



Summary report on recommendations

for the DG MOVE study to assess the situation in terms
of demand and supply of finance for the maritime
sector and develop a living inventory



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SUMMARY REPORT ON RECOMMENDATIONS

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EXECUTIVE SUMMARY

Background

Maritime transport is vital to facilitating international and coastal trade, yet is responsible for a significant portion of global greenhouse gas (GHG) emissions. Given the commitments to reduce GHG emissions under the Paris Agreement and the Fit for 55 objectives, which aim for a 90% reduction in maritime GHG emissions by 2050, reductions of GHG emissions from the maritime sector must also be progressed.

In the EU, the European Commission has already introduced a suite of policies to facilitate this reduction. This includes the FuelEU Maritime Regulation, which incentivises the reduction in the GHG intensity of the energy used on board vessels, the use of electrofuels and the use of onshore power in ports; the extension of the EU Emissions Trading System to cover the maritime sector, which puts a price on GHG emissions produced by vessels calling to EU ports; and the Alternative Fuel Infrastructure Regulation, which complements FuelEU Maritime by requiring major EU ports to install shore-side power equipment.

Internationally, in 2023 the International Maritime Organization revised its GHG emissions strategy to a more stringent target of net zero by 'or around' 2050. It is poised in autumn 2024 to begin finalising the policies to transition the sector to this steeper trajectory.

Efforts to decarbonise the shipping sector require the buy-in and investment from a diverse value chain including shipyards, ports, energy companies, engine manufacturers and fuel suppliers, among others. Ensuring the availability of green finance options, including integrated financing ecosystems targeting the entire value chain, notably for projects with strong EU added value, can enable the shipping sector to transition to become smarter, more efficient and more environmentally friendly while fostering the EU's advanced manufacturing capabilities and industrial base and competitiveness of the full value chain. And yet several shipping organisations, particularly small and medium-sized enterprises (SMEs), have flagged a barrier they face is not only accessing the green finance options but also simply the awareness about what options are available to them.

Overall, the shipping green transition presents both challenges and opportunities, particularly for the EU shipbuilding and maritime equipment value chain. Access to green finance has been identified as crucial in navigating this transformation.

Aims and objectives of the study

The main objective of this study was to improve the accessibility of the shipping sector to financing products and to understand the needs of the maritime sector in terms of financing products for its decarbonisation, with a particular focus on Small and Medium Enterprises (SMEs) and Midcaps.

The specific objectives of this report are as follows:

- 1)** Identifying gaps in the availability and relevance of existing options to finance investments in technological improvements related to the decarbonisation of the shipping sector.
- 2)** Define concrete options for shipbuilding and maritime equipment industry stakeholders to access EU financing instruments, to support the development and deployment of green technologies.

Limitations

This document is part of a broader exercise to provide valuable insights into the availability and needs of financing in the maritime sector for decarbonisation activities. It would be amiss not to state the limitations in the approach. These can be broadly categorised into data availability, stakeholder engagement and methodological scope.

- A significant challenge was the limited availability of publicly accessible information, particularly concerning private finance instruments. Many private arrangements remain undisclosed, and the vast number of financial providers means that some entities may have been inadvertently omitted.
- The study's findings were shaped by the responses from surveys and interviews, which were finite in value. The restricted sample size may have resulted in underrepresentation of certain sub-sectors or geographical regions.

The analysis supporting the recommendations in this report reflects a snapshot in time-based on information gathered during the initial phase of the project, potentially excluding emerging financing instruments or recent developments. Furthermore, the complexity of the maritime industry and its interplay with broader decarbonisation topics means that broader funding opportunities outside direct decarbonisation activities, and interactions amongst different tools or programmes, may not have been fully captured.

Sector-specific financial need and challenges in decarbonising the shipping industry

The maritime sector has specific characteristics that differentiate its financing needs from those of other industries. First, it is highly capital-intensive, with ships having long lifetimes, often necessitating significant retrofitting to meet decarbonisation targets. The long lead times in ship production, typically spanning 2-3 years from contract signing to delivery, create substantial financial demands for shipyards. Payment structures, where only a fraction is paid upon contract signature, leave shipyards with considerable pre-delivery financing requirements, such as the need for guarantees. Furthermore, shipping is widely recognised as a hard-to-abate sector due to the lack of scalable market-ready green solutions, making the transition more complex. The ship finance regulatory framework, notably the Basel III and the incoming Basel IV regulations, also imposes stricter capital requirements, further limiting access to financing. Global competition, particularly from regions like East Asia, where dedicated ship financing programmes offer more favourable terms, underscores the need for specialised financial instruments in Europe. This competition raised competitiveness issues in the past decades, where market shares have been lost to global competitors. These specificities make access to green finance both crucial and uniquely challenging for the maritime industry, compared to other sectors.

High-level estimates have been developed to assess the green finance required for the decarbonisation of the EU maritime sector under this study, based on the Technology Readiness Level (TRL) of investment technologies. The estimated annual cost ranges from EUR 10.9 billion to EUR 44.0 billion, covering vessel fleet decarbonisation (EUR 2.4 billion to EUR 8.5 billion) and infrastructure for fuel production and bunkering (EUR 8.5 billion to EUR 35.5 billion).

Policy recommendations on improving access to green finance for the decarbonisation of the maritime industry

Synthesis of the above findings and from consultation with the industry yielded a list of eight market barriers, as follows:

- 1) Lack of financing opportunities for certain activities or technologies
- 2) Higher costs and lower availability of alternative fuels compared to traditional fuels; uncertainty about the future supply and prices of such fuels
- 3) Financing instruments not fit for purpose
- 4) Scarcity of adequate financing tools for EU shipbuilding activities
- 5) Lack of financing schemes that consider the whole value chain
- 6) Lack of adequate and comprehensive information on private and public instruments

7) Administrative burden on application processes and compliance requirements for SMEs

8) Existing taxonomy and standardisation schemes difficult to understand and apply

These barriers represent the areas where the maritime industry is most in need of intervention in green financing, either due to a lack of existing products or because current products are insufficient.

To address these barriers, we made three groups of recommendations:

- i. Financial recommendations address financial challenges (see sections 2.1.1 and 2.1.2) within the shipping sector and the ability of stakeholders to participate in financial markets.
- ii. Regulation, post-application procedures and capacity building recommendations target obstacles in administrative processes, regulatory frameworks, and the enhancement of skills and capabilities related to financing in the shipping industry.
- iii. Communication and streamlining recommendations focus on disseminating information, making them accessible and optimising processes related to financing within the shipping industry.

Financial recommendations

Recommendation areas	Suggested financing instrument(s)¹	Type of finance	Estimate (EUR billion)	Barrier or gap tackled
Targeted financial support programmes for the shipping industry including newbuilds and retrofitting activities				
1. Bridge the innovation financing gap	Grants and subsidies Quasi-equity	Public or Public/private	<1-2	Limited financing instruments for certain activities and/or technologies
2. Finance early-stage demonstration and testing	Blended Finance Concessions Customer guarantees	Public/private	<1	
3. Support retrofitting existing vessels	Grants and subsidies Quasi-equity	Public	<1-2	
4. Support fundamental research and feasibility	Grants and subsidies	Public	<1	
5. Finance shipbuilding	Guarantees	Public	2-5	Scarcity of financing opportunities for EU-shipbuilding activities
6. Introduce dedicated maritime financing and calls	(All products)	Public	<1	Financing instruments not fit for purpose
7. Encourage banks to build and provide specialised financing products for maritime decarbonisation	Standard loans Grants and subsidies	Private	<1	

Recommendation areas	Suggested financing instrument(s) ¹	Type of finance	Estimate (EUR billion)	Barrier or gap tackled
Targeted financial support and incentive schemes for bunkering and recharging infrastructure				
8. Finance fuel production	Green loans	Public/private	3-12	Financial gaps due to higher costs and lower availability of alternative fuels when compared to conventional fuels; uncertainties of the future price
9. Finance bunkering infrastructure	Green loans	Public/private	2-7	
10. Reduce the alternative fuel cost gap	Long-term contracts (CfD) Blended finance	Public/private	3-14	
11. Introduce dedicated maritime financing and calls	(All products)	Public	0.5-2	Financing instruments not fit for-purpose

Note (1): Glossary of financing instruments included in Annex I: Glossary of financing instruments of this report.

Note (2): High level estimate calculated within the scope of the study.

Regulation, post-application procedures and capacity building recommendations

Recommendation	Description	Actions	Expected outcome
Mainstream policy and financial regulatory frameworks (Taxonomy)	Ensure clarity and harmonisation standards within policy and financial regulatory frameworks for maritime decarbonisation initiatives.	- Establish unified standards. - Provide clarity on the applicability of requirements and processes. - Facilitate specialised financing.	- Clear and harmonised standards, tied to EU or international requirements. - Simplified and proportional requirements and processes supported by existing verification mechanisms. - Easier access to specialised financing.
Establish support mechanisms for administrative and financial training	Address administrative burdens by offering comprehensive application process support and financial training.	- Create unique teams or platforms for application support. - Develop financial training programmes.	- Accurate and timely submission of financing applications. - Enhanced financial literacy and capability among stakeholders.
Offer training programmes for	Enhance industry-specific knowledge	Provide training programmes and	More accurate and informed

Recommendation	Description	Actions	Expected outcome
evaluation and bidder teams	and market dynamics for evaluation and bidder teams.	guidelines focused on maritime decarbonisation projects and financing options.	evaluations of financing applications. Better decision-making and effective allocation of resources.

Communication and streamlining recommendations

Recommendation	Description	Actions	Expected Outcome
Create comprehensive repositories of information and resources related to decarbonisation finance	Centralised platforms can house a wealth of information, including instrument guidelines, case studies, and best practices, aiding stakeholders in navigating decarbonisation finance.	Develop and maintain a centralised platform that includes comprehensive resources on decarbonisation finance.	Stakeholders have easy access to a wide range of information, enabling better understanding and decision-making.
Provide detailed information on available financing options, eligibility criteria, and application processes	Offering a clear overview of various financing options, eligibility criteria, and application processes helps stakeholders identify suitable opportunities.	Create a detailed directory of financing options, including eligibility criteria and application processes.	Stakeholders can efficiently identify and apply for suitable financing opportunities, increasing successful applications.
Streamline access to financing opportunities for various stakeholders within the maritime industry	A centralised platform would simplify the process of finding and accessing financing opportunities, offering a one-stop-shop for all financing needs.	Develop a user-friendly, centralised platform that consolidates financing opportunities and related information.	Simplified access to financing opportunities for stakeholders, saving time and effort in the application process.

CONTENTS

EXECUTIVE SUMMARY	6
CONTENTS	11
1. INTRODUCTION	12
1.1. This report	12
1.2. Background	12
1.3. Aims and objectives of the study	14
2. RECOMMENDATIONS	15
2.1. Financial recommendations.....	17
2.2. Regulation, post-application procedures and capacity building recommendations.....	46
2.3. Communication and streamlining recommendations.....	48
3. METHODOLOGY	50
3.1. Mapping and characterisation of market barriers and gaps	50
3.2. Formulation and characterisation of recommendations	50
3.3. Categorisation of investment activities and financing products	52
3.4. Scale of green finance needed	54
ANNEXES	55
Annex I: Glossary of financing instruments	56
REFERENCES	57

1. INTRODUCTION

The purpose of this report is to present the recommendations formulated to address the key market barriers that have been identified and assessed in shipping financing and the resulting gaps. Information and data gathered across the stakeholder engagement activities was used to develop targeted recommendations for ship financing and/or EU wide scrapping/renewal schemes, ultimately aiming to improve the accessibility and availability to SMEs of capital for decarbonisation of the maritime sector.

1.1. This report

This report is structured as follows:

- **Section 2** presents the recommendations of the study, divided into three groups:
 - Section 2.1: Financial recommendations, focusing on financing mechanisms and investment strategies.
 - Section 2.2: Regulation and post-application recommendations, focusing on policy frameworks and compliance measures.
 - Section 2.3: Communication and streamlining recommendations, aimed at enhancing information flow and operational efficiency.
- **Section 3** describes the methodology employed, explaining the research design and analysis techniques used to identify market barriers and formulate recommendations.

1.2. Background

Maritime transport is the most cost-efficient method of transporting goods per tonne-mile (Heinrich Boell Stiftung, 2021) and accounts for 77% of European external trade and 35% of all trade by value between Member States (EEA, 2021). Thus, efficient maritime transport is vital to both the lives of EU citizens and the EU economy as a whole. However, shipping within the EU still represents a significant amount of GHG emissions, 128 MtCO₂ in 2022 which represents 14% of all EU transport emissions. If compared to the largest GHG-producing countries in the world, EU shipping would rank 46th in terms of GHG emissions (EDGAR, 2024) ⁽¹⁾. Given the commitments for the reduction of GHG emissions under the Paris Agreement (peak emissions before 2025 and decline by 43% by 2030 (UNFCCC, 2024)), it is important that work is done to reduce GHG emissions from the maritime sector. The role of a sustainable 'blue economy', including the EU shipbuilding and maritime industrial supply chain, in achieving the European Green Deal is also crucial and will work alongside proposed policies and strategies such as the industrial maritime strategy to enhance the competitiveness, sustainability and resilience of Europe's maritime manufacturing sector, as recommended by the Draghi report (Leyen, 2024).

At the same time, the maritime sector is highly capital-intensive, necessitating significant upfront investments for shipbuilding, retrofitting, and maintenance (Daniel & Cenk, 2019). Financing requirements are driven by several factors, including the long asset lifetimes of vessels, which can exceed 25 years, and the extended production lead times of 2-3 years between contract signature and delivery. These dynamics create substantial financing needs, particularly for pre-delivery guarantees and retrofitting initiatives aimed at reducing greenhouse gas emissions. Additionally, the sector faces unique challenges, such as limited market-ready solutions and a complex regulatory framework, which further complicate access to necessary financing. As the industry strives to meet decarbonisation goals, securing sufficient financial support will be critical for facilitating investments and ensuring the sector's transition to more sustainable operations. This green transformation of the sector will also positively impact the EU

⁽¹⁾ Excluding domestic shipping.

industrial cluster by enhancing its capacity, fostering innovation, and increasing competitiveness in global markets.

In that context, the “Fit for 55” package², adopted by the Commission in July 2021, consists of a set of related proposals designed to deliver a reduction in GHGs of at least 55% by 2030, relative to 1990 levels (European Council, 2024). Transport policies are a key component of this strategy, including policies directly affecting waterborne transport. Such policies are the FuelEU Maritime framework, the inclusion of the maritime sector in the EU ETS as well as the Alternative Fuels Infrastructure Regulation (AFIR). More specifically, FuelEU Maritime Regulation provides a mandate for reducing the Well-to-Wake (WtW) GHG intensity of the energy used on board vessels, by 80% in 2050, compared to 2020 levels, while also creating clear incentives for the use of Renewable Fuels of Non-Biological Origin (RFNBO) as well as for on-shore power supply (OPS). With regards to the EU ETS, this legislation introduces a price on the CO₂ emissions produced by vessels calling to EU ports, helping reduce the price gap between fossil fuels and sustainable alternative options. Finally, the AFIR complements FuelEU Maritime, setting binding targets for TEN-T core and comprehensive maritime ports to install shore-side electricity and liquified natural gas (LNG) bunkering stations.

On an international level, in July 2023, the International Maritime Organization (IMO) updated its Strategy to reduce GHG emissions from ships, a revision to the 2018 Initial GHG Strategy (MEPC, 2023). During the 80th session of the Marine Environmental Protection Committee (MEPC), the 2023 IMO Strategy on Reduction of GHG Emissions from Ships (Resolution MEPC.377(80)) was agreed upon, setting forth four key ambitions (IMO, 2023):

1. Enhance the energy efficiency of new ships to reduce their carbon intensity.
2. Lower the carbon intensity of international shipping by at least 40% by 2030, relative to 2008 levels, maintaining the target from the Initial Strategy.
3. Increase the use of zero or near-zero GHG emission technologies, fuels, and energy sources to at least 5%, aiming for 10% of the total energy used by international shipping by 2030.
4. Ensure that total GHG emissions from international shipping peak as soon as possible and achieve net-zero emissions by or around 2050.

The 2023 GHG Strategy also set indicative checkpoints for emission reductions: at least 20% (aiming for 30%) by 2030 and at least 70% (aiming for 80%) by 2040, compared to 2008 (MEPC, 2023). Finally, the Strategy clarified that the Organization should develop and finalise mid-term measures delivering on the set reduction targets, taking into account the well-to-wake GHG emissions of marine fuels, with the overall objective of reducing GHG emissions within the boundaries of the energy system of international shipping and preventing a shift of emissions to other sectors. These measures are expected as a “basket”, combining a technical and an economic element. Recent IMO discussions during MEPC 82 have shown broad support for a GHG Fuel Standard (GFS), a goal-based marine fuel standard regulating the phased reduction of the marine fuel's GHG intensity, while also introducing flexible compliance strategies. Furthermore, discussions showed significant support for an economic element based on a GHG pricing mechanisms, as well as revenue collection and distribution (IMO, 2024). The IMO's intent is to agree the policy mid-term measures in 2025 and for them to come into force in 2027. These further signal the maritime industry's need to adopt technologies, fuels, and systems to achieve significant decarbonisation and move towards net-zero emissions by around 2050.

² Fit for 55 package, available at: <https://www.consilium.europa.eu/en/policies/fit-for-55/>

Therefore, the expected IMO measures, as well as the existing EU measures, underscore the urgency of decarbonisation the shipping sector and driving its transformation towards a low carbon future.

In the case of shorter maritime journeys, including ferry connections or feeder services, battery electric-powered vessels could deliver emissions reductions where there is access to zero/low carbon electricity. In the case of longer journeys, and especially deep-sea shipping, green hydrogen derivatives such as ammonia and/or methanol and advanced biofuels are viewed as potential contributors to achieving the necessary emissions reductions, dependent on the fuel chain/feedstock lifecycle emissions (including processes such as electricity generation, fuel production, fuel transport and storage, and fuel use). In parallel, the appropriate fuel production and bunkering infrastructure needs to come into place in a timely manner. Shipbuilding practices and timescales will need to align with these ambitions and strategies, so the existing fleet can be adjusted and the new fleet to be commissioned in accordance with the IMO targets.

All of these factors underscore the significant impact on the sector, with the competitiveness of the EU shipping industry at stake. Decarbonising the shipping sector will require substantial buy-in and investment across the entire value chain, including shipyards, ports, energy companies, engine manufacturers, and fuel suppliers. Moreover, it will be necessary to introduce schemes to de-risk and finance decarbonisation solutions, particularly in hard-to-abate segments, while also involving private sector solutions (European Commission, 2024).

Focusing on reducing emissions within the European segment of this value chain is crucial, but ensuring the availability of green finance options is essential to support this transition. This will help the EU shipping sector become smarter, more efficient, and environmentally friendly, contributing to the EU's climate goals while strengthening its advanced manufacturing capabilities and industrial base. However, many stakeholders, especially SMEs, face barriers in accessing and understanding available green finance options.

1.3. Aims and objectives of the study

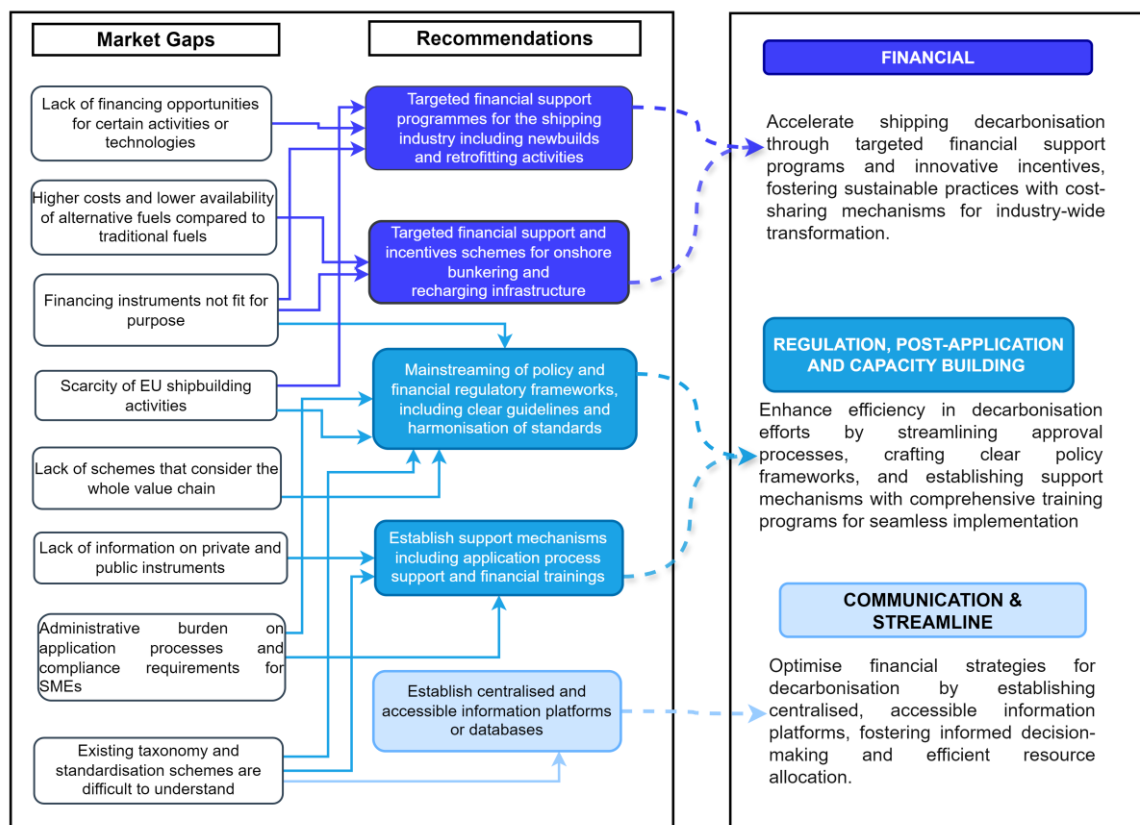
This report focuses on two core objectives:

1. **Mapping and characterisation of market barriers:** The first objective is to conduct a thorough mapping of the maritime sector to identify areas where intervention is necessary. This involves pinpointing financial, regulatory, and communication gaps that are currently impeding the sector's ability to transition to more sustainable practices. The insights from this analysis are critical for informing effective and actionable strategies.
2. **Development of policy recommendations:** Based on the identified barriers and market gaps, the study aimed to develop tailored policy recommendations that cater to the diverse financial needs of stakeholder groups across the maritime industry. These recommendations are provided in three categories: Financial, Regulatory and Communication.

2. RECOMMENDATIONS

Figure 2-1 summarises the findings of this study on barriers and market barriers and gaps, and resulting recommendations on access to green finance to address those gaps.

Figure 2-1 Summary of market barriers and resulting recommendations.



Based on barriers identified through a literature review and stakeholder consultations³, eight critical market barriers related to green finance for the shipping industrial were identified. These barriers represent the areas related to green finance where the maritime industry is most in need of intervention, either due to a lack of existing solutions or because current solutions are insufficient or not suited.

To address these barriers, three groups of recommendations were formulated:

- **Group 1 – Financial** recommendations gaps in access to green finance (public, private and blended) and provide solutions for high capital investment requirements in the sector. In particular, unlocking private financing is instrumental. (section 2.1).
- **Group 2 – Regulation, post-application procedures and capacity building** recommendations to simplify and support compliance with both EU and international climate policies, ensuring a competitive edge for the EU's maritime sector (section 2.2).
- **Group 3 – Communication and streamlining** recommendations to enhance awareness and access to information about decarbonisation efforts and available financial instruments, particularly for small and medium-sized enterprises (SMEs) (section 2.3).

Within these three groups, fourteen specific recommendations have been detailed, with a particular emphasis on those related to financing. Tailored financial instruments and

(³) Study to assess the situation in terms of demand and supply of finance for the maritime sector and develop a living inventory

support mechanisms are crucial for the maritime industry's transition to sustainable practices and competitiveness. These recommendations provide practical solutions to financial market barriers hindering the adoption of green technologies and are presented into detail in the next section.

2.1. Financial recommendations

The objective of the financial recommendations is to accelerate shipping decarbonisation by addressing key financial barriers and fostering sustainable practices within the industry. By providing targeted financial support and cost-sharing mechanisms, these recommendations aim to facilitate the transition towards greener technologies and enhance industry competitiveness, enhance industry competitiveness and minimise financial barriers. These recommendations are formulated not only to encourage the adoption of cleaner technologies but also to support the industry's competitiveness throughout its transition.

Thus, the recommendations focus on two primary areas of action (sub-groups of financial recommendations):

1. Targeted financial support programmes for the shipping industry including newbuilds and retrofitting activities.
2. Targeted financial support and incentive schemes for bunkering and recharging infrastructure and stimulating the production and uptake of alternative fuels.

The financial recommendations are summarised in Table 2-1.

Table 2-1 Overview of financial recommendations

Recommendation areas	Suggested financing instrument(s) ¹	Type of finance	Estimate (EUR billion) ¹	Barrier or gap tackled
Targeted financial support programmes for the shipping industry including newbuilds and retrofitting activities				
1. Bridge the innovation financing gap	Grants and subsidies Quasi-equity	Public or Public/private	<1-2	Limited financing instruments for certain activities and/or technologies
2. Finance early-stage demonstration and testing	Blended Finance Concessions Customer guarantees	Public/private	<1	
3. Support retrofitting existing vessels	Grants and subsidies Quasi-equity	Public	<1-2	
4. Support fundamental research and feasibility	Grants and subsidies	Public	<1	
5. Finance shipbuilding	Guarantees	Public	2-5	Scarcity of financing opportunities for EU-shipbuilding activities
6. Introduce dedicated maritime financing and calls	(All products)	Public	<1	Financing instruments not fit for purpose
7. Encourage banks to build and provide specialised financing products for maritime decarbonisation	Standard loans Grants and subsidies	Private	<1	

Recommendation areas	Suggested financing instrument(s) ¹	Type of finance	Estimate (EUR billion) ¹	Barrier or gap tackled
Targeted financial support and incentive schemes for bunkering and recharging infrastructure				
8. Finance fuel production	Green loans	Public/private	3-12	Financial gaps due to higher costs and lower availability of alternative fuels when compared to conventional fuels; uncertainties of the future price
9. Finance bunkering infrastructure	Green loans	Public/private	2-7	
10. Reduce the alternative fuel cost gap	Long-term contracts (CfD) Blended finance	Public/private	3-14	
11. Introduce dedicated maritime financing and calls	(All products)	Public	<1-2	Financing instruments not fit for-purpose

Note (1): High level estimate calculated within the scope of the study.

Each recommendation includes an indication (high level estimate) of the scale of green finance needed to support decarbonisation of the EU maritime sector. The approach for developing these estimates is set out in section 3.4.

2.1.1. Targeted financial support programmes for the shipping industry including newbuilds and retrofitting activities

There is a pressing need for targeted financial support programmes aimed at both newbuilds and retrofitting activities. The recommendations aim to provide insights into how existing instruments can be adapted or leveraged to address the identified market barriers or gaps.

These instruments are essential to address the financing gaps hindering advancements in maritime technology, emissions reduction, and sustainability initiatives. By focusing on tailored financial solutions, such as those presented in these **seven recommendations**, the aim is to drive innovation, facilitate the adoption of greener technologies, and bolster the competitiveness of the shipping sector and maritime manufacturing value chain.

Each recommendation, including information on the specific market barrier it addresses, is described on the following pages. Below, the key barriers or gaps addressed are described:

- **Limited financing for maritime operations, machinery and instruments:** There is a clear need for tailored financing solutions for critical areas such as the development of low-emission machinery, the retrofitting of existing vessels, the establishment of green port infrastructure, and R&D activities in maritime decarbonisation. Dedicated public financing programs targeting these areas are needed to promote innovation which in turn can stimulate private investment. Current public funds are often applicable to cross-sector applicants resulting in modal competition for public funds and not addressing the direct and unique needs of the maritime sector.
- **Financing needs and fierce global competition faced by EU shipbuilding activities:** The scarcity of financing for shipbuilding in Europe is driven by the industry's long production timelines (e.g. 2-3 years) and high capital intensity, which create significant liquidity pressures for shipyards (Daniel & Cenik, 2019). Payment structures, typically based on milestones, further exacerbate cash flow gaps, while limited access to specialised financing products and competition from shipyards in

Asia, such as those in China and South Korea, add to the challenge (CSIS, 2020). Additionally, the need for investment in maritime green technologies and compliance with stringent environmental regulations introduces further financial complexities (Ecorys, CE Delft, & IDEA Consult, 2012).

The shortage of financing options and guarantees for construction periods, presents a significant challenge to the growth of EU shipbuilding activities, notably in light of the fierce competition from Asia driven by strong state-supported financing programs and subsidies. To tackle this issue, specialised financing options tailored to maritime decarbonisation are recommended, accompanied by other measures in the context of a wider maritime strategy. These targeted support measures would cater specifically to the unique needs of the maritime industry, offering solutions that traditional banking products may not adequately provide. By filling this gap, these specialised financing options would enable the growth of EU shipbuilding activities while driving forward the transition toward more sustainable practices.

- **Current financing products are not fit for purpose:** Existing financing tools often lack the necessary flexibility to meet the diverse needs of the industry. To address this inadequacy, dedicated financing opportunities should be structured to consider the individual characteristics of vessels, their service life, and the dynamics of the industry they operate in. By doing so, these financing opportunities can better support sustainable practices such as vessel retrofitting and the adoption of alternative fuels, facilitating the transition towards a more environmentally friendly, competitive, and economically viable maritime sector.

Box 2-1 Specific considerations for small and medium size (SMEs) companies.

The recommendations described below have been designed to potentially meet the industry need for dedicated financing programs for various activities and technologies. However, some actions can be taken to further adapt the programmes suggest for SMEs. For instance, eligibility criteria could be adjusted to accommodate smaller-scale projects. Simplified application processes and reduced bureaucratic requirements would make it easier for SMEs to access grants and participate in the programme. Additionally, targeted outreach and support services could be provided to help SMEs understand and navigate the quasi-equity approach, ensuring that they can benefit from the programme's support while minimising administrative burdens.

Recommendation 1: Bridge the innovation financing gap

This programme would offer **grants** specifically to innovative projects in the maritime sector, particularly targeting **mid-level TRL** projects that encounter difficulty accessing traditional financing. The programme would also include a **quasi-equity approach**, where the programme may take an **ownership stake in a project**, linking returns to the project's success. This approach aims to **reduce the investment risk** associated with investments in innovative activities hence facilitating access to finance. In that sense, the programme would target activities such as **prototyping, initial testing of decarbonisation solutions, and research and development**.

This programme would be closely aligned with existing initiatives at the EU level, such as Horizon Europe and the Innovation Fund. Consequently, their scope and objectives should be taken into account when further designing this instrument. However, the aim of this programme would not be to duplicate the instruments already offered under current programmes, but rather to complement or strengthen these by providing instruments specifically designed or tailored to meet the needs of the maritime industry.

In addition to these programmes, the Zero Emission Waterborne Partnership⁴ should also be considered in the design of this instrument. This initiative seeks to accelerate the development and deployment of zero-emission technologies in the maritime sector by bringing together stakeholders from both the public and private sectors to collaborate on innovative solutions.

The source of financing to implement this recommendation could come from either public or a mix of public/private sources. It goes beyond the scope of this study to state which would work best in practice, but both remain realistic options with some level of public funding expected to be needed to help mature the technology before private financing mechanisms become available at an appropriate risk level.

More details on the scope and implementation of this recommendation are summarised in Table 2-2.

Table 2-2 Bridging the innovation financing gap

Aspect	Description
Programme focus	Provide financial support to innovative maritime projects, especially mid-level TRL projects (TRL 4-6)
Support mechanism	Grants targeting specifically innovative maritime projects, coupled with the introduction of a quasi-equity approach where the programme takes an ownership stake in the project.
Targeted activities	Prototyping and initial testing of decarbonisation solutions. Research and development activities.
Specific activities	Innovative systems like wind propulsion aimed at substantial emissions reduction.
Beneficiary	Technology producers /suppliers, European associations /bodies, R&D and advocacy
Order of magnitude (total financing)¹	EUR <1 – 2 billion
Challenges addressed	Difficulty in accessing traditional financing due to technologies still being under development and not having been demonstrated at an industrial scale or in operational settings.

⁴ Zero-Emission Waterborne Transport Partnership, available at: <https://www.waterborne.eu/partnership/partnership>

Aspect	Description
Implementation strategy	Public-private partnerships to mobilise resources and expertise, ensuring projects progress from development to market deployment.
Supporting evidence	The Wind-Powered Shipping Project by Wallenius Wilhelmsen, specifically the Oceanbird initiative, has received vital support from Sweden's Innovation Agency Vinnova through grants aimed at advancing the project. These grants focus on several key areas: • Research and Development: Funding for developing the engineering solutions necessary for the vessel's wing sail and hybrid propulsion. • Prototyping: Financial support for creating the Oceanbird prototype, which allows for essential testing and refinement of the design. • Feasibility Studies: Coverage for assessments to evaluate the vessel's operational viability in various maritime environments (Wallenius Wilhelmsen, 2023)
Existing financing providers	Innovation Fund, Horizon Europe, Interregional Innovation Investments (I3) Instrument

Note (1): The approach for developing these estimates is set out in section 3.4.



Addressing the unique complexity of the maritime industry

The maritime sector faces significant challenges in securing **financing for mid-level TRL projects**, such as **innovative wind propulsion systems**.

- Three broad financing programmes offering grants to mid-level TRL projects have been identified (Innovation Fund, Horizon Europe, Interregional Innovation Investments (I3) Instrument)
- Despite the availability of financing instruments specifically dedicated to the maritime sector, there are few targeted options. The European Commission has committed approximately EUR 1.6 billion to the maritime sector through the Innovation Fund (IF) (European Commission, 2024) and allocated EUR 530 million under the Zero Emission Waterborne Transport (ZEWT) initiative (ZEWT, 2021). However, the scarcity of focused instruments, as highlighted by industry stakeholders throughout this study, leads to intense competition with other industries for the same financial resources.
- There is a limited number of existing programmes that address the unique needs of maritime projects, including compliance with environmental regulations, technological advancements, and infrastructure modernisation, such as those previously mentioned.

The proposed programme aims to fill this gap by providing targeted financial support, ensuring that the maritime sector can advance its innovative projects effectively without competing with other sectors for the same financial resources.

Recommendation 2: Finance early-stage demonstration and testing

The proposed programme aims to support the scaling up of decarbonisation technologies in the maritime sector through a **blended finance approach**. This approach combines **concessional finance** (grants, subsidies, or guarantees from government agencies) with **commercial capital** (equity financing or venture capital) to address the financial needs of companies moving beyond early-stage development to large-scale implementation. Commercial capital from private sector sources would provide additional finance and expertise necessary for successful scaling up and deployment of decarbonisation technologies. Hence, this approach helps mitigate risks associated with commercialisation and ensures the long-term sustainability of projects. More details on the scope and implementation of this recommendation are summarised in Table 2-3.

Table 2-3 Finance for early-stage demonstration and testing

Aspect	Description
Programme focus	Support the scaling up of decarbonisation technologies in the maritime sector.
Support mechanism	Blended finance combining concessional finance (grants, subsidies, guarantees) with commercial capital (equity financing, venture capital).
Targeted activities	Scaling operations and implementing emission reduction measures.
Specific activities	Early-stage demonstration, testing initiatives, large-scale deployment, ongoing operational costs.
Beneficiary	Technology producers /suppliers, European associations /bodies, R&D and advocacy, Shipowners, Ship operators
Order of magnitude (total financing)¹	EUR <1 billion
Challenges addressed	Financial barriers for scaling up, lack of appropriate financial products for advanced technology stages, risk mitigation for commercialisation.
Implementation strategy	Establish clear guidelines, provide capacity building, monitor impacts, engage financial institutions, align with regulatory frameworks.
Supporting evidence	The Zero Emissions Waterborne Transport (ZEWT) initiative under Horizon Europe offers a significant example of grants being used to fund innovative projects. The European Commission and the Waterborne Technology Platform have co-programmed this partnership to accelerate the transformation of waterborne transport to achieve zero emissions by 2050. The initiative provides €530 million in EU funding and a further €3.3 billion from private sector partners for research and development projects, particularly focused on deploying zero-emission technologies (ebu, 2021).
Existing financing providers	Innovation Fund, Invest EU, Connecting Europe Facility, Horizon Europe Interregional Innovation Investments (I3) Instrument, LIFE

Note (1): The approach for developing these estimates is set out in section 3.4.



Addressing the scaling needs of established companies

Current maritime sector incentives often **neglect the scaling needs of established companies**, focusing instead on early-stage innovations. This creates a **financial gap** for companies looking to implement large-scale decarbonisation technologies.

- Several products have been identified (see [Table 2-1](#)) that provide financing solutions to scale up the production and deployment of decarbonisation technologies.
- They predominantly offer grants which are effective for early stages of commercial rollout, such as technology development and initial prototyping or demonstration up to Technology Readiness Levels (TRL) 7/8.
- However, once the technology advances beyond this stage, other financial mechanisms are needed to support large-scale deployment.

The proposed blended finance approach addresses this gap by reevaluating incentive structures and combining concessional finance with commercial capital. The programme aims to mitigate the risks of commercialisation and support the long-term success of decarbonisation projects, providing the necessary financial support for mature technologies to scale up.

Recommendation 3: Support retrofitting existing vessels

The proposed programme aims to support retrofitting projects in the maritime sector to reduce GHG emissions. It would offer **grants and a quasi-equity financing approach**, providing financial support and fostering the adoption of decarbonisation technologies in existing vessels. The programme would specifically target retrofit projects that focus on commercial deployment and active testing of decarbonisation solutions at a **high TRL level (7-9)**, as well as to support early compliance with regulatory requirements, e.g. requirements under FuelEU Maritime. More details on the scope and implementation of this recommendation are summarised in Table 2-4.

Table 2-4 Retrofitting existing vessels

Aspect	Description
Programme focus	Support retrofitting projects in the maritime sector to reduce GHG emissions
Support mechanism	Grants and quasi-equity financing, where the programme may take an ownership stake in projects, with returns linked to project success.
Targeted activities	Retrofitting projects focusing on commercial deployment and testing of decarbonisation solutions at high TRL levels (7-9), as well as the early compliance with regulatory requirements.
Specific activities	Installation of emission reduction technologies, fuel efficiency improvements, adoption of alternative fuels in existing vessels.
Beneficiary	Shipowners & ship operators / associations, Marine equipment manufacturers / associations
Order of magnitude (total financing)¹	EUR <1 – 2 billion
Challenges addressed	Financial gaps in retrofitting efforts, lack of dedicated public financing for large-scale retrofitting, long-term resource commitment needed for fleet upgrades.
Implementation strategy	Establish clear grant eligibility criteria, ensure transparency in the quasi-equity approach, provide support for project management and monitoring, engage with maritime companies.
Supporting evidence	The Global Centre for Maritime Decarbonisation (GCMD) in Singapore is exploring the Pay-As-You-Save (PAYS) financing model as a potential solution to the data-financing gap in the shipping industry. This innovative financing approach aims to facilitate the adoption of energy efficiency technologies (EETs) without imposing substantial upfront costs on shipowners. The PAYS model allows third parties, such as financiers or energy service providers, to cover the initial investment costs for energy-efficient upgrades. Shipowners then repay the financier over time, with payments directly linked to the energy savings realized. This creates a shared risk-and-reward scenario where all parties benefit from reduced energy consumption and lower operating costs. ⁽⁵⁾
Existing financing providers	Invest EU, European Maritime, Fisheries and Aquaculture Fund

Note (1): The approach for developing these estimates is set out in section 3.4.

⁽⁵⁾ <https://www.gcformd.org/gcmd-pay-as-you-save-financing/>



Addressing the need for large-scale retrofitting projects

The maritime sector needs financing that includes **GHG emission avoidance criteria and supports retrofitting projects**. Current financing often overlooks retrofitting, creating a market gap.

- Existing EU financing programs support pilot projects for retrofitting vessels, showcasing the feasibility of upgrading older ships with new technologies.
- There is a lack of dedicated public financing for large-scale retrofitting efforts across the shipping industry.
- Large-scale retrofitting, which involves upgrading entire fleets, requires substantial resources and long-term commitment.

Without specific financing programmes, shipping companies must rely on other sources, hindering widespread adoption of sustainable technologies. Increased investment and revised regulations are needed to incentivise retrofitting, crucial for decarbonisation. Existing EU programs support pilot retrofitting but lack large-scale public financing. Closing this gap is vital for accelerating the transition to greener practices, potentially increasing demand for EU shipyards and enhancing their competitiveness.

Recommendation 4: Support fundamental research and feasibility

The proposed programme aims to address the financing gap for risky investment for activities in the maritime sectors typically overlooked by private financial institutions. It would provide **grants** to support **early-stage projects** in decarbonisation technologies, fostering innovation and sustainability in these essential but less profitable sectors. In that sense, it could cover sectors like inland waterways, short sea shipping, offshore, and harbour operations. Priority would be given to projects operating at **lower TRL (TRL 2-4)** and require financial support for development.

This programme would be closely aligned with existing initiatives at the EU level, such as Horizon Europe. Consequently, their scope and objectives should be taken into account when further designing this instrument. However, the aim of this programme would not be to duplicate the instruments already offered under current programmes, but rather to complement or strengthen these by providing instruments specifically designed or tailored to meet the needs of the maritime industry.

More details on the scope and implementation of this recommendation are summarised in Table 2-5.

Table 2-5 Support fundamental research and feasibility

Aspect	Description
Programme focus	Support sectors like inland waterways, short sea shipping, offshore operations, and harbour activities with grants for early-stage decarbonisation projects.
Support mechanism	Grants for projects operating at lower Technology Readiness Levels (TRL 2-4), covering feasibility studies, technology validation, and fundamental research in decarbonisation.
Targeted activities	Demonstration of decarbonisation feasibility, early-stage research into decarbonisation technologies, and technology validation at lower TRL.
Specific activities	Feasibility studies, fundamental research into decarbonisation processes, technology validation, reducing financial risks, fostering innovation in sustainable practices.
Beneficiary	European associations /bodies, R&D and advocacy, Technology producers /suppliers
Order of magnitude (total financing)¹	EUR <1 billion
Challenges addressed	Limited private investment due to perceived higher risks, disparity in finance availability between profitable and less profitable maritime sectors.
Implementation strategy	Foster collaboration and knowledge sharing among funded projects, establish networking events and online platforms, monitor and evaluate project progress and sustainability.
Supporting evidence	The BlueBARGE initiative is receiving €11 million in funding from Horizon Europe, aims to develop offshore electrical power bunkering solutions. The project, led by the American Bureau of Shipping (ABS), will explore OPS (Onshore Power Supply), a method allowing ships at port to plug into electrical power, thereby reducing local pollution and GHG emissions. The project involves collaboration among 14 partners across 10 European countries and will focus on electrical integration and operational safety
Existing financing providers	Horizon Europe through the European Innovation Council

Note (1): The approach for developing these estimates is set out in section 3.4.



Addressing the needs of less profitable shipping sectors

Private financial institutions tend to **prioritise investment in profitable shipping sectors**, due to their perceived stability and higher returns on investment. This preference often overlooks other sectors like inland waterways, short sea shipping, offshore operations, and harbour activities, which may be less profitable but are essential.

- Financing for early-stage innovative projects in these sectors primarily comes from public sources like Horizon Europe through the European Innovation Council
- Public finance becomes essential to kick-start innovation and sustainable development in sectors where private investment is lacking.
- However, even within public finance, opportunities for financing projects at low Technology Readiness Levels (TRL) can be limited.

The programme fills this gap by providing grants for early-stage decarbonisation projects, supporting feasibility studies, technology validation, and research. This initiative aims to accelerate the adoption of sustainable practices, foster innovation, and ensure long-term economic and environmental sustainability in the maritime industry.

Recommendation 5: Supporting shipbuilding

This programme would provide **financial guarantees** to companies engaged in large-scale decarbonisation projects in **shipbuilding activities**. The scope for the shipyards would cover the additional increment of a decarbonised vessel above and beyond a conventionally fuelled ship. The scale of this varies substantially from the smallest vessels serving ports (e.g. pilot boats; increment may be <1m EUR) to the largest cruise ships (increment may be 10s or 100s million EUR).

Clear definitions are essential for determining which fuels and technologies in shipbuilding activities qualify as sustainable under the EU Taxonomy, based on their GHG saving potential. Support would thus be directed towards the construction of ships incorporating specific GHG/energy-saving technologies and/or utilising renewable carbon fuels.

The guarantees would serve as a form of assurance for lenders and investors, mitigating the financial risks associated with construction periods and encouraging investment in decarbonisation initiatives and new investments. The terms and conditions of these guarantees would stipulate that shipbuilding activities must be conducted at EU shipyards to qualify for finance, ensuring alignment with EU objectives and supporting local industry.

In terms of scope, key EU maritime growth areas that could be prioritised under this programme include offshore wind, thus targeting the shipbuilding of Crew Transfer Vessels (CTVs) and Offshore Support Vessels (OSVs). Other areas, such as the cruise sector, in which EU shipbuilding is already a leader, might not require specific support.

More details on the scope and implementation of this recommendation are summarised in Table 2-6.

Table 2-6 Bridging the shipbuilding financing gap.

Aspect	Description
Programme focus	Projects involved in the implementation and operation of large-scale decarbonisation projects, both newbuildings and retrofitting projects, which typically operate at a high Technology Readiness Level (TRL) level (7-9).
Support mechanism	Financial guarantees to assure lenders and investors, mitigating risks associated with construction periods in decarbonisation initiatives.
Targeted activities	Implementation and operation of large-scale decarbonisation projects in shipbuilding, typically at high TRL (7-9).
Specific activities	Shipbuilding activities
Beneficiary	Ship builders & shipyards / ship builders & shipyards associations
Order of magnitude (total financing)¹	EUR 2 – 5 billion
Challenges addressed	Financing and construction period gap directly affects companies involved in shipbuilding activities in Europe.
Implementation strategy	Implementation considerations include ensuring specificity of guarantees, synergies with related programmes, and straightforward accessibility for stakeholders involved in shipbuilding activities. For SMEs, a dedicated programme would offer similar guarantees, ensuring financial stability and alignment with EU decarbonisation goals while promoting industry growth.

Aspect	Description
Supporting evidence	The Public Gas Corporation of Greece SA (DEPA) and the European Investment Bank (EIB) signed an agreement to finance with up to EUR 20 million the construction of a new LNG bunkering vessel for maritime use in Greece. LNG infrastructure can readily transition in the future to zero or near-zero GHG fuels, via bio-methane and/or e-methane. The loan is guaranteed by the European Fund for Strategic Investments (EFSI / Juncker Plan) and will cover 50% of the vessel's construction cost. For the construction of the vessel, DEPA has secured an additional amount of EUR 8.9 million from the European Union under the European Action entitled "BlueHUBS", which is coordinated by DEPA and aims at expanding the use of LNG in maritime transport in the eastern Mediterranean (EIB, 2020).
Existing financing providers	European Investment Bank (EIB), Horizon Europe- Pillar 2, CL4

Note (1): The approach for developing these estimates is set out in section 3.4.



Addressing the need for shipbuilding companies in Europe

Shipbuilding companies in Europe face **challenges securing financing and guarantees for construction periods**, impacting project initiation and completion.

- Financing for EU shipbuilding is limited and primarily come from public sources like Horizon Europe through the European Innovation Council.
- Without access to adequate financing and guarantees for construction periods, companies may struggle to initiate or complete projects which can result in reputational damage and loss of potential future contracts.
- This hampers their ability to capitalise on business opportunities, expand their operations, and remain competitive in the market.

The programme addresses these issues by providing financial guarantees tailored to large-scale decarbonisation projects, thereby fostering investment in EU shipbuilding, and supporting local economic benefits.

Recommendation 6: Introduce dedicated maritime financing calls

The proposed programme aims to address the diverse financing needs of the shipping industry by **offering tailored financial products**. It would target vessel owners and operators, including SMEs, to facilitate their transition to sustainable practices through retrofitting and adoption of alternative fuels. Despite the necessity for dedicated financing opportunities, it is crucial that these remain relatively **generic and flexible** to effectively address the **diverse needs of the shipping industry**. More details on the scope and implementation of this recommendation are summarised in Table 2-7.

Table 2-7 Bridging the innovation financing gap

Aspect	Description
Programme focus	Provide flexible financing opportunities tailored to the unique needs of the shipping industry, accommodating factors like vessel characteristics and operational dynamics.
Support mechanism	Customisable financing packages including flexible repayment schedules, lower interest rates, and reduced collateral requirements for SMEs and other stakeholders.
Targeted activities	Retrofitting existing vessels, adoption of alternative fuels, and transitioning to sustainable practices in alignment with EU sustainability goals.
Specific activities	Guidance on cost-effective retrofitting solutions, advisory services tailored to SMEs' operational needs and sustainability goals.
Challenges addressed	Difficulty in accessing traditional financing due to experimental nature of projects.
Beneficiary	All
Order of magnitude (total financing)¹	EUR < 1 billion
Implementation strategy	Clear eligibility guidelines, transparent fund allocation processes, ongoing monitoring, capacity-building initiatives, and collaboration with stakeholders. To adapt this programme for SMEs, financing opportunities should be designed SMEs with their unique characteristics and challenges in mind: reduced collateral requirements, lower interest rates, and flexible repayment schedules to suit SMEs' financial constraints.
Supporting evidence	An example of a tailored financing approach can be illustrated through a recent deal involving the financing of a new LNG carrier by Société Générale (SG). The project encompassed several key components, beginning with structured financing, where SG arranged a combination of debt and equity to address the significant capital requirements associated with the project. This arrangement included advising the client on the optimal debt structure to minimise financing costs effectively. Additionally, the bank provided a leasing option that enabled the shipping company to manage its cash flow while acquiring the necessary vessel. To further ensure financial stability throughout the project lifecycle, SG implemented risk management strategies, which included hedging against fuel price fluctuations and currency risks (OECD, 2019).
Existing financing providers	Applicable to all financing products identified

Note (1): The approach for developing these estimates is set out in section 3.4.



Addressing the complex needs of this shipping industry

Current financing tools from public sources often adopt a one-size-fits-all approach, failing to accommodate the **diverse needs of the shipping industry**. Incentives are necessary to facilitate the transition of vessels on a global scale, considering their individual remaining service life and the dynamic nature of the industry.

- Many broad EU financing programs do offer finance for shipping companies. However, these programs often lack the specificity needed to effectively support the unique aspects of the maritime sector.
- The financing mechanisms currently in place are usually designed for a wide range of industries, and hence there are very few dedicated calls for proposals exclusively targeting the shipping industry.

Thus, given the multidimensional nature of transport, including various fuel options, technologies, and units, a flexible approach to technology criteria for finance is essential, recognising that 'one size does not fit all' in this sector.

Recommendation 7: Encourage banks and intermediaries to build and provide specialised financing products for maritime decarbonisation

European banks were once active in ship financing but have largely withdrawn from the market for two primary reasons. Firstly, the introduction of Basel II capital requirement rules significantly increased the capital requirements and funding costs for long-term lending commitments, which are typical of project and ship financing loans. These loans usually have much longer tenors than corporate loans. Secondly, the cyclical nature of the shipping industry, characterised by high and low periods, has led to substantial losses for banks during downturns.

An alternative approach is to encourage non-bank lending sources which are not subject to the same capital requirements as banks. This shift would see non-bank lenders taking over the role traditionally held by banks in the ship financing sector.

Given these challenges, the proposed programme aims to introduce **replicable loans** tailored specifically for the shipping industry, enhancing accessibility and transparency in financing. While standard loans are inadequate for the sector's needs, we advocate for the establishment of flexible and adjustable loan schemes that can be adapted to the unique requirements of each project. The role of the public sector is vital in stimulating private lending as public lending can de-risk early-stage investments, particularly true for unproven innovative technologies. Reducing the financial risk to a level where private lenders have greater confidence to invest in is critical to bridging the innovation gap. These replicable fund structures would share common characteristics, providing clear guidelines and terms that facilitate easier access to financial resources for new builds and retrofitting activities within the maritime sector.

More details on the scope and implementation of this recommendation are summarised in Table 2-8.

Table 2-8 Bridging the innovation financing gap

Aspect	Description
Programme focus	Introduce standardised loans for new builds and retrofitting in the maritime sector, enhancing accessibility and transparency in financing.
Support mechanism	Standard loans with flexible repayment terms, competitive interest rates, and various collateral options to incentivise investment in environmentally friendly projects.
Targeted activities	Financing new builds and retrofitting activities, expert advisory support for project evaluation and risk assessment.
Specific activities	Innovative systems like wind propulsion aimed at substantial emissions reduction.
Beneficiary	All
Order of magnitude (total financing)¹	EUR <1 billion
Challenges addressed	Difficulty in accessing traditional financing due to experimental nature of projects.
Implementation strategy	Ensure transparency in terms and conditions, facilitate quicker decision-making for lenders and borrowers, and promote confidence among stakeholders. Tailor financial solutions to address SMEs' challenges in accessing financing for decarbonisation projects, including reduced perceived risks and uncertainties.
Supporting evidence	Prow Capital launched a €420 million green shipping fund aimed at promoting sustainable practices within the maritime industry. This fund is designed to provide loans to shipowners for both new and

Aspect	Description
	existing vessels that meet specific environmental, social, and governance (ESG) criteria, contributing to the reduction of emissions in line with international goals like the IMO's 2030 and 2050 targets and the EU Green Deal. The fund primarily focuses on financing vessels powered by low-emission fuels such as LNG, LPG, methanol, hydrogen, and fully electric or hybrid ships. The typical investment amounts range from €15 million to €50 million, providing senior secured debt financing to operators across Europe
Existing financing providers	Bespoke products from private sources

Note (1): The approach for developing these estimates is set out in section 3.4.



Addressing the need for standardised solutions from private sources

While private banks and intermediaries do offer products tailored to the shipping industry, it is important to note that these **solutions are often not standardised**. Instead, they are offered on a case-by-case basis, depending on the specific needs and circumstances of each client. Hence, it is still essential to have more standardised financing programs from private sources.

These tailored products address specific needs but having standardised options could provide broader access to financing and streamline the process for many shipping businesses. Additionally, there is a clear need for greater transparency in the availability and terms of financial products tailored to the shipping industry. Unlike more standardised banking services, information about specialised shipping products offered by private banks can be limited. This lack of transparency makes it difficult for shipping companies to fully understand their options and make informed decisions.

2.1.2. Targeted financial support and incentive schemes for bunkering and recharging infrastructure

The objective of these recommendations is to accelerate the decarbonisation of the shipping industry by providing targeted financial support and incentives for *bunkering and recharging infrastructure*. The focus is on overcoming the financial and technical challenges that hinder the adoption of alternative fuels and energy sources. Key areas for financial intervention include constructing and enhancing onshore bunkering facilities for alternative fuels and developing shore power and recharging infrastructure for electric and hybrid vessels. By addressing these critical components, the proposed schemes aim to remove barriers, encourage investment, and support the industry's transition to sustainable practices.

In this context, it is noted the current role and potential future role of the Renewable and Low-Carbon Fuels Value Chain Industrial Alliance (RLCF Alliance) in the EU with regards to financing opportunities related to bunkering and recharging infrastructure for the maritime sector (European Commission, 2022). The RLCF Alliance is an initiative set up in 2022 and supported by the European Commission, which is focused on promoting the production and distribution of renewable and low-carbon fuels for the aviation and maritime industries. This alliance plays a key role in the FuelEU Maritime and RefuelEU Aviation Regulations, collaborating with a range of stakeholders from the transport fuels and related value chains.

Four recommendations were formulated under the scope of this second group of recommendations. The following table outlines each of them together with the key market barriers they address, and the financing instruments identified. A detailed description of the scope of each is provided in the following sections.

These recommendations for targeted financial support programs and schemes stem from identified needs and gaps in the sector, as follows:

- **Higher costs and lower availability of alternative fuels:** One of the primary challenges in the shipping industry's shift towards greener technologies is the financial gap created by the higher costs (Solakivi, Paimander, & Ojala, 2022) and limited availability of alternative fuels compared to conventional fuels. This challenge affects both shipping companies and financing institutions. While there is strong momentum towards greener technologies (GMF, 2024), the alternative fuel market is still emerging, and there is uncertainty about whether supply can scale to meet the increasing demand driven by new regulatory measures, such as FuelEU and future IMO rules (T&E, 2024). As a result, shipping companies will need to adapt to higher fuel prices, which may be passed down the value chain to consumers. Concurrently, the alternative fuel sector must secure long-term offtake agreements to finance the construction of production facilities and ensure stable supply. The market is thus shaped by the interactions between shipping companies, financial institutions, and the evolving fuel supply industry.

Several factors contribute to this gap:

- Cost disparity: Alternative fuels such as hydrogen derivatives and biofuels are currently more expensive than traditional marine fuels. This cost disparity makes it challenging for shipping companies to justify and manage the switch to cleaner energy sources without substantial financial support.
- Infrastructure investment: The production and distribution of alternative fuels require significant investment in infrastructure. This includes the development of refuelling stations, storage facilities, and distribution networks, which are currently underdeveloped compared to those for conventional fuels.
- Scaling up production capacity: To make alternative fuels more viable, there is a need to scale up production capacity. This scaling up involves not only technological innovations but also large-scale investments to meet the anticipated demand from the shipping industry.

The Bankability Guide 'Enhancing financial instruments, risk mitigation strategies and preparatory steps for engaging the public sector, securing sponsors and attracting lenders for your project'⁶ published by the RLCF Alliance in November 2024 aims to provide clarity on the availability of products to support the transition.

- **Financing products not fit for purpose:** The current suite of financing tools available to the shipping industry often adopts a one-size-fits-all approach, which fails to meet the sector's diverse needs, according to the feedback provided by stakeholders throughout this study (April 2024). Existing instruments include CEF Transport Alternative Fuels Infrastructure Facility (AFIF), InvestEU, and the Recovery and the temporary instrument Resilience Facility (RRF) under NextGenerationEU.

However, it was noted by stakeholders that the multidimensional nature of the shipping industry demands a more flexible and tailored approach to financing. Key issues include:

- Lack of flexibility: Existing financial products often do not account for the varying requirements of different shipping companies and vessels. This lack of flexibility can stifle innovation and prevent the adoption of new technologies that are essential for decarbonisation.
- Technology criteria: Financial institutions frequently impose rigid technology criteria for financing, which may not align with the unique operational realities and strategic goals of individual shipping companies. Recognising that 'one size does not fit all' is crucial for developing more effective financing solutions.
- Diverse industry needs: The shipping industry encompasses a wide range of vessel types, sizes, and operational profiles. Financing tools must be designed to cater to this diversity, considering factors such as vessel characteristics, service life, and specific operational contexts.

⁶ RLCF Alliance presentation on the Bankability Guide titled 'Enhancing financial instruments, risk mitigation strategies and preparatory steps for engaging the public sector, securing sponsors and attracting lenders for your project', available at: <https://ec.europa.eu/assets/move/video/RLCF-Webinar-BankabilityGuide.mp4>

Recommendation 8: Finance for fuel production

The proposed programme aims to support companies involved in alternative fuel production, focusing on hydrogen and biofuels by offering a blended finance approach. It provides green loans tailored for infrastructure development, technology innovation, and scaling up production capacity, thus addressing challenges and synergies across AF production value chain. By integrating renewable electricity into the production processes, the programme seeks to accelerate the transition to alternative fuels, reduce reliance on fossil fuels, and mitigate environmental impacts. This initiative emphasises targeted financing to help companies, especially SMEs, invest in critical infrastructure upgrades, develop new technologies, and integrate renewable energy sources. It also aims to offer longer-term fixed pricing options to reduce financial risk and ensure a straightforward application process.

This programme would be closely aligned with the RLCF Alliance. Therefore, the scope and objectives of the Alliance, as well as their recent work on the Bankability Guide should be taken into account when further designing this instrument.

More details on the scope and implementation of this recommendation are summarised in Table 2-9.

Table 2-9 Finance for fuel production

Aspect	Description
Programme focus	Support for alternative fuel production, particularly hydrogen and hydrogen-derive fuels, as well as biofuels
Support mechanism	Green loans for infrastructure, technology, and scaling up production
Targeted activities	Infrastructure development, technology innovation, and integration of renewable electricity
Specific activities	Development of new technologies and integration of renewable energy into fuel production processes
Beneficiary	Fuel supply chain, Marine equipment manufacturers / associations, Technology producers /suppliers
Order of magnitude (total financing)¹	EUR 3 – 12 billion ²
Challenges addressed	High capital investment needs, reliance on fossil fuels, environmental impact, financial risk
Implementation strategy	Longer-term fixed pricing, simple and user-friendly application process
Supporting evidence	Clean Energy Finance Corporation (CEFC) in Australia offers green loans for projects that aim to enhance the production of renewable energy, including biofuels and hydrogen. They finance infrastructure projects, technology development, and scaling up production. In this regard, the CEFC has invested in the development of hydrogen as a clean marine fuel through its involvement in the H2C Offshore Hydrogen Project, which aims to produce hydrogen from renewable sources to be used in the maritime sector (CEFC, 2024).
Existing financing providers	LIFE Clean Energy Transition, Innovation Fund, Horizon Europe

Note (1): The approach for developing these estimates is set out in section 3.4.

Note (2): The fuel supply chain was not a primary focus of the study. Therefore, please refer to the study's limitations regarding the figure presented in this table.



Addressing the production of alternative fuels

Fuel production, particularly for alternative fuels like hydrogen (and hydrogen-derived fuels) and biofuels, requires **substantial investment in technology development and scaling up production capacity**. Renewable electricity, crucial for producing alternative fuels, also needs significant financial support to ensure affordability. This support is necessary to reduce the carbon footprint of alternative fuels.

While several EU financing programmes provide public grants to meet these needs, the high capital investment required by the shipping industry indicates that public finance alone may be insufficient. Therefore, formalised involvement of private financiers is crucial to bridge the financing gap.

Recommendation 9: Finance for bunkering infrastructure

The proposed programme aims to finance the development of infrastructure for alternative fuel production and distribution in the maritime sector, particularly focusing on electricity provision for shore power, hybrid vessel battery recharging, and electrification of smaller voyages. This programme would provide green loans to finance the development of infrastructure for the production and distribution of alternative fuels in the maritime sector on top of the exiting public programmes such as CEF/AFIF. The loans would be specifically targeted at projects involved in scaling up production and expand pilot projects to demonstrate technology capability and reliability of decarbonisation technologies operating at a Technology Readiness Level (TRL) 4-6, such as ammonia and hydrogen bunkering facilities, as well as renewable energy infrastructure. The initiative targets projects scaling up decarbonisation technologies such as ammonia and hydrogen bunkering facilities and renewable energy infrastructure. To support SMEs and smaller ports, this instrument would offer smaller green loans with flexible repayment terms, simplified eligibility criteria, and dedicated advisory services.

More details on the scope and implementation of this recommendation are summarised in Table 2-10.

Table 2-10 Finance for bunkering infrastructure

Aspect	Description
Programme focus	Financing bunkering infrastructure with electricity provision for shore power, hybrid vessels, and smaller voyages
Support mechanism	Green loans for infrastructure development, technology scaling, and renewable energy integration
Targeted activities	Shore power provision, hybrid vessel battery recharging, ammonia and hydrogen bunkering facilities, renewable energy infrastructure
Specific activities	Technology Readiness Level (TRL) projects (4-6), decarbonisation technologies, alternative fuels infrastructure
Beneficiary	Port operators, Fuel supply chain, Marine equipment manufacturers / associations, Technology producers /suppliers
Order of magnitude (total financing)¹	EUR 2 – 7 billion
Challenges addressed	Need for financing bunkering infrastructure, reliable access to cleaner fuel options, transition to sustainable shipping
Implementation strategy	Coordinated and integrated initiatives, collaboration among stakeholders, alignment with other value chain programmes
Supporting evidence	On 2021, EIB and the European Commission signed an agreement that made it possible to combine EU grants and long-term EIB financing for alternative fuels infrastructure projects. The agreement comes under the Alternative Fuels Infrastructure Facility (AFIF) and is part of the European Union's Connecting Europe Facility (CEF) transport programme (FEPORT, 2021).
Existing financing providers	Connecting Europe Facility Transport Alternative Fuels Infrastructure Facility

Note (1): The approach for developing these estimates is set out in section 3.4.



Addressing the need

Given the increasing trend of vessels plugging in for shore power provision while at berth, coupled with the rising hybridisation of vessels requiring part-propulsion battery recharging, and the electrification of smaller voyages, there is a critical need for financing bunkering infrastructure that incorporates electricity provision. This infrastructure development would support the rollout of shore power provision in ports, facilitating the adoption of alternative fuels like ammonia and hydrogen. Additionally, investments in renewable energy infrastructure are vital to ensure reliable access to cleaner fuel options for maritime operations, thereby advancing the transition towards sustainable shipping practices.

Recommendation 10: Reduce the alternative fuels cost gap

The proposed programme addresses the challenge of the fuel cost gap between conventional fuels and alternatives such as renewable energy sources or electric power. This gap is primarily an operational expense (OPEX) issue, which makes financing difficult due to the preference of financiers for capital expenses (CAPEX) projects with tangible assets and predictable returns.

To bridge this financial gap and encourage the adoption of alternative fuels, vessel operators would enter long-term contracts with fuel suppliers, similar to contracts for differences in the energy sector. These contracts guarantee fixed prices or price differentials for cleaner fuels, providing stability and predictability in fuel costs. A blended finance approach involving public and private sector finance would mitigate financial risks, making investments more attractive to lenders and investors. More details on the scope and implementation of this recommendation are summarised in Table 2-11.

Table 2-11 Closing the alternative fuels cost gap

Aspect	Description
Programme focus	Bridging the fuel cost gap between conventional and alternative fuels
Support mechanism	Long-term contracts with fuel suppliers, blended finance approach, public and private sector finance
Targeted activities	Fixed price or price differential contracts, guarantees or risk-sharing mechanisms, government subsidies
Specific activities	Innovative financial mechanisms for OPEX-based projects, making cleaner fuel investments more attractive
Beneficiary	Shipowners & ship operators / associations, Fuel supply chain
Order of magnitude (total financing)¹	EUR 3 – 14 billion
Challenges addressed	High operational costs of alternative fuels, financing reluctance for OPEX-based projects
Implementation strategy	Collaboration among vessel operators, fuel suppliers, financial institutions, clear regulatory guidelines
Supporting evidence	The utilisation of Contracts for Differences (CfDs) as a mechanism to facilitate the decarbonisation of the shipping industry and closing the alternative fuel cost gap is increasingly recognised in the literature. For instance, researchers from the University of Oxford have proposed a method through which CfDs can support shipping decarbonisation, similar to how CfDs have been used by the UK and other governments to bring down the costs of renewable electricity generation. The main purpose of a CfD is to close the cost gap between an old technology and a high-potential new technology in the short term, until the new technology becomes competitive. Long-term competitiveness will be driven by technology learnings, scaling effects, and in the case of SZEFS the introduction of regulation to price externalities such as GHG emissions. CfDs would allow the EU to subsidise the difference between what it costs to produce SZEFS (strike price) and the price at which SZEFS can be sold to energy users (reference price) (Safety4Sea, 2022).

Aspect	Description
Existing financing providers	Horizon Europe (different calls), Innovation Fund

Note (1): The approach for developing these estimates is set out in section 3.4.



Addressing the need

The transition to alternative fuels presents a significant challenge due to the fuel cost gap, which is the disparity between the expenses associated with conventional fuels and those of alternatives such as renewable energy sources or electric power. This challenge is compounded by the fact that the majority of these costs fall under operational expenses (OPEX), rather than capital expenses (CAPEX). While CAPEX investments typically attract private financiers seeking tangible assets and long-term returns, OPEX-based projects are less appealing due to their ongoing nature and uncertain returns. Consequently, financing institutions face reluctance in providing finance for projects reliant on alternative fuels, as they prefer investments with clear asset ownership and predictable returns. Bridging this financial gap is essential to encourage the adoption of alternative fuels and requires innovative financial mechanisms to make OPEX-based projects more attractive to investors.

Recommendation 11: Introduce more dedicated maritime financing calls in the existing EU financial framework

The proposed programme aims to address the diverse financing needs of the shipping industry by offering flexible and adaptable financial support tailored to the unique aspects of individual vessels, remaining service life, and the dynamic nature of the sector. Current financing tools often fail to accommodate the specific requirements of shipping companies, with existing mechanisms typically designed for a wide range of industries. This programme seeks to provide tailored financial support to facilitate the transition to sustainable practices, including retrofitting existing vessels and adopting alternative fuels. To support SMEs, the programme would offer customisable financing packages with flexible repayment schedules, lower interest rates, and reduced collateral requirements. Successful implementation requires clear eligibility guidelines, transparent fund allocation, ongoing monitoring, and collaboration with industry stakeholders, policymakers, and financial institutions. More details on the scope and implementation of this recommendation are summarised in Table 2-12.

Table 2-12 Dedicated calls and/or financing opportunities for the maritime sector

Aspect	Description
Programme focus	Flexible and adaptable financial support for the diverse needs of the shipping industry
Support mechanism	Customisable financing packages, flexible repayment schedules, lower interest rates, reduced collateral requirements
Targeted activities	Adopting alternative fuels, tailored financial support for sustainable practices for bunkering and recharging infrastructure.
Specific activities	Tailored financial mechanisms to accommodate vessel characteristics, remaining service life, and industry dynamics
Beneficiary	All
Order of magnitude (total financing)¹	EUR 0.5 – 2 billion
Challenges addressed	One-size-fits-all financing tools, lack of dedicated shipping industry support, operational and regulatory pressures
Implementation strategy	Clear eligibility guidelines, transparent fund allocation, ongoing monitoring, stakeholder collaboration
Supporting evidence	The EIB offers financing products that focus on reducing carbon emissions in the transport sector, including shipping. They offer customisable loan packages to eligible projects that demonstrate clear environmental benefits. This flexibility is particularly important for shipping companies transitioning to greener technologies. Similarly, the Nordic Investment Bank (NIB) also provides financing options with favourable terms for projects related to maritime decarbonisation. Their loans typically feature lower interest rates and flexible repayment schedules, making it easier for shipping companies to adopt green technologies. This includes financing for retrofitting ships to use alternative fuels or improving port infrastructure for sustainable shipping.
Existing financing providers	Applicable to all financing products identified

Note (1): The approach for developing these estimates is set out in section 3.4.



Flexible approach to technology criteria to address the need

Current financing tools often adopt a one-size-fits-all approach, failing to accommodate the diverse needs of the shipping industry. Incentives are necessary to facilitate the transition of vessels on a global scale, considering their individual remaining service life and the dynamic nature of the industry. Many broad EU financing programs do offer finance for shipping companies. However, these programs often lack the specificity needed to effectively support the unique aspects of the maritime sector. The financing mechanisms currently in place are usually designed for a wide range of industries, which means they do not cater specifically to the technological advancements, operational nuances, or regulatory pressures faced by shipping companies. Consequently, there are very few dedicated calls for proposals exclusively targeting the shipping industry. Thus, given the multidimensional nature of transport, including various fuel options, technologies, and units, a flexible approach to technology criteria for finance is essential, recognising that 'one size does not fit all' in this sector.

Overall considerations

An overall consideration when accessing and/or providing finance in the shipping sector is on how to deal with the usually high-risk levels associated with the investments in the shipping industry. Financial providers tend to prioritise the thorough assessment of potential risks to ensure sustainable growth and stability and evaluating factors such as technical and commercial challenges, or regulatory changes when formulating financial strategies. Hence, it is crucial to integrate a comprehensive risk analysis into financial planning, so financing seekers can make informed decisions that balance opportunities and threats. In that sense, Box 2-2 below delves into the critical aspects of managing investment risks.

Box 2-2 Derisking the sector

"Derisking" in the shipping sector refers to strategies and actions taken to minimise financial, operational, and compliance risks. This concept has gained prominence due to various global challenges, including, technical and commercial concerns, and regulatory changes. In fact, there is a saying in the financial world that "financing follows structure", highlighting the importance of well-structured and low risk projects in order to attract finance. Hence, the structure, or risk level of a project determines what kind of financing is available, and not the other way around. Although, what can be appropriate is determined on individual basis, a few general topics can be identified.

- **Technical:** newly developed emission-reducing technologies on ships may have teething problems in the unforgiving maritime environment. Appropriate guarantees from OEMs would increase the take-up of new technology.
- **Commercial:** Emissions from ships are 'scope 3' emissions for their customers for reporting purposes. It is therefore in their interest to "lock-in" scarce low emission shipping capacity. So far, though, shippers have been hesitant to commit long-term to low-carbon ships, thus leaving the risk of a green shipping project largely with the shipowner. Because shipping is such an efficient mode of transportation, the increased cost of green transportation for the end-user is negligible in comparison with the total cost of a product. Therefore, the deeper into the value chain parties commit long-term to green shipping, the lower the (financial) risk for the shipowner. This requires new commercial arrangements in which interests are properly aligned and more of a partnership approach.
- **Regulatory:** Regulatory authorities can assist in decarbonising the value chain of maritime transportation by either putting a sufficiently high price on carbon emissions or alternatively by creating meaningful zero-emission zones.

For instance, the EU Emissions Trading System (EU ETS), which has included maritime emissions since January 2024 and covers ships over 5,000 gross tonnage operating within or to/from the EU, puts a price on GHG emissions for maritime transport. Companies must surrender allowances equivalent to their annual emissions. This requirement is being phased in, starting with 40% of emissions in 2024, increasing to 70% in 2025, and reaching 100% from 2027 onwards (European Commission, 2024).

- **Fuels:** There is still a lot of uncertainty around the choice of clean fuels for the future. A wrong choice today can lead to significant losses or stranded assets in the future. Ultimately, it would be decided outside the shipping sector which fuel(s) would be available for shipping at the scales needed, as the willingness to pay for clean fuels would always be higher in many other sectors. Shipping is expected to be the least willing to pay, given the historical fuel uptake of the maritime sector of "the bottom of the barrel" heavy fuel oils. A cross-sector approach can assist in de-risking the choice of fuel.
- **Performance data:** lack of reliable performance data for new technology makes investing in this technology higher risk. Sharing of performance data

between parties in the value chain can accelerate the availability of reliable data and therefore de-risk investing in new technology.

Governments can play an active role in derisking the maritime sector, by implementing expedited approval processes to adopt new technologies and improving port infrastructure. Legislative measures, such as setting maximum emission levels, can further drive industry compliance and innovation. Additionally, implementing carbon pricing mechanisms could provide financial incentives for reducing emissions. By taking these concrete actions, governments not only facilitate the transition to greener practices but also reduce the sector's reliance on public finance and as such contribute to mitigate risks and promote sustainable development within the maritime industry.

At the EU level, in July 2024, it was announced that the EU will adopt the Basel III banking package from January 2025, aiming to fortify the EU banking sector (European Commission, 2024). The Basel standards are designed to improve banks' capacity to endure financial shocks. These prudential requirements will be applicable to all EU banks, adding an extra layer of resilience to the banking system. However, inconsistent global application of such regulations could result in an uneven playing field. Banks in less regulated regions may engage in riskier activities, while banks in stricter regions could face competitive disadvantages due to higher compliance costs.

Box 2-3 Basel IV, the new regulatory framework from BIS

Basel IV, the new regulatory framework from the Bank for International Settlements effective from January 2025, favours corporate loans over asset-backed lending (BIS, 2023). It requires banks to maintain higher capital reserves for shipping loans compared to the current regime. The impact will vary by bank, depending on their current risk and capital allocation models and the significance of shipping finance to their operations.

In the short term, banks are likely to increase the pricing of shipping loans to compensate for the higher capital requirements, with an expected increase of 20-40 basis points (Eurofin Group). The extent of this increase will depend on market conditions. In the long term, banks may re-evaluate their capital allocation strategies, potentially reducing their exposure to shipping finance to prioritise other activities.

Basel IV mandates the use of standardised risk models over advanced models, reducing the impact of deal structuring on capital allocation. This may lead banks to structure riskier deals to justify higher margins, which could be detrimental in the long run. Alternatively, banks might focus more on corporate-style deals, which require less capital allocation but are less accessible to smaller shipping companies.

Overall, the impact of Basel IV will vary across banks and could lead to a more diverse funding landscape, with an increased role for non-bank lenders.

2.2. Regulation, post-application procedures and capacity building recommendations

This section outlines the regulation, post-application procedures and capacity building recommendations, detailing their objectives and the market barriers and challenges they aim to address. Following this, the specific recommendations are presented, accompanied by a discussion of key considerations for their implementation.

2.2.1. Objective and scope

Regulation post-application procedures and capacity building recommendations aim to enhance efficiency in decarbonisation efforts by streamlining approval processes, creating clear policy frameworks, and establishing support mechanisms with comprehensive training programmes for seamless implementation. These recommendations are designed to address the unique challenges faced by the maritime industry and promote a more effective transition towards sustainable practices.

2.2.2. Detailed recommendations

The detailed recommendations are described as follows:

Recommendation	Description	Actions	Expected Outcome
Mainstreaming policy and financial regulatory frameworks (taxonomy)	Ensure clarity on the applicability and harmonisation of standards within policy and financial regulatory frameworks for maritime decarbonisation initiatives.	- Establish unified standards. - Provide clarity on the applicability of requirements and processes. - Facilitate specialised financing.	- Clear and harmonised standards, tied to EU or international requirements. - Simplified and proportional requirements and processes supported by existing verification mechanisms. - Easier access to specialised financing.
Establishing support mechanisms for administrative and financial training	Address administrative burdens by offering comprehensive application process support and financial training.	- Create dedicated teams or platforms for application support. - Develop financial training programmes.	- Accurate and timely submission of financing applications. - Enhanced financial literacy and capability among stakeholders.
Offering training programmes for evaluation and bidder teams	Enhance industry-specific knowledge and market dynamics for evaluation and bidder teams.	Provide training programmes and guidelines focused on maritime decarbonisation projects and financing options.	- More accurate and informed evaluations of financing applications. - Better decision-making and effective allocation of resources.

2.2.3. Considerations for implementation

These recommendations emphasise the importance of public-private partnerships and targeted interventions at the national level to overcome obstacles associated with administrative processes, regulatory frameworks, and the enhancement of skills and capabilities in the shipping industry. Public-private partnerships can bring together the

necessary resources, expertise, and support to implement these recommendations effectively. In that sense, key components of successful implementation include:

- **Collaboration between government and industry:** Ensuring that both public and private sectors work together to develop and maintain the proposed support mechanisms and training programmes. This collaboration can facilitate the sharing of best practices, resources, and expertise, leading to more efficient and effective implementation.
- **Targeted interventions:** Focusing on specific areas where the maritime industry faces the most significant challenges. By addressing these targeted areas, interventions can have a more substantial impact on improving administrative processes, regulatory frameworks, and skill development.
- **Continuous monitoring and improvement:** Implementing a system of continuous monitoring and feedback to assess the effectiveness of the support mechanisms and training programmes. This would allow for ongoing adjustments and improvements, ensuring that the initiatives remain relevant and effective in meeting the needs of the maritime industry.

2.2.4. Market barriers and challenges

By addressing these key areas, the maritime industry can overcome existing barriers and enhance its capacity to implement decarbonisation efforts successfully. In particular, the following market barriers and challenges identified were identified:

- **Existing taxonomy and standardisation schemes are difficult to apply, in particular for the transition.** Stakeholders in the maritime industry face challenges in interpreting and applying the various taxonomies used in the sector. This lack of clarity complicates the financing process, highlighting the need for clearer, more uniform standards to facilitate smoother interactions and improve access to finance. Additionally, the applicability of the EU taxonomy within the maritime sector remains unclear, particularly regarding its specific relevance to maritime activities and how it aligns with existing industry practices. The complexity of navigating these frameworks at both the EU and sectoral levels creates further barriers to compliance and financing. Clearer guidelines and more consistent and streamlined standards, taking into account the sector specificities can help demystify the financial landscape, making it easier for stakeholders to comply with requirements and secure necessary financing.
- **Lack of schemes that consider the whole value chain:** The shipping industry faces the absence of comprehensive schemes that address the entire value chain. Current interventions often target specific segments, neglecting the interconnected nature of shipping operations. A holistic approach is needed, one that considers the entire value chain, from production to delivery, ensuring that all parts of the industry can benefit from decarbonisation initiatives. This would encourage more integrated and sustainable practices across the sector while fostering capabilities and industrial synergies in the EU.
- **Administrative burden on application processes and compliance requirements for SMEs:** SMEs in the maritime sector face significant hurdles accessing finance due to complex application processes, including extensive reporting and compliance demands. Limited resources often hinder their ability to navigate these challenges independently. Simplifying these processes and providing targeted support can alleviate these burdens, making it easier for SMEs to apply for and secure finance. This support could include streamlined application procedures and enhanced guidance to help SMEs meet compliance requirements effectively.

2.3. Communication and streamlining recommendations

This section outlines the communication and streamlining recommendations, detailing their objectives and the market barriers and challenges they aim to address. Following this, the specific recommendations are presented, accompanied by a discussion of key considerations for their implementation.

2.3.1. Objective and scope

Communication and streamlining recommendations aim to address significant market barriers hindering the adoption of innovative financial mechanisms for decarbonisation within the maritime industry. These recommendations focus on enhancing communication, streamlining access to information, and standardising processes to facilitate a smoother transition to sustainable financial practices. The scope includes establishing centralised information platforms and fostering public-private partnerships to ensure widespread adoption and effectiveness.

2.3.2. Detailed recommendations

To address these market barriers and optimise financial strategies for decarbonisation, enhancing communication and streamlining recommendations is essential. In that sense, establishing centralised and accessible information platforms can significantly contribute to informed decision-making and efficient resource allocation. These platforms would serve multiple purposes, including:

Recommendation	Description	Actions	Expected Outcome
Create comprehensive repositories of information and resources related to decarbonisation finance	Centralised platforms can house a wealth of information, including instrument guidelines, case studies, and best practices, aiding stakeholders in navigating decarbonisation finance.	Develop and maintain a centralised platform that includes comprehensive resources on decarbonisation finance.	Stakeholders have easy access to a wide range of information, enabling better understanding and decision-making.
Providing detailed information on available financing options, eligibility criteria, and application processes	Offering a clear overview of various financing options, eligibility criteria, and application processes helps stakeholders identify suitable opportunities.	Create a detailed directory of financing options, including eligibility criteria and application processes.	Stakeholders can efficiently identify and apply for suitable financing opportunities, increasing successful applications.
Streamlining access to financing opportunities for various stakeholders within the maritime industry	A centralised platform would simplify the process of finding and accessing financing opportunities, offering a one-stop-shop for all financing needs.	Develop a user-friendly, centralised platform that consolidates financing opportunities and related information.	Simplified access to financing opportunities for stakeholders, saving time and effort in the application process.

2.3.3. Considerations for implementation

To implement these recommendations effectively, concerted efforts through public-private partnerships at the EU level are necessary. These partnerships would ensure that the information platforms are widely accessible and adopted across the maritime sector.

Public-private collaborations can provide the necessary resources, expertise, and legitimacy to develop and maintain these platforms. Moreover, such partnerships can facilitate the standardisation of taxonomies and financing processes across the industry, ensuring consistency and clarity.

2.3.4. Market barriers and challenges

By addressing these key areas, the maritime industry can overcome existing barriers and enhance its capacity to implement decarbonisation efforts successfully. In particular, the maritime industry faces significant market barriers that hinder the adoption of innovative financial mechanisms for decarbonisation. These gaps include a lack of industry understanding of existing taxonomies and standardisation schemes, as well as insufficient information on private and public financing products. The complexities of current taxonomies used in financing applications complicate the process, highlighting the need for clearer, more uniform standards to facilitate smoother interactions and improve access to finance. Additionally, essential details such as interest rates and repayment terms are often unavailable online, making it difficult for stakeholders to make informed financing decisions and secure finance for maritime projects.

3. METHODOLOGY

3.1. Mapping and characterisation of market barriers and gaps

3.1.1. Objective

The objective of this step is to identify areas within the maritime industry that necessitate intervention and to pinpoint gaps that can be effectively addressed through targeted recommendations. This task is crucial for laying the groundwork for actionable and impactful strategies aimed at decarbonising the maritime sector.

3.1.2. Process

The objective of this step was to identify areas within the maritime industry that necessitate intervention and to identify gaps that can be effectively addressed through targeted recommendations.

This process involved a comprehensive review and processing of information previously gathered from various sources. Data from stakeholder consultation activities, which included surveys, targeted interviews and roundtables, as well as outputs from an extensive literature review covering financing products available for the industry, were collated and scrutinised. This multifaceted approach ensured that a broad spectrum of insights was considered.

Following the data collection phase was the characterisation of barriers and needs within the industry. The intelligence gathered from the previous step served as the foundation for this analysis. Through a detailed examination, more than fifty distinct needs related to the decarbonisation of the maritime industry were identified. Additionally, the analysis highlighted the specific gaps that currently prevent these needs from being met. This characterisation process was essential for understanding the complex landscape of barriers that hinder the industry's progress towards decarbonisation. By clearly defining these barriers and needs, a solid basis for formulating targeted recommendations in subsequent phases was established. The identified gaps range from technological and financial challenges to regulatory and application obstacles, all of which require strategic interventions to overcome.

3.2. Formulation and characterisation of recommendations

For each of the barriers identified, one or more policy recommendations were developed. They aimed to address the needs of different stakeholder groups in the maritime sector and to fill in the main financing gaps identified in the previous steps.

3.2.1. Financial recommendations

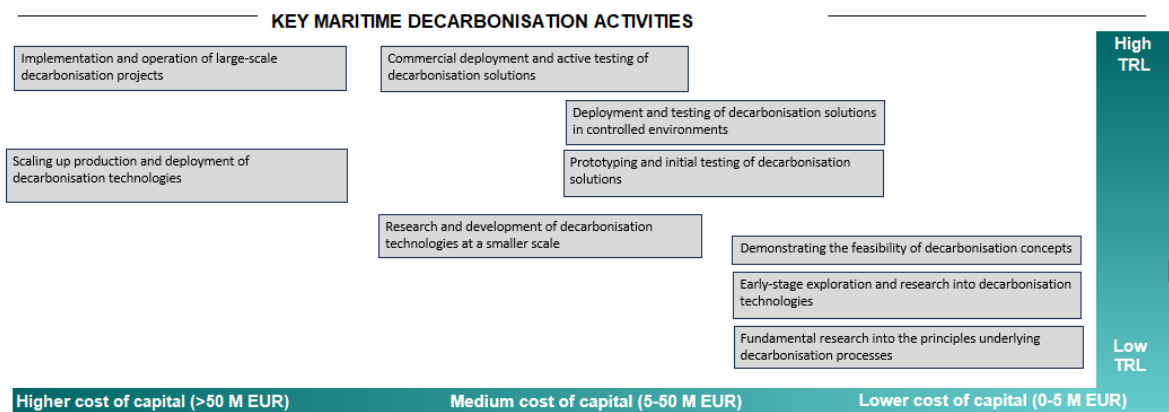
The objective of the recommendations is to accelerate shipping decarbonisation by addressing key financial barriers and fostering sustainable practices within the industry. By providing targeted financial support and cost-sharing mechanisms, these initiatives aim to facilitate the transition towards greener technologies and enhance industry competitiveness.

A bespoke model was developed to formulate financial recommendations targeting the identified gaps. It was based on the Technology Readiness Level (TRL) of the investment technologies and the corresponding capital investment needed. This model also categorised financing products according to investment levels and TRL stages to predict the capital required for each stage of development, aiding in strategic resource allocation. By leveraging TRL frameworks and expert insights, this approach offers tailored financial guidance to address specific technological maturity gaps. It worked as a support tool for optimising investment strategies, ensuring efficient resource allocation and mitigating risks associated with technology development projects.

Step 1: Categorisation of decarbonisation investment activities

The first step was to categorise key maritime decarbonisation activities by their Technology Readiness Level (TRL) and associated capital costs. This framework helped in understanding the distribution of various decarbonisation activities based on their maturity and financial requirements in order to identify the most appropriate financing product for each activity. This approach was built upon the idea that there is a clear correlation between the maturity of the technology (TRL) and the associated capital costs. Early-stage activities are less expensive but crucial for building the foundation of future technologies, while mature technologies require significant investment for large-scale deployment. At the same time strategic investment planning is needed to identify where to focus investments. This should be based on the current maturity of technologies, with the intention for there to be finance across all stages to achieve progress in decarbonisation of the industry. This process is summarised in Figure 3-1.

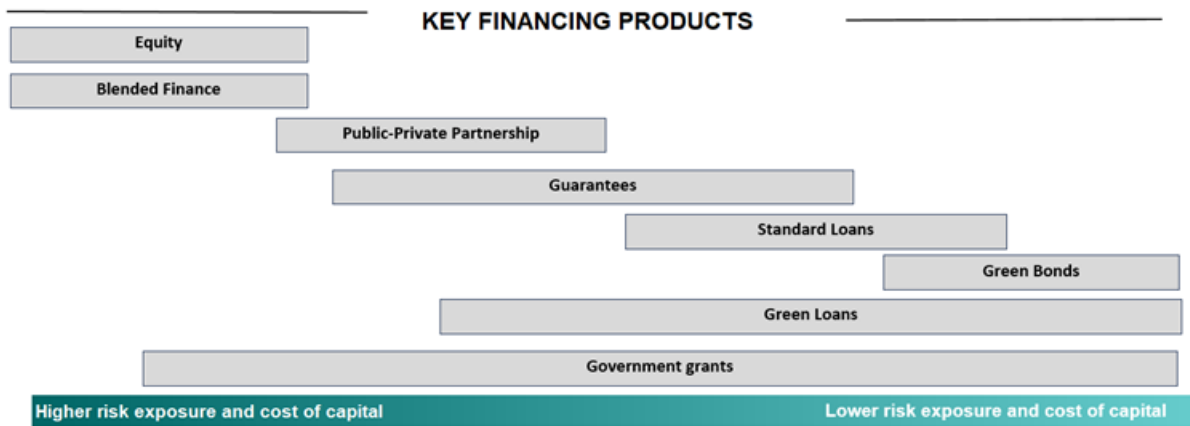
Figure 3-1 Categorisation of decarbonisation investment activities



Step 2: Categorisation of financing instruments according to TRL level (high/medium/low) and level of capital investment (high/medium/low)

The next step in the definition of financial recommendations was the categorisation of various financing mechanisms available for maritime decarbonisation activities by their risk exposure and cost of capital. The two figures together offer a comprehensive overview of how different financing products can support various stages of maritime decarbonisation activities, categorised by their TRL and capital costs. The categorisation of financing products is outlined in **Error! Reference source not found.**, where the horizontal axis represents the spectrum of risk exposure and cost of capital associated with different financing products, ranging from higher to lower risk and cost. This helped with understanding the financial trade-offs involved in selecting a particular financing mechanism.

Figure 3-2 Categorisation of financing instruments



By integrating the information from both figures, stakeholders can strategically align their financial planning with the specific needs of maritime decarbonisation activities. This integrated approach ensures that appropriate financial instruments are matched with the corresponding stage of technology development, thereby enhancing the effectiveness and efficiency of decarbonisation efforts in the maritime sector.

3.2.2. Regulation, post-application procedures and capacity building recommendations

Regulation post-application procedures and capacity building recommendations aim to enhance efficiency in decarbonisation efforts by streamlining approval processes; craft clear policy frameworks; and establish support mechanisms with comprehensive training programmes for seamless implementation. These recommendations are designed to address the unique challenges faced by the maritime industry and promote a more effective transition towards sustainable practices.

3.2.3. Communication and streamlining recommendations

Communication and streamlining recommendations aim to address significant market barriers hindering the adoption of innovative financial mechanisms for decarbonisation within the maritime industry. These recommendations focus on enhancing communication, streamlining access to information, and standardising processes to facilitate a smoother transition to sustainable financial practices. The scope includes establishing centralised information platforms and fostering public-private partnerships to ensure widespread adoption and effectiveness.

3.3. Categorisation of investment activities and financing products

Two categorisations of investment activities and financing products were produced for the study. First, investment activities were categorised by TRL and capital investment levels as shown in **Error! Reference source not found..** The vertical axis of this figure represents the TRL, ranging from low (early-stage research and development) to high (implementation and operation of large-scale projects). It indicates the maturity of the technology or process involved in the decarbonisation activities. Meanwhile, the horizontal axis categorises the activities based on their capital costs: lower cost of capital (EUR 0-5 million); medium cost of capital (EUR 5-50 million); higher cost of capital (EUR greater than 50 million). Through literature review and expert judgement, the decarbonisation activities were categorised as follows:

- **High TRL and higher cost of capital:** Activities at this end of the spectrum are mature, ready for large-scale deployment and require substantial investment such as:
 - Implementation and operation of large-scale decarbonisation projects.
 - Commercial deployment and active testing of decarbonisation solutions.

- **Medium TRL and medium cost of capital:** This category includes activities involving scaling and testing technologies that are beyond the initial research phase but not yet at full commercial deployment, as for instance:
 - Scaling up production and deployment of decarbonisation technologies.
 - Deployment and testing of decarbonisation solutions in controlled environments.
 - Prototyping and initial testing of decarbonisation solutions.
- **Low TRL and lower cost of capital:** These are foundational and early-stage activities involving basic research and initial concept testing, requiring relatively lower capital investment. Such as:
 - Research and development of decarbonisation technologies at a smaller scale.
 - Demonstrating the feasibility of decarbonisation concepts.
 - Early-stage exploration and research into decarbonisation technologies.
 - Fundamental research into the principles underlying decarbonisation processes.

Secondly, financing products were categorised as outlined in

Figure 3-2, where the horizontal axis represents the spectrum of risk exposure and cost of capital associated with different financing products, ranging from higher to lower risk and cost. This helps with understanding the financial trade-offs involved in selecting a particular financing mechanism. The following groups of products were designed:

- **For high-risk exposure and cost of capital activities** financing options include equity, blended finance and PPPs. These are suitable due to their capacity to handle high-risk, high-reward projects such as the implementation and operation of large-scale decarbonisation projects.
 - Equity: Represents investments where investors take on higher risk for potentially higher returns, suitable for high-risk projects.
 - Blended Finance: Combines public and private investment, balancing risk and return, often used in innovative or early-stage projects.
- **For medium risk exposure and cost of capital activities** guarantees and standard loans are appropriate as they provide a balance of risk management and financial support for scaling up production and testing decarbonisation technologies in controlled environments.
 - Public-Private Partnership (PPP): Involves collaboration between government and private sector, sharing risks and rewards, ideal for mid-stage projects with moderate risk.
 - Guarantees: Provides a safety net for lenders, reducing perceived risk and encouraging investment in higher-risk ventures.
- **For lower risk exposure and cost of capital activities** green loans, green bonds and government grants are suitable for early-stage research and development activities, where risk is lower, but innovation is crucial for future advancements.
 - Standard loans: Traditional financing with fixed repayment terms, used for well-understood and lower-risk projects.
 - Green bonds: Special bonds issued to fund environmentally friendly projects, offering lower interest rates due to their green credentials.
 - Green loans: Loans specifically tailored for sustainable projects, often with favourable terms and conditions to encourage decarbonisation efforts.
 - Government grants: Non-repayable funds provided by the government, ideal for foundational research and low-risk activities.

3.3.1. Regulation, post-application procedures and capacity building recommendations

Regulation post-application procedures and capacity building recommendations aim to enhance efficiency in decarbonisation efforts by streamlining approval processes; craft clear policy frameworks; and establish support mechanisms with comprehensive training programmes for seamless implementation. These recommendations are designed to address the unique challenges faced by the maritime industry and promote a more effective transition towards sustainable practices.

3.3.2. Communication and streamlining recommendations

Communication and streamlining recommendations aim to address significant market barriers hindering the adoption of innovative financial mechanisms for decarbonisation within the maritime industry. These recommendations focus on enhancing communication, streamlining access to information, and standardising processes to facilitate a smoother transition to sustainable financial practices. The scope includes establishing centralised information platforms and fostering public-private partnerships to ensure widespread adoption and effectiveness.

3.4. Scale of green finance needed

To understand the scale of green finance needed to support decarbonisation of the EU maritime sector, high-level estimates have been developed to contextualise financial recommendations targeting the identified gaps. The estimates are based on the Technology Readiness Level (TRL) of the possible investment technologies and the corresponding capital investment needed to further increase TRL to develop the technologies. These estimates also categorise financing products according to investment levels and TRL stages to predict the capital required for each stage of development, aiding in strategic resource allocation.

The estimated annual cost to decarbonise the EU maritime industry ranges from EUR 10.9 to 44.0 billion, accounting for:

- Vessel fleet decarbonisation (newbuilds and retrofits): EUR 2.4 to 8.5 billion
- Infrastructure for fuel production and bunkering: EUR 8.5 to 35.5 billion, depending on the main information sources being used for the calculations.

This is aligned with 2024 report on The future of European Competitiveness which states that *the investment needs to decarbonise the most internationally exposed transport sectors (aviation and maritime) lie in the region of [...] EUR 39 billion each year (for the international maritime sector) from 2031 to 2050* (European Commission, 2024).

These results are based on EU-level estimates, incorporating data on the current state of green finance for the shipping industry, as well as recent reports on the decarbonisation of the maritime sector at both European and global levels (EDF, 2024) GMF (2020). The information in this source – on the proportion of the global fleet attributable to EU country ownership (32.5%) – has been used to estimate the approximate EU fleet and infrastructure costs to decarbonise from global totals, with additional considerations for investments related to fuel technologies.

ANNEXES

Annex I: Glossary of financing instruments

Type of information	Description
(Green) bond	A bond of which the “use of proceeds” is earmarked to a defined green purpose.
Sustainability linked loan	A loan of which certain terms (including pricing) are linked to achieving defined ESG-related KPI’s
Guarantees	A guarantee is a funder’s insurance policy against non-payment should their borrower not be able to pay in the future
Blended finance	A financial solution in which public- and private funding are combined (blended) towards a common goal.
Concession	a grant of right by a government or local authority, to operate a certain shipping route against certain defined (decarbonisation-) conditions
Grants	A grant is a financial donation awarded by the contracting authority to the grant beneficiary
R&D subsidies	Subsidy to support certain pre-agreed (decarbonisation related) R&D activities
Capex subsidies	Subsidy to support an investment with specific features such as emissions reduction.
Contracts for difference (Opex subsidies)	Agreement to pay / receive the difference in price between green energy and its fossil alternative, until the price difference has disappeared.
Quasi-equity	A hybrid financial instrument that combines elements of both debt and equity, offering flexible financing with higher returns than debt but lower risk than equity.

REFERENCES

- BIS. (2023). *The Basel Framework*. Retrieved from Bank of International Settlements: https://www.bis.org/basel_framework/
- CEFC. (2024). *CEFC steers maritime sector towards net zero with finance to decarbonise Australian ports*. Retrieved from CEFC: <https://www.cefc.com.au/media/media-release/cefc-steers-maritime-sector-towards-net-zero-with-finance-to-decarbonise-australian-ports/>
- CSIS. (2020). *Hidden Harbors: China's State-backed Shipping Industry*. Center for Strategic & International Studies.
- Daniel, L., & Cenk, Y. (2019). *Ship finance practices in major shipbuilding economies (Policy papers No. 75)*. OECD Publishing.
- ebu. (2021). *European Partnership to make Zero-Emission Waterborne*. Retrieved from European Barge Union (ebu): <https://www.ebu-uenf.org/wp-content/uploads/210622-Press-release-Zero-Emission-Waterborne-Transport.pdf>
- Ecorys, CE Delft, & IDEA Consult. (2012). *Green growth opportunities in the EU shipbuilding sector*. European Commission.
- EDF. (2024). *Green Shipping and Sustainable Finance: Stronger Together*. Environmental Defense Fund.
- EDGAR. (2024). *GHG emissions of all world countries*. Retrieved from EDGAR - Emissions Database for Global Atmospheric Research: https://edgar.jrc.ec.europa.eu/report_2024#emissions_table
- EEA. (2021). *European Maritime Transport Environmental Report 2021*. Retrieved from European Environment Agency: <https://www.eea.europa.eu/publications/maritime-transport/>
- EIB. (2020). *Greece: Financing agreement for the construction of the first LNG bunkering vessel for maritime use in Eastern Mediterranean*. Retrieved from European Investment Bank: <https://www.eib.org/en/press/all/2020-029-financing-agreement-for-the-construction-of-the-first-lng-bunkering-vessel-for-maritime-use-in-eastern-mediterranean>
- Eurofin Group. (n.d.). *Basel IV and its Impact on Ship Financing*. Retrieved from Eurofin Group: <https://eurofingroup.com/insights/basel-iv-impact-on-ship-financing-eurofin-group/>
- European Commission. (2022). *Renewable and Low-Carbon Fuels Value Chain Industrial Alliance*. Retrieved from European Commission: https://transport.ec.europa.eu/transport-themes/clean-transport/alternative-fuels-sustainable-mobility-europe/renewable-and-low-carbon-fuels-value-chain-industrial-alliance_en
- European Commission. (2024). *Banking package: Moving forward with the implementation of the Basel standards, while preserving the international level playing field*. Retrieved from European Commission: <https://finance.ec.europa.eu/news/banking-package-questions-and-answers-2024-07->

24_en#:~:text=The%20EU%20has%20agreed%20on,application%20from%201%20January%202025.

European Commission. (2024, October). *Questions and answers on the results of the 2023 call for proposals under the Innovation Fund*. Retrieved from European Commission: https://ec.europa.eu/commission/presscorner/detail/en/qanda_24_5424

European Commission. (2024). *Reducing emissions from the shipping sector*. Retrieved from European Commission: https://climate.ec.europa.eu/eu-action/transport/reducing-emissions-shipping-sector_en

European Commission. (2024). *The future of European competitiveness*. European Commission.

European Council. (2024, April). *Fit for 55*. Retrieved from Council of the European Commission: <https://www.consilium.europa.eu/en/policies/fit-for-55/>

FEPORIT. (2021). *EIB and the EU Commission sign agreement to finance alternative fuels infrastructure*. Retrieved from Federation of European Private Port Companies and Terminals: <https://www.feport.eu/media-corner/news/general-news/988-eib-and-the-eu-commission-sign-agreement-to-finance-alternative-fuels-infrastructure>

GMF. (2024, January). *Unravelling IMO policy measures towards a just and equitable energy transition*. Retrieved from Global Maritime Forum: https://cms.globalmaritimeforum.org/wp-content/uploads/2024/01/Getting-to-Zero-Coalition_Unravelling-IMO-policy-measures-towards-a-just-and-equitable-energy-transition-1-1.pdf

Heinrich Boell Stiftung. (2021). *European Mobility Atlas*. Retrieved from Heinrich Boell Stiftung: https://eu.boell.org/sites/default/files/2021-07/EUMobilityatlas2021_2ndedition_FINAL_WEB.pdf

IMO. (2023). *2023 IMO Strategy on Reduction of GHG Emissions from Ships*. Retrieved from International Maritime Organization: <https://www.imo.org/en/OurWork/Environment/Pages/2023-IMO-Strategy-on-Reduction-of-GHG-Emissions-from-Ships.aspx>

IMO. (2024). *Marine Environment Protection Committee (MEPC 82), 30 September – 4 October 2024*. Retrieved from International Maritime Organization: <https://www.imo.org/en/MediaCentre/MeetingSummaries/Pages/MEPC-82nd-session.aspx>

IMO. (2024). *Marine Environment Protection Committee 81st session (MEPC 81), 18-22 March 2024*. Retrieved from International Maritime Organization: <https://www.imo.org/en/MediaCentre/MeetingSummaries/Pages/MEPC-81.aspx>

Leyen, U. v. (2024, September 17). *Mission Letter - Apostolos Tzitzikostas*. Retrieved from European Commission: https://commission.europa.eu/document/download/de676935-f28c-41c1-bbd2-e54646c82941_en?filename=Mission%20letter%20-%20TZITZIKOSTAS.pdf

MEPC. (2023). *RESOLUTION MEPC.377(80) 2023 IMO strategy on reduction of GHG emissions from ships*. IMO.

- OECD. (2019). *Ship finance practices in major shipbuilding economies*. Retrieved from OECD: [https://www.oecd.org/en/publications/ship-finance-practices-in-major-shipbuilding-economies_e0448fd0-en.html#:~:text=Shipyards%20also%20need%20to%20finance,debt%20\(loans%20and%20bonds\)](https://www.oecd.org/en/publications/ship-finance-practices-in-major-shipbuilding-economies_e0448fd0-en.html#:~:text=Shipyards%20also%20need%20to%20finance,debt%20(loans%20and%20bonds))
- Safety4Sea. (2022). *How EU Contracts for Difference can support zero-emission fuels*. Retrieved from Safety4Sea: https://safety4sea.com/wp-content/uploads/2022/05/Getting-to-Zero-Coalition-How-EU-Contracts-for-Difference-can-support-zero-emission-fuels-2022_05.pdf
- Solakivi, T., Paimander, A., & Ojala, L. (2022). Cost competitiveness of alternative maritime fuels in the new regulatory framework. *Elsevier*, 19.
- T&E. (2024, May). *E-Fuels observatory for shipping*. Retrieved from Transport & Environment: https://www.transportenvironment.org/uploads/files/Briefing_e-fuels_observatory_for_shipping.pdf
- UNFCCC. (2024, December 12). *The Paris Agreement*. Retrieved from United Nations Climate Change: <https://unfccc.int/process-and-meetings/the-paris-agreement>
- Wallenius Wilhelmsen. (2023). *World's first wind-powered RoRo vessel secures EUR 9M in EU funding*. Retrieved from Wallenius Wilhelmsen: <https://www.walleniuswilhelmsen.com/news/worlds-first-wind-powered-roro-vessel-secures-eur-9m-in-eu-funding>
- ZEWT. (2021, June). *European Partnership to make Zero-Emission Waterborne Transport a reality before 2050*. Retrieved from Zero-Emission Waterborne Transport: https://www.waterborne.eu/images/210622_Press_release_Zero-Emission_Waterborne_Transport.pdf

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