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**MEDITERRANEAN ACTION PLAN (MAP)  
REGIONAL MARINE POLLUTION EMERGENCY RESPONSE CENTRE FOR THE  
MEDITERRANEAN SEA (REMPEC)**

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Sixteenth Meeting of the Focal Points of the Regional  
Marine Pollution Emergency Response Centre for the  
Mediterranean Sea (REMPEC)

REMPEC/WG.61/8/1  
24 February 2025  
Original: English

Sliema, Malta, 13-15 May 2025

**Agenda Item 8: Reduction of GHG emissions from ships**

**Effective Implementation of the 2023 IMO Strategy on Reduction of Greenhouse Gas (GHG) Emissions from Ships  
in the Mediterranean region**

For environmental and cost-saving reasons, this document will not be printed and is made available in electronic format only. Delegates are encouraged to consult the document in its electronic format and limit printing.

### **Note by the Secretariat**

The present document presents the Study on the Effective Implementation of the 2023 IMO Strategy on Reduction of Greenhouse Gas (GHG) Emissions from Ships in the Mediterranean region.

## **Background**

1. Shipping contributes to 2.89% of global Greenhouse Gas (GHG) emissions (IMO, 2020)<sup>1</sup>. As the regulatory body for international shipping, the International Maritime Organisation (IMO) is committed to reducing air emissions from the industry. The 2023 IMO GHG Strategy marks a significant milestone in the industry's transition towards zero-emission shipping by approximately 2050. Achieving this target requires a holistic, systematic, and transdisciplinary approach, incorporating a mix of strategies and active collaboration among stakeholders (Vakili et al., 2022). Adopting and enforcing appropriate regulations are crucial for the decarbonisation of the maritime industry. The IMO is working on adopting regulations for implementing the 2023 IMO GHG Strategy to phase out GHG intensity from the industry, including GHG pricing to incentivise the transition to carbon-neutral energy and zero-emission technologies. Meanwhile, the European Union (EU) has already implemented the EU ETS and plans to apply the FuelEU Maritime Regulation in 2025.

2. The unique characteristics of the Mediterranean region influence the shift to net-zero emission from shipping. Economic and policy disparities between the Mediterranean coastal States that are EU Member States and those that are not EU Member States create challenges for adopting a unified strategy for zero-emission shipping in the Mediterranean region. Furthermore, geopolitical instability in the Mediterranean region or adjacent regions, obstructs efforts to establish a coordinated approach to the transition. While the region's renewable energy resources hold significant potential to transform it into a green energy hub, working towards resolving geopolitical issues is essential to attract investors and drive economic growth through job creation. The Mediterranean's strategic importance as a global trade and energy corridor enhances its potential to become a leading energy hub and a pivotal player in the energy transition. However, trying to overcome geopolitical instability and adopting a cohesive approach to maritime industry decarbonisation are crucial for realising this potential.

3. The ship-port interface is another area where the economic and policy disparities among Mediterranean coastal States become evident. Acknowledging the essential role of ports in achieving the goals of the 2023 IMO GHG Strategy, the need for the ports to prioritise the improvement of their energy efficiency in the short term and support decarbonisation efforts within the shipping industry through automation, digitalisation, and the use of artificial intelligence to reduce ship-port stays, thereby decreasing shipping emissions within ports is clear. For example, although the role of OPS as an effective measure for reducing emissions from ships while at port is underlined in existing literature and included in the 2023 IMO GHG Strategy, associated barriers such as high capital costs, technological demands, limited space at ports, electricity costs, energy sources, and the potential strain on the national grid hinder its wide implementation in the Mediterranean region.

4. Additionally, and in relation to port long-term sustainability by establishing sustainable bunkering infrastructure and transitioning to energy hubs, government policies are critical in guiding ports to act as energy hubs in the maritime domain. Appropriate governmental policies need to be developed as ports adhere to national regulations and policies and will contribute to the decarbonisation initiatives in place.

5. To overcome the obstacles to decarbonising the regional shipping industry, collaboration and collective efforts are crucial. Although the region's ports compete with other industries and ports globally, for appropriate investment, this competitive status should not result in an unstable legal framework, particularly concerning foreign investments. Therefore, it is vital for the region to adopt a consistent approach to all critical infrastructures and foster reciprocal relationships with other regional ports to establish partnerships that discourage protectionist measures and ensure genuine market access.

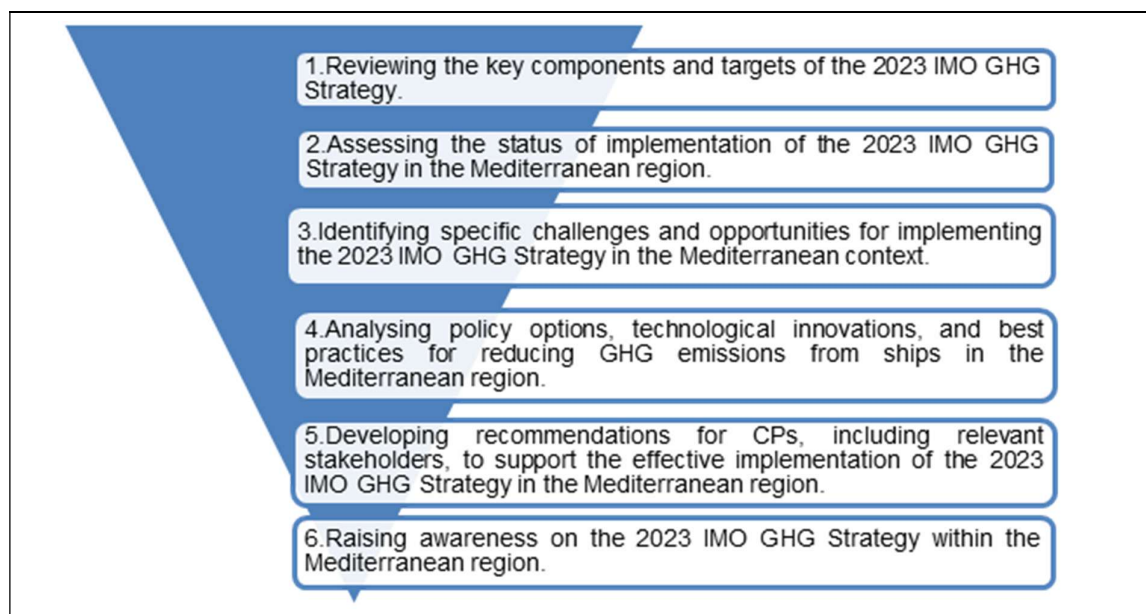
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<sup>1</sup> Fourth IMO GHG Study. Retrieved from: <https://wwwcdn.imo.org/localresources/en/OurWork/Environment/Documents/Fourth%20IMO%20GHG%20Study%202020%20-%20Full%20report%20and%20annexes.pdf>

6. Regulatory bodies should develop comprehensive and harmonised rules that address the unique challenges and characteristics of the region. This involves ensuring alignment with both international (IMO) and regional (EU) regulations for consistency and effectiveness. Furthermore, to address uncertainties regarding future policies, proactive engagement from Governments, industry stakeholders, and international organisations is crucial. This engagement will help establish clear and stable regulatory frameworks, fostering confidence and enabling long-term planning and investment. Lastly, fostering collaboration among stakeholders is vital. This includes creating platforms for dialogue, sharing best practices, and promoting partnerships between Governments, shipping companies, port authorities, and environmental organisations to collectively achieve the goals of the 2023 IMO GHG Strategy in the Mediterranean region.

7. To this effect, the Secretariat commissioned a Study on the Effective Implementation of the 2023 IMO Strategy on Reduction of Greenhouse Gas (GHG) Emissions from Ships in the Mediterranean region, herein after referred to as the Study. Funding was secured from the voluntary contribution by the French Ministry for Europe and Foreign Affairs. The Study was carried out by Capt. Dr Seyedvahid Vakili and Ass. Prof. Dr Anastasia Christodoulou and is provided in document REMPEC/WG.61/INF. 13.

8. The Study aims to assess the effective implementation of the 2023 IMO GHG Strategy in the Mediterranean region. The specific objectives of the study included :



9. Various active stakeholders in the maritime domain in the Mediterranean Region, including shipowners, port operators, seafarers, ship operators, regulator bodies, international organisations, regional organisations, local communities, research and education centres, technology providers, as well energy and fuel providers, were consulted and shed light into the different parameters for the effective implementation of the 2023 IMO GHG Strategy in the region. The main points raised may be summarised as follows:

	<ul style="list-style-type: none"><li>- A lack of awareness about the 2023 IMO GHG Strategy among stakeholders in the Mediterranean region.</li><li>- Awareness of the EU legislation was slightly higher, especially among the stakeholders in Mediterranean coastal States that are EU Member States.</li></ul>
	<ul style="list-style-type: none"><li>- Mediterranean coastal States that are EU Member States, with their green economy policies and legislation such as the EU ETS, FuelEU Maritime and the AFID, are in a better position regarding the decarbonisation of the maritime industry compared to Mediterranean coastal States that are not EU Member States.</li></ul>
	<ul style="list-style-type: none"><li>- Many Mediterranean coastal States have already developed comprehensive plans for producing carbon-neutral fuels, positioning themselves as significant energy hubs.</li><li>- Some of major ports in Mediterranean coastal States that are EU Member States have established sustainable infrastructure for OPS and bunkering alternative fuels, aiming to become future energy hubs.</li></ul>
	<ul style="list-style-type: none"><li>- Stakeholders in Mediterranean coastal States that are not EU Member States argue that the EU should comply with the IMO, the international regulatory body for global shipping due to the risk of carbon leakage.</li><li>- Stakeholders in Mediterranean coastal States that are EU Member States believe that the EU legislation encourages the IMO and other IMO Member States to transition to zero-emission shipping and that, overall, the implementation of regulations like the EU ETS offers greater environmental benefits than the potential risk of carbon leakage.</li></ul>
	<ul style="list-style-type: none"><li>- The Mediterranean region's unique characteristics influence the shift to zero-emission shipping, with economic and policy disparities among the Mediterranean coastal States that are EU Member States and those that are not EU Member States creating challenges for a unified strategy.</li><li>- Geopolitical instability in the Mediterranean region or adjacent regions, such as in the Black Sea, further obstructs coordinated efforts.</li><li>- The Mediterranean's strategic importance as a global trade and energy corridor enhances its potential in the energy transition, but overcoming geopolitical instability and adopting a cohesive maritime decarbonisation approach are crucial.</li></ul>
	<ul style="list-style-type: none"><li>- Ports should prioritise energy efficiency and support decarbonisation through automation, digitalisation, and AI to reduce ship-port stays and emissions.</li><li>- Barriers to the wide implementation of OPS in the region include high costs, technological demands, limited space, and electricity-related issues.</li></ul>
	<ul style="list-style-type: none"><li>- For long-term sustainability, government policies are critical in guiding ports to become energy hubs.</li><li>- While European ports transition due to EU legislation, similar policies are needed in non-EU ports to accelerate the 2023 IMO GHG Strategy.</li></ul>

**Strengths, Weaknesses, Opportunities, Threats from the implementation of the 2023 IMO GHG Strategy in the Mediterranean Region**

10. Besides the overall opportunities and challenges associated with the implementation of the 2023 IMO GHG Strategy globally, there are certain Strengths, Weaknesses, Opportunities and Threats from the implementation of the Strategy in the Mediterranean Region deriving from its unique geographical, economic, social and political features.

<p><b>Strengths</b></p> <ul style="list-style-type: none"> <li>• The 2023 IMO GHG Strategy is a significant step towards achieving zero-emission shipping by mid-century. 2050 goals are achievable due to the availability of carbon neutral fuel by that time.</li> <li>• The 2030 goals are achievable in the short term through energy efficiency improvements and existing technologies.</li> <li>• The potential of improving energy efficiency in ports, automation, digitalisation, and the use of artificial intelligence to reduce ship-port stays, thereby decreasing shipping emissions within ports.</li> <li>• The role of OPS as an effective measure for reducing emissions from ships while at port.</li> <li>• The importance of government policies in guiding ports to act as energy hubs in the maritime domain.</li> </ul>	<p><b>Weaknesses</b></p> <ul style="list-style-type: none"> <li>• Appropriate regulations are still lacking to determine how to achieve this goal.</li> <li>• Meeting the 2040 goal of a 70% reduction, striving for an 80% reduction in total annual GHG emissions by 2040, requires around 90% reduction in GHG intensity. This necessitates the widespread availability of carbon-neutral fuel. Given the barriers and the required investment in infrastructure, one may be sceptical about the availability of such fuel for the maritime domain.</li> <li>• Several barriers hinder the achievement of zero-emission shipping, including high capital costs, inadequate regulations, associated uncertainties, immature technologies, insufficient sustainable infrastructure such as ports and shipyards, and high investment risks.</li> <li>• Human factors have been underestimated compared to other disciplines in the transition to zero-emission shipping.</li> <li>• Lack of clear guidance on the implementation of regulations and uncertainties surrounding future technologies aimed at meeting the goals of the 2023 IMO GHG Strategy.</li> <li>• Associated barriers for the adoption of the OPS such as high capital costs, technological demands, limited space at ports, electricity costs, energy sources, and the potential strain on the national grid.</li> <li>• While European ports are transitioning to energy hubs due to EU legislation, similar governmental policies also need to be initiated in non-EU ports in the region to accelerate the implementation of the 2023 IMO GHG Strategy.</li> </ul>
<p><b>Opportunities</b></p> <ul style="list-style-type: none"> <li>• There is a limitation on access to carbon neutral fuel by 2030. It becomes more available by 2035 and will uptake after 2040.</li> <li>• The importance of energy efficiency and technologies such as WAPS, air lubrication, and fuel cells.</li> </ul>	<p><b>Threats</b></p> <ul style="list-style-type: none"> <li>• The amount of success in overcoming the challenges associated with carbon neutral fuels can affect meeting the goals.</li> <li>• Current ships need to be equipped with carbon-neutral fuel technologies to meet these goals by 2040, which is not the case.</li> </ul>

<ul style="list-style-type: none"> <li>• Capacity building, training, competency improvement, and leadership development should be prioritised to facilitate this transition effectively.</li> <li>• The region's renewable energy resources hold significant potential to transform it into a green energy hub and drive economic growth through job creation.</li> <li>• The strategic importance of the Mediterranean region as a global trade and energy corridor enhances its potential to become a leading energy hub and a pivotal player in the energy transition.</li> <li>• In relation to port long-term sustainability by establishing sustainable bunkering infrastructure and transitioning to energy hubs, government policies are critical in guiding ports to act as energy hubs in the maritime domain.</li> </ul>	<p>The existence of an ageing fleet further complicates achieving the 2040 target.</p> <ul style="list-style-type: none"> <li>• The uncertainties in selecting the best type of fuel as well as the lack of sufficient and clear regulations for transitioning to zero-emission shipping.</li> <li>• Economic and policy disparities between the Mediterranean coastal States that are EU Member States and those that are not EU Member States create challenges for adopting a unified strategy for zero-emission shipping in the Mediterranean region.</li> <li>• Geopolitical instability in the Mediterranean region or adjacent regions, such as in the Black Sea, obstructs efforts to establish a coordinated approach to the transition.</li> <li>• Shipping companies are opting to pay penalties until they have more certainty, and only then invest in the necessary technology. Their rationale is that, while penalties represent short-term costs, investing in technology requires long-term planning and careful decision-making to avoid further losses.</li> </ul>
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### **Roadmap and Action Plan**

11. In order to assess the effective implementation of the 2023 IMO GHG Strategy in the Mediterranean region, a roadmap and action plan should be developed and designed to guide stakeholders in addressing the issue and establishing mechanisms to achieve the reduction targets of the 2023 IMO GHG Strategy. The action items outlined are intended to be implemented concurrently with the 2023 IMO GHG Strategy. The suggested timeframes for each measure are flexible and should be adjusted by the respective CPs based on their evaluations and needs.

12. The recommendations listed below are based on the expert analysis tailored to each specific action item. It is important to note that, depending on the policies, economic conditions, and social factors of each CP, the timelines and priorities of these recommendations may vary.

13. The plan is broken down into the following actions:



<i>Short-term actions</i>	<i>Short- to mid-term actions</i>	<i>Short- to long-term actions</i>
<ul style="list-style-type: none"> <li>• <b><u>Capacity Building:</u></b> Enhanced Action Plan for Stakeholder Capacity Building on Decarbonisation and Regulatory Compliance.</li> <li>• <b><u>Raising Awareness and Fostering Commitment:</u></b> Launch comprehensive awareness programs and secure commitments from maritime companies to reduce carbon emissions while highlighting the advantages of complying with the 2023 IMO GHG Strategy.</li> <li>• <b><u>Disseminating and Improving Existing Recommendations, Principles, and Guidelines:</u></b> Spread and enhance current guidelines and develop new ones to facilitate the implementation of the 2023 IMO GHG Strategy.</li> <li>• <b><u>Conducting a Comprehensive Impact Assessment Study:</u></b> Analyse the impact of the implementation of the 2023 IMO GHG Strategy and EU maritime legislation.</li> </ul>	<ul style="list-style-type: none"> <li>• <b><u>Supporting Decision-Makers:</u></b> Design and develop tools to assist decision-makers in reducing GHG emissions from the maritime industry.</li> <li>• <b><u>Encouraging Participation in Research and Development (R&amp;D):</u></b> Motivate scientific, technical, and industrial organisations to engage in R&amp;D efforts aimed at enhancing energy efficiency and reducing GHG emissions, including at the ship-port interface.</li> </ul>	<ul style="list-style-type: none"> <li>• <b><u>Developing and Implementing Sustainable Port Infrastructure Plans:</u></b> Ensure the provision of adequate facilities to support ships using alternative energy sources and promote emissions-free shipping.</li> <li>• <b><u>Establishing Green Corridors:</u></b> Create Green Corridors linking ports within the region and extending beyond it.</li> </ul>

14. To craft, create, and execute a roadmap for aligning with the 2023 IMO GHG Strategy and its associated objectives, the following actions need to be considered:

- .1 **Convene Stakeholder Meetings:** Organise meetings involving key stakeholders from the maritime industry, including representatives from shipping companies, maritime organisations, environmental groups, governmental bodies, and research institutions.
- .2 **Review Current Progress:** Evaluate the current status of efforts to meet the 2023 IMO GHG Strategy. Assess the achievements made thus far, identify any barriers or challenges encountered, and determine areas requiring urgent attention.
- .3 **Develop Roadmap Objectives:** Establish clear and measurable objectives for the roadmap, aligned with the targets outlined in the 2023 IMO GHG Strategy. Define specific goals related to emission reduction, technological innovation, regulatory frameworks, and industry collaboration.



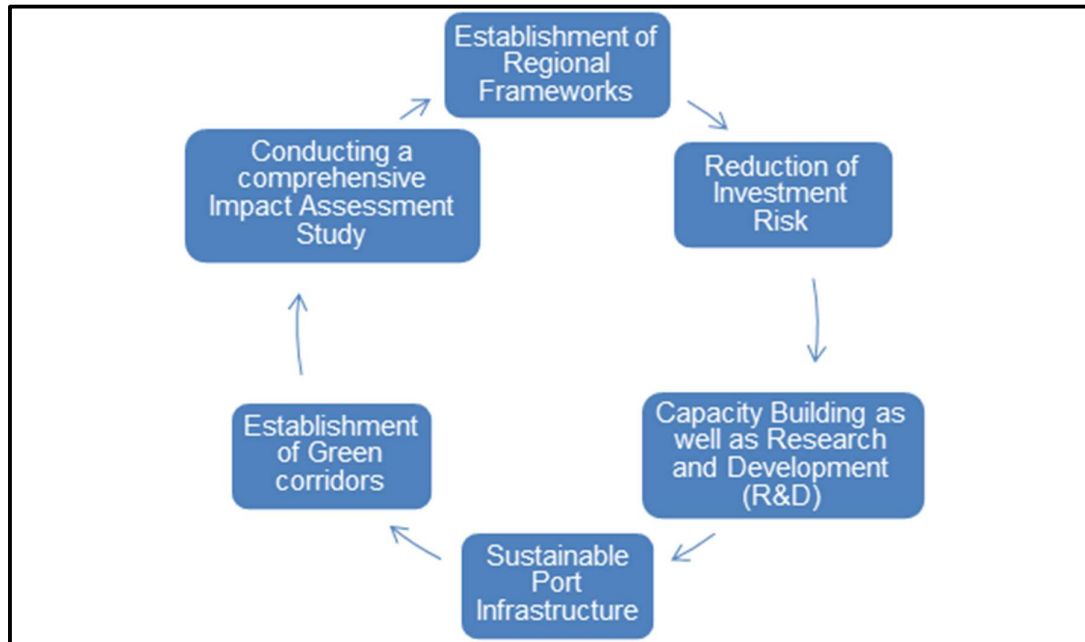
- .4 **Identify Priority Actions:** Identify priority actions necessary to accelerate progress towards the goals of the 2023 IMO GHG Strategy. This may include measures such as promoting the uptake of low-carbon technologies, enhancing energy efficiency measures, implementing alternative fuels, and fostering international cooperation.
- .5 **Engage in Technical Workshops and Studies:** Organise technical workshops and commission studies to explore innovative solutions and best practices for reducing GHG emissions from ships. Share knowledge and expertise to facilitate informed decision-making.
- .6 **Develop Implementation Plans:** Collaborate with relevant stakeholders to develop detailed implementation plans for each priority action identified in the roadmap. Define responsibilities, timelines, and resource requirements for executing the proposed initiatives.
- .7 **Allocate Funding and Resources:** Secure funding and allocate resources necessary to support the implementation of the roadmap initiatives. Explore opportunities for public-private partnerships and international funding mechanisms to ensure adequate financial support.
- .8 **Establish Monitoring and Reporting Mechanisms:** Establish robust monitoring and reporting mechanisms to track progress towards achieving the objectives of the roadmap. Regularly assess performance against set targets and adjust strategies as needed to stay on course.
- .9 **Promote Knowledge Sharing and Capacity Building:** Facilitate knowledge sharing and capacity building initiatives to empower stakeholders with the necessary skills and expertise to drive forward the implementation of the roadmap. Foster collaboration and peer learning among industry players.
- .10 **Periodic Review and Revision:** Conduct periodic reviews of the effectiveness and relevance of the roadmap in light of evolving circumstances, technological advancements, and regulatory developments. Revise the roadmap as needed to ensure its continued alignment with the goals of the 2023 IMO GHG Strategy.

#### **Way Forward: A Holistic, Systematic, and Transdisciplinary Approach with Collaboration Among Contracting Parties and Stakeholders**

15. Transitioning to zero-emission shipping is a complex task that involves numerous active stakeholders with varying priorities. To achieve this transition, a holistic, systematic, and transdisciplinary approach is essential. Additionally, robust collaboration among stakeholders is crucial to overcoming barriers and expediting progress towards meeting the 2023 IMO GHG Strategy.

16. Given the unique features and geopolitical complexities of the Mediterranean region, achieving a harmonised approach to decarbonisation presents significant challenges. While some Mediterranean coastal States, particularly those that are EU Member States, have made significant strides towards zero-emission shipping due to stringent EU legislation, similar initiatives may be lacking in other Mediterranean coastal States, notably those that are not EU Member States. This disparity can lead to carbon leakage within the area.

17. Therefore, a coordinated effort that includes the following is recommended:



### **.1 Establishment of Regional Frameworks**

The CPs should design, develop, and implement a holistic, systematic, and transdisciplinary framework that aligns the decarbonisation efforts of all Mediterranean coastal States, ensuring consistent policies and regulations for meeting the 2023 IMO GHG Strategy. The framework should integrate technical, innovative, operational, human factors, policy and regulatory and economic disciplines to achieve the goals. It should also foster stronger collaboration among governments, shipping companies, ports, technology providers, and other stakeholders to create unified strategies and share best practices.

### **.2 Reduction of Investment Risk**

CPs should explore the possibility of reducing the risk associated with investing in new and green technologies. To facilitate the transition to zero-emission shipping, it is crucial to mitigate investment risks. The uncertainty surrounding the most effective strategies for achieving zero-emission shipping heightens the financial risk for investors in new zero or near-zero emission technologies. Regulatory bodies and governments can alleviate these risks by offering clear guidelines and financial support to early developers. This support can take the form of low-interest loans, tax exemption schemes, and utilising funds from the EU ETS and future IMO carbon pricing schemes. Such measures will encourage investment in green technologies and sustainable infrastructure, driving the industry towards a zero-emission future.

### **.3 Capacity Building as well as Research and Development (R&D)**

CPs should enhance capacity building, raise awareness, and invest in research and development as these are essential tools for accelerating the transition to zero-emission shipping and achieving the 2023 IMO GHG Strategy. This includes comprehensive training for personnel and staff in accordance with MARPOL Annex VI, as well as IMO and EU goals for zero-emission shipping. Training programs should be holistic, systematic, and transdisciplinary, involving active stakeholders such as government officials, shipyards, port authorities, and shipping companies across various levels of management. Simultaneously, R&D efforts should focus on data collection and analysis, sustainable infrastructure development, technology transfer, and socio-economic development. These initiatives are crucial for supporting the transition to a sustainable and zero-emission maritime industry.

#### **.4 Sustainable Port Infrastructure**

Developing and implementing plans for sustainable port infrastructure, ensuring the provision of adequate facilities to support ships using alternative energy sources and advancing emissions-free shipping is crucial. CPs should first conduct a comprehensive assessment of existing port infrastructure to identify strengths, weaknesses, and areas for improvement in supporting alternative energy use and emissions reduction at the national level. Engaging with stakeholders, including port authorities, shipping companies, energy providers, environmental organisations, and local communities, is crucial to gather input and perspectives on the development of sustainable port infrastructure.

CPs should then proceed with the research and identification of viable alternative energy sources for maritime use, such as LNG, hydrogen fuel cells, ammonia, shore power, and renewable energy sources like solar and wind power. Detailed plans should be developed for the design and implementation of sustainable port infrastructure, considering the specific requirements of alternative energy systems and emissions reduction technologies. Securing funding and investment for the development of sustainable port infrastructure is also essential, leveraging public-private partnerships, government grants, and other financial mechanisms to support the implementation of infrastructure projects. Finally, fostering ongoing collaboration and partnership between port authorities, shipping companies, government agencies, and other stakeholders is vital to ensure the continued development and improvement of sustainable port infrastructure in support of emissions-free shipping.

#### **.5 Establishment of Green corridors**

CPs should explore the possibility of establishing green corridors that can significantly accelerate the transition to zero-emission shipping. By creating these corridors between EU and non-EU ports as well as supporting investments and technology transfer, a harmonious approach to decarbonising the maritime industry and meeting the 2023 IMO GHG Strategy is facilitated. This initiative provides an opportunity for regional ports to adopt innovative measures and green technologies throughout the value chain to achieve zero-emission shipping. However, while the benefits are clear, there are challenges such as establishing sustainable infrastructure, managing high costs and required investments, meeting regulatory framework requirements, integrating the value chain, raising public awareness and acceptance, and managing the transitional period. Addressing these challenges will require further collaboration among all stakeholders.

#### **Actions requested by the Meeting**

18. **The Meeting is invited to:**
  - .1 **take note** of the information provided in the present document; and
  - .2 **comment** as deemed appropriate, on the recommendations provided in paragraph 17 and discuss a possible way forward.

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