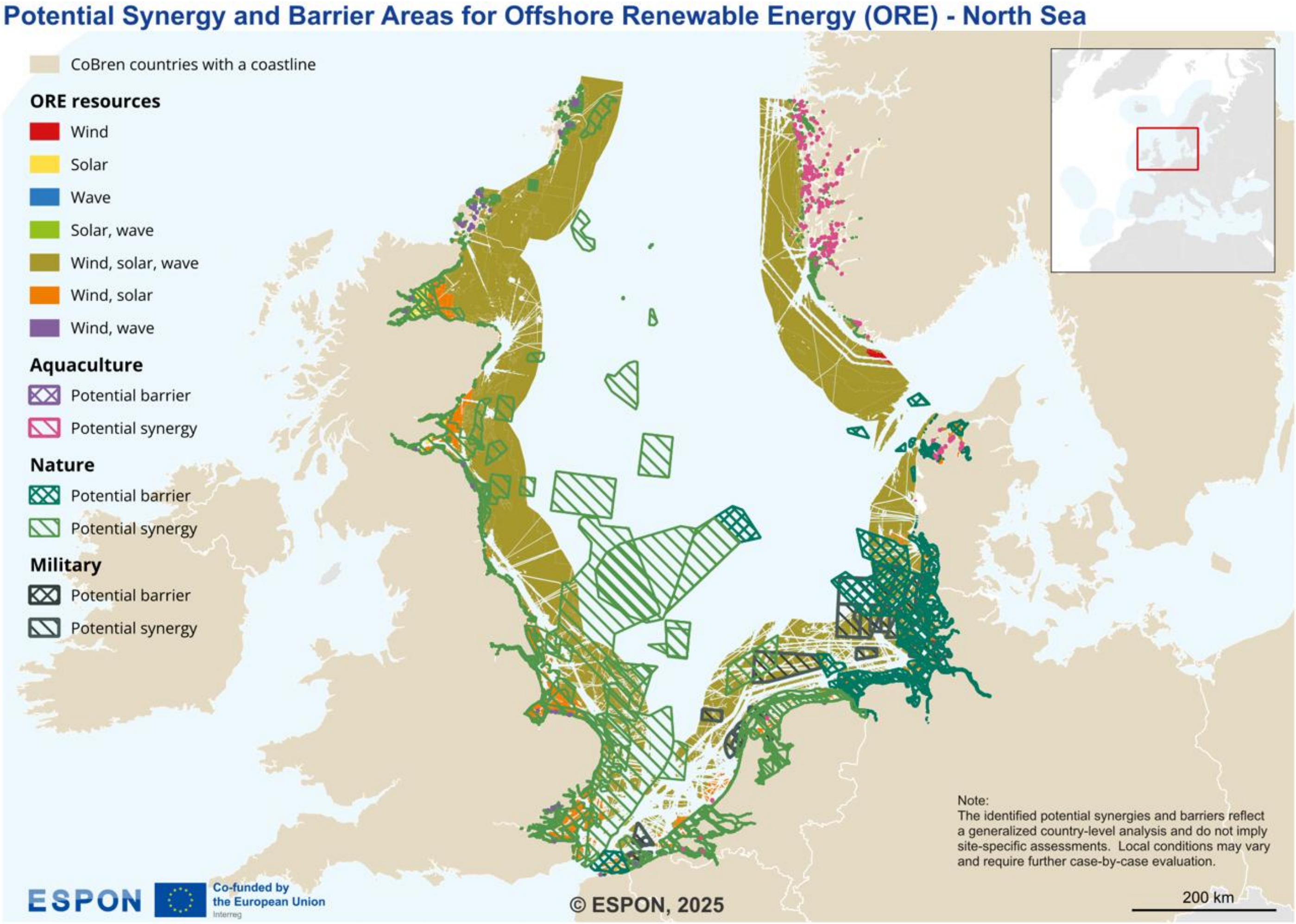
* The status of overriding public interest can help to expedite permitting procedures as it reconfirms and clearly defines which permits need to be given out within a 2-year deadline.

Synergy and barrier analysis

North Sea countries focus on conservation and multi-use synergies due to space constraints, incorporating ORE in sensitive areas

Key observations

- **Nature**: North Sea countries seek synergies for space constraints, focusing on conservation and multi-use. Belgium explores ORE in sensitive areas.
- **Military**: The NSEC declaration promotes offshore energy security. SeaSEC explores seabed security synergies with ORE.
- **Aquaculture**: Fisheries face spatial claims from shipping, nature, military, and ORE. Recommendations and area passports for aquaculture within OWFs are explored.
- **Other ORE**: Beyond 300 GW offshore wind, tidal, and wave, integration and tenders for offshore solar within OWFs are explored.



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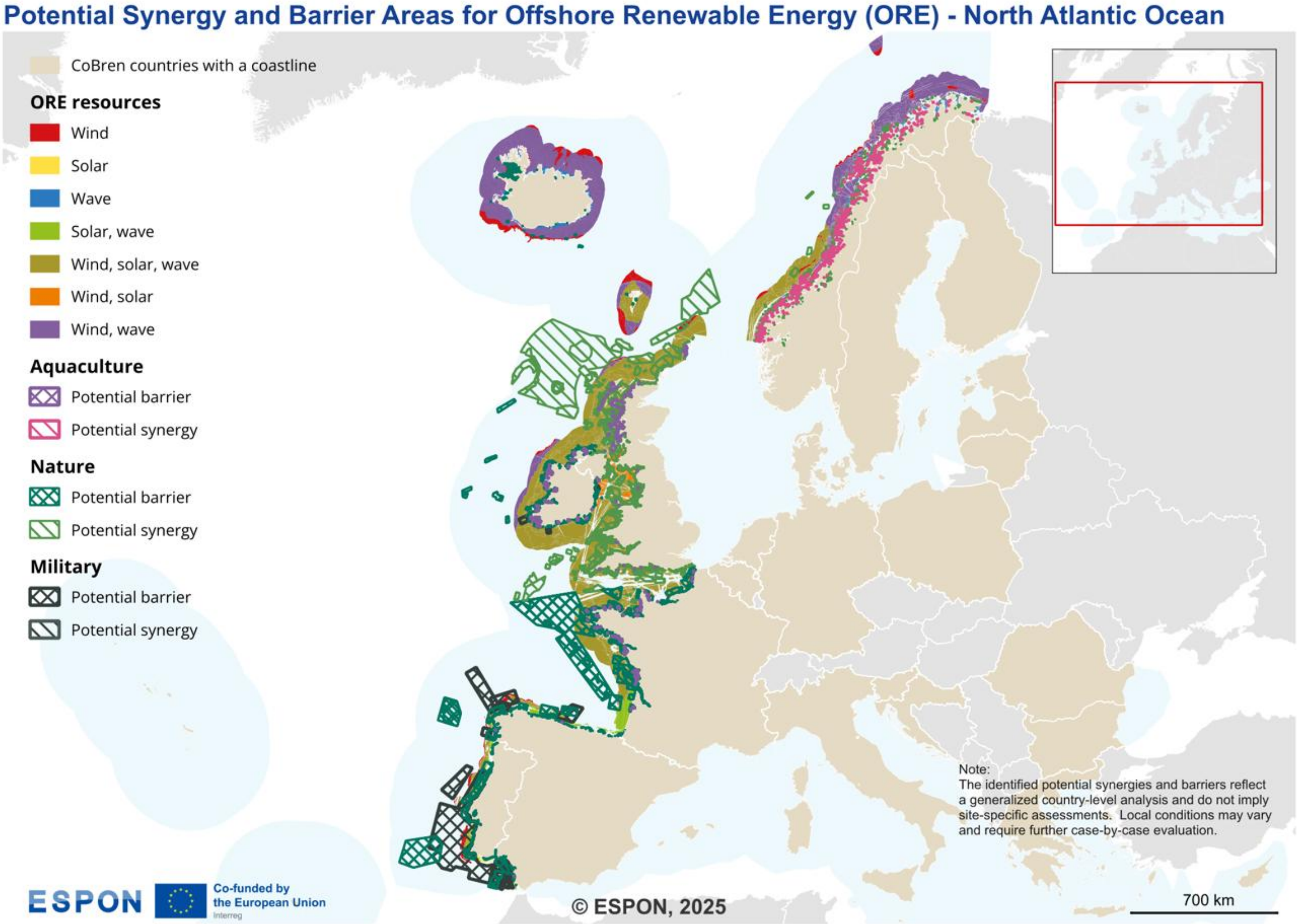
Synergy and barrier analysis

*The **Atlantic Ocean** has significant wave and wind potential requiring further planning*

Key observations

- **Nature**: In France, nature and ORE can coexist, but is often seen as a barrier, especially nearshore, problematic on the Spanish coast near Portugal.
- **Military**: Military impact varies; Ireland has few claims; Portugal could explore synergies.
- **Aquaculture**: Nearshore aquaculture is seen as an ORE barrier. Ireland has few claims; exploring synergies in Spain could help.
- **Other ORE**: Atlantic Ocean has significant wave and wind potential. Planning includes wave energy for northern Portugal, Ireland's west coast, and Spain. Offshore solar and wind potential exist but are not fully identified.



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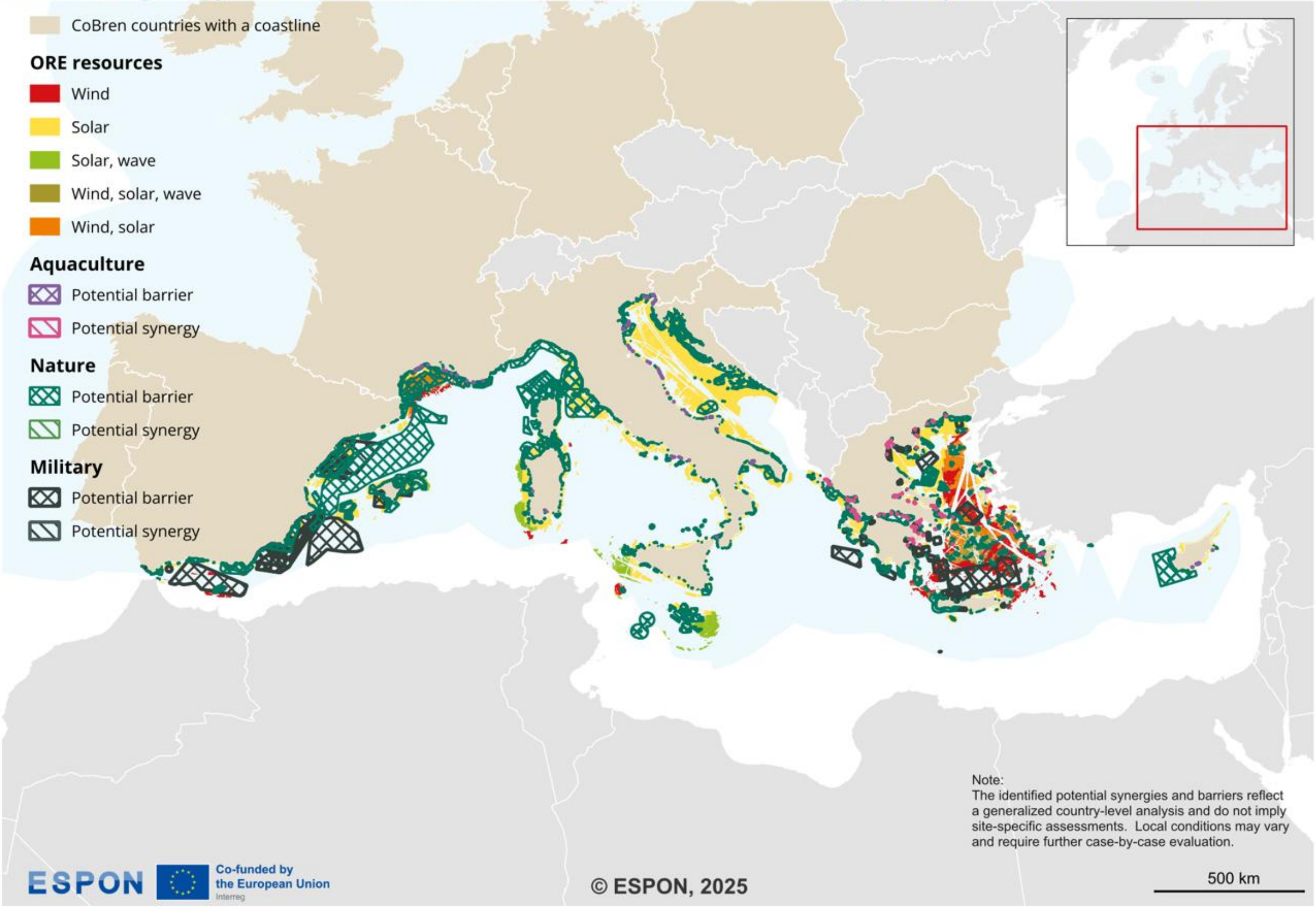
Synergy and barrier analysis

*Limited ORE overlap in the **East Mediterranean** allows potential coexistence with tourism*

Key observations

- **Nature**: Limited ORE overlap in the East Mediterranean due to small claims and nearshore nature. Slovenia aims for renewable energy in Natura 2000 areas but lacks policies. Tourism may coexist with ORE.
- **Military**: Varying zone allocation. Cyprus has large EEZ overlaps with ORE; Greece has rare overlaps; Croatia's zones are unknown.
- **Aquaculture**: Seen as an obstacle in Greece and Slovenia, especially nearshore. Greece's strategy includes using renewable energy to meet demand.
- **Other ORE**: Limited wind potential in Croatia and Slovenia, no targets. Slovenia and Greece consider solar and wave energy, benefiting tourism with less visual impact. Support policies vary.

Potential Synergy and Barrier Areas for Offshore Renewable Energy (ORE) - Mediterranean Sea



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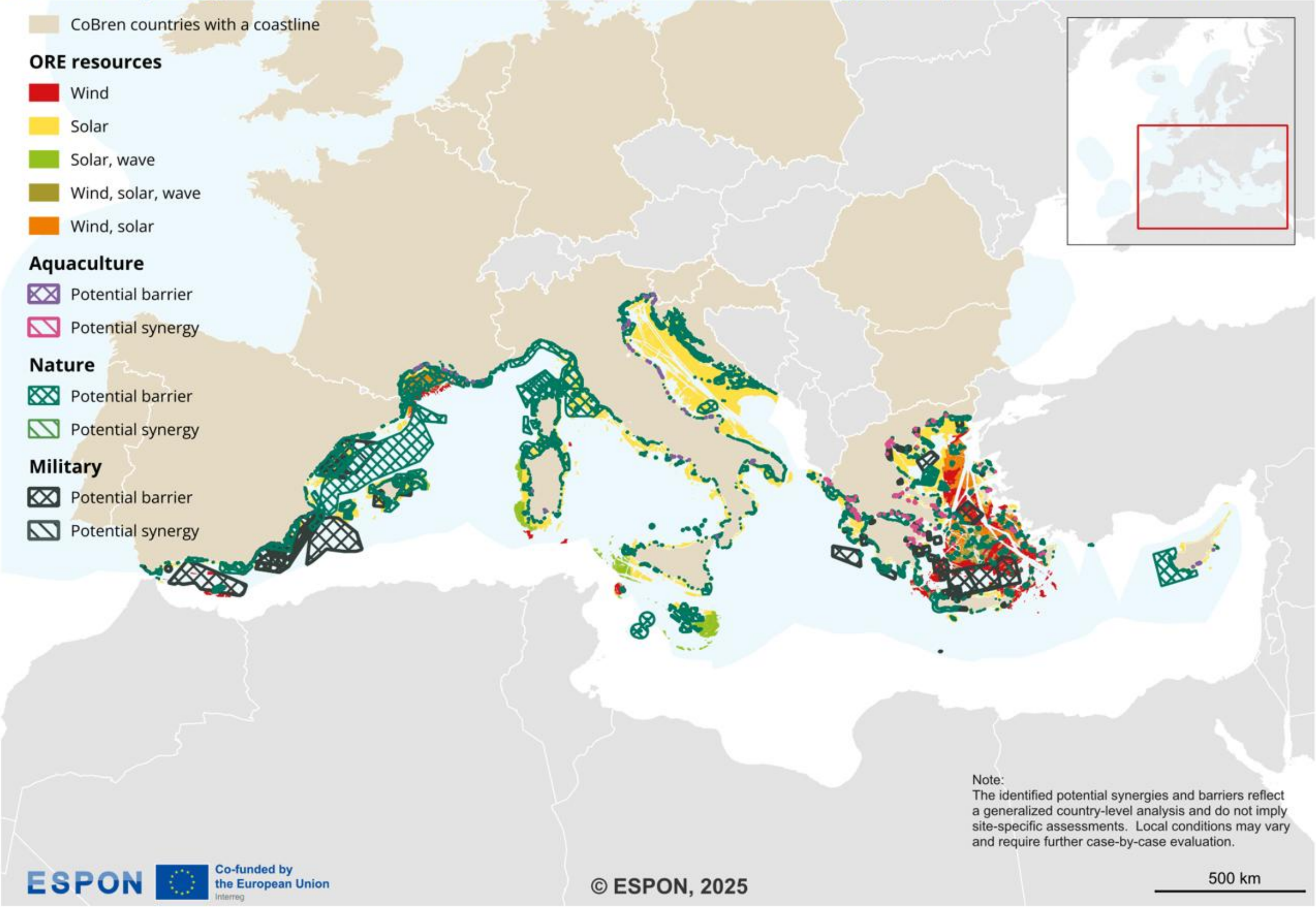
Synergy and barrier analysis

*The **West Mediterranean** faces a mix of synergies and barriers for ORE deployment*

Key observations

- **Nature**: While nature does not represent an obstacle for some countries (e.g. France), other countries (e.g. Italy) might need to consider co-existence between nature and ORE. Corsica's nature zones complicate deployment.
- **Military**: Minimal impact on ORE.
- **Aquaculture**: Malta considers aquaculture a 'no-go zone' due to risks. No overlaps with Maltese ORE; other Western Mediterranean countries do not explore synergies.
- **Other ORE**: Significant wind, solar, and wave resources exist, but deep waters limit exploitation. Italy, Malta, and Spain consider ORE beyond wind. Malta focuses on hybrid wind & solar projects.

Potential Synergy and Barrier Areas for Offshore Renewable Energy (ORE) - Mediterranean Sea



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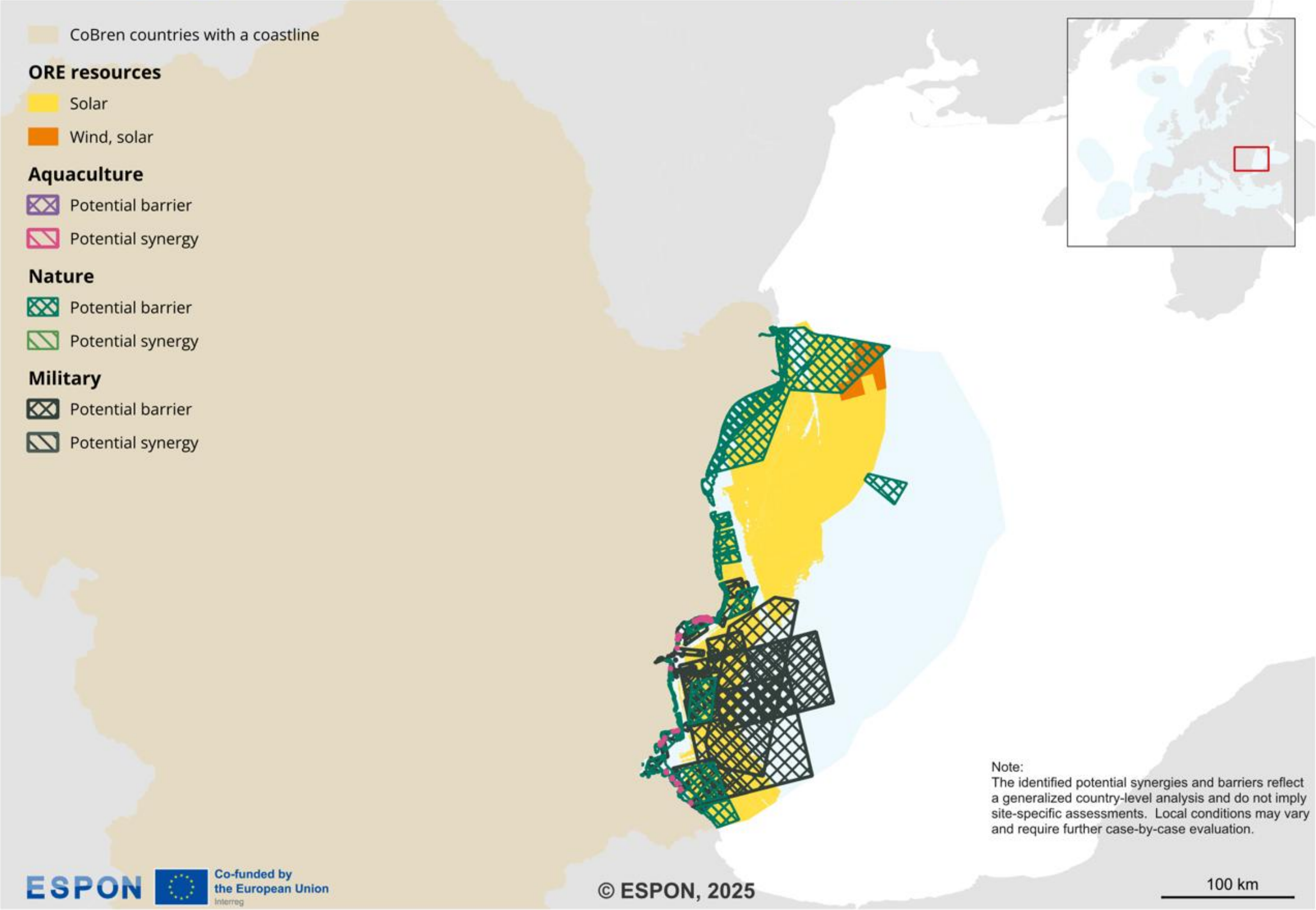
Synergy and barrier analysis

*The **Black Sea** region faces ORE challenges due to overlaps with nature zones and large military areas*

Key observations

- **Nature**: ORE overlaps with nature zones. Romania plans near-shore deployment; Bulgaria hasn't allocated zones.
- **Military**: Large military zones in the Black Sea overlap with ORE. Synergies exist despite security risks. Romania excludes offshore wind from military zones.
- **Aquaculture**: Bulgarian aquaculture overlaps with Natura 2000 MPAs. Co-existence with OWFs could benefit ORE but needs more synergies. One wind turbine powers a Bulgarian platform.
- **Other ORE**: Potential for wave, solar, and wind combinations exists, but solar overlaps with nature and military areas. Bulgaria and Romania do not explore these opportunities in policies. Bulgaria's draft NECP misses offshore renewable goals.

Potential Synergy and Barrier Areas for Offshore Renewable Energy (ORE) - Black Sea



Territorial level: Exclusive economic zone (EEZ)
ESPON Project: COBREN, 2025
Origin of data: Copernicus Climate Change Service ERA5, 2024 for resource data; EMODnet, 2024 and World Database on Protected Areas (WDPA), 2024 for synergy and barrier; © Marine Regions EEZ, IHO Areas Intersection v11, and EuroGeographics for boundaries

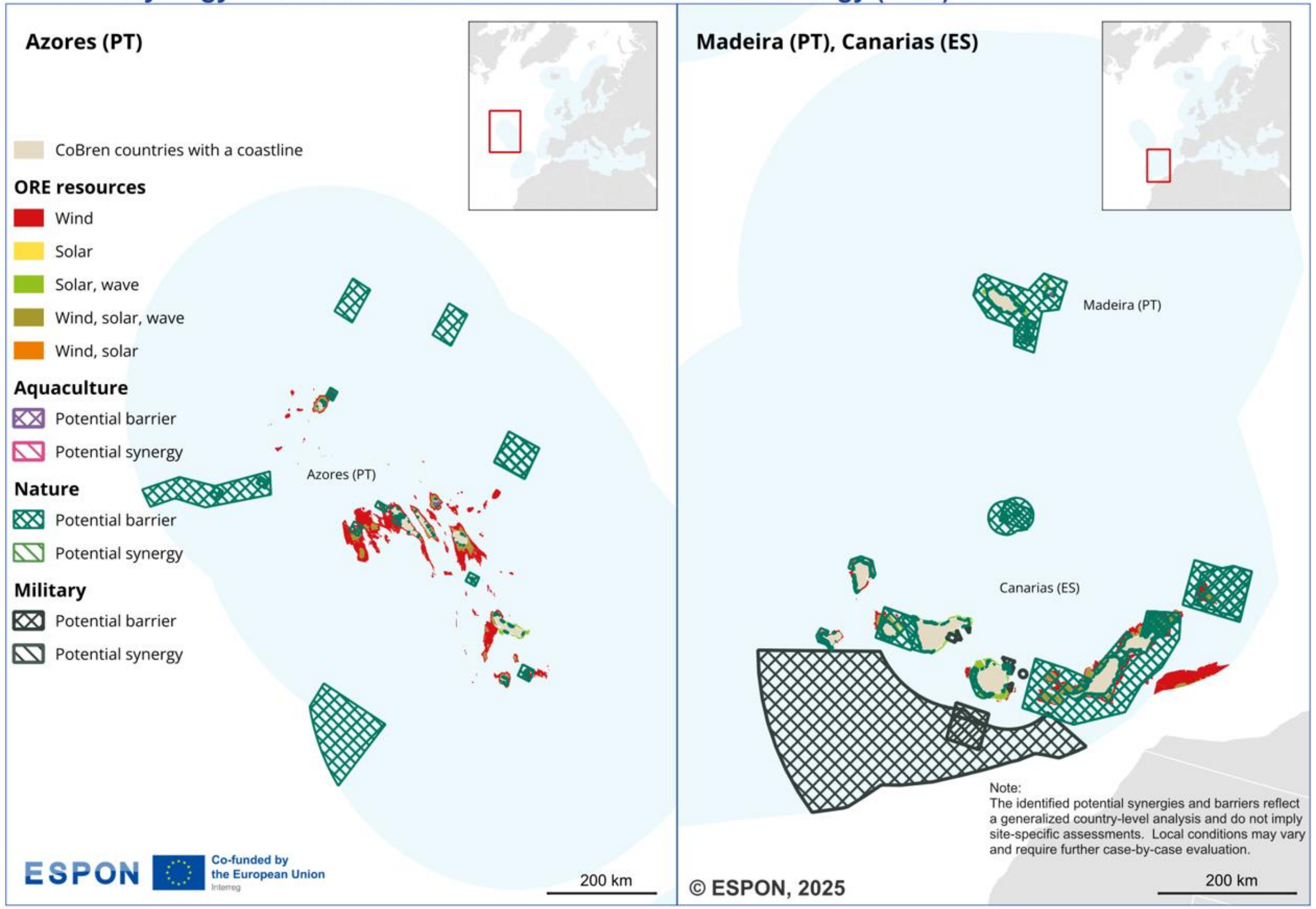
Synergy and barrier analysis

*The **Outermost Regions** face ORE challenges due to significant overlaps with nature areas, necessitating sustainable planning to protect delicate island ecosystems (1/2)*

Key observations

- **Nature**: In Outermost Regions like Guadeloupe, Martinique, Madeira, Saint Martin, and Canarias, ORE resources significantly overlap with nature areas. Guyane, La Réunion, and Mayotte have combination potential but lack nature zone data. Sustainable planning must protect delicate island ecosystems.
- **Military**: Data suggests no overlap between military zones and ORE potential in the Outermost Regions. This should be reassessed when more data is available.
- **Aquaculture**: Limited data on aquaculture zones in the Outermost Regions creates gaps in understanding synergies or conflicts with ORE projects.
- **Other ORE**: Significant potential for wave, solar, and wind combinations exists. In Guadeloupe, Martinique, Madeira, Saint Martin, and Canarias, ORE potential overlaps with nature zones, requiring detailed MSP to address conflicts.

Potential Synergy and Barrier Areas for Offshore Renewable Energy (ORE) - Macaronesia



Territorial level: Exclusive economic zone (EEZ)
ESPON Project: COBREN, 2025
Origin of data: Copernicus Climate Change Service ERA5, 2024 for resource data; EMODnet, 2024 and World Database on Protected Areas (WDPA), 2024 for synergy and barrier; © Marine Regions EEZ, IHO Areas Intersection v11, and EuroGeographics for boundaries

Synergy and barrier analysis

*The **Outermost Regions** face ORE challenges due to significant overlaps with nature areas, necessitating sustainable planning to protect delicate island ecosystems (2/2)*

Key observations

- **Nature**: In Outermost Regions like Guadeloupe, Martinique, Madeira, Saint Martin, and Canarias, ORE resources significantly overlap with nature areas. Guyane, La Réunion, and Mayotte have combination potential but lack nature zone data. Sustainable planning must protect delicate island ecosystems.
- **Military**: Data suggests no overlap between military zones and ORE potential in the Outermost Regions. This should be reassessed when more data is available.
- **Aquaculture**: Limited data on aquaculture zones in the Outermost Regions creates gaps in understanding synergies or conflicts with ORE projects.
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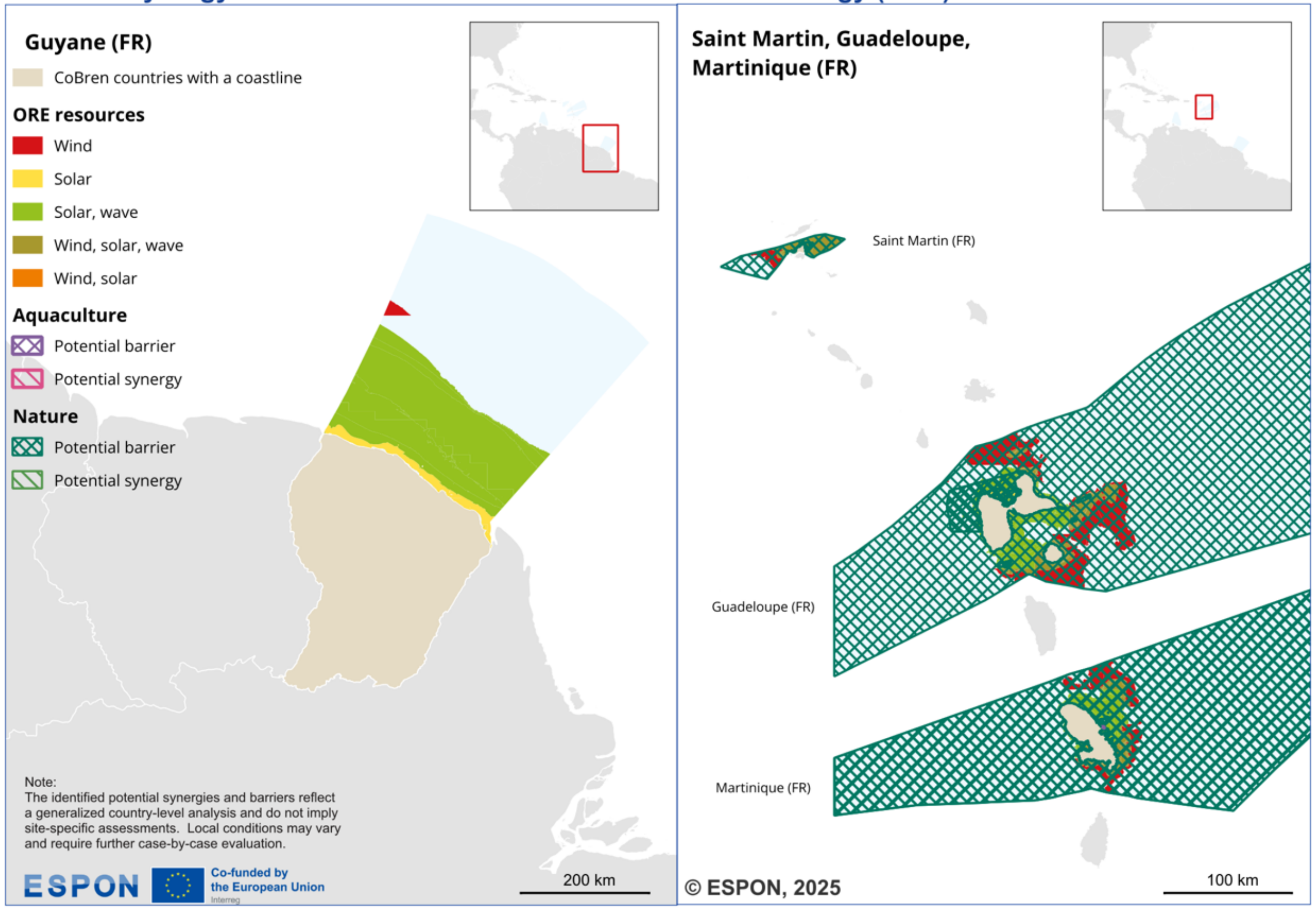
Potential Synergy and Barrier Areas for Offshore Renewable Energy (ORE) - French Caribbean



Territorial level: Exclusive economic zone (EEZ)
ESPON Project: COBREN, 2025
Origin of data: Copernicus Climate Change Service ERA5, 2024 for resource data; EMODnet, 2024 and World Database on Protected Areas (WDPA), 2024 for synergy and barrier; © Marine Regions EEZ, IHO Areas Intersection v11, and EuroGeographics for boundaries

Synergy and barrier analysis

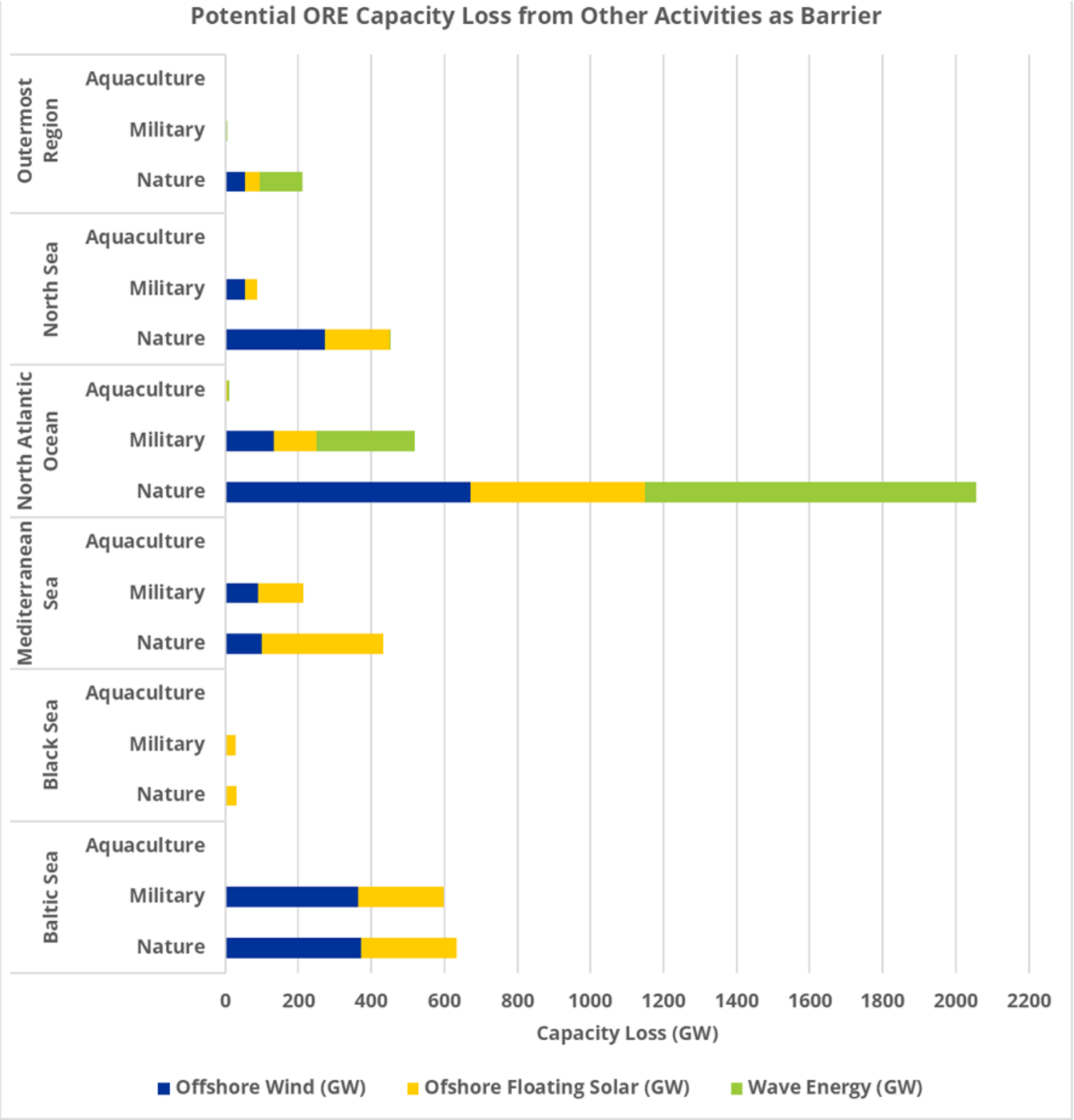
Significant Capacity Loss of ORE potential if other sea uses are treated as Barriers

ORE Capacity loss from treating other sea uses as barrier:

- Military activities are significant barriers in the Baltic and Black Seas; synergies are explored in data exchange and asset protection.
- The Mediterranean sees aquaculture as an obstacle to ORE nearshore, except in Greece, which enhances ORE for aquaculture energy demand.
- Significant ORE resources in the Atlantic and North Seas are only partly reflected in policy initiatives.
- Outermost Regions emphasize maritime coexistence, though Azores excluded ORE from MSP plans.

Effective marine space management is crucial to unlock ORE potential and minimise capacity losses:

- Integrating activities and fostering synergies minimize conflicts and optimize marine space.
- Co-location strategies promote shared use, ensuring thriving ecosystems and socio-economic activities.
- Maximizing ORE potential requires synergies and effective management through national or cross-border territorial cooperation, ensuring efficient marine resource use.



ORE potential in European Seas

Key takeaways from the analysis of the ORE potential of European Seas

Role of European Seas

European seas play a vital role in achieving the EU's 2050 climate-neutral goal by supporting renewable energy, biodiversity, and economic growth.

Offshore Renewable Energy

ORE has the potential to decarbonize energy and boost economic opportunities while balancing various priorities. EU policies like the Green Deal aim to support ORE development, focusing on biodiversity and cooperation.

EU Policy Frameworks

The EU promotes ORE within a framework that prioritizes environmental protection and socio-economic benefits.

ORE Capacity and Targets

There is a significant need to increase current capacity to meet EU targets. The current capacity includes 32 GW of offshore wind, and future projections see offshore wind leading the way to 475 GW by 2050, with growth also expected in wave, tidal, and solar energy.

Sea Basin Challenges

Each sea basin—the Atlantic, Baltic, Black, Mediterranean, and North Seas—faces unique challenges in deploying ORE

Mapping ORE Potential

Mapping the potential of ORE reveals significant capacity and efficiency gains achievable through colocation. Strategic planning is needed to maximize resource availability across all European sea basins.

Efficient Planning & Collaboration

To maximize the potential of ORE, efficient planning, creating synergies, interconnected grids, shared infrastructure, and cross-border territorial cooperation are necessary.

Barriers and Synergies

Integrating other uses of sea space, such as military areas, aquaculture, tourism, and maritime traffic flows, is crucial for unlocking the full potential of ORE. Effective management and co-location strategies are key to optimizing marine space and minimizing conflicts.

2b

Presentation of results

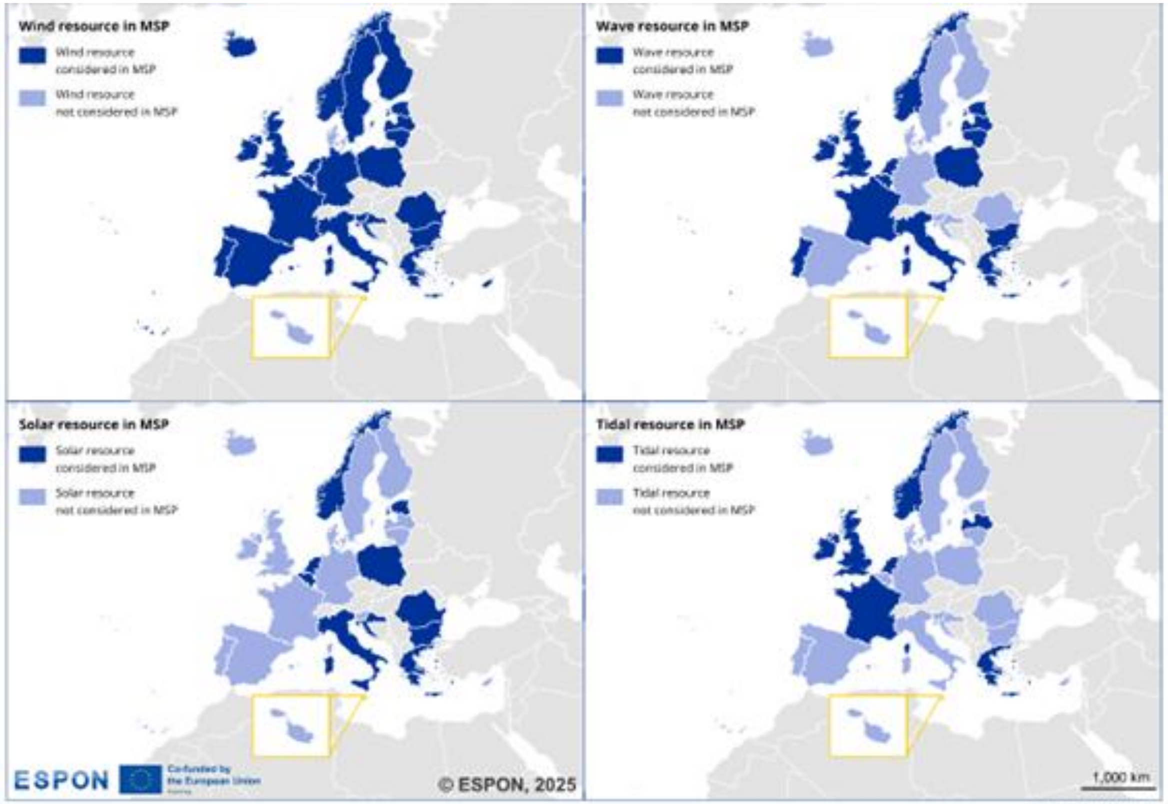
Integrated maritime Spatial Planning as an enabler to unlock ORE potential

Integrated Maritime Spatial Planning as an enabler to unlock ORE potential

Maritime Spatial Planning includes different types of ORE

- **MSP is the process analysing and allocating the spatial and temporal distribution of human activities in marine areas** to achieve ecological, economic and social objectives that are usually specified through a political process.
- The **EU MSP Directive** (2014/89/EU) requires Member States to create spatial plans for their maritime zones, the Directive ensures that ORE deployment harmonises with other uses and environmental priorities.
- **Planning for ORE is clearly mentioned in 23 out of the 25 reviewed MSP documents***.
  - Most MSP documents present specific plans with areas allocated to ORE development.
  - MSP documents present objectives to explore the possibilities of ORE.
  - However, few MSP documents present an ORE capacity target. Most plans refer to others policy documents that further describe these ambitions – most notably as the National Energy & Climate plans.

Types of ORE included in MSP documents



Territorial level: Country
ESPON Project: COBREN, 2025
Origin of data:
Maritime Spatial Plans, 2024
© EuroGeographics for administrative boundaries

* The study reviewed 25 Maritime Spatial Plans, collecting insights on the proposed planning practices for ORE development.

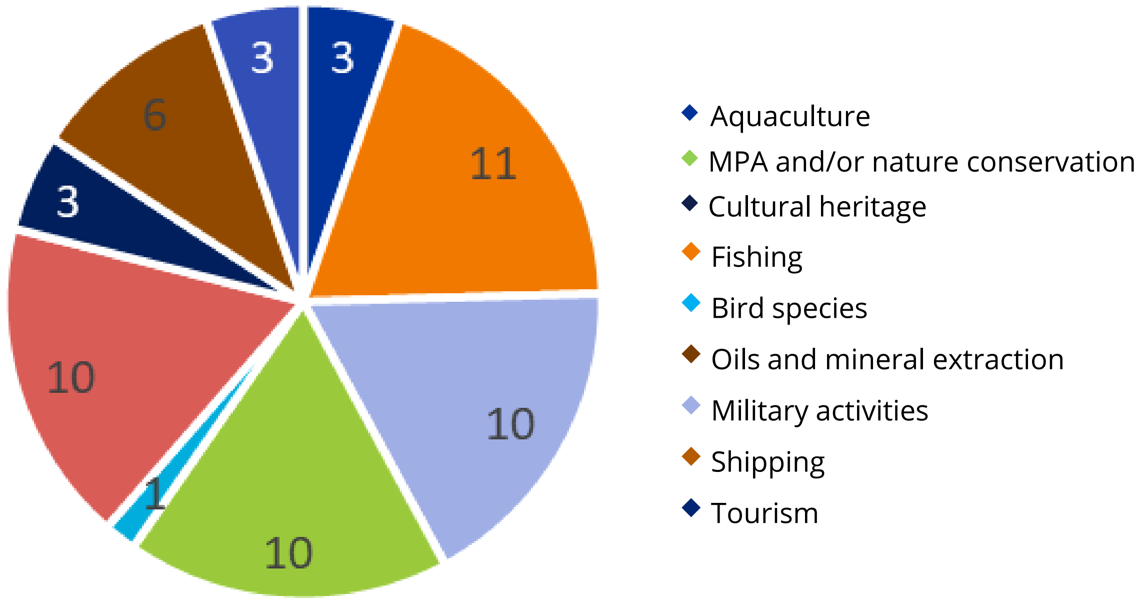
Integrated Maritime Spatial Planning as an enabler to unlock ORE potential

Maritime Spatial Planning identifies potential conflicts with other sea uses

Spatial conflicts with ORE vary by country:

- Conflicts in MSP documents depend on local functions and restrictions. Potential conflicts with fishing activities are most often included in MSP documents.
- ORE development is affected by environmental protection and military areas.
- Examples of possible conflicts:
  - **Potential ecological damage due to the presence of ORE**, as mentioned in the MSP of Estonia, Finland, Lithuania, the Netherlands, Romania, Slovenia and Sweden. In addition, the MSP of the Netherlands specifies potential conflicts of ORE development with bird migration patterns.
  - **Potential noise pollution**, as mentioned in the MSP of Estonia, the Netherlands and Sweden.
  - **Potential negative impact on tourism**, due to horizon pollution is mentioned in the MSP for Latvia, Estonia and Sweden.

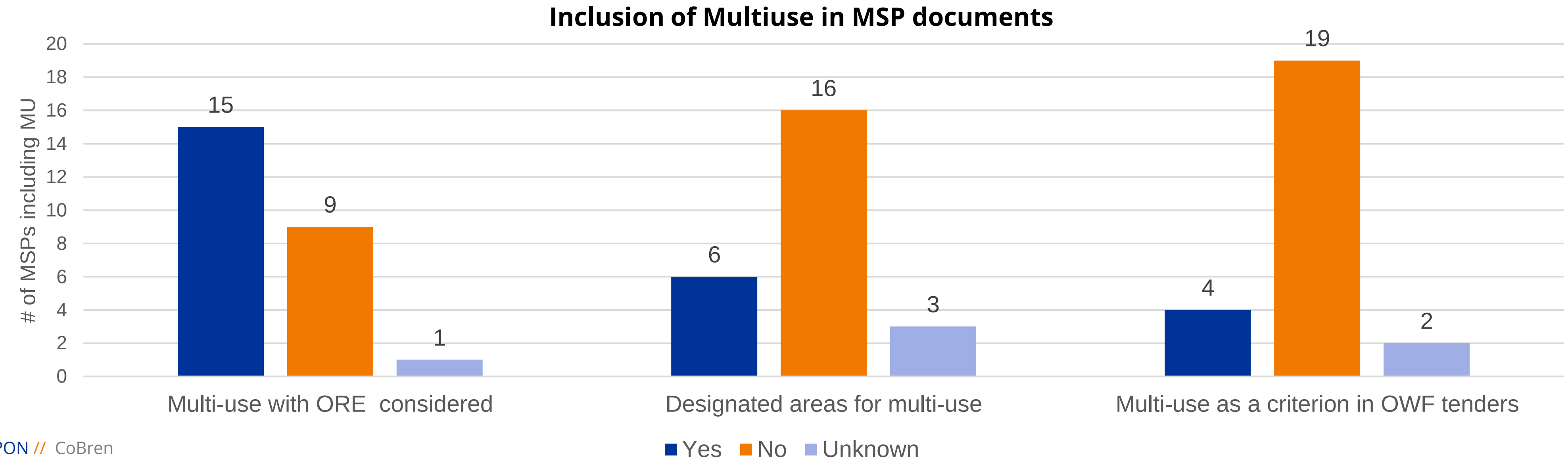
Potential conflicts identified in MSP documents



Integrated Maritime Spatial Planning as an enabler to unlock ORE potential

MSP as a planning tool to encourage ORE multi-use and enhance synergies among sea use functions

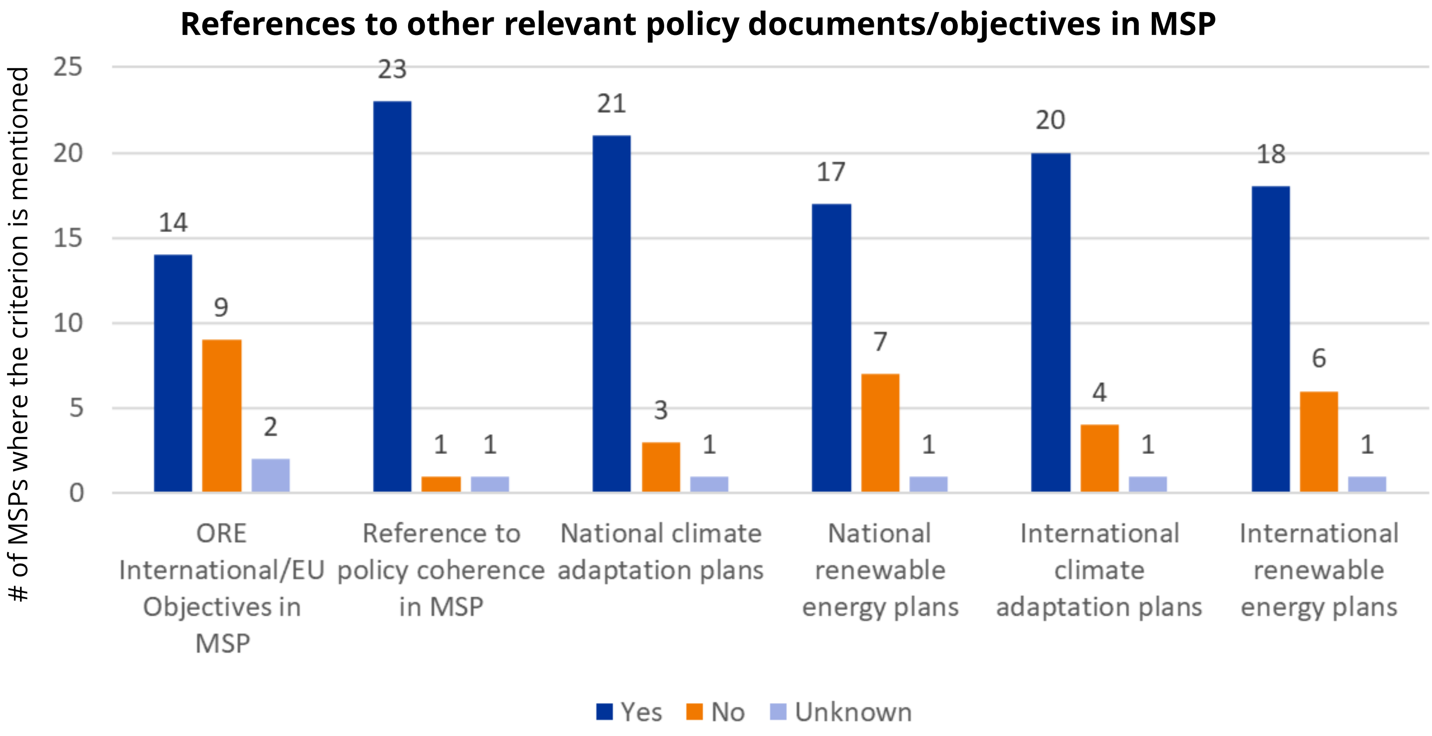
- MSPs acknowledge **potential barriers and synergies for ORE development**. Fisheries is most often referred to as sector with overlapping sea use space.
- MSP **offer possibilities for multi-use**. 15 MSP documents consider multi-use, mostly with fisheries and aquaculture.
- **Strategic impact assessments are a relevant planning practice to depict barriers and synergies**. 15 out of the 25 reviewed MSP documents demonstrate the use of an integrated impact assessment, considering environmental, social, economic and other impacts such as historical landscape or cultural considerations.



Integrated Maritime Spatial Planning as an enabler to unlock ORE potential

MSP as a planning tool to support policy coherence and define the need for ORE

- **ORE development requires seeking coherence with shipping, fisheries and environmental policies and regulation.**
- Several international policies provide frameworks for ORE development, including IMO routing measures, RFMOs, EU Birds and Habitat Directives, the Barcelona Convention, and OSPAR regulations.
- **References to international/EU objectives for CO2 reduction targets and renewable energy shares illustrate the need for ORE development.**



Integrated Maritime Spatial Planning as an enabler to unlock ORE potential

MSP as a means for stakeholder engagement and addressing conflicts

Stakeholder engagement is an integral part of Maritime spatial planning practices

- MSP documents provide an opportunity for Member States to engage stakeholders in ORE development.
- Stakeholder involvement is a key principle in maritime spatial planning.
- 24 out of 25 MSP documents explicitly refer to stakeholder participation processes.

Types of stakeholders and participation mentioned in MSP documents

- Stakeholders involved include government actors, businesses, NGOs, and researchers.
- Different ways to organize stakeholder participation: meetings, workshops, surveys, newsletters.

Stakeholder engagement to address spatial conflicts

- Five MSPs mention stakeholder involvement to overcome spatial conflicts.
- Participatory approach helps address needs of affected communities, create awareness, and build political willingness.
- Spatial conflicts often occur in areas of high biodiversity and accessible marine infrastructure.
- Conflict between ORE and fisheries, especially with bottom contacting gears, is a major concern.

Integrated Maritime Spatial Planning as an enabler to unlock ORE potential

MSP as a planning tool to enhance territorial cooperation

The MSP Directive requires EU Member States to promote cooperation with non-EU Member States. Key areas for territorial cooperation include:

- **Interconnecting grid infrastructure**: Develop shared electrical grids for energy distribution across sea basins, supported by initiatives like the North Sea Energy Cooperation and the Baltic Energy Market Interconnection Plan.
- **Coordinating maritime spatial planning**: Collaborate on allocating areas for ORE to maximize cost-effectiveness and resource output.
- **Legal and administrative harmonisation**: Simplify cross-border permits, licenses, and legal procedures for offshore projects.
- **Standardising regulatory framework**: Establish common standards for the construction, operation, and maintenance of ORE installations.
- **Economic and financial cooperation**: Enable joint investment strategies, shared subsidies, and tax incentives.
- **Environmental and social impact coordination**: Conduct joint impact assessments for marine ecosystems and coastal communities.

Transnational cooperation supports integrated offshore and onshore energy grids, exemplified by initiatives like the North Sea Wind Power Hub and the Offshore Grid Initiative in the North Sea.

Sea basin strategies act as enabling factors for concrete ORE development actions, with examples like Estonia and Latvia's hybrid offshore wind park and Norway-Sweden's joint electricity certificate market benefiting from transnational cooperation.

Integrated Maritime Spatial Planning as an enabler to unlock ORE potential

EU cooperation mechanisms supporting ORE development

Different tools and mechanisms are available at European level that enable and support territorial cooperation:

- **Interreg is a main lever to enhance territorial cooperation and unlock the potential for ORE.**
- Currently, **35 out of 53** Interreg programmes with sea access support ORE development.
- Most Interreg programmes with sea access focus on research and innovation processes, technology transfer and cooperation between enterprises, research centres and universities, focusing on the low carbon economy, resilience and adaptation to climate change.
- **Projects funded by Horizon contribute to advancing Europe's technical capabilities on ORE.**
- The uptake of funding from EMFAF, LIFE and CEF is mainly challenged due to low priority to ORE in these programmes.
- The uptake of the cooperation mechanisms enabled through the Renewable Energy Directive is challenged by **complexity to reach agreements**.
- EEA analysis of projects applying cooperation mechanisms illustrates barriers to reach agreements that shall underpin the joint actions. The barriers relate to **concerns with incoherent national measures for permits and licences, uncertainty on sharing costs and benefits, and public acceptance.**

Integrated Maritime Spatial Planning as an enabler to unlock ORE potential

7 case studies complement findings from desk research and interviews, providing details on planning practices for ORE development

UNITED	***United, Middelgrunden wind farm*** Denmark, Baltic Sea	Project focused on bottom-fixed wind turbines and exploring possibilities to develop ORE in combination with tourism and aquaculture.
AQUAWIND	***Aquawind*** Spain Canary Islands, Atlantic Ocean (Outermost region)	Project exploring ways to integrate floating wind technology with aquaculture and enhancing marine biodiversity.
BLOW	***BLOW*** Bulgaria, Black Sea	Innovative project testing floating wind technology and assessing technical feasibility and commercial use.
MUSICA	***MUSICA*** *Greece,* Mediterranean Sea	Project developing a one-stop-shop solution for a multi-use platform leveraging energy provision for islands.
	EU SCORES, WindFloat Atlantic wind farm Portugal, Atlantic Ocean	Research project demonstrating the integration of wind, wave and solar energy.
ULTFARMS	***ULTFARMS, FINO3 platform*** Germany, North Sea	Project exploring and testing possibilities to integrate aquaculture systems with offshore wind farms.
EUROTIDES	***EURO-TIDES*** UK, North Sea	Pilot project on tidal energy advancing the technology and accelerating commercialisation.

Integrated Maritime Spatial Planning as an enabler to unlock ORE potential

The case studies highlight the role of MSP to manage sea space designating ORE zones, involving stakeholders and relevant perspectives for territorial cooperation

Coordinate the use of sea space and identity a place for ORE development	• All case studies, except for *BLOW*, benefit from a dedicated zone for ORE development. • All case studies, except *EURO-TIDES*, seek to advance ORE multi-use development by exploiting potentials for sea use synergies. Synergies with aquaculture and fisheries are mainly explored via multi-use as illustrated in *AquaWind*, *BLOW*, *EU-SCORES*, *ULTFARMS* and *MUSICA*. • Fisheries and nature conservation are among the main barriers for ORE development.
Involve stakeholders to reduce potential conflicts, gain social acceptance and define the need for ORE	• All case study projects apply a stakeholder involvement process to advance the development of ORE. • The case studies *AquaWind*, *EU-SCORES* and *MUSICA* demonstrate the importance of inclusive stakeholder engagement to raise acceptance and promote the benefits of (multi-use) ORE. • Stakeholders participate in various stages of ORE project development.
Align with policy objectives at national and European levels to support the development of ORE	• The acknowledgement of clear targets for ORE in national policy documents provides ORE project partners with a lever to initiate and promote their project ideas, as mentioned in the cases of *UNITED*, *BLOW* and *EU-SCORES.* • Stakeholders in the *UNITED* and *ULTFARMS* case studies highlight trickling down effects of clear commitments and target setting in national policy documents for offshore renewable energy.
Consider perspectives for territorial cooperation from the project start	• Case studies illustrate little evidence for territorial cooperation to unlock the potential of ORE through MSP. • The *ULTFARMS* case study nevertheless highlights the relevance of aligning MSP with neighbouring countries and of transnational cooperation at sea basin level. • The *BLOW* and *MUSICA* projects illustrate the challenges of implementing the design of ORE technology in another geographic context mainly due to different regulatory contexts.

Integrated Maritime Spatial Planning as an enabler to unlock ORE potential

Enhancing territorial cooperation in support of unlocking ORE potential

EU MSP Directive

The Directive requires Member States to create spatial plans for their maritime zones, ensuring that ORE deployments harmonize with other uses and environmental priorities.

Maritime Spatial Planning

MSP organises marine activities to achieve ecological, economic, and social goals, coordinating sea space use, identifying areas for ORE development, and addressing conflicts with environmental protection and military zones.

ORE Development

Most MSP documents plan for ORE development, outlining areas and objectives, addressing barriers, and considering multi-use with fisheries and aquaculture.

Stakeholder Engagement

Stakeholder involvement, including government actors, businesses, NGOs, and researchers, is emphasized in MSP documents. Effective engagement requires long-term investment and crucial trust-building.

International Policies

Frameworks like IMO routing measures, RFMOs, EU Birds and Habitat Directives, the Barcelona Convention, and OSPAR regulations play significant roles in guiding ORE development.

Territorial Cooperation

MSP fosters cooperation among EU and non-EU states in key areas: interconnected grid infrastructure, coordinated spatial planning, legal harmonization, standardized frameworks, economic collaboration, and joint impact assessments.

EU Cooperation Mechanisms

Tools such as Interreg, Horizon, EMFAF, LIFE, and CEF support territorial cooperation and ORE development, despite challenges in agreement complexity.

Challenges and Examples

Despite limited concrete actions, initiatives like NSWPH and Offshore Grid in the North Sea show successful cooperation. Regional strategies support coordinated ORE development, but more policy coordination is needed to unlock full potential.

3

Conclusions

Conclusions

EU policy frameworks provide a vision for ORE development in close alignment with environmental, socio-economic and sustainability considerations

Key elements to consider:

- MSP provides a comprehensive policy framework to drive offshore renewable energy (ORE) deployment.
- Utilise MSP to support expanding renewable energy capacity while emphasizing environmental protection, socio-economic considerations, and sustainable development.
- Member States can align their strategies and ORE objectives with overarching EU targets.
- The EU Green Deal, Marine Strategy Framework Directive (MSFD), Renewable Energy Directive II, and Habitats and Birds Directives provide key related policy frameworks to embed MSP practices.

Conclusions

More progress is needed to achieve national, regional and EU targets

Overall, significant gaps exist between current deployment levels and targets for ORE:

- Offshore wind:
  - Ambitious ORE targets have been set for all sea basins except the Black Sea for the coming decade.
  - The EU-27 has a cumulative installed capacity of offshore wind of 19.4 GW; including Norway and the UK, Europe's total capacity is approximately 32 GW with offshore wind being the most prominent technology and floating wind gaining traction in the Atlantic Ocean and Mediterranean Sea.
  - Current capacity is far from the 2030 target of 111 GW and the 2050 target of 317 GW for offshore wind, requiring a steep increase in deployments.
- Other ORE technologies:
  - Tidal stream leads with 11.75 MW installed, mostly in the UK.
  - Wave energy has 1 MW installed in Portugal, Italy, Spain, and France.
  - Offshore solar has 1 MW installed in The Netherlands, Belgium, and France.
  - EU target for ocean energy (wave and tidal) is 1 GW by 2030 and 40 GW by 2050, above current national targets.

Achieving targets depends on efficient marine space use, addressing overlapping interests, and increasing policy support and investment in wave and tidal technology to accelerate commercialization and scale-up.

Conclusions

Co-location of different types of ORE reveals potential in terms of capacity and efficiency gains towards achieving energy targets

Key elements to consider:

- Significant variation in ORE potential across Europe's sea basins is driven by geographic, climatic, and environmental factors.
- Co-location of offshore wind, offshore solar, and wave energy shows great potential, especially in the North Atlantic Ocean, North Sea, Norwegian Sea, and to a lesser extent in the Mediterranean Sea and Macaronesia.
- **Efficient spatial use and strategic planning reveal much more capacity can be unlocked by integrating multiple ORE sources in multi-use energy parks throughout European sea basins.**
- **Potential ORE capacity overlaps with other sea uses, particularly nature protection and military areas:**
    - Offshore wind capacity overlaps significantly with other ORE in the North Atlantic, Baltic sea and North Sea.
    - Offshore solar capacity overlaps with other ORE sources in the North Atlantic, the Mediterranean Sea as well as the Baltic and North sea.
    - Offshore wave energy capacity significantly overlaps with other ORE sources particularly in the North Atlantic Ocean.
- Supportive policy and regulatory frameworks are essential to incentivize co-location and multi-use, considering both synergies and barriers in ORE development.

Conclusions

Integrative spatial planning that considers synergies and barriers posed by other sea uses is needed to fully exploit the co-location potential with ORE

Effective management of marine space is crucial for maximising ORE potential:

- Overlapping activities such as military zones, aquaculture, nature conservation, and other marine uses can limit available space for ORE if treated solely as barriers.
- Excluding these areas results in significant capacity loss and undermines EU climate and energy goals.
- Integrated spatial planning is vital to foster synergies, reduce capacity losses, and enhance ORE project viability.
- Co-location strategies promote shared use of marine areas to minimize conflicts and unlock additional capacity:
  - ORE projects can coexist with marine protected areas through nature-inclusive designs.
  - ORE projects can align with aquaculture zones to support sustainable food production.
- These approaches optimize marine space and ensure marine ecosystems and socio-economic activities thrive alongside energy generation.

Conclusions

Maritime Spatial Planning practices can help stakeholders to exploit the potential of ORE

Key elements to consider:

- National MSP documents and the EU Renewable Energy Directive encourage balancing marine energy production with ecosystem health and socio-economic interests.
- All EU Member States, the UK, Norway, and Iceland have adopted MSP documents that consider ORE development.
- The MSP documents complement other policy documents advancing ORE development, including national energy and climate plans as well as national and international climate adaptation and renewable energy plans.
- MSP practices follow guidelines from the MSP Directive (2014/89/EU) and MSPGlobal, ensuring coherence with other policies, stakeholder consultation, impact assessments, and multi-use considerations.
- MSP documents provide guidance for ORE development by:
    - Mapping synergies and barriers.
    - Designating areas for ORE, either specifically or in combination with other sea uses (multi-use).
    - Conducting impact assessments to illustrate effects and potential conflicts.
    - Providing conflict resolution provisions and platforms for stakeholder engagement.
- There is a need for improved monitoring of the implementation of MSP planning practices to benefit ORE deployment.

Conclusions

Maritime Spatial Planning practices could put more emphasis on territorial cooperation

Territorial cooperation is underexplored in MSP documents; cooperation for interconnecting grid infrastructure, spatial planning, and legal harmonization remains limited:

- Cooperation practices mainly consider effects of sea uses beyond the EEZ, however, limited reference to comprehensive cooperation strategies in national MSP documents could be identified.
- Transnational cooperation initiatives exist across all sea basins, but only the Greater North Sea Basin Initiative integrates ORE with other sea uses.
- Specific initiatives in other sea basins, like the Baltic Sea are promising but are not fully exploited to maximize ORE efficiency, sustainability, and fairness.
- Therefore, an enhanced effort is needed:
  - to foster partnerships, harmonize sector policies, and leverage shared resources to advance energy targets and strengthen regional ties.
  - To overcome barriers including incoherent national measures for permits and licences, uncertainty in sharing costs and benefits, limited data exchanges, and public acceptance.

International good practices are necessary to illustrate effective transboundary collaboration in MSP, supported by projects like Baltic SCOPE and eMSP NSBR.

Conclusions

Maritime Spatial Planning practices can assist in avoiding conflicts between different sea-uses

- MSP supports avoiding conflicts between different sea uses by analysing and allocating the spatial and temporal distribution of human activities to achieve ecological, economic, and social objectives.
- Development of ORE can lead to conflicts with fisheries and aquaculture, nature conservation, tourism, military activities, and shipping.
- Designating specific ORE or multi-use areas is a proposed planning practice to address potential conflicts.
- **Multi-use development shows that combining different functions is challenging, with few examples in European seas.**
- Research and innovation projects focus on combinations with aquaculture, seaweed, and other ORE technologies.
- Participation and stakeholder consultation are crucial for resolving spatial conflicts, but only five member states include stakeholder involvement in their MSP documents.
- Enhanced participatory approaches can address the needs of affected communities, raise awareness, and build political support for ORE projects.

Conclusions

Maritime Spatial Planning practices could benefit from more dynamic planning, considering regular updates of planning documents

- MSP document review aimed to discover links to energy and climate plans.
- Some MSP documents include references to these policies, but not all.
- Documents adopted before the growth of ORE and introduction of energy and climate plans in the late 2010s may lack these references.
- MSPs are revised every 5 to 10 years, potentially missing the latest technological and political developments.
- A dynamic MSP framework would be beneficial to easily incorporate new developments.
- Accompanied by a dynamic and integral impact assessment methodology to stay current with advancements

4

Recommendations

Recommendations

Recommendations are structured around 4 different topics addressing 4 types of stakeholders

4 key recommendation topics

- Strengthening the maritime spatial planning process in the context of ORE development through existing means (i.e. MSP documents).
- Supporting the optimal use of existing sea-space for ORE development in concert with synergies and barriers.
- Promoting territorial cooperation in the context of ORE developments at the sea basin level.
- Additional fields of research.

4 types of key stakeholders addressed by the recommendations

- ***Policymakers***: National and regional authorities involved in/responsible for maritime spatial planning.
- ***ORE developers***: Engineers, technicians, companies involved in developing and implementing ORE projects.
- ***Affected communities and stakeholders***: Operators of other sea use activities e.g. fisheries, aquaculture, military, environmental protection areas/zones.
- ***Researchers and data holders***: Researchers in the field of ORE, collectors of data (e.g. maritime, environmental data).
- **Investors**: Private sector stakeholders and institutional funds

We propose to apply the RACI principle to identify stakeholder involvement:

R - Responsible	A - Accountable	C - Consulted	I - Informed
Stakeholders actively involved in carrying out the activities described in the recommendation	Stakeholder taking the decision on the implementation of the recommendation (deci sion-maker)	Stakeholder providing input for the implementation of the recommendation	Stakeholder informed about the progress/implementatio n of the recommendation

Recommendations

1. Strengthen MSP as a toolkit for strategic planning

- **Quantify ORE targets in MSP documents:** Clearly state and quantify ORE targets, ideally by ORE technology (e.g. wind, wave, tidal, solar etc.) and thereby strengthen the political commitment to supporting the development of ORE.

- **Engage with stakeholders in the MSP process:** Facilitate the participation and exchange between all relevant stakeholders (e.g. ORE developers, affected business and communities, researchers in the field and data holders) in the MSP process.

- **Collect, analyse and update MSP data:** Collect, analyse and update relevant data (e.g. spatial data on sea use, ORE relevant factors such as windspeed, bathymetry, currents, synergies/barriers, latest technological developments in relation to ORE, etc.) to support decision-making in the planning process.

- **Monitor the implementation and update of MSP documents:** Strengthen MSP through monitoring of the implementation of maritime spatial plans and drawing regular lessons learned on identified best practices and problems/issues encountered in ORE developments when applying maritime spatial plans. Performing regular updates of planning documents based on new data, identified lessons learned and best practices.

Stakeholder / Recommendation	Quantify ORE targets in MSP Documents	Stakeholder engagement in MSP process	Collect, analyse and update MSP data	Monitoring, implementation and update of MSP documents
Policymaker	R, A	R, A	A	R, A
ORE Developer	C	R	R	C
Affected Communities	I	R	C	C
Researcher / data holder	C	C	R	C
Investors	I	C	C	I

R - Responsible A - Accountable C - Consulted I - Informed

Recommendations

2. Facilitate optimal use of available sea space (1/2)

- **Map synergies and barriers**: Map the different sea uses to identify synergies and barriers for ORE development:
  - (1) the theoretical potential of ORE for the sea space (for different technologies e.g. wind, wave, tidal, solar)
  - (2) the current use of sea space for non-ORE related activities such as aquaculture, fishery, military activities, environmental protection zones.
- **Identify co-location potential:** Analyse identified synergies and barriers to ORE development and evaluate the potential for co-location with other sea use activities (ORE or non-ORE related activities). To assess the co-location potential in relation to other sea uses and stakeholders, perform a comprehensive impact assessment on environment, society and local/regional economy.
- **Allocate sea space to ORE:** Based on the co-location analysis, allocate sea space to ORE and if applicable other sea uses. The allocation should define areas for ORE deployment in a way that avoids conflicts. Specifically for co-location include multiuse as a requirement in offshore wind farm tenders (from the early stages of development).

Recommendations

2. Facilitate optimal use of available sea space (2/2)

- **Facilitate targeted stakeholder dialogue to promote multi-use:** To support the uptake of multi-use for ORE developments, engage in targeted stakeholder discussions to:
    - Discuss and find solutions for identified sea-use conflicts.
    - Raise the level of societal acceptance for multi-use among affected stakeholders by highlighting benefits of shared infrastructure, renewable energy and to the local/regional economy.

Stakeholder / Recommendation	Map synergies and barriers	Identify co-location potential	Allocate sea space to ORE	Facilitate targeted stakeholder dialogue to promote multi-use
Policymaker	A	R,A	R, A	R, A
ORE developer	R	R	C	C
Affected communities	C	C	C	C
Researcher / data holder	R	R	C	C
Investors	I	C	I	C

R - Responsible A - Accountable C - Consulted I - Informed

Recommendations

3. Enhance territorial cooperation at sea basin level (1/2)

- **Enhance territorial cooperation in national MSP processes**: Putting more emphasis on cooperation in national MSP processes makes relevant planning practices more visible for relevant stakeholders. This should include:
    - Collecting and sharing data to support decision-making at sea basin level.
    - Assessing cross-border effects in environmental impact assessments. As recommended in the Espoo convention, regional cooperation at sea basin level could support such assessments.
- **Develop sea basin level MSP documents:** Leverage existing sea basin strategies and instruments to coordinate use of sea space in an integrated manner. This should build upon enhanced territorial cooperation in national MSP processes and could serve as a platform for stakeholder engagement.

Recommendations

3. Enhance territorial cooperation at sea basin level (2/2)

- **Promote good practices of territorial cooperation.** Encourage Interreg project partners to focus their activities on coordinating regulatory frameworks, considering cross-border elements in environmental impact assessments, feasibility studies, data exchange, sharing of costs and benefits, and building good governance, including mutual trust and political will. This could be supported by:
  - A comprehensive assessment of hampering factors for potential project partners to utilise Interreg in support of ORE development.
  - A comprehensive assessment of qualitative results, including the durability of results, of past projects in the field of ORE development.
  - Leveraging opportunities to share experiences across Europe e.g. through S3 communities of practice, Interreg Europe, INTERACT and ESPON initiatives and use of the lessons learnt for further initiation and promotion of projects in the field of ORE.

Stakeholder / Recommendation	Enhance territorial cooperation in MSP	Develop sea basin level MSP documents	Promote good practices
Policymaker	R, A	R, A	A
ORE developer	C	C	R, I
Affected communities	I	C	R, I
Researcher / data holder	C	C	R, I
Investors	C	C	C

R - Responsible   A - Accountable   C - Consulted   I - Informed

Recommendations

4. Perform further research (1/2)

- **Assess distributional effects of MSP**:
  - Engaging with stakeholders and resolving potential conflicts is key for ORE projects to develop in alignment with the activities of other actors.
  - Risk of societal resistance from stakeholders and sectors that feel that their interests are not sufficiently considered in the planning process.
  - Further researching on such distributional effects could potentially support the planning process by increasing overall societal acceptance of those stakeholders who may otherwise be in opposition of ORE developments.
- **Dealing with "mobile" actors**:
  - Maritime spatial planning has been criticized for failing to include so-called "mobile users" of sea space.
  - These includes users that do not have a fixed place to operate (e.g. tourism and fisheries).
  - These actors do not have an interest in claiming a particular part of the sea for their use, which is typically what the MSP process leads to.
  - Multi-use / co-location can help solving overlapping interests. However, this typically considers stationary activities.
  - Further research on the potential of combining stationary and mobile users in a multi-use concept could support maritime spatial planning in general and the development of ORE projects.

Recommendations

4. Perform further research (1/2)

- **Incentives for territorial cooperation**:
  - Support for territorial cooperation through EU instruments and regional cooperation mechanisms exists.
  - However, the application of territorial cooperation practices is hindered by limited consideration of practices in the MSP document with maritime spatial planning at the sea basin level not being a common practice yet.
  - Further research toward identifying and promoting the economics benefits of territorial cooperation could be beneficial.

Stakeholder / Recommendation	Research on: Assess distributional effects of MSP	Research on: Dealing with "mobile" actors	Research on: Incentives for territorial cooperation
Policymaker	A	A	A
ORE Developer	C	C	C
Affected Communities	C	C	C
Researcher / data holder	R	R	R
Investors	R	R	R

R - Responsible A - Accountable C - Consulted I - Informed

5

Annexes

5.1

Annex 1 – *Project approach*

Annex 1 - Presentation of project approach

CoBren study is based on the conduct of three main research tasks

Project management and quality assurance (ongoing throughout the whole project)

	4 **Task 4:** Project management	0 **Task 0:** Inception phase ✓	1 **Task 1:** Map and analyse the current use of European seas	2 **Task 2:** Review of maritime spatial planning practices	3 **Task 3:** Conduct case study analysis
Key activities	• Perform project management activities: **Initiating, Planning, Executing, Monitoring & Controlling, Closing.** Project management activities start with the signature of the contract and continue until its closure. The start-up activities are to be finalised within 2 weeks after the project's kick-off. PM² PM² *from the European Commission*	• **Activity 0.1**: Organise and conduct Kick-off meeting • **Activity 0.2**: Map available data on ORE and identification of possible data gaps • **Activity 0.3**: Map available information on MSP and identification of possible gaps • **Activity 0.4**: Identify relevant stakeholders and prepare stakeholder strategy • **Activity 0.5**: Prepare and submit inception report	• **Activity 1.1**: Gather and Integrate Marine Data in CoBren dataset • **Activity 1.2**: Map ORE use and potential in European Seas • **Activity 1.3**: Assess current state of play and forecasts on ORE deployment in 2030 and 2050 • **Activity 1.4**: Assess prevalent combinations and potential opportunities for multi-use • **Activity 1.5**: Assess relation to policy goals and identify proposals for potential improvement	• **Activity 2.1**: Prepare inventory of maritime spatial plans and stakeholders • **Activity 2.2**: Develop an evaluation framework for the review of maritime spatial planning practices • **Activity 2.3**: Review of all relevant maritime spatial plans • **Activity 2.4**: Interview with key stakeholders • **Activity 2.5**: Analysis and synthesise findings	• **Activity 3.1**: Develop case study templates • **Activity 3.2**: Hold an internal workshop to select case studies • **Activity 3.3**: Collect input on offshore renewable energy • **Activity 3.4**: Collect input on Maritime Spatial Planning practices • **Activity 3.5**: Conduct stakeholder interviews / focus groups • **Activity 3.6**: Mapping and visualisations • **Activity 3.7**: Draft case study reports • **Activity 3.8**: Conduct comparative analysis • **Activity 3.9**: Hold an internal workshop on main lessons learnt
Outputs	• Project management toolkit including Quality management plan • **D 4.1 a/b** Project Progress Reports • Meeting minutes from key meetings • Meeting minutes from closing meeting, incl. lessons learned • **D4.2** Final report	• Kick–off meeting slide deck • **D0.1 Inception report** – Conceptual framework, – Assessment of data availability and approach to overcome data challenges, – Stakeholder strategy, – Work plan.	• **ID1.1** Marine dataset overview • **ID1.2** Preliminary map (1 location) • **ID1.3** Installed capacity/ORE deployment (1 specific park) • **ID1.4** Prevalent combinations (1 location) • **D1.5** Conclusions & recommendations on synergies and barriers to expand ORE • **D1.6** Policy paper / white paper	• **ID2.1** Draft evaluation framework • **ID2.2** Draft on the position of ORE in MSP • **D2.3** Conclusions on the position of ORE in MSP • **D2.4** Conclusions and recommendation on possible spatial conflicts and possible innovative approaches to mitigate them	• **ID 3.1** Case study selection • **ID 3.2** Case study templates • **D3.3a** 7 case studies • **D3.3b** Conclusions and recommendations on the use of EU instruments

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