

Mediterranean Sustainable Shipping Observatory (MSSO)

A decarbonisation hub for the Eastern and wider Mediterranean region

Background & Motivation

As we move further away from the first regulatory actions regarding climate change, decarbonisation efforts around the world are continuously increasing across industries. Technological readiness, financial feasibility, social awareness, and policy making are only some of the crucial parameters in this rather difficult and challenging energy transition. Among others, blue economy – including maritime transport – holds a considerable share in terms of greenhouse gas (GHG) and other polluting emissions, with significant impacts to the marine environment. In this respect, the continuously growing shipping industry needs to adapt fast to this new reality, and gradually limit its environmental footprint, aligning with the decarbonisation targets at both global and regional levels, contributing also to a sustainable blue economy.

The European Union (EU) has been trying hard to push towards decarbonisation across industries, including ambitious legislation and measures for the maritime industry. In more detail, following international agreements and its Green Deal, the EU has adopted the recent “Fit for 55” package, which introduced the inclusion of shipping in the EU ETS, the FuelEU Maritime Regulation, paving the road towards reducing the use of conventional fossil fuels, the alternative fuels infrastructure Regulation (AFIR) and others. On the other hand, the International Maritime Organisation (IMO) has already set the first legislation layers that are necessary for the industry’s energy transition, by focusing on establishing the emission reduction baseline and targets, while introducing the monitoring mechanisms and standardised assessment methodologies to be used industry-wide and facilitate all decarbonisation efforts. However, the performance and feasibility of technological options, such as low-carbon fuels and energy saving devices, are still under a great deal of uncertainty. On top of that, the recent derailment of the IMO’s Net Zero Framework, as it was adjourned for one year, is a serious setback showcasing that apart from geopolitical interests, political risks, mainly due to techno-economic uncertainties, are affecting greatly the road towards Net Zero future for shipping.

In parallel, a number of initiatives under the European Commission (EC) were launched to enhance the capacities for Member States, associated countries and relevant stakeholders, such as funding of research and innovation, providing tools and platforms to facilitate networking and data and knowledge sharing, while also fostering regional policies and strategies as a more focused approach for the specific characteristics and comparative advantages of each region. The **Zero-Emission Waterborne Transport (ZEWI)** platform that aims at a continuous dialogue between

all waterborne stakeholders, the **WestMED initiative** which further enhances the regional policy efforts – following the **UfM Ministerial Declaration on the Sustainable Blue Economy** – in the western Mediterranean, the **EU Assistance Mechanism** for supporting the regional strategies in its sea basins, as well as the **European Alternative Fuels Observatory (EAFO)** and the **EU Blue Economy Observatory** are only some of them.

Regional focus

The Mediterranean Sea, as a semi-enclosed sea basin, is particularly vulnerable to pollution from increased maritime traffic, which is of growing concern. Specifically, the eastern Mediterranean region plays a key role with regards to the international trade and economic activities, since it refers to key maritime industry countries such as Greece, Cyprus and Egypt, also considering the maritime transport routes in the region. Thus, particular challenges are presented with respect to a sustainable blue economy. However, the eastern Mediterranean remains outside the scope of many regional initiatives or sea basin strategies, which is translated into less regional cooperation that would provide the necessary push towards policy and technical actions.

In addition, there is a lack of alignment of non-EU but EU-adjacent countries, such as the north African countries, with EU policies, including the ambitious decarbonisation targets. Addressing such a gap aims for a wider regional compliance that will facilitate the necessary clean energy transition for the rather vulnerable to pollution Mediterranean Sea basin.

Meanwhile, the derailment of IMO's Net Zero Framework demonstrated the need for evidence-based planning that can get the industry back on track, by reducing political but also investment risks. To this end, robust analytic tools can provide support for informed-decisions to both industry stakeholders and policy makers. However, by considering a scalable approach, a focus on the Mediterranean Sea basin, supported by the EU Sea Basin strategy for the western and soon the eastern Mediterranean, facilitates the development of such tools.

Definition & Establishment

In this context, considering the need for a regional approach in the shipping decarbonisation challenge, while also acknowledging the weak efforts in the eastern Mediterranean, in conjunction with the WestMED initiative priorities and activities, and the uncertainties regarding the various decarbonisation options for industry stakeholders, **the Mediterranean Sustainable Shipping Observatory (MSSO) is established, as a decarbonisation hub focusing on eastern and wider Mediterranean region.** *The MSSO aims, through its integrated approach for the MSSO platform, to provide a foundational framework for steering the energy transition for regional shipping from high-level ambition to practical, implementable pathways. The monitoring and foresight of ship technologies, fleet activity and energy demand, low-carbon fuels supply chains' development allow*

for a continuous decision support of maritime industry actors, including ship owners, technology providers, ports, policy makers, energy and fuel providers. Its vision is to leave behind a mature, scalable, and data-driven foundation that can continue supporting regional shipping decarbonisation efforts beyond the project's lifetime. Beyond a technical platform and an active observatory, the MSSO fosters cross-Mediterranean collaboration through a growing community of stakeholders in the region and beyond, who exchange knowledge and shape the future of shipping. The Observatory aspires to serve as a point of reference for decarbonisation initiatives in the region, especially in the Eastern Mediterranean, by also joining forces with national Governments and maritime authorities, and by establishing a standardised interaction with the WestMED initiative and its Technical Groups, as well as the European Union and its bodies.

Development – the GreenMED project

The Observatory is built step by step, with the strong involvement of industry stakeholders, aligned to deliver a roadmap towards the decarbonisation of the Mediterranean region. In its first phase, it is established within the context of the **GreenMED project** – with its distinct identity and online presence – and operates under the joint management of its Consortium partners, involving three countries in the eastern Mediterranean – Greece, Cyprus and Egypt – as the area of focus, with the support and strong partnership with a western Mediterranean country – Spain – which also serves as a link with the WestMED initiative. The project supported its early development in terms of network and technical resources. The MSSO network is built by considering all relevant stakeholders, especially the ones with regional characteristics and priorities. In parallel, the MSSO platform has been built considering information about the availability of decarbonisation measures and technologies and their uptake, the regional shipping activity, the fleet energy consumption and demand, the levels of emissions in the Mediterranean and the regional fuels' supply chains for new and conventional fuels, based on a set of methodologies, practices and models that are developed within GreenMED project. This knowledge will be available to stakeholders through the MSSO platform and tools and will be used to explore decarbonisation options and identify industry gaps, under evolving market and policy conditions.

Vision – beyond the GreenMED project

In its second phase, the Observatory will transform into lasting resource, under the joint management of GreenMED partners, as well as the developing MSSO network of partners.

It will be focusing on research, innovation and policy making, with its own management structure, by considering all MSSO network members for a wide regional partnership. Its operation will follow a two-way stream, between the Observatory's knowledge base and partners/stakeholders community, to continuously align with the industry needs and update its knowledge capacity. With

this structure, MSSO will later expand further, to reach and partner with other regional initiatives, establish synergies and support actively regional cooperation. In overall, the Mediterranean Sustainable Shipping Observatory will complement the already active initiatives on green shipping, by focusing on a rather challenging region and by contributing in terms of knowledge, clustering and scientific methods to the wider efforts for shipping decarbonisation, both at an EU- and international level.

Segments

The MSSO is structured around a set of core components, i.e., segments, developed within the GreenMED project. These are summarised in Figure 1, which also indicates the ownership of its of the segments.

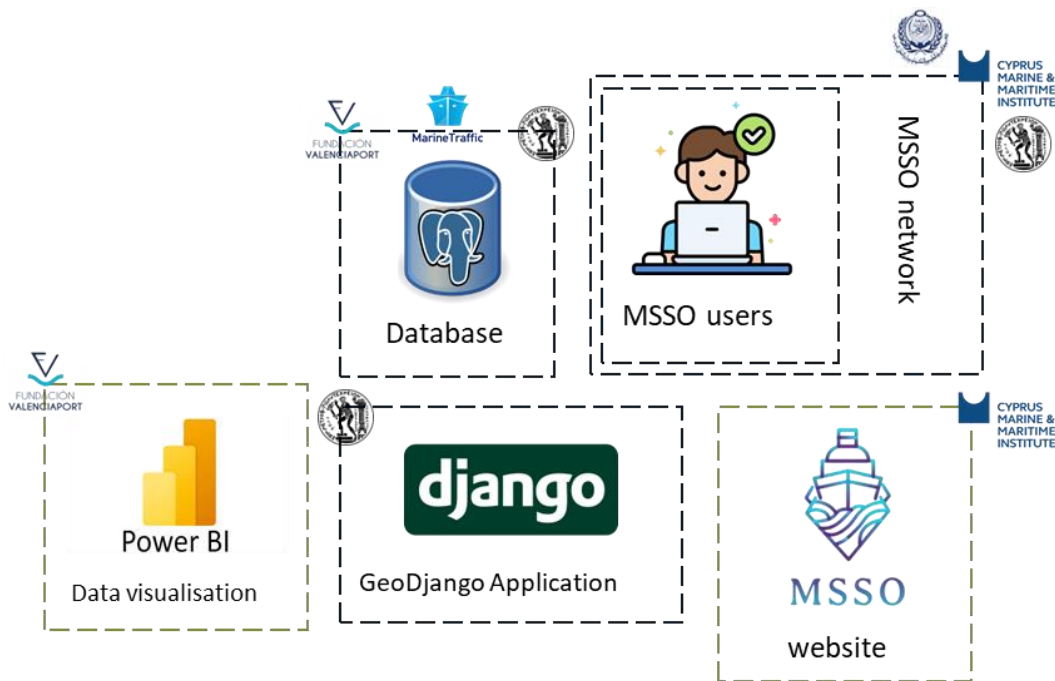


Figure 1: The MSSO segments

In more detail, each of the segments is analysed shortly below:

- MSSO network:** The network of stakeholders engaged with MSSO during the GreenMED project and its events/workshops. In practice, beyond its of the partners' network, the MSSO network is depicted in the MSSO registered users, the social media followers (i.e., in LinkedIn) and the newsletter subscribers. These are collectively owned by CMMI, NTUA and AASTMT as partners in the GreenMED project.

- **MSSO website:** The website serves as the main portal for the MSSO as decarbonisation hub, to share content and engage the target audience effectively, while redirecting to the MSSO platform. It is owned by CMMI as the project’s dissemination manager, with content formulated collectively by project partners.
- **Database:** The core of the MSSO knowledge base, where all relevant data are stored. Data are collected from multiple sources or generated via project models and calculations. The database is mainly owned by its main contributors, NTUA, Valenciaport Foundation and MarineTraffic. However, the data are divided into the data generated by the MarineTraffic study on fuel consumption and emissions (owned by MarineTraffic), data from the techno-economic analysis (owned by Valenciaport Foundation), and all the rest, covering fleet characteristics, energy demand and supply chains (owned by NTUA).
- **Data visualisation:** Data are consumed either by the MSSO platform and its tools to provide results or are shown through proper visualisation for the users’ consideration. The latter is materialised through Power BI dashboards, developed by -and thus owned by- Valenciaport Foundation, which is hosted on the MSSO platform.
- **MSSO platform:** This is the main infrastructure for hosting the tools of MSSO, as well as the database and the data visualisation segment (through Power BI). It includes user validation and access, PostgreSQL and PostGIS structure for the database, a GeoDjango Application and frames for hosting the Power BI dashboards. The application is the basis for the tools of the platform, which are currently the “*Fuel Demand Calculator*”, focusing on exploring scenarios for the current and future energy demand and its allocation around the Mediterranean, identifying gaps in infrastructure and fuel production, and the “*Fuel Consumption Calculator*”, which explores user-specific cases, considering various Mediterranean shipping routes and scenarios, conducting a pre-feasibility assessment. This segment is owned by NTUA.

Organisational structure

The continuous operation of the MSSO is based on the motivation and active presence of the GreenMED project partners in the regional sustainable blue economy efforts and maritime transport community of stakeholders. In addition, it lies also with the effort to further grow the network of MSSO collaborators and partnering initiatives, and their interest to be actively involved in the Observatory’s endeavors.

In order to translate this motivation of partners and network of stakeholders, combined with their expertise on shipping decarbonisation, into a functional structure, an organisation structure is formulated, considering the necessary agility and flexibility that will not burden with administrative load the organisations involved. This includes:



- **Steering Committee (SC):** The SC will have the main authority and responsibility over the Observatory's operation and activities. It will ensure the platform's maintenance, oversee the ownership of MSSO segments and possible ownership changes, coordinate and ratify partners' decisions for possible amendments, updates or expansions of segments that fall under their ownership and ensure alignment with the MSSO vision and long-term sustainability objectives. At its first stage, the SC consists of the GreenMED project partners that have signed an MoU that defines their joint management of the project outputs, represented by a specific person – a point of contact for each organisation. At the next stages, additional organisations can be considered, through their representative. The inclusion of additional organisations in the SC must be unanimous among the existing SC members. The SC is coordinated by the coordinator of the GreenMED project, NTUA, through its representative. A change in coordination must be unanimous.
- **Advisory Board (AB):** The AB serves as a group of industry experts that are providing strategic guidance and targeted feedback on MSSO activities, tools and outputs, ensuring relevance, credibility and alignment with market and policy developments. To the extent possible, the AB is also supporting the validation of methodologies, results and scenarios developed in the context of MSSO, while facilitating regional networking, connections with external collaborators and partnering initiatives. The AB, at this first stage, consists of the members of the AB of GreenMED project that are willing to be further linked with the initiative, without any strict commitment. AB members already linked with GreenMED and MSSO are representatives of WestMED initiative and its Technical Group on Green Shipping¹, the S3 Shipbuilding Alternative Fuels propulsion Alliance (SAFA)², the MEDports association³, the former leading fuel provider BaseBlue and other companies, organisations, projects and initiatives as listed in the MSSO website. GreenMED AB members were considered on the basis of interest and willingness to actively participate in the efforts of the project, while identifying the added value of MSSO. At the next stages, AB may be further enriched with industry experts, complementing the existing composition, considering key stakeholder categories such as policy makers, public authorities, ship owners and operators, technology providers, fuel and energy providers, ports and port authorities, classification societies, researchers and innovators, as well as academia representatives that ensure a solid scientific basis. The inclusion of an organisation, through its representative(s) in the AB is ratified unanimously by the SC, while the coordination of the AB is managed by the SC coordinator.

¹ <https://westmed-initiative.ec.europa.eu/green-shipping/>

² https://ec.europa.eu/regional_policy/policy/communities-and-networks/s3-community-of-practice/partnership_sustainable_blue_bioeconomy_shipbuilding_en

³ <https://medports.net/>

- **Secretariat:** A lightweight coordination function is established to support the day-to-day operation of the MSSO. This includes administrative coordination, communication with stakeholders, organisation of events and workshops, and support to the SC and AB. This function may initially be undertaken by selected partners and evolve over time as the MSSO structure matures.
- **Stakeholder community:** The MSSO network constitutes a significant pillar of the Observatory’s operation. The community contributes to the continuous exchange of knowledge, provides feedback on MSSO outputs, and supports the co-creation and validation of decarbonisation pathways at regional level. It includes all engaged stakeholders, including the members of the SC and AB, and meets at least once per year, with the responsibility of the SC.

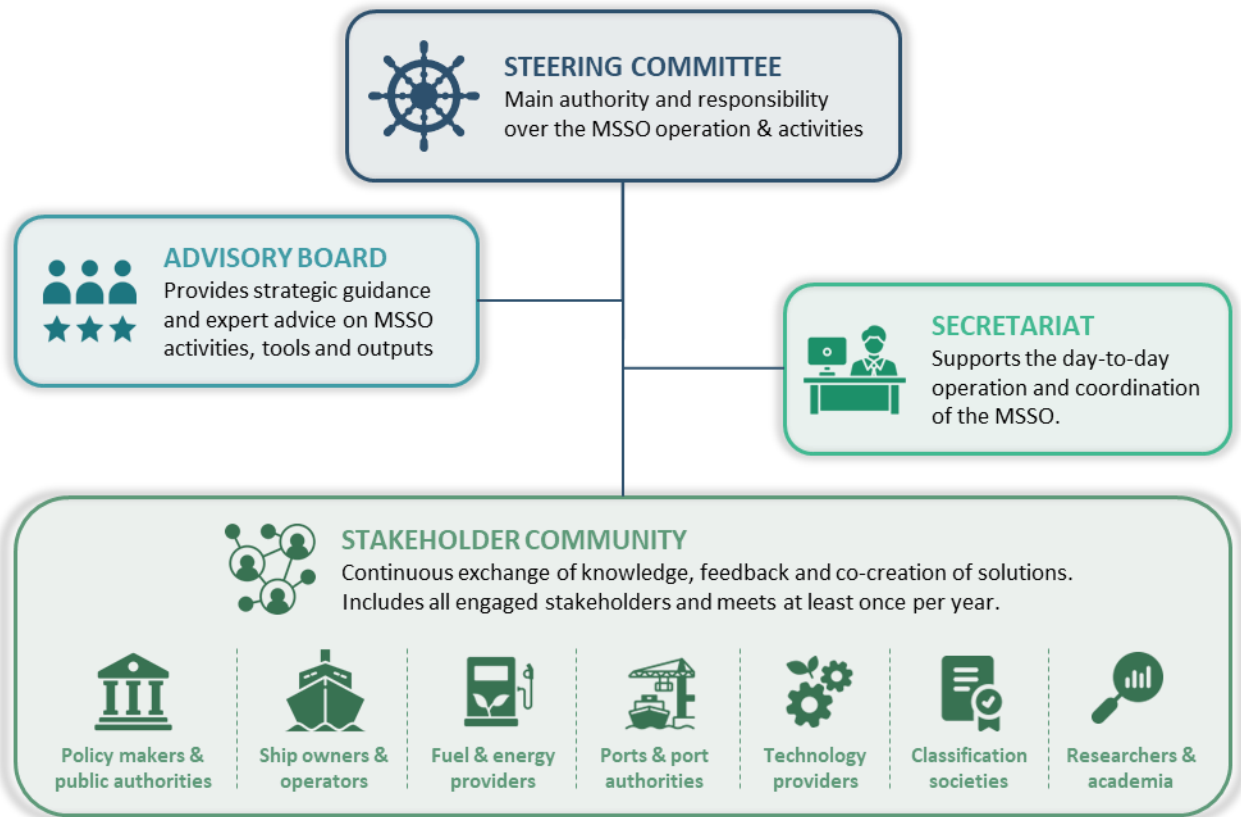


Figure 2: MSSO organisational structure

The Figure 2 above summarises the organisation structure of the MSSO, in its first stages, that will ensure its operation and activities, towards its goal for regional shipping decarbonisation.

Site offices

The MSSO operates as a distributed and collaborative Observatory, without a single centralised physical location, reflecting its regional scope and multi-stakeholder nature. Thus, there is a main operational site, but also several site offices across the Mediterranean region, linked to the SC members, ensuring its scientific, technical and regional outreach capacity. More site offices may be created, depending on the growing SC, AB or MSSO stakeholder community.

- **Cyprus (CMMI):** where the main operational site of the MSSO is currently hosted, which supports key infrastructure elements, including the MSSO website and communication functions.
Contact point: *NAOME team* (NAOME@cmmi.blue)
- **Greece (NTUA):** the coordinator of the GreenMED project, now leading the scientific coordination and methodological development of MSSO through the Maritime Risk Group (MRG), while also hosting and operating the MSSO platform.
Contact point: *Manolis Annetis* (mannelis@mail.ntua.gr)
- **Egypt (AASTMT):** supporting regional engagement in the Eastern and Southern Mediterranean, acting as a key link to North Africa, further strengthened through the Arab Institute for Sustainable Blue Economy (AISBE).
Contact point: *Kazem Agamy* (kazem.agamy@aast.edu)
- **Spain (Fundación Valenciaport):** contributing to the connection with the Western Mediterranean ecosystem and relevant initiatives but also bringing closer the port communities in the Mediterranean region.
Contact point: *Aurelio Lázaro* (alazaro@fundacion.valenciaport.com)

This multi-site structure enhances the MSSO's ability to operate across regions, foster cross-border collaboration and ensure a balanced representation of Mediterranean stakeholders, while maintaining a flexible and scalable operational model.

Financing

The MSSO has been formulated by the EU-funded GreenMED project, including its knowledge base and its network, while maturing across the project's duration, relying on the partners' initiative. In the early post-project phase, the Observatory's operation, as consisting of the outputs of the project -the MSSO segments- owned by one or multiple partners, is ensured by the project partners (i.e., website and platform active, database and results maintained). Thus, the MSSO is initially supported through the in-kind contribution of the GreenMED project partners. This approach allows for flexibility and rapid growth, without strict commitments and without imposing financial barriers on partners' engagement. This approach aligns with the project's broader vision

of establishing the MSSO as a collaborative, science-driven observatory supporting stakeholders across the Mediterranean maritime ecosystem.

However, to ensure long-term sustainability, scalability and increased market readiness beyond this initial phase, a structured business and commercialisation framework is envisaged, based on a hybrid model combining complementary revenue streams:

1. **Membership-based model:** This model will provide tiered access to advanced MSSO tools, datasets, insights and decision-support services to registered members, while maintaining a core set of open-access functionalities. A gradual transition towards this model is foreseen, supported by a detailed business plan that considers stakeholder uptake, pricing strategies, infrastructure scaling needs and operational costs. Entry-level access (freemium approach) can be offered to demonstrate the MSSO capabilities and attract new members, while premium services will deliver high added-value content (e.g., advanced analytics, customised dashboards, early-access insights). This ensures both inclusiveness and financial viability.
2. **Fee-for-service model:** The MSSO will offer tailored services to industry stakeholders, public authorities and financial actors, including case-specific techno-economic analyses, decarbonisation pathway assessments, infrastructure planning support and policy-oriented studies. Additional platform features could be considered for delivering such services. This model leverages the strong scientific foundation and datasets developed within GreenMED, transforming them into high-value consultancy-type services. It also responds directly to identified stakeholder needs for decision support in investments and strategic planning, as already demonstrated by the project.
3. **Tenders and Research & Innovation (R&I) funding:** The MSSO partners will actively pursue national, European and international funding opportunities (e.g., Horizon Europe, regional initiatives) to further develop the Observatory's capabilities, expand its knowledge base and support policy-relevant studies. Participation in collaborative R&I projects will not only ensure additional financial inflows but also maintain the MSSO at the forefront of scientific and technological developments, reinforcing its credibility and relevance. In this case, partners involved in tenders or R&I funding will be able to capitalise on existing MSSO tools and features, while also expanding on the MSSO segments that fall under their ownership. Any other activity, linked to the rest MSSO segments, should be agreed by the SC members unanimously, or agreed with the segment owner(s) individually, in case they are not involved in the tender or R&I activity.
4. **Strategic partnership and sponsorship schemes:** In addition, the SC may explore strategic partnerships with industry leaders, ports, energy providers and financial institutions, including sponsorship agreements for specific tools, datasets or thematic

modules (e.g., alternative fuels, port infrastructure). This strategic option should be agreed unanimously among the SC members. Such collaborations can enhance visibility, accelerate tool development and create mutual value, but need to be managed appropriately for safeguarding the scientific independence of the Observatory.

This hybrid approach ensures a balanced transition from an EU-funded research project to a sustainable, semi-autonomous structure, maintaining its scientific integrity, openness and collaborative character, gradually enhancing its market-oriented services and long-term impact.

However, to enable the implementation of the above financing mechanisms and ensure stable revenue streams, the establishment of an appropriate legal entity for the MSSO may be required. In its current form, as a distributed structure consisting of independently owned MSSO segments, the Observatory cannot directly generate or manage financial flows in a unified manner. For certain revenue streams—such as participation in research and innovation projects or tender-based activities—financial flows can be managed through individual MSSO partners and segment owners (e.g., through institutional agreements or project-based funding schemes). However, for models such as membership-based access or fee-for-service provision, a more structured operational and financial framework is necessary. In this respect, the creation of a dedicated legal entity is envisaged as the most suitable long-term solution, enabling the MSSO to manage revenues, provide services and ensure transparent governance. The preferred option under consideration is the establishment of a non-profit organisation, which would align with the MSSO’s scientific, collaborative and policy-supporting nature, while allowing the implementation of sustainable financing mechanisms.

Target stakeholders

The MSSO is designed to support a wide range of stakeholders involved in the maritime transport and energy transition ecosystem in the Mediterranean region. Key target groups include:

- **Ports and port authorities**, for identifying infrastructure gaps and supporting strategic planning for alternative fuels and energy systems.
- **Energy and fuel providers**, for assessing production needs, supply chain development and market opportunities in the region.
- **Policy makers and public authorities**, including governments and ministries, for supporting evidence-based decision making, policy design, prioritisation of investments.
- **Shipping companies and ship owners**, for exploring decarbonisation pathways, alternative fuel options and techno-economic feasibility of solutions.
- **Technology providers and industry stakeholders**, for understanding market needs and positioning innovative solutions.

- **Classification societies**, for supporting the assessment, validation and standardisation of decarbonisation solutions, aligned with regulatory and safety frameworks.
- **Research organisations and analysts**, for conducting studies, accessing structured datasets and supporting methodological development.
- **Academic institutions and students**, for education, training and skills development in sustainable maritime transport and energy systems.

By addressing the needs of these diverse groups, MSSO aims to facilitate coordinated action and informed decision-making across the entire maritime value chain.

Strategic advantages

The MSSO offers a unique combination of scientific, regional and operational advantages that position it as a key enabler for maritime decarbonisation in the Mediterranean.

First, the Observatory is scientifically driven, grounded on robust methodologies, validated data and analytical tools, ensuring credibility and reliability of its outputs. Second, it places a strong emphasis on the Eastern Mediterranean, a region of high geopolitical and economic importance, where policy and technical efforts for decarbonisation remain relatively limited. By focusing on this area, MSSO actively contributes to enhancing regional cooperation and strengthening currently weak policy frameworks. Third, the MSSO promotes the active involvement of policy makers, including governments and ministries, enabling direct links between scientific insights and policy implementation. In parallel, it fosters collaboration with EU-adjacent countries, supporting alignment with EU decarbonisation targets and facilitating cross-border cooperation.

A key strength of the MSSO lies in its integrated knowledge base, which combines both maritime and energy system perspectives. By linking ship energy demand with fuel supply chains and infrastructure development, the Observatory provides a holistic, system-level understanding of the transition challenge. In addition, the MSSO platform is designed to be scalable, adaptive and agile, allowing for continuous expansion through new datasets, tools and functionalities, in response to evolving market, technological and policy conditions.

Finally, MSSO complements existing initiatives, such as WestMED, while being supported within the broader framework of European Commission actions and priorities. In this context, it acts as a bridging mechanism between regional needs and EU-level strategies, amplifying their impact in the Mediterranean Sea basin.