

Maritime Climate Finance Landscape: A pilot study of flows, gaps, and opportunities

With a focus on developing countries, particularly small island developing States and least developed countries

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GHG SMART
SUSTAINABLE MARITIME TRANSPORT TRAINING PROGRAMME

INTERNATIONAL MARITIME ORGANIZATION

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ABOUT

International Maritime Organization

International Maritime Organization (IMO) is the specialized agency of the United Nations (UN) with responsibility for the safety and security of shipping and the prevention of marine and atmospheric pollution by ships. The IMO's work supports the UN Sustainable Development Goals.

IMO GHG-SMART Project Programme

The Sustainable Maritime Transport Training Programme (GHG-SMART) is implemented by IMO and funded by the Republic of Korea. The project supports least developed countries (LDCs) and small island developing States (SIDS) through targeted capacity building and aims to strengthen access to human, technological and financial resources needed to advance national actions on maritime energy transition.

Climate Policy Initiative

CPI is an analysis and advisory organization with deep expertise in finance and policy. CPI's mission is to help governments, businesses, and financial institutions drive economic growth while addressing climate change.

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EXECUTIVE SUMMARY

CONTEXT

International shipping is fundamental to the global economy, but its decarbonization requires a rapid shift in financing across a maritime system facing significant transition challenges. Maritime transport facilitates approximately 90% of world trade by volume and 70% by value, while accounting for around 3% of global greenhouse gas (GHG) emissions. More than 90% of the active fleet continues to operate on conventional fossil fuels. Without targeted interventions, emissions from international shipping could increase substantially, as demand for shipping continues to grow. The *2023 IMO Strategy on Reduction of GHG Emissions from Ships* (2023 IMO GHG Strategy) establishes a pathway towards net-zero GHG emissions from international shipping by or around 2050, with indicative checkpoints for 2030 and 2040 and targets to increase the uptake of alternative low- and zero-carbon fuels. Achieving this transition will require significant investment, with estimates indicating capital needs of approximately USD 1.2 to 1.6 trillion by 2050, covering low- and zero-emission ships, and supporting land-based infrastructure.

Financing this transition is particularly complex because there is no single technological pathway and investment decisions across the maritime value chain are interdependent. Factors including long asset lifetimes, high upfront costs, uncertain fuel availability and prices, evolving regulation, and ambiguity over the future roles of fuels may further add to the complexity of financing pathways. Low- and zero-emission ships require compatible fuel supply and port infrastructure, while fuel producers and ports require sufficient confidence in future ship demand and offtake before committing capital. The climate challenge also extends beyond reducing operational emissions. Ports and coastal ecosystems must remain resilient to physical climate risks while also adapting to the infrastructure, systems and processes required for a safe transition. This is especially important in small island developing States (SIDS) and coastal least developed countries (LDCs), where ports provide essential access to trade, food, fuel, medicines, and emergency services, while also facing heightened exposure to sea-level rise, storm surge, flooding, and other climate hazards. Maritime climate finance is needed to address both decarbonization and resilience across a wider maritime ecosystem.

This study, for the first time, as a pilot, develops an initial evidence base for mapping what constitutes maritime climate finance, where it is flowing, and where key gaps remain. This pilot study has two parts. **First,** it develops a pilot classification framework that maps relevant activities, technologies and processes across the maritime value chain against existing sustainable finance frameworks and the IMO GHG Strategy. **Second**, it applies that framework in a pilot assessment of finance flows across geographies, segments, actors and financial instruments, with particular attention to developing countries, especially SIDS and LDCs.

PILOT MARITIME CLIMATE FINANCE CLASSIFICATION FRAMEWORK

Maritime climate activities are already present in several sustainable finance taxonomies, but they are dispersed across different sectors and covered at varying levels of detail. The study reviewed 19 national and regional taxonomies and global frameworks. Maritime operations and technologies were the most consistently represented activities, particularly ship retrofits and low- and zero-emission ships. Port infrastructure was the next most common category, including shore power, charging infrastructure and other infrastructure enabling lower-carbon water transport. Alternative low- and zero-carbon fuel (alternative fuels) were also widely recognized as climate relevant but were generally classified under the energy sector. Shipbuilding was less visible, appearing in only four of the taxonomies reviewed. Adaptation and enabling activities were also less systematically captured, despite their relevance to climate-vulnerable countries. These common denominators provide a useful starting point, but no existing framework captures the entire maritime value chain.

A pilot classification framework was developed along the maritime value chain, classified by climate objective. This pilot classification (Table ES1) is divided into **six overarching segments**: **(1)** alternative low- and zero-carbon fuel production and distribution; **(2)** port infrastructure and operations; **(3)** maritime operations and technologies; **(4)** shipbuilding and recycling; **(5)** institutional strengthening; and **(6)** cross-sectoral activities. Together, they cover both the physical investments and enabling activities such as policy development and capacity building required for the transition.

The resulting pilot framework distinguishes climate finance from the broader landscape of maritime transition-related investments that may contribute to the transition but do not meet criteria for climate finance. Activities that meet mitigation or adaptation criteria are classified as climate finance, including dual-benefit activities that deliver both outcomes. Given the hard-to-abate nature of shipping, the framework also identifies "other associated finance" that may contribute to near-term transition or environmental objectives but cannot be treated as climate finance. The distinction provides greater visibility over the broader transition. This pilot framework provides the basis for the subsequent assessment of maritime climate finance flows.

Table ES1: Overview pilot classification framework

Mitigation Segment	Solutions
Alternative low- and zero-carbon fuel production and distribution	Alternative fuels with zero or near-zero emissions production
	Transitional gaseous and liquid fuel production
	Alternative fuels with zero or near-zero emissions distribution
	Transitional gaseous and liquid fuel distribution
Port infrastructure and operations	Alternative fuels with zero or near-zero emissions bunkering
	Transitional fuel bunkering
	Onshore power (cold ironing)
	Vessel battery charging infrastructure
	Port clean energy
	Electrification of operational equipment
	Port energy efficiency
	Energy-efficient and low-carbon cold storage facilities
	Port waste management infrastructure
Maritime operations and technologies	Alternative fuel propulsion - low- and zero-emissions ships
	Transitional fuel propulsion
	Battery-electric propulsion
	Auxiliary power system input
	Energy efficiency - Engine room
	Energy efficiency - Propeller
	Energy efficiency - Wind-assisted propulsion efficiency
	Energy efficiency - Voyage optimization, performance and energy management systems
	Energy efficiency - Hull and superstructure efficiency and maintenance
	Onboard carbon capture and storage (OCCS)
Shipbuilding and recycling	Green ship manufacturing materials
	Ship recycling
	Shipyard decarbonization
Institutional strengthening	Policy development and institutional support
	Capacity building and training, including in project finance
	Technical assistance and knowledge transfer
	Maritime emissions data systems and monitoring, reporting, and verification (MRV) infrastructure
	Green shipping corridors project preparation
	R&D and pilot demonstration projects
	Restoration and conservation of biodiversity or ecosystem services
	Cross-sectoral solutions

Table ES1 *(cont.)*

Adaptation Segment	Solutions
Port infrastructure and operations	Climate-resilient infrastructure
	Nature-based solutions (NbS) at ports
	Enhanced early warning systems for port operations
	Disaster response and emergency preparedness infrastructure
	Habitat preservation
Cross-sectoral activities	Habitat restoration
	Support or co-management of marine protected areas (MPA) and conserved areas
	Management of invasive species
	Cross-sectoral solutions
Institutional strengthening	Marine spatial planning (MSP)
	Climate risk assessment and adaptation planning
	Capacity building and training for climate adaptation

PILOT ASSESSMENT OF MARITIME CLIMATE FINANCE

Maritime climate finance is growing rapidly from a relatively low base, and this pilot assessment establishes an initial baseline against which future progress can be measured. Annual flows increased at a compound annual growth rate (CAGR) of 49%, reaching USD 4.7 billion in 2023. Despite this growth, current flows remain modest relative to estimated annual investment needs for maritime decarbonization, which are in the tens of billions of US dollars.

The study identified USD 10.5 billion in direct maritime climate finance between 2018 and 2023 globally, equivalent to 0.14% of tracked global climate finance over the period. The relatively small share of global climate finance currently directed to maritime activities indicates scope to mobilize a larger share of existing climate finance for maritime decarbonization and resilience. Furthermore, while growth has been uneven and influenced by a limited number of large projects, with no clear sustained trend yet evident, recent increases point to the potential to broaden and sustain investment over time.

Commercial capital is more prominent in mature markets, while SIDS and LDCs remain almost entirely dependent on international public finance. As per the available data tracked in this report, China stands out for its entirely domestic financing base, with contributions from both private actors and state-owned institutions, while advanced economies combine domestic and international, public and private capital. Emerging markets draw predominantly on public international finance but also attract substantial private investment. By contrast, almost all tracked finance to SIDS and LDCs came from international public sources, principally bilateral and multilateral development finance institutions and donor governments.

However, maritime climate finance already plays an important role in supporting resilience in SIDS and LDCs, which together received around 68% of tracked maritime adaptation finance between 2018 and 2023, largely for port infrastructure providing a foundation for broader participation in the maritime transition. Moreover, maritime activities represent a higher share of

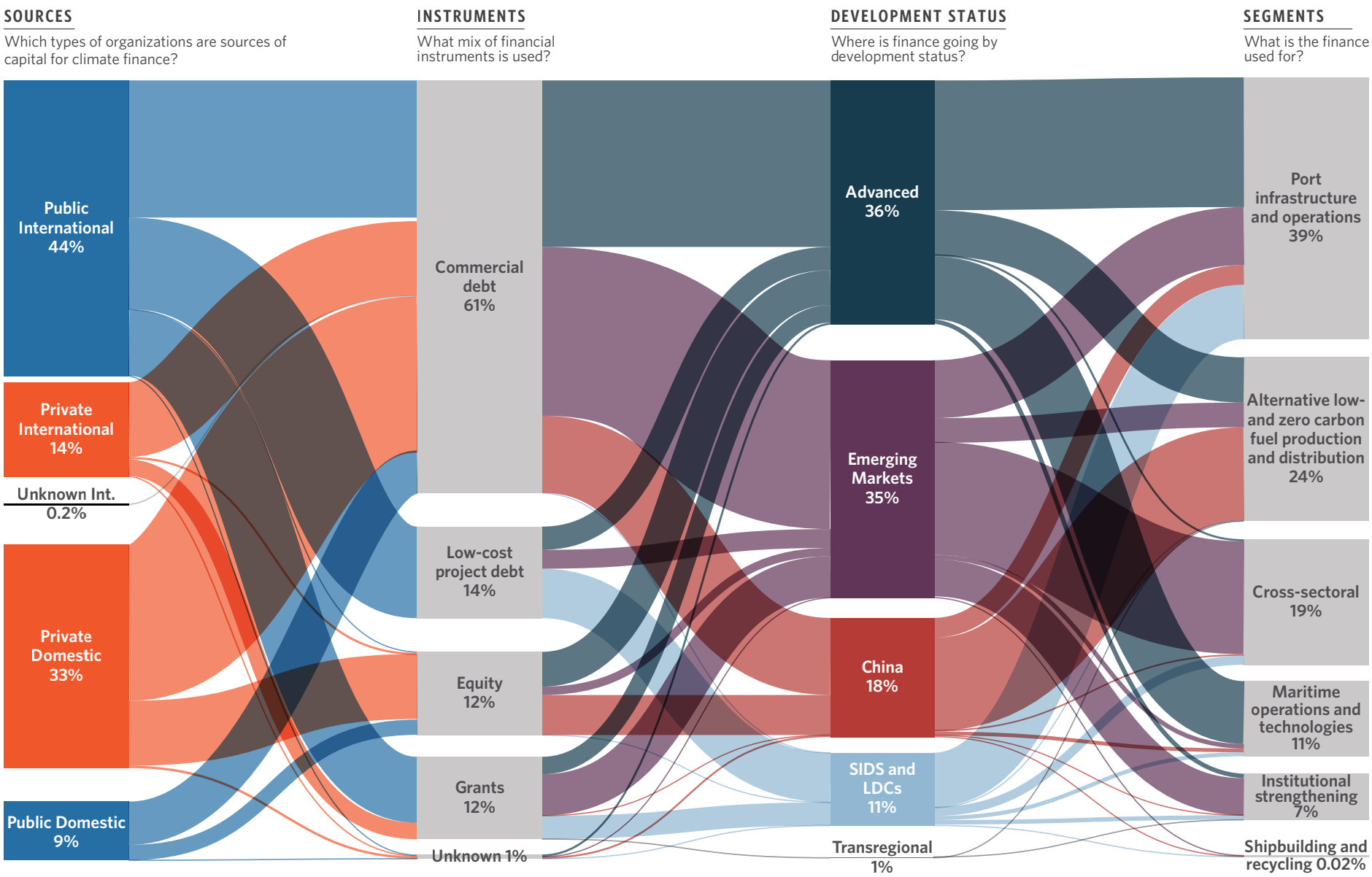
overall climate finance in SIDS and LDCs than at the global level, although absolute volumes remain relatively small. The next opportunity is to build on this experience by expanding their access to mitigation finance and investment in ship efficiency, alternative fuels, port decarbonization and other emerging maritime segments, noting that their share of mitigation finance is considerably lower, at around 1.5%, with almost no tracked investment reaching SIDS and LDCs for alternative fuel production and distribution, while tracked finance for maritime operations and technologies was also minimal. This highlights an opportunity to broaden the participation of SIDS and LDCs in the sector's emerging transition, particularly in investment-intensive segments that are expected to play an important role in the future of low- and zero-carbon shipping.

Most of the tracked finance is concentrated in alternative fuel production and port infrastructure and operations, with relatively limited flows to other parts of the maritime value chain. In 2023, alternative fuel production and distribution received USD 2.5 billion and port infrastructure and operations USD 1.4 billion, together accounting for around 83% of direct maritime climate finance that year. Maritime operations and technologies, institutional strengthening, and particularly shipbuilding and recycling received substantially less. While the concentration of finance in fuel production and infrastructure may partly reflect their higher capital requirements, further analysis would be needed to determine whether the current distribution of finance across the maritime value chain is in line with transition investment needs. Effective decarbonization will require coordinated investment across the maritime value chain, as misalignment in the timing and scale of investment across fuel production, infrastructure and fleet transition could create infrastructure mismatches, inefficiencies in capital allocation and stranded-asset risks.

A significant share of upstream alternative fuel financing cannot yet be linked to identifiable maritime demand, suggesting a potential disconnect between broader fuel investments and maritime offtake based on available climate finance tracking data. A much larger pool of upstream alternative low- and zero-carbon fuel investment exists than can currently be attributed directly to maritime use. Combined direct and indirect finance tracked for alternative fuel production and distribution reached USD 16.7 billion between 2018 and 2023, of which 85% could not be directly attributed to maritime as an end-use sector. Of the total fuel production and distribution finance captured, 70% was indirect investment in e-ammonia. In comparison, 9% was direct e-ammonia finance attributed to the maritime sector, concentrated largely in China and other emerging markets. As these facilities can serve multiple sectors, the pilot assessment applies fuel demand assumptions rather than attributing their full investment value to maritime climate finance. This distinction provides visibility over potentially relevant future fuel supply without overstating the finance specifically supporting shipping. The finding indicates the importance of greater coordination between upstream alternative fuel investment projects and the maritime sector and its potential demand, while recognizing that examination of individual offtake arrangements was outside the scope of this assessment. In the meantime, significantly more capital continues to flow towards established transitional technologies, such as liquefied natural gas (LNG).

The pilot assessment also shows that gaps in underlying data can impact the financing gaps in the sector. Domestic public expenditure is not systematically captured because maritime climate spending is rarely tagged consistently in national budgets, while South-South public finance is incompletely reported. Private investment is particularly difficult to identify for ship retrofits, incremental energy-efficiency measures, shipbuilding and recycling, and adaptation finance remains challenging to attribute consistently at project level. Strengthening project-level disclosure, climate budget tagging and common reporting classifications would therefore improve future assessments and make it easier to distinguish where maritime climate finance is genuinely absent from where it is not adequately tracked.

Figure ES1: Snapshot of direct maritime climate finance by country grouping, 2018–2023 (share of each grouping's tracked finance)



Note: China forms part of the EMDE grouping, alongside Emerging Markets and LDCs. Results for China are presented separately in selected analyses due to relatively large scale compared to other EMDEs, in line with CPI's Global Landscape of Climate Finance methodology. This is a data management approach and does not imply separate treatments of individual Member States.

The above Sankey diagram illustrates how direct maritime climate finance flows across sources, instruments, recipients by development status, and segments.

RECOMMENDATIONS

The recommendations reflect the main barriers identified through the pilot. Based on these findings, three priority areas were identified, with recommendations developed under each to strengthen the classification, financing and tracking of maritime climate finance.

Key findings	Recommendations
1. Further developing and implementing the classification framework to advance consistency and alignment in maritime climate finance	
Maritime climate activities are not consistently or comprehensively covered across existing sustainable finance taxonomies. There is a lack of a common and standardized basis for climate-aligned, transition and ineligible activities across the maritime decarbonization value chain.	**Expand coverage across the full maritime value chain.** Governments, international and regional organizations, and taxonomy developers should include mitigation and adaptation maritime climate activities and technologies. These should have clear descriptions and technical criteria. Promote harmonization of common definitions for near-, medium- and long-term sustainable maritime fuel pathways, as well as introduce time-bound and context-specific screening criteria to distinguish near-, medium- and long-term pathways and reduce carbon lock-in risks.
Maritime activities are often embedded within broader transport, energy and infrastructure investments. Taxonomies and reporting systems also differ across jurisdictions.	**Design classifications for practical investment and disclosure.** Common activity codes, evidence requirements and reporting templates could support consistent use by governments and other public and private financial institutions. Strengthen international interoperability through common definitions and methodologies, including relevant IMO lifecycle accounting approaches.
2. Scaling up and targeting maritime climate finance, with a focus on SIDS and LDCs	
The pilot study establishes a baseline, showing that maritime climate finance is growing but has not yet reached the scale seen in other mature sectors and remains uneven and short of estimated needs. USD 10.5 billion in direct maritime climate finance was tracked between 2018 and 2023, equivalent to 0.14% of tracked global climate finance. A limited share of the finance reached SIDS and LDCs. This indicates substantial scope to connect a broader range of maritime decarbonization and resilience priorities with existing climate finance, while strengthening investment-ready pipelines.	**Strengthen project pipelines and scale targeted finance, particularly in SIDS and LDCs.** Develop prioritized investment pipelines and strengthen feasibility studies and project preparation, including consideration of relevant technical standards, safety and regulatory requirements to help reduce uncertainty and support project bankability, and improve alignment between available finance and country needs. Engage development finance institutions or other financing partners early to align financing with country needs and facilitate implementation. **Strengthen institutional capacity in both technical matters and project finance to support investment readiness.** Support countries in identifying suitable financing institutions and instruments, understanding eligibility and investment criteria, assessing concessional and risk-sharing needs, and preparing projects for financing consideration. Facilitate early engagement with development financial institutions and other financing partners to improve alignment between project development and financing requirements. **Further assessment of factors underlying the comparatively low share of maritime climate finance.** Future analysis could distinguish between investment barriers, limited project pipelines and access to finance, technology and market maturity, and gaps in classification and data coverage.

Key findings	Recommendations
2. Scaling up and targeting maritime climate finance, with a focus on SIDS and LDCs *(cont.)*	
The financial instruments available to SIDS and LDCs may not match those financing emerging maritime decarbonization segments, particularly alternative fuels and maritime technologies. The pilot assessment indicates that alternative fuels and maritime technologies were financed largely through market-rate debt and equity, while the finance tracked for SIDS and LDCs was almost entirely through grants or low-cost debt from international public sources, potentially reflecting higher perceived or actual risks.	**Use public and private finance more strategically across project stages and market needs.** Match financing instruments to project maturity, risk and commercial viability. Consider concessional finance, guarantees and risk-sharing to improve the bankability of emerging maritime projects and enable greater access to market-rate debt and private equity where appropriate. Maintain grants and low-cost debt for activities and countries where commercial finance is not yet viable. Where appropriate, sovereign instruments such as green and blue bonds and sustainability-linked financing could provide additional sources of long-term capital. **Identify and design projects from the outset with a pathway to progress towards investment readiness and bankability**. Strengthen project structuring, feasibility work and financial planning so that projects can progress from early-stage preparation towards financing and implementation. Engage financing partners early to improve alignment between project design and financing requirements. **Adapt financing mechanisms to countries' comparative advantages.** Financing approaches should reflect country circumstances, comparative advantages and expected maritime demand, with instruments tailored to relevant value-chain segments including fuel production, import, storage, distribution and bunkering, as well as vessels, port infrastructure and maritime technologies, based on national needs and feasibility.
Investment decisions across fuels, ships, and ports are interdependent, and observed data indicate a need for greater alignment and coordination across segments. While a detailed assessment of offtake arrangements was outside the scope of the study, the extent of existing coordination may vary considerably across markets and geographies.	**Coordinate investment across the maritime value chain.** Support alignment of fuel, ships, port and supporting-infrastructure investment through national and regional planning taking into account expected demand and opportunities. Assess risks arising from current financing profiles and market trends, including infrastructure mismatches and exposure to premature or underutilized assets. Explore regional approaches to aggregate demand, coordinate infrastructure and share facilities where individual markets may lack sufficient scale.
SIDS and LDCs face particular constraints in accessing the finance and capabilities needed to participate in the maritime transition. Finance reaching them was limited and predominantly adaptation-focused. They relied predominantly on public and concessional finance. In contrast, commercial finance played a considerably larger role in the broader maritime market, suggesting that growth in overall maritime climate finance alone may not ensure their effective participation in the transition.	**Tailor support to the roles, needs and opportunities of SIDS and LDCs, while also expanding access to mitigation and dual-benefit finance.** Investment priorities should reflect country context, including connectivity needs, market size, institutional capacity, energy systems and renewable energy potential. While maritime climate finance in SIDS and LDCs was predominantly adaptation-focused, support can also enable investment in mitigation and emerging maritime segments by combining resilient infrastructure and essential connectivity investment with support for ship efficiency, alternative fuels and green shipping corridors, where appropriate. **Target public and concessional finance and improve access to a broader range of financing instruments**. Sustain concessional finance where commercial capital is unlikely to follow, while considering guarantees, risk-sharing and blended-finance approaches that may help mobilize private and market-rate capital as projects mature. **Strengthen institutional capacity and regional coordination.** Build capacity for project preparation, financing and engagement with financial institutions, and use regional cooperation to aggregate demand, coordinate infrastructure and address constraints associated with small market size and fragmented demand.

Key findings	Recommendations
3. Improving global maritime climate finance data, monitoring, and reporting	
Maritime climate priorities are not consistently integrated in national climate and financing frameworks. Limited integration across national climate, transport, energy and infrastructure planning constrains the translation of maritime priorities into investment-ready pipelines, while gaps in climate budget tagging and expenditure reporting limit visibility of domestic maritime climate finance.	**Identify synergies and link maritime climate planning to multi-sectoral investment pipelines and financing strategies.** Integrate and link maritime decarbonization and adaptation into national strategies, including broader national climate action plans under the UNFCCC and sustainable finance frameworks, with measurable targets, priority investments and financing needs. Integrate maritime activities into national climate budget tagging and expenditure tracking.
Maritime climate finance is not yet monitored through a consistent, regularly updated global system.	**Enable the establishment of an institutional maritime climate finance tracker.** Build on the pilot with regular updates, a consistent core methodology and progressive expansion of data sources. IMO could play a facilitating role in supporting further development and wider application by relevant stakeholders, alongside data sharing and methodological improvements.
Fragmented project-level reporting limits visibility of how maritime climate finance is committed, mobilized and deployed.	**Improve the coverage and consistency of project-level maritime finance data.** Standardize project descriptions, instruments, amounts and climate outcomes, while distinguishing commitments, disbursements, co-financing, mobilized private finance and total project value.
Tracking finance flows does not show whether investment is sufficient to deliver the maritime transition.	**Link maritime finance tracking with investment needs and implementation progress.** Compare tracked flows with global and regional investment needs and, as data improve, country-level and project-pipeline requirements. Use the comparison to identify financing gaps, benchmark progress and inform investment priorities across regions and value chain segments.

1. INTRODUCTION

International shipping is central to global trade, but also a major and growing emissions source that requires urgent, scaled-up climate finance. Maritime transport is the backbone of international commerce, facilitating approximately 90% of world trade by volume and 70% by value (WMU, 2024). This essential economic role carries a substantial environmental cost, with the sector currently responsible for around 3% of global greenhouse gas (GHG) emissions, a share that is expected to grow (Carbon Pricing Leadership Coalition, 2017; UNCTAD, 2025a). Although more than half of new ship tonnage on order consists of alternative fuel ships (including transitional fuels such as liquefied natural gas (LNG)), more than 90% of the active fleet continues to run on conventional fossil fuels (UNCTAD, 2025a). Without major intervention, emissions from international shipping are projected to reach up to 130% of 2008 levels by 2050 (IMO, 2020). In response, the International Maritime Organization (IMO) developed the *2023 IMO Strategy on Reduction of GHG Emissions from Ships* (IMO, 2023, resolution MEPC.377(80), adopted on 7 July 2023), which establishes a framework for decarbonizing international shipping and achieving net-zero emissions by or around 2050, including indicative checkpoints for 2030 and 2040 and targets to scale up alternative marine fuels and technologies. Delivering on these targets will require substantial investment, alongside robust systems to track finance flows, implementation progress, and remaining investment gaps.

Scaling up maritime climate finance will be required to address barriers and strengthen conditions for investments. Maritime decarbonization faces challenges including high upfront capital costs, small or fragmented markets, the long lifespan of maritime assets, uncertainty over future fuel pathways, and limited visibility over the availability, demand and pricing of alternative fuels (OECD, 2025a; Spiegelenberg, Fernke et al., 2026). These factors can increase investment risk and delay investment in ships, fuels and supporting infrastructure. Public and private climate finance can help address some of these constraints by reducing risk, supporting enabling conditions and mobilizing additional capital.

Investment in maritime decarbonization has significant socioeconomic impacts, alongside its climate benefits. This is especially important for small island developing States (SIDS) and least developed countries (LDCs), where the maritime sector is central to trade and internal transport. It also intersects with key sectors such as tourism and fishing. At the same time, decarbonization exposes small and remote economies to potentially high freight costs and transition risks. Climate risks also make the adaptation of maritime infrastructure increasingly important. Scaling this investment, particularly in SIDS and LDCs, is therefore critical. It can help meet mitigation and adaptation goals, while ensuring that economic development gains are sustained.

The total capital investment required to achieve maritime decarbonization by 2050 is estimated to range between USD 1.2 trillion and USD 1.6 trillion (Krantz et al., 2020). This corresponds to an average of USD 40-60 billion per year from 2030 to 2050. Most of these investments (87%) are required for land-based infrastructure and alternative fuel production, including hydrogen production, ammonia synthesis, and associated storage and bunkering facilities. By contrast, ship-related investments, including engines, onboard storage, and energy efficiency technologies, represent approximately 13% of the total required (Krantz et al., 2020). Other estimates suggest a wider range of annual investment needs, with ship-related investments between USD 8 billion and USD 28 billion per year and onshore infrastructure

requiring USD 28 billion to USD 90 billion annually (UNCTAD, 2023a). These estimates highlight the substantial and sustained financing required across the maritime value chain to achieve the decarbonization objectives of the IMO GHG Strategy.

These financing needs have key implications for SIDS and coastal LDCs, where maritime activities play a pivotal role in economic development, connectivity, and resilience. For many SIDS, maritime transport supports access to food, fuel, medicines, and other essential goods, while also supporting tourism, fisheries, employment, and connections between remote communities. Geographic isolation, high transport costs, climate vulnerability, and limited fiscal and institutional capacity of many SIDS and LDCs mean that the transition to a decarbonized maritime sector has significant climate and broader socioeconomic implications. At the same time, national circumstances vary, and some SIDS and LDCs with large open registries may have more established institutional capacities for the implementation of IMO instruments, while still facing wider structural, administrative and regulatory constraints. Such investment needs also arise in the context of high debt burdens, inflationary pressures, limited fiscal space and comparatively low climate finance flows. Total climate finance reached USD 1.9 trillion in 2023[1], but SIDS and LDCs received only 2.9% of total flows (CPI 2025 global climate finance dataset). They may therefore face disproportionate transition costs while relying on scarce public resources or expensive debt, reflecting broader challenges in mobilizing finance for vulnerable and capacity-constrained countries (CPI, 2025b). Accessible and appropriately structured climate finance can therefore be particularly important in supporting maritime investment needs in SIDS and LDCs.

Understanding where and how maritime climate finance is being channeled is essential to identifying which technologies, assets, and value chain segments are being financed, where investment gaps persist, and the scale of additional investment required to align the sector with decarbonization pathways. However, tracking climate finance flows to the maritime sector remains challenging due to fragmented data systems, inconsistent methodologies and taxonomies, complex financing arrangements, and the international and cross-sectoral nature of activities required for decarbonizing shipping. These characteristics create challenges in determining what qualifies as maritime climate finance, identifying and disaggregating relevant flows, and consistently attributing finance across activities and jurisdictions. Key challenges include:

- **Lack of harmonized definitions and taxonomies, and a globally recognized framework for defining "climate", "green", and "transition" finance in the maritime sector**. Maritime climate finance is assessed and reported through a range of frameworks that apply different classifications, eligibility criteria, indicators and emissions accounting approaches, which can limit comparability across datasets and institutions. Maritime decarbonization performance may be assessed using established IMO metrics, such as the Energy Efficiency Existing Ship Index (EEXI), Energy Efficiency Design Index (EEDI), and Carbon Intensity Indicator (CII) (IMO, no date), while financial-sector initiatives, such as the Poseidon Principles, apply respective methodologies for assessing the climate alignment of shipping portfolios. Maritime finance is also categorized through different approaches, including green finance linked to specific assets (Environmental Defense Fund, 2024), sustainability-linked finance tied to KPIs, and transition finance based on credible decarbonization pathways (RMI, 2023). The absence of a common approach for translating these different frameworks and metrics into climate

1 At the time of the analysis, the latest available data was for 2023

finance classifications can therefore complicate comparability and consistent tracking across institutions and systems.

- **Limited availability and accessibility of data on maritime climate finance flows**. Reliable, publicly available information on maritime decarbonization investments is scarce, particularly at the project level and in developing countries. In addition, many investments are embedded within broader transport, infrastructure, or energy portfolios, making maritime-specific finance difficult to isolate.
- **Complexity and interdependence of the maritime value chain complicate finance tracking.** Decarbonization requires coordinated investment across ships, ports, fuel infrastructure, logistics, retrofitting, and alternative fuels, while financing is channeled through diverse actors and financing structures. Investment needs across these segments are also interdependent. The deployment of low-carbon ships depends on the availability of appropriate alternative fuel and port infrastructure, while investment in this infrastructure depends on sufficient visibility over future vessel and fuel demand (IMO, 2023a; UNCTAD, 2023a). As investment in low-carbon ships increases, the type and availability of supporting infrastructure varies considerably across technologies and alternative fuel pathways. Port readiness can also take different forms depending on a port's role and does not require every port to provide bunkering for every alternative fuel. Relevant ports may instead need the capacity to safely receive and service new ship types, alongside adequate energy, safety, handling, and regulatory systems. Clarksons' Green Technology Tracker reports that 276 ports globally have LNG bunkering operational or planned and 275 ports have operational or planned shore power connections, compared to only 35 ports with methanol bunkering infrastructure, illustrating different levels of infrastructure readiness across technologies and emerging alternative fuel pathways (Clarksons, 2025).
- **The global nature of shipping creates attribution and accountability challenges, which complicate consistent tracking of financial contributions and progress toward maritime climate finance goals**. Ships are often financed, flagged, owned, and operated across multiple jurisdictions and actors, meaning that related investments and emissions frequently fall outside national accounting and climate finance frameworks.

1.1 REPORT OBJECTIVES

In this context, this pilot study aims to define and scope maritime climate finance flows. The report's objectives are split into two key areas and the associated recommendations:

1. **Developing a pilot classification framework for maritime activities:** Map, define and classify maritime activities, technologies and processes across the maritime value chain, covering shipping and ports and including activities relevant to both climate mitigation and adaptation. The framework considers activities across the value chain, from alternative fuel production to ship recycling and climate-resilient port infrastructure, and supports alignment and interoperability with relevant international frameworks and standards, including the IMO GHG Strategy where applicable. It also provides a foundation for the further integration of maritime activities into sustainable finance taxonomies.
2. **Conducting a pilot climate finance assessment: Based on the pilot classification framework,** the assessment analyzes climate finance flows across the maritime value chain and establishes a structured baseline for tracking maritime climate finance, with particular

attention to SIDS and LDCs. The assessment provides a preliminary overview of current flows, trends, and data gaps. The application of the pilot classification framework helps address differences in reporting practices and existing taxonomies.

3. **Recommendations:** Evidence-based recommendations to strengthen the classification and tracking of maritime climate finance and support increased investment in mitigation and adaptation activities, taking into account the regional and economic characteristics and specific vulnerabilities of SIDS and LDCs.

Accordingly, the report is structured as follows:

- **Section 2:** Development of a pilot maritime climate finance classification framework
    - Presents the rationale, approach, and structure of the framework, in line with the IMO GHG Strategy, to support consistent tracking of climate finance across the full maritime value chain, including enabling activities.
- **Section 3:** Pilot assessment of maritime climate finance flows
    - Applies the pilot classification framework (in Section 2) to establish an initial baseline of climate finance flows to maritime decarbonization and adaptation from 2018 through 2023, outlining the assessment methodology, financing across value chain segments, and a focus on SIDS and LDCs.
- **Section 4:** Recommendations
    - Provides recommendations to strengthen the application of the pilot maritime climate finance classification framework, scale, and better target investment across the maritime value chain with a focus on SIDS and LDCs, and improve the tracking, monitoring, and reporting of maritime climate finance.
- **Section 5:** Annex
    - Contains the supporting methodological documentation and classification parameters underpinning the climate finance assessment.
- **Section 6:** References
    - Lists the sources cited and used in the report.

2. DEVELOPMENT OF A PILOT MARITIME CLIMATE FINANCE CLASSIFICATION FRAMEWORK

2.1 PILOT CLASSIFICATION FRAMEWORK METHODOLOGY

2.1.1 CLIMATE FINANCE DEFINITION

Defining climate finance sets the scope of analysis for tracked investment in the maritime sector. However, there is no universal definition (IPCC, 2023). This framework follows CPI's working definition of climate finance and is aligned with the latest recommended operational definition of the UNFCCC Standing Committee on Finance (SCF) (UNFCCC, 2024):

> "Climate finance aims at reducing emissions and enhancing sinks of greenhouse gases, aims at reducing vulnerability, increasing adaptive capacity, and mainstreaming and increasing resilience of human and ecological systems to negative climate change impacts, and includes financing for actions identified in a country's nationally determined contribution, adaptation communication, national adaptation plan, long-term low-emission development strategy or other national plan for implementing and achieving the goals of the Paris Agreement and the objective of the Convention."

The pilot classification primarily focuses on climate finance activities, defined as:

- **Mitigation finance**: resources directed to activities either contributing to reducing or avoiding GHG emissions, including gases regulated by the Montreal Protocol; or maintaining or enhancing GHG sinks and reservoirs.
- **Adaptation finance**: resources directed to activities aimed at reducing the vulnerability of human or natural systems to the impacts of climate change and climate-related risks, by maintaining or increasing adaptive capacity and resilience.
- **Dual-benefit finance:** resources directed to activities contributing to both mitigation and adaptation and meeting the respective criteria for each category.

Given the hard-to-abate nature of the maritime sector, the pilot classification framework for maritime decarbonization and adaptation activities adopts a broader lens than strictly defined climate finance, to holistically classify all activities relevant to the long-term decarbonization pathway of the shipping sector. It therefore categorizes green or transition finance that is not climate finance as "**other associated finance**". These types of finance are defined below and visualized in Figure 1.

- **Green finance** takes environmental considerations into account but is not exclusive to positive GHG mitigation or climate adaptation outcomes. The International Development

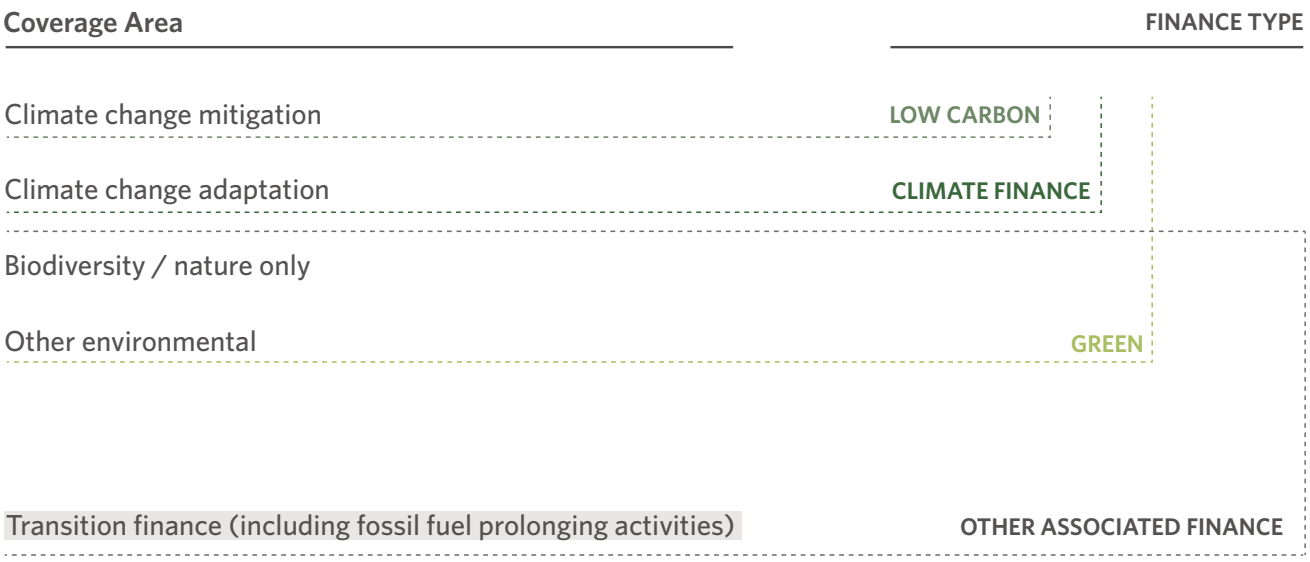
Finance Club (IDFC, 2024) uses 'Green Finance' as an umbrella term, which contains the categories of: (i) Climate finance; (ii) Biodiversity finance; and (iii) Finance with other environmental objectives.

- **Transition finance** refers to the investment in services that support the decarbonization of high-emitting sectors or activities that are critical to socioeconomic development but currently lack economically viable low- or zero-emission alternatives (CPI, 2025b). This applies to activities that cannot be classed as low carbon but can demonstrate alignment with a net-zero pathway, when adhering to time-bound emission reductions by a prescribed sunset date (CPI, 2025b). Without this condition, investments risk fortifying long-term carbon lock-in.

While the importance of other activities is recognized, including transitional solutions, for short- to medium-term decarbonization, these activities are not classified as climate finance under CPI's tracking principles. They are therefore tracked and analyzed separately, where relevant (see Annex 5.1 for more information). Whilst the framework utilizes all these definitions, the pilot finance tracking focuses on:

1. **Maritime climate finance,** the primary focus of this report; and
2. **Transition finance,** through LNG ship investments, providing a comparative benchmark for maritime climate finance.

Figure 1: Climate finance vs other associated finance



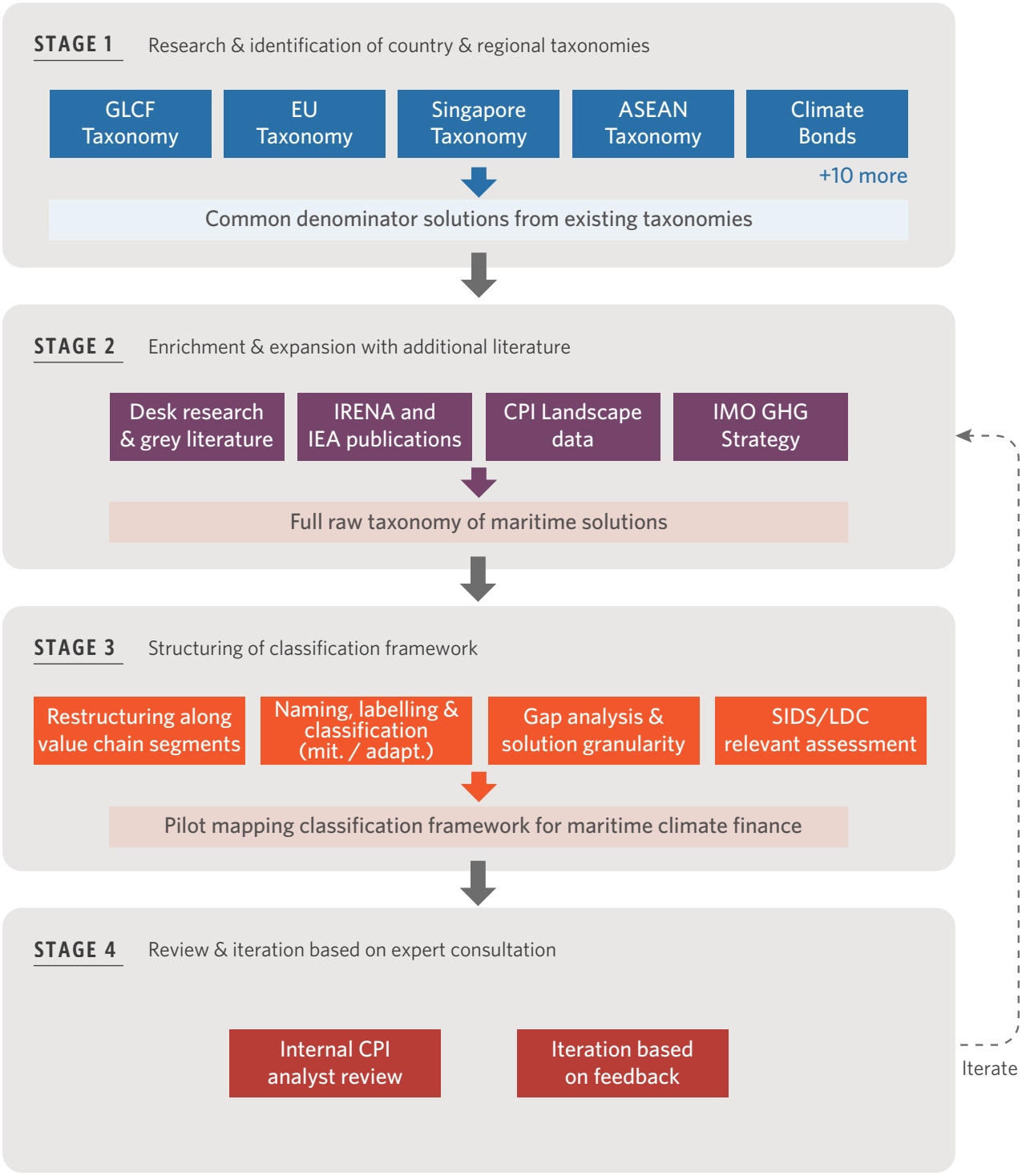
Note: Transition finance is overarching as it supports the pathway from current high-emission activities toward full sustainability, encompassing elements of green, climate, social, and environmental finance.

Biodiversity / nature finance with a climate mitigation or adaptation benefit is captured within the respective category.

2.1.2 FRAMEWORK DEVELOPMENT PROCESS

The pilot classification framework was developed through a structured, multi-stage process designed to consolidate the fragmented landscape of maritime climate finance activities into a single, coherent framework. Figure 2 illustrates this process, which combines a review of existing taxonomies with targeted enrichment and validation steps.

Figure 2: Pilot classification framework creation process



Note: GLCF Taxonomy refers to CPI's Global Landscape of Climate Finance Taxonomy.

Stage 1 – Source identification and common solutions. Nineteen sustainable finance taxonomies were reviewed and analyzed to determine the scope of maritime activities already covered. These existing global frameworks, regional taxonomies, and national taxonomies across sub-Saharan Africa, South Asia, and Latin America were selected for their relevance to maritime decarbonization and/or status as a SIDS or LDC.[2] This review revealed significant variation in how maritime decarbonization activities are scoped, structured, and operationalized. Table 1 details the taxonomies reviewed, with a short overview.

Table 1: List of regional and national taxonomies and global frameworks reviewed[3]

Country / Region	Brief description of taxonomy and classification approach
National and Regional Taxonomies	
Fiji Taxonomy (Reserve Bank of Fiji, 2025)	The first SIDS taxonomy in the Pacific. It applies a traffic light classification, assigning Green and Amber technical thresholds to activities. Covers both sea/coastal and inland water transport, including ships and ship retrofits. Includes enabling and port operational infrastructure.
EU Taxonomy (European Commission, 2026)	Most detailed regional taxonomy, with technical screening criteria. Includes sea/coastal and inland passenger/freight water transport, vessels for port operations, retrofits, enabling infrastructure and port infrastructure.
ASEAN Taxonomy (Version 4.0) (ACMF, 2025)	Regional taxonomy for Southeast Asia. Covers sea and coastal passenger/freight transport, port operations and vessels, retrofitting, inland water transport, and low-carbon water-transport infrastructure. Contains energy and storage categories, covering fuel supply and renewable electricity.
Singapore Taxonomy (SSFA, 2023)	Advanced Asia-Pacific taxonomy with explicit tank-to-wake (TTW) GHG emissions accounting boundaries. Applies three-tier technical screening criteria disaggregated by (1) zero direct tailpipe GHG emissions, (2) 80% GHG savings on a TTW basis, (3) Climate Bonds Initiative (CBI) emission intensity threshold by vessel type. Covers sea and coastal water transport, including passenger and freight transport, coastal and harbor craft, ferries and towage.
Nepal Taxonomy (NEPAL RASTRA BANK, 2024)	Landlocked LDC taxonomy notable for including shipbuilding and manufacture of water transport vehicles. Also includes port/dryport infrastructure and operations (inc. charging stations, waste disposal facilities, shore side power and hydrogen refueling), zero-tailpipe vessels, low-GHG cargo and passenger ships, and hybrid propulsion technologies.
Rwanda Taxonomy (MINECOFIN, 2024)	Landlocked sub-Saharan Africa LDC taxonomy covering inland water transport, shipping infrastructure (electricity charging, shore power), port operations, and circular economy activities (battery recycling/ replacement for vessels). Mainly supports relevance through enabling fuel and adaptation categories. In the energy sector, low-carbon hydrogen, biofuels, and renewable/low-carbon gas networks are included.
Uganda Taxonomy (Government of Uganda, 2025)	LDC taxonomy mainly covers adaptation and nature-based measures. Includes water and flood risk management for coastal/riverbank protection, nature-based infrastructure for port resilience (mangrove restoration, wetland protection), and biodiversity protection measures.
Zambia Taxonomy (Government of Zambia, 2025)	Landlocked maritime relevant taxonomy, encompassing hybrid/electric propulsion systems for ferries and barges, alternative fuels, digitalization and automation, innovative logistics solutions and environmental monitoring. Applies a zero direct emissions standard with 5-year review cycles.
Dominican Republic Taxonomy (SIMV, 2024)	First Caribbean SIDS taxonomy with maritime relevance. Covers fleet modernization and electrification, low-carbon fuels including sustainable biofuels and biogas, and vessels using alternative fuels such as green hydrogen.

2 In this context, a taxonomy is a classification system or framework that uses metrics, targets, eligibility criteria, or thresholds to identify, classify, and guide finance toward activities, assets, projects, or investments that meet defined environmental, climate, social, or "green" objectives (CPI, 2022a, 2024, 2025a).

3 This table provides an overview of relevant solutions covered by each taxonomy and is not exhaustive of all activities. For more information, see the source reference.

Table 1 *(cont.)*

Country / Region	Brief description of taxonomy and classification approach
National and Regional Taxonomies *(cont.)*	
South Africa Taxonomy (Department of National Treasury, 2022)	Covers inland passenger and freight water transport with activity compliance criteria, plus infrastructure enabling low-carbon water transport, including electric charging, hydrogen refueling, port infrastructure and operations.
Sri Lanka Taxonomy (Central Bank of Sri Lanka, 2022)	Includes manufacture of low-carbon transport fleets and ships, infrastructure enabling low-carbon water transport, and treatment of wastewater from ships, shipping yards, and ports. Includes shore-side power, hydrogen refueling, and port operation vessels.
Global and Cross-Cutting Shipping Frameworks	
IMO GHG Strategy (IMO, 2023a)	Sets the overarching decarbonization pathway for international shipping, targeting net-zero by or around, i.e., close to 2050, with 2030 and 2050 emission-reduction targets. The framework targets improved carbon intensity and increased uptake of zero- and near-zero GHG fuels and technologies.
Poseidon Principles (2019)	A framework for financial institutions to assess and disclose climate alignment of ship portfolios against IMO-aligned decarbonization trajectories. It uses ship emissions data to support climate-aligned lending decisions.
Global Landscape of Climate Finance (CPI, 2025b)	Binary classification covering maritime transport activities including retrofit of existing fleets with low-carbon technologies, new low-carbon fleet construction, port infrastructure and operations risk hardening, charging infrastructure, biofuel transport and distribution, and operational efficiency measures in shipping.
Climate Bonds Initiative (CBI, 2020)	The CBI shipping criteria framework includes a taxonomy of assets and projects relevant to shipping. This includes ships above 5,000 GT, for which data is collected under the EU MRV and/or IMO DCS data collection regimes; ships below 5000 GT if zero-emissions ships; infrastructure that is dedicated to refueling or recharging zero-emissions ships. Coverage includes cargo ships, low- and zero-emission vessels, passenger ships, ferries, and inland waterway vessels with emission intensity thresholds.
Common Principles for Climate Mitigation (Joint MDBs, 2023)	Covers low-carbon vehicles and associated infrastructure, low-carbon mode and efficiency improvement in maritime and inland waterway transport, and low-carbon fuels for transport.
Latin America and Caribbean Common Framework (UNEP FI, 2023)	Covers alternative fuel operation of vehicle fleets and electric and green hydrogen-based transport systems.
IRENA (2021)	Covers maritime decarbonization pathways through renewable fuels, energy-efficiency measures, fleet modernization, and enabling fuel supply infrastructure. Assesses fuel pathways, ship improvements, and the role of ports and supply chains.
Multilateral development banks (MDB) Common Nature Finance Taxonomy (Joint MDBs, 2025)	Standardized taxonomy of nature-finance activities. Relevant to maritime climate finance through coastal and marine ecosystems, nature-based coastal resilience, and biodiversity-positive port and coastal infrastructure.

From this review, a set of "common denominator solutions" – maritime activities that appear across multiple taxonomies and frameworks, such as ship retrofits, low- and zero-emission ships, port infrastructure, alternative fuels, and nature-based coastal resilience – were extracted. Table 2 maps examples of these common denominator solutions, the broad activity categories identified across multiple source taxonomies, to the relevant frameworks in which they appear.

Table 2: Example of common denominator solutions across existing taxonomies

Segment	Solutions	Source Taxonomies
Maritime operations and technologies	Retrofitting of sea and coastal freight and passenger water transport	GLCF; ASEAN; EU; Fiji
	Retrofitting of inland water passenger and freight transport	GLCF; ASEAN; EU; Fiji; Nepal; Common Principles; South Africa
	Sea and coastal water transport — low- and zero-emission ships	GLCF; EU; Singapore; ASEAN; Fiji; Climate Bonds; Common Principles
	Inland water transport — low- and zero-emission ships	EU Taxonomy; Singapore; South Africa Taxonomy; Fiji; Rwanda; Zambia
	Fleet modernization and electrification	GLCF; Zambia; Dominican Republic; Nepal; EU; ASEAN; Fiji; Singapore; Climate Bonds; Common Principles; Sri Lanka
	Operational efficiency and logistics optimization in shipping	GLCF; Zambia; Common Principles; South Africa
Port infrastructure and operations	Enabling infrastructure for low-carbon water transport	Climate Bonds; Singapore; Rwanda; Sri Lanka; Nepal; Fiji; EU; ASEAN; South Africa; Common Principles; GLCF
	Shore-side electrical power (cold ironing)	Singapore; Rwanda; Nepal; Sri Lanka; EU; ASEAN; Fiji; South Africa; Common Principles
	Port infrastructure risk hardening and climate resilience	Uganda; ASEAN; GLCF; Rwanda
	Battery charging infrastructure for vessels	GLCF; Singapore; Nepal; Climate Bonds; EU; ASEAN; Fiji; South Africa; Sri Lanka; Common Principles
Alternative low- and zero-carbon fuel production and distribution	Low-carbon marine fuels	GLCF; Dominican Republic; Zambia; Nepal; Common Principles; Latin America; Caribbean Common Framework; Fiji; ASEAN; Singapore; Rwanda; South Africa; EU
	Biofuel transport and distribution infrastructure	GLCF
Shipbuilding and recycling	Manufacture of low-carbon water transport vehicles	Nepal; Sri Lanka; Climate Bonds;
Cross-sectoral	Nature-based infrastructure for port resilience	Uganda, Zambia, MDBs Nature Finance

Note: all solutions relate to mitigation, except for Port infrastructure risk hardening, climate resilience and Nature-based infrastructure for port resilience.

Some common solutions identified include:

a) **Maritime operations and technologies** are the most widely covered activities across taxonomies, particularly retrofitting and the operation of zero/low-emission ships.

b) **Port infrastructure,** including enabling infrastructure and shore power, is the second most common category.

c) **Alternative low- and zero-carbon fuel production and distribution**, while critical to maritime decarbonization, typically appears in taxonomies under other sectors, mostly energy. The link to end-use sectors, such as maritime decarbonization, is not established. Fuel storage and bunkering are often represented at the port level.

d) **Shipbuilding activities** are notably underrepresented, appearing in only four of the nineteen taxonomies reviewed.

Stage 2 – Enrichment and expansion. The initial list of solutions derived from existing taxonomies was further developed by drawing on additional sources, including desk research and gray literature, national adaptation plans (NAPs), and related policy documents, CPI climate finance landscape data, and technical publications from IMO, IRENA, the International Energy Agency (IEA) and others. Combining these sources with the common denominator solutions produced a full raw taxonomy of maritime solutions, capturing a broader set of mitigation and adaptation activities across the maritime value chain, including enabling infrastructure and fuel supply.

Stage 3 – Structuring and validation. The full raw solution list was structured and validated to produce the pilot classification framework for maritime climate finance. This involved:

- **Restructuring solutions along clear value chain segments** (e.g., maritime operations and technologies, port infrastructure and operations, alternative fuel production and distribution, shipbuilding and recycling, nature-based infrastructure for port resilience),
- **Naming, labeling, and classifying solutions** as mitigation and/or adaptation,
- Undertaking a **gap analysis** to identify under-represented solutions and assess the level of granularity needed, and
- **Assessing relevance for SIDS and LDCs contexts**, given their specific maritime and vulnerability profiles.

Stage 4 – Review and iteration. The pilot framework then underwent iterations based on feedback from partners and experts to ensure it is methodologically robust, while remaining flexible enough to incorporate future updates as new taxonomies, technologies, and IMO decisions emerge.

2.2 PILOT CLASSIFICATION FRAMEWORK – VALUE CHAIN SEGMENTS AND SOLUTIONS

A classification framework capturing the full maritime decarbonization pathway in line with the IMO GHG Strategy is needed to map and track climate finance flows and gaps to the sector. It can also serve as a foundational basis to support future integration and interoperability with emerging sustainable finance taxonomies. Existing regional and institutional taxonomies provide a useful foundation to understand how countries, especially SIDS and LDCs, approach maritime climate finance, but they are often fragmented and localized, leaving some key solutions underrepresented. The pilot classification framework developed for this report begins to address these gaps by capturing the full maritime decarbonization and adaptation pathway.

The report proposes the categorization of the maritime value chain into the core segments displayed in Figure 3, including enabling activities, such as institution strengthening and cross-sectoral activities. Each segment is broken down further in the full classification framework in Section 2.3.

Figure 3: Simplified maritime climate finance classification framework

CLIMATE FINANCE

Mitigation

Alternative low- and zero-carbon fuel production and distribution

Investment in alternative (low-carbon & zero-emission) fuel production and distribution, inc. efficiency.

Shipbuilding and recycling

Focuses on sustainable materials and practices within ship construction, including recycling.

Port infrastructure and operations

Investment in physical systems, equipment, and energy solutions at ports. Including bunkering and ship fueling.

Cross-sectoral activities

Supports activities that cut emissions across multiple parts of the maritime value chain, including integrating planning and shared low-carbon systems and services.

Institutional strengthening

The policy, regulatory, and knowledge frameworks that underpin maritime decarbonization, including emissions monitoring infrastructure and workforce capacity building.

Maritime operations and technologies

The technologies and systems on board ships that directly reduce emissions. Including energy efficiency measures.

Adaptation

Port infrastructure and operations

Climate resilient infrastructure - physical upgrades and design standards that protect port assets from climate-related hazards.

Cross-sectoral activities

Broader environmental management approaches that extend beyond port boundaries, including marine spatial planning, habitat restoration, and the co-management of protected areas.

Institutional strengthening

Covers the policy, regulatory, and knowledge frameworks that directly strengthen climate adaptation and resilience in the maritime sector, including climate risk assessment, resilience planning, monitoring systems, and capacity building.

OTHER ASSOCIATED FINANCE

Transition finance

Investment in transitional fuels (e.g. LNG), including production and distribution, vessel propulsion and retrofits, port bunkering infrastructure, and onboard carbon capture.

2.2.1 SEGMENT – ALTERNATIVE FUEL PRODUCTION AND DISTRIBUTION

The marine fuel value chain is a major bottleneck to maritime decarbonization (Nordic West Office, 2023). Fossil-based fuels represented approximately 95% of total marine fuel consumption in 2023, and heavy fuel oil (HFO) represented 79% of total fuel consumption in international shipping demand in 2018 (IMO, 2020; DNV, 2025b). To ensure decarbonization, the maritime sector must rapidly transition towards alternative low- and zero-carbon fuels, including green ammonia, methanol, hydrogen-based synthetics, and sustainable biofuels (IMO, 2020). According to modeling by the IEA, 'low-carbon' fuels need to supply approximately 35% of global shipping fuel demand by 2035 to align with IMO's net-zero pathway (IEA, 2025a). Achieving this target will require a rapid scale-up of production and distribution. However, the market faces a significant supply-demand imbalance, with the production of alternative low- and zero-carbon marine fuels in 2025 falling very short of the breakthrough target required to be on track to provide 5-10% of international shipping fuel demand in 2030 (Global Maritime Forum & UCL Energy Institute, 2026).

A lack of regulatory certainty constrains investment across both supply and demand. Fuel producers are reluctant to invest in large-scale production capacity without securing long-term offtake agreements. Meanwhile, shipowners hesitate to commit to low-carbon fuel purchases given uncertainty over availability, evolving regulations, and significant cost premiums relative to conventional fuels (IEA, 2025a). These challenges are compounded by the cross-sectoral demand for low-carbon fuels, creating competition for future supply. Fuels such as ammonia and methanol are expected to play important decarbonization roles across several hard-to-abate sectors, including chemicals, power generation, and heavy industry. Competition across sectors may influence both the cost and allocation of these fuels for shipping, particularly where more cost-effective uses may exist in other sectors.

The implications of the fuel transition are particularly significant for SIDS. Dependence on fossil fuels exposes many SIDS to fuel price volatility and supply disruptions. Those in the Pacific use approximately 75% of their oil imports for transport (UNDP, 2024). Alternative marine fuels present an opportunity to diversify their energy mix, supporting energy security while supporting maritime decarbonization. Given their small domestic markets and industrial base, opportunities for SIDS to participate in emerging maritime fuel value chains may vary according to renewable energy potential, market and infrastructure conditions, capacity and access to finance. While some may develop low- and zero-carbon marine fuel production, others may participate through import, bunkering and distribution. These opportunities may be particularly relevant for SIDS, as renewable-based marine fuels could enable new suppliers to enter markets historically dominated by fossil-fuel producers, while the lower specific energy of some alternative fuels may increase refueling requirements and expand opportunities for new bunkering and distribution hubs along maritime routes.

For SIDS and LDCs, expanding access to reliable, affordable, and renewable energy remains a national priority, while many also possess abundant solar, wind, and hydropower resources that could support future production of green hydrogen, ammonia, methanol, and other alternative marine fuels. Developing alternative fuel production capacity will require substantial investment in renewable energy, infrastructure, technical capacity, and enabling policies, alongside improved access to concessional finance and technology transfer. In the near term, investment is expected to focus on strengthening renewable energy systems and associated port infrastructure, which could support future alternative-fuel production.

2.2.2 SEGMENT – PORT INFRASTRUCTURE AND OPERATIONS

Port infrastructure and operations are becoming a critical enabler of maritime decarbonization, evolving beyond traditional logistics roles to become strategic green energy hubs. This transition involves the deployment of onshore power supply[4] (OPS, "cold ironing") systems and infrastructure for the storage, handling, and bunkering of alternative marine fuels. Port readiness for the maritime energy transition extends beyond bunkering and will vary in scope depending on each port's role and context, while generally involving improvements in technologies, infrastructure and operations to reduce portside emissions and support lower-emission vessel operations. It can include the capacity to safely receive and service alternative fuel ships, adequate energy infrastructure, fuel storage and handling systems, emergency response capabilities, trained personnel, and appropriate safety and regulatory frameworks. Not all ports will therefore need to develop the same infrastructure or become alternative fuel bunkering hubs.

However, deployment of these solutions remains uneven across technologies and fuel pathways, requiring significant investment in port infrastructure and operations. Onshore power supply and alternative marine fuel bunkering facilities are available in only a small number of ports, with adoption often driven by regulatory requirements. Significant investment is required to modernize port infrastructure, including for the upgrade of energy systems, operational equipment, and supporting infrastructure to ensure compatibility with future maritime fuel pathways. Green shipping corridors can provide an important framework for coordinating these investments and supporting ports' transition by concentrating early demand for alternative fuels and technologies along defined maritime routes, helping to create clearer demand signals and coordinate investment across ports, fuel producers, vessel operators, and cargo owners (Global Maritime Forum, 2021).

For LDCs and SIDS, ports represent the most immediate opportunities to reduce emissions, as activities fall under the direct control of port authorities. Electrifying port equipment, improving operational efficiency, integrating renewable energy, and deploying digital solutions can reduce operational emissions while improving energy security and generating cost savings. For example, Fiji Ports Muaiwalu 2 inter-island shipping wharf operates entirely on renewable electricity generated by a 6-kW rooftop solar PV system, complemented by solar-powered lighting and energy-efficiency building upgrades. This project has transformed the facility into a net-zero operation for Scope 1 and 2 emissions, reducing emissions by an estimated 2.2 tCO_2eq (tonnes of carbon dioxide equivalent), with projected annual electricity cost savings of approximately FJD 1,600 (USD 700) (WPSP, 2023). Participation in regional or international green shipping corridors can also help SIDS and LDCs coordinate port and fuel infrastructure around specific trade routes and demand, reducing investment uncertainty while concentrating fuel supply and bunkering at strategically located ports.

These investments should also account for the climate resilience of critical port infrastructure and operations, particularly in SIDS and coastal LDCs where ports are essential for connectivity, trade, and access to essential goods. This is also relevant in the context of new fuels and technologies, which may introduce additional safety, storage, handling and emergency response requirements that need to remain resilient to climate-related hazards. Relevant adaptation measures may include quay elevation, breakwater and coastal protection, improved drainage systems, floodproofing of critical infrastructure, and nature-based solutions (NbS), among others (see Case Study 8).

4 This process allows vessels to shut down auxiliary engines and connect to the local grid while at berth

2.2.3 SEGMENT – MARITIME OPERATIONS AND TECHNOLOGIES

The maritime operational value chain offers some of the most immediate opportunities for reducing emissions from shipping, particularly through energy efficiency and operational optimization (World Bank, 2025a). These measures can support compliance with IMO regulatory requirements such as the Energy Efficiency Existing Ship Index (EEXI) and the Carbon Intensity Indicator (CII), while also delivering short-term fuel savings. Energy efficiency encompasses both technical and operational measures.

Technical measures include hull-form optimization, propeller upgrades, air lubrication systems, waste-heat recovery, and wind-assisted propulsion technologies. Recent analysis suggests that ambitious energy-efficiency measures could reduce emissions by up to 40% by 2030 relative to 2008 levels, surpassing IMO's 2030 targets (Environmental Defense Fund, 2024; UNCTAD, 2025a; World Bank, 2025a). However, investment remains constrained by regulatory uncertainty over future carbon intensity standards, compliance requirements, and fuel regulations. Split incentives hinder adoption, as shipowners invest in expensive energy-efficient technologies while charterers benefit from the fuel-saving advantages (U.S. Department of Transportation, 2023). In some markets, shipowners capture less than 10% of the fuel savings generated by efficiency improvements, with the majority accruing to charterers through prevailing rate structures (Carbon Pricing Leadership Coalition, 2017). Operational measures include speed optimization, weather routing, and improved port call coordination. Slow steaming is among the most effective short-term GHG abatement opportunities, with studies estimating emissions savings of approximately 5-15%. Further reductions can be achieved through just-in-time arrival systems that reduce waiting times and congestion at ports (World Bank, 2025a). Operational measures enabled through digitalization, automation, smart-port systems, and advanced logistics management can improve ship utilization and facilitate additional fuel and emissions savings.

For SIDS and LDCs, operational measures focus on improving the efficiency of domestic and regional shipping through fuel consumption monitoring, route optimization, and digital port systems. For instance, the Maritime Technology Cooperation Centre-Pacific program (Pacific Community, no date) funded by IMO and the European Union has supported pilot projects across Fiji, Kiribati, Samoa, Solomon Islands, Tuvalu, and Vanuatu. These projects have sought to monitor fuel consumption, improve ships' energy efficiency, and strengthen technical capacity for emission reductions. Another example is an initiative by IMO, the World Bank, and the Africa Transport Policy Program in Eastern and Southern Africa to accelerate digitalization of ports through the implementation of Maritime Single Windows and Port Community Systems to digitalize the exchange of information between ships, ports, and public authorities, helping to streamline clearance procedures, improve call coordination, and reduce ships' waiting time. While primarily aimed at trade facilitation, such systems can provide enabling infrastructure for more efficient port operations and emission reductions (IMO, 2026).

Retrofitting the existing global fleet is another key decarbonization lever, particularly given the long lifespan of maritime assets and the need to improve emissions performance of existing ships. Energy efficiency retrofitting, such as hull design optimization, air lubrication, wind-assisted propulsion, and propeller upgrades, can reduce GHG emissions by 7-8% in 2030 and 10-11% in 2050 compared to 2030 business as usual under a 10% speed reduction scenario (World Bank, 2025a). These upgrades can also reduce carbon intensity, supporting compliance with the CII. Despite their potential, retrofit investments face a combination of

financial, commercial, and regulatory barriers. A split incentive persists, whereby financiers seek returns or premiums on retrofit investments, while charter markets often fail to adequately reward these improvements. Financing of retrofits is also hindered by loan security challenges, as banks are often reluctant to provide capital for smaller amounts against assets that are already hindered by original first-ranked mortgages, making such transactions less attractive than newbuild financing (Environmental Defense Fund, 2024). The absence of independently verified performance data for wind-assisted propulsion technologies and the energy savings they deliver is a further constraint, as shipowners and financiers cannot readily appraise expected fuel savings and payback periods. Additionally, uncertainty surrounding future fuel pathways, fuel availability, and evolving regulatory requirements can discourage investment in existing assets, leading shipowners to favor dual-fuel newbuilds over the modernization of older units (Getting to Zero Coalition, 2025). Nevertheless, the retrofitting of energy-saving technologies is gaining momentum in some maritime hubs. China leads on hull and propeller retrofits, while European shipyards specialize in wind-assisted propulsion and onboard carbon capture (OECD, 2025a). In Europe, the inclusion of maritime transport in the EU Emissions Trading System (EU ETS) and the implementation of FuelEU Maritime are also strengthening incentives to reduce vessel emissions and fuel consumption, potentially improving the business case for some energy-efficiency and low-carbon retrofit investments. Bulk carriers and container ships represent over 60% of retrofit activity, highlighting the prioritization of high-emitting vessel segments (OECD, 2025a). This concentration of technical expertise and retrofit capacities may pose challenges for SIDS and LDCs due to high costs of retrofit technologies (IMOCARES, 2024) and dependence on overseas facilities and external technical expertise.

2.2.4 SEGMENT – SHIPBUILDING AND SHIP RECYCLING

The shipbuilding value chain will be critical in determining the long-term emissions trajectory of the sector. Given that the global fleet averaged 22.2 years by ship count in 2024 (UNCTAD, 2025a), ships built today are likely to remain operational beyond the 2050 net-zero target (UNCTAD, 2025a). Decisions made during design and construction can lock in emissions and fuel pathways for decades, creating a risk of stranded assets if ships are not compatible with future fuels and regulatory requirements.

Decarbonization of shipbuilding and recycling also requires addressing embodied emissions from materials and construction processes. In the pre-production phase, emissions arise primarily from extraction and processing of raw materials. Steel is the dominant source of emissions in this process and accounts for approximately 8% of global GHG emissions (OECD, 2025a). The adoption of lower-carbon hot-rolled steel could reduce international shipping's cumulative carbon emissions by roughly 776 million tons between 2024 and 2050 (OECD, 2025a). Achieving these reductions requires a combination of material efficiency, increased use of recycled materials, and cleaner industrial production.

The transition toward low-carbon ship fleets is expected to accelerate the retirement and recycling of older ships. As international shipping moves towards decarbonization by or around 2050, it is expected that demand for newer, low-carbon and more efficient fleets will increase, requiring older ships to be recycled. Ship recycling supports maritime decarbonization by enabling fleet renewal and recovering steel and other materials for reuse, reducing demand for virgin materials and supporting a more circular, lower-carbon shipbuilding and recycling value chain. The Hong Kong International Convention for the Safe and Environmentally Sound

Recycling of Ships, 2009 (Hong Kong Convention), provides a global framework for safe and responsible recycling. However, the transition to low-carbon shipbuilding is constrained by economic and technological barriers, including an average 12% price premium for low-carbon ships, fuel cost differentials, and capacity bottlenecks associated with new propulsion and fuel systems (OECD, 2025a).

Large-scale commercial shipbuilding is highly concentrated: China, the Republic of Korea and Japan accounted for around 95% of global shipbuilding output in 2023 (UNCTAD, 2024). The industrial infrastructure, specialized labor and economies of scale required for shipbuilding, marine engine manufacturing and large-scale recycling limit direct participation opportunities for many smaller developing economies, particularly SIDS. However, as in other transport sectors, such as aviation, repair and maintenance activities can be more geographically distributed even where production is concentrated in a limited number of locations. For SIDS, this may create opportunities to strengthen selected ship operation, maintenance, repair and retrofit services, particularly where sufficient vessel traffic, technical capacity and supporting infrastructure exist, while also building capabilities for compliance with international environmental and safety standards. By contrast, some LDCs already play an important role in the global shipbuilding and ship recycling value chain**.** Bangladesh is a leading ship recycling country (Hossain, 2025) and has developed a shipbuilding sector for small and medium-sized vessels. Growing fleet renewal could increase demand for recycling capacity, which recovers substantial volumes of steel and other materials for reuse in shipbuilding and other sectors, displacing emissions-intensive primary production and reducing embodied emissions across the maritime value chain. This reinforces the need to modernize facilities and strengthen worker safety, pollution control and environmental management in line with the Hong Kong Convention (IMO, 2023b).

2.2.5 SEGMENT – INSTITUTIONAL STRENGTHENING

The transition to low-carbon shipping depends on strong institutions capable of planning, coordinating, regulating, and implementing the transition. The IMO GHG Strategy recognizes capacity-building and technical cooperation as key supportive measures for implementation, with particular attention to the needs of developing countries, especially SIDS and LDCs. Climate finance can support these actions alongside investment in technologies and infrastructure. IMO supports these efforts through its Integrated Technical Cooperation Program and several dedicated initiatives for developing states, especially SIDS and LDCs, that strengthen national capacity to implement the IMO GHG Strategy. For example, the IMO GHG-SMART training program provides dedicated capacity-building support to SIDS and LDCs on regulatory, policy, technological and financial aspects of maritime decarbonization (IMO, 2023a).

Effective policy, regulatory and institutional frameworks can create enabling conditions for maritime investment. This includes national strategies and action plans, technical assistance, monitoring and reporting systems, research and innovation, and international cooperation (IRENA, 2021; UNCTAD, 2023c). Conversely, weak institutional capacity, fragmented governance and uncertainty over future policies, regulations and technology pathways can delay investment decisions and increase financing risks across interconnected maritime value chains (Global Maritime Forum, 2023a).

These challenges are often most acute in SIDS and LDCs. Strengthening human and institutional capacity can help countries develop national transition pathways, prepare investment pipelines, access climate finance and participate in emerging green shipping corridors.

Although institutional strengthening represents a relatively small share of total maritime climate finance, it plays a catalytic role in enabling larger-scale climate investments across the maritime value chain. It helps establish governance, regulatory, and institutional foundations to mobilize investment and support the transition to zero-emission and resilient shipping. IMO technical cooperation programs provide practical examples of this support. For example, GreenVoyage2050 assists developing countries with national action plans, while GHG-SMART specifically builds capacity in SIDS and LDCs to implement the IMO GHG Strategy.

2.2.6 SEGMENT – CROSS-SECTORAL ACTIVITIES

Cross-sectoral activities strengthen the links between maritime transport, biodiversity conservation, and ecosystem management. Maritime and port activities interact closely with marine and coastal ecosystems. While decarbonizing the sector is essential to reducing emissions, maritime development must also minimize impacts on biodiversity and the ecosystem services that underpin fisheries, tourism, coastal protection, and local livelihoods (World Bank, 2016). Compliance measures applied in Emission Control Areas (ECAs) and marine protected areas are designed to reduce impacts from vessel operations in the first instance. Complemented by habitat restoration and ecosystem management, they enhance the resilience of marine and coastal environments, contributing to a sustainable blue economy (World Bank, 2022).

These measures are highly relevant for economies and communities in SIDS and coastal LDCs, which depend on healthy marine ecosystems and sustainable ocean industries. As countries develop sustainable ports and green shipping corridors, integrating ecosystem protection into maritime planning can help ensure that decarbonization efforts are safe and resilient, while also safeguarding marine biodiversity and strengthening the resilience of coastal ecosystems (MPA Singapore, 2022). Effective implementation requires coordination (MPA Singapore, 2022) across the maritime, environmental, fisheries, and coastal management sectors, supported by appropriate governance arrangements, monitoring systems, and institutional capacity. Although cross-sectoral activities represent a small share of maritime climate finance, they generate multiple environmental, climate, and socioeconomic benefits (World Bank, 2016).

2.3 FULL RESULTS OF THE PILOT CLASSIFICATION FRAMEWORK

The pilot classification framework covers the full maritime value chain, covering solutions relevant to the decarbonization and resilience of maritime activities regardless of vessel sizes and route distance, designed to encompass all relevant activities.

The full pilot classification framework is displayed in Table 3 (for mitigation solutions) and Table 4 (for adaptation solutions). Details on the boundaries of the solutions and the types of activities included and excluded are also provided for each solution. The framework covers both climate finance and 'other associated' finance, depending on the activity. The focus of the classification exercise, and data coverage in stages 3 and 4 (Figure 2) is on climate finance projects.

2.3.1 MITIGATION MARITIME CLIMATE FINANCE ACTIVITIES

Table 3: Pilot classification list of mitigation solutions for maritime climate finance

Key/legend: Climate Finance | Other Associated Finance | Activity Dependent [5]

Solution[6]	Description	Includes	Exclusions
Segment: Alternative low- and zero-carbon fuel production and distribution			
Alternative fuels with zero or near-zero emissions[7] production *ISIC - 2011; 2012; 3510*	The production of fuels for use in maritime transport that achieve significantly reduced well-to-wake (WtW) GHG emissions intensity compared to the use of traditional marine fuels, as evidenced through IMO's Life Cycle Analysis methodology (2024 LCA Guidelines, resolution MEPC.391(81)). **Note:** biofuels are tagged as climate finance, consistent with IRENA's identification of advanced **second-generation biofuels** as a key near-term decarbonization solution for international shipping.	Green hydrogen, blue hydrogen, e-ammonia, blue ammonia, e-methanol, e-methane, and synthetic hydrocarbons. Bio-based fuels derived from biological feedstocks including agricultural residues, waste oils, forestry by-products, algae, or municipal solid waste. Bio-LNG produced from biomethane or anaerobic digestion of organic waste, advanced sustainable biofuels (e.g., fatty acid methyl esters, bio-methanol, bio-dimethyl ether, and hydrotreated vegetable oil (HVO) biodiesel), bioethanol, biomethane, algae-derived fuels.	Transitional fuels that do not evidence significant long-term well-to-wake (WtW) GHG emission intensity reductions.
Transitional gaseous and liquid fuel production[7] *ISIC - 0610; 0620; 1920; 3520*	The production of fossil-derived or partially decarbonized fuels for maritime use that deliver measurable near-term reductions in well-to-wake (WtW) GHG emissions intensity relative to conventional marine fuels (heavy fuel oil (HFO) and marine gas oil (MGO)), as evidenced through IMO's 2024 LCA Guidelines, resolution MEPC.391(81). **Note:** These fuels are classified as other associated finance - they are not components of a Paris-aligned decarbonization pathway for international shipping, carry material carbon lock-in risks through long-lived ship and port assets, and are not aggregated as climate finance in headline reporting without clear disclosure. They are included to ensure a comprehensive de-fossilization approach to fuel mapping.	LNG, LPG	Conventional HFO and MGO where no emission reduction can be evidenced.

5 Solutions are tagged as *climate finance* or *other associated finance* based on the finance definitions in Section 2.1.1. *Activity-dependent* solutions are solutions where projects could be *climate finance* or *other associated finance* depending on the fuel – these are fully separated into *climate* or *other associated* finance in data processing and results analysis. For example, blue ammonia is classified as other associated finance, while e-ammonia is considered climate.
6 Includes applicable or related International Standard Industrial Classification of All Economic Activities (Department of Economic and Social Affairs, 2008) standard, where relevant.
7 Investments should incorporate fuel-specific safety measures for production, storage, transfer and bunkering, including containment, monitoring and leak detection, emergency shutdown systems, and spill or release management for the safe handling and bunkering of new fuels. Additional safeguards are required for toxic fuels such as ammonia, following IMO (2025) Guidelines.

Table 3 *(cont.)*

Key/legend: Climate Finance | Other Associated Finance | Activity Dependent

Solution	Description	Includes	Exclusions
Segment: Alternative low- and zero-carbon fuel production and distribution (cont.)			
Alternative fuels with zero or near-zero emissions distribution[7] ISIC - *3520; 4930; 4661*	The construction of infrastructure, and investment into low-carbon vehicles to transport alternative fuels as described in Row 1 of this Classification Framework. Covering the supply chain from production site to port boundaries.	Inland hydrogen pipelines dedicated for fuel delivery to ports, electric or green hydrogen transport vessel investment for fuel distribution.	All in-port bunkering and infrastructure, which is captured in the 'Port infrastructure' segment.
Transitional gaseous and liquid fuel distribution[7] ISIC - *3520; 4930; 4661*	The construction of infrastructure, and investment into vehicles to transport transitional fuels as described in Row 2 of this classification framework. Covering the supply chain from production site to port boundaries.	Investment in transitional gaseous and liquid fuel supply infrastructure outside port boundaries, including pipelines, transport vessels, storage and distribution systems.	All in-port bunkering and infrastructure, which is captured in the 'Port infrastructure' segment.
Segment: Port infrastructure and operations			
Alternative fuels with zero or near-zero emissions bunkering[7] *ISIC – 4930; 5222*	In-port infrastructure that stores, handles, and supplies alternative low-carbon and zero-emission marine fuels to ships (as defined in Row 1), enabling fuel switching and associated operational emissions reductions relative to conventional marine fuels. This may include measures to address safe handling and emergency preparedness.	Green hydrogen, blue hydrogen, e-ammonia, blue ammonia, e-methanol, e-methane, advanced biofuels, bio-LNG and e-LNG bunkering terminals. Ship-to-ship and truck-to-ship bunkering equipment, transfer systems, safety systems, and port-side handling infrastructure dedicated to alternative fuels.	
Transitional fuel bunkering[7] *ISIC - 0610; 0620; 1920; 3520; 5222*	The development of in-port infrastructure that stores, handles, and supplies transitional fuels to ships, enabling fuel switching and associated reductions relative to conventional marine fuels. This may include measures to address safe handling and emergency preparedness. **Note:** These technologies are classified as Other Associated Finance – their fuels are not components of a Paris-aligned decarbonization pathway for international shipping, carry material carbon lock-in risks through long-lived ship and port assets, and are not aggregated as climate finance in headline reporting without clear disclosure. They are included to ensure a comprehensive de-fossilization approach to fuel mapping.	LNG bunkering terminals and storage, ship-to-ship and truck-to-ship bunkering equipment, transfer systems, safety systems, and port-side handling infrastructure dedicated to transition fuels.	Conventional oil bunkering infrastructure and general port upgrades not specific to transitional fuel storage or supply.

Table 3 *(cont.)*

Key/legend: Climate Finance | Other Associated Finance | Activity Dependent

Solution	Description	Includes	Exclusions
Segment: Port infrastructure and operations *(cont.)*			
Onshore Power (cold ironing) *ISIC - 3510; 5222*	Shore power infrastructure that enables the supply of electricity to docked ships, eliminating auxiliary engine use while in ports.	Shore connection systems (cables, connectors, frequency conversion), substations and switchgear upgrades, metering and control systems, and berth-level infrastructure required for connection.	
Vessel battery charging infrastructure *ISIC - 3510; 5222*	Port infrastructure that enables the charging of battery-electric vessels, including associated grid connections and on-site electrical upgrades within port boundaries.	Fixed or mobile charging units, high-capacity connectors/ cabling, substations and switchgear upgrades, on-site energy storage systems dedicated to charging, and smart charging systems.	General grid-scale transmission or charging projects not dedicated to port demand.
Port clean energy *ISIC - 3510; 5222*	Generating energy from renewable resources to supply port operations with low-carbon electricity.	Projects commissioned to increase or decarbonize electricity supply to ports, e.g., dedicated or on-site solar PV, wind, battery energy storage, grid expansion to enable connection to clean energy supply, and other renewable projects.	General renewable energy projects without reference to serving ports.
Electrification of operational equipment *ISIC - 5222*	The electrification of port equipment, including operational vessels, leading to reduced direct emissions.	Automated guided vehicle (AGVs), rubber-tyred gantry (RTG), prime mover (PM), luffing cranes, zero-emission or low-carbon tugboats, electric mobile harbor cranes.	
Port energy efficiency *ISIC - 5222*	Investment in energy-efficiency upgrades to port equipment, buildings, and operational systems that reduce energy consumption and associated GHG emissions across port facilities. Includes efficiency upgrades within maritime access, basic port infrastructure, superstructures, energy-related infrastructure, digital infrastructure and industrial and logistics terminals (IAPH, 2024).	Replacement of conventional lighting with LED and smart lighting systems, installation of high-efficiency electric motors and variable frequency drives (VFDs) for cranes, conveyors and pumps and ventilation systems. Port-side voyage performance management systems and digitalization to enforce, e.g., just-in-time arrival.	On-board measures relating to digitalization and voyage performance management systems. This is tracked in maritime operations and technologies.
Energy-efficient and low-carbon cold storage facilities *ISIC – 5222*	Investment in low-emission and energy-efficient cold storage and refrigeration infrastructure at ports that reduces the energy intensity and GHG emissions of cold chain operations.	Installation or retrofit of refrigeration systems using high-efficiency compressors and low-global warming potential refrigerants, integration of renewable energy supply (e.g., solar PV) to power cold storage operations, thermal insulation upgrades to reduce cooling energy demand, smart temperature monitoring control systems that optimize refrigeration load.	

Table 3 *(cont.)*

Key/legend: Climate Finance | Other Associated Finance | Activity Dependent

Solution	Description	Includes	Exclusions
Port waste management infrastructure *ISIC – 5222*	Infrastructure that enables the collection, treatment, and environmentally sound processing of ship-generated waste, where this contributes to GHG emission reductions, for example by avoiding methane emissions from anaerobic decomposition, capturing methane, or recovering energy or materials.	Port reception facilities, segregation and storage systems, oily waste and bilge water treatment, wastewater connections, and waste-to-energy or material recovery systems dedicated to ship-generated waste.	General municipal waste infrastructure not linked to ship waste streams, and routine waste collection services without dedicated treatment or recovery infrastructure.
Segment: Maritime operations and technologies			
Alternative-fuel propulsion - low- and zero-emissions ships *ISIC – 3011; 3315*	Investment in ships with main engine technologies that are compatible with alternative low-carbon and zero-emission fuels (as defined in Row 1), such as fuel cells for primary propulsion, including the retrofitting of existing ships with qualifying engine technologies.	Methanol, ammonia and hydrogen-ready ships.	
Transitional fuel propulsion *ISIC – 3011; 3315*	Investment into ships with main engine technologies that are compatible with transitional fuels, or technologies to capture associated carbon. **Note:** These technologies are classified as other associated finance – their fuels are not components of a Paris-aligned decarbonization pathway for international shipping, carry material carbon lock-in risks through long-lived ship and port assets, and are not aggregated as climate finance in headline reporting without clear disclosure. They are included to ensure a comprehensive de-fossilization approach to fuel mapping.	LNG-compatible ships and retrofits, low-methane-slip LNG engine technologies.	
Battery-electric propulsion *ISIC – 3011; 3315; 5011*	Investment in vessels and retrofits that enable primary propulsion through battery-electric systems, resulting in zero direct emissions during operation.	Fully battery-electric vessels, hybrid-electric configurations where battery propulsion is the primary mode for defined operating profiles, battery system retrofits, battery management systems, and associated power electronics.	Minor auxiliary batteries that do not materially displace main-engine fuel consumption.
Auxiliary power system input *ISIC – 3011; 3315*	Powering auxiliary systems with renewable or more efficient fuel inputs.	Auxiliary power generation with fuel cells, batteries, and marine solar systems.	

Table 3 *(cont.)*

Key/legend: Climate Finance | Other Associated Finance | Activity Dependent

Solution	Description	Includes	Exclusions
Segment: Maritime operations and technologies *(cont.)*			
Energy efficiency - Engine room *ISIC – 3011; 3315*	Investment in equipment fitted to the ship's main and auxiliary engine systems that reduces fuel consumption and GHG emissions through improved thermal management, combustion optimization, and onboard energy recovery.	Waste heat recovery generators (WRHG), Variable compression ratio (VCR) engine technologies, fuel emulsifiers.	
Energy efficiency - Propeller *ISIC – 3011; 3315*	Investment in hydrodynamic devices to fit around the propeller and rudder assembly that improve the efficiency of propeller-water interaction, reducing fuel consumption and GHG emissions.	Propeller ducts, pre-swirl stator, rudder bulb, propeller cap fin, wake equalizing duct, propeller roughness management.	
Energy efficiency - wind-assisted propulsion efficiency *ISIC – 3011; 3315*	Investments into wind-assisted propulsion systems (WAPS) fitted to ships that harness wind energy to supplement conventional engine-driven propulsion, reducing fuel consumption and GHG emissions.	Flettner rotors, suction wing, rigid sail, wind kite.	Fully wind-powered ships (i.e. sail-only vessels without conventional propulsion).
Energy efficiency - voyage performance and energy management systems *ISIC – 3011; 3315*	Improvements to monitor, report and reduce on board power demand and energy consumption. Includes activities to measure and improve the efficiency of existing main engine technologies, and decision support and coordination of voyage.	Just-in-time arrival (JIT), route optimization algorithms and advanced autopilot systems, slow steaming and speed optimization, data collection systems (DCS), real-time monitoring, shaft power meters, fuel flow meters.	Port-side measures relating to digitalization and voyage performance management systems. This is tracked in port infrastructure and operations.
Energy efficiency - hull and superstructure efficiency and maintenance *ISIC – 3011; 3315*	Improvements to the structural form and external surface of ships that increase hydrodynamic efficiency and reduce fuel consumption, including active drag reduction systems and ongoing hull maintenance practices that preserve efficiency gains over the operational life of the ship.	Air Lubrication Systems (ALS), Bow Enhancement designs, Hull Fin devices, Elogrid turbulence reduction systems, biofouling management and hull coating applications, aftbody and forebody optimization.	
Onboard carbon capture and storage (OCCS) *ISIC – 3011; 3315*	Investment in onboard systems that capture CO_2 from ship exhaust and store it safely onboard for later transfer to certified reception facilities for permanent storage or approved utilization. **Note:** given CPI's principle of 'no carbon lock-in', OCCS is categorized as other associated finance.		

Table 3 *(cont.)*

Key/legend: Climate Finance | Other Associated Finance | Activity Dependent

Solution	Description	Includes	Exclusions
Segment: Shipbuilding and recycling			
Green ship manufacturing materials *ISIC - 3011*	The use of low-carbon and circular material inputs in ship construction to reduce embodied emissions associated with shipbuilding.	Certified low-carbon steel, recycled aluminum and other recycled metals, and low-emission composite materials.	Conventional materials without evidence of reduced embodied emissions or increased recycled content.
Ship recycling *ISIC - 3011*	Measures to support environmentally sound recycling of end-of-life ships and enhance the recovery, reuse and recycling of materials from retired ships.	Dismantling, sorting and recovery of materials and components from retired vessels for reuse or recycling, including upgrades that increase recovery rates, including facility upgrades, equipment and processes that improve material recovery, pollution control, worker safety and environmental performance, consistent with the Hong Kong Convention.	Routine dismantling without material recovery.
Shipyard decarbonization *ISIC 3011 and 3315*	Renewable energy supply and energy-efficiency improvements in vessel production facilities.	Renewable energy, electrification and energy-efficiency improvements in shipbuilding, repair and retrofit facilities.	General shipyard expansion, routine equipment replacement without demonstrated emissions savings.
Segment: Institutional strengthening			
Policy development and institutional support	Investments and measures to strengthen the enabling environment for maritime decarbonization, improving the policy, regulatory and institutional conditions required to mobilize and implement climate-aligned maritime investments.	Development and implementation of national maritime decarbonization strategies and action plans, design and development of regulatory measures and incentives, technical standards and guidelines, stakeholder coordination mechanisms, and institutional strengthening for permitting, safety, and enforcement related to low- and zero-emission shipping, HFO bans.	General maritime policy activities not linked to emissions reduction, climate resilience, or the enabling conditions for decarbonization finance.
Capacity building and training	Technical assistance that builds institutional and workforce capacity to plan, finance, deploy, operate, and maintain maritime decarbonization solutions, including finance capabilities and skills for the safe transition to new fuels and technologies.	Training and institutional support for maritime administrations, port authorities, regulators, seafarers and operators on maritime decarbonization and adaptation, including technological, regulatory, policy and financial aspects of alternative fuels and technologies; safety and emergency response for new fuels. Capacity building for project development and financing, including strengthening engagement with MDBs, climate funds, and other financing partners; and capacity to track finance mobilized against identified investment priorities, particularly in SIDS and LDCs.	General education or training programs not clearly linked to maritime decarbonization or climate-resilient maritime operations and technologies.

Table 3 *(cont.)*

Key/legend: Climate Finance | Other Associated Finance | Activity Dependent

Solution	Description	Includes	Exclusions
Segment: Institutional strengthening *(cont.)*			
Technical assistance and knowledge transfer	Investment in analytical, advisory, and knowledge-sharing activities that support the planning, design, and implementation of maritime decarbonization solutions, including feasibility and pre-investment studies, technology demonstration support, and transfer of knowledge between developed and developing country contexts.	Feasibility studies and pre-investment technical assessments; project preparation and development of bankable investment concepts, project pipelines and financing strategies; knowledge exchange programs, technical support for the development of national maritime decarbonization roadmaps and investment pipelines.	
Maritime emissions data systems and MRV infrastructure	Support to develop the systems and infrastructure that enable the monitoring, reporting, and verification (MRV) of maritime and port-related emissions and energy use, supporting compliance, benchmarking, and performance improvement.	Digital MRV platforms, data governance systems, sensors and metering (e.g., fuel flow meters, shaft power meters where applicable), integration with IMO DCS-related reporting, port emissions inventories, and supporting audits and guidelines (e.g., master energy audits and national MRV guidance).	
Green shipping corridors	Project preparation and enabling activities that develop and operationalize green shipping corridors, coordinating stakeholders and investments to deploy low/zero-emission fuels and ships along defined routes.	Feasibility studies; corridor governance and stakeholder coordination; port readiness assessments; safety and regulatory planning; demand aggregation and offtake structuring; early-stage design and permitting support; and monitoring frameworks for corridor performance.	
R&D and pilot demonstration projects	Research, development, and small-scale pilots that test, validate, and de-risk climate-aligned maritime decarbonization technologies and operational approaches, particularly those relevant to small vessel and SIDS/LDC contexts. Safety training for working with alternative low- and zero-carbon fuels.	Prototype vessels and retrofits, fuel trials (e.g., sustainable biofuels, e-methanol, ammonia-ready systems), pilot on-shore power supply installations, battery-electric pilots, safety and standards testing, and demonstration programs supported through grants or concessional finance.	
Segment: Cross-sectoral activities			
Restoration and conservation of biodiversity or ecosystem services	Investments that protect, restore or enhance marine and coastal ecosystems to increase or maintain carbon sequestration and storage, or avoid GHG emissions resulting from ecosystem degradation and loss.	Protection and restoration of blue-carbon ecosystems, including mangroves, seagrass meadows and saltmarshes; rehabilitation of degraded coastal ecosystems where measurable carbon-storage or avoided-emissions benefits are expected; and conservation measures that maintain existing ecosystem carbon stocks.	
Cross-sectoral solutions	Projects that contribute towards multiple relevant mitigation activities across segments of the maritime value chain and for which finance cannot be meaningfully attributed to a single solution.	Integrated maritime decarbonization projects combining multiple eligible activities.	Projects attributable to a single taxonomy solution; general maritime investment without clearly identifiable climate finance activities.

2.3.2 ADAPTATION MARITIME CLIMATE FINANCE ACTIVITIES

Adaptation and resilience should be integrated into maritime climate finance pathways to ensure investments in vessels, ports and fuel infrastructure supporting shipping decarbonization also remain safe and resilient under increasing physical climate risks and natural hazards, particularly in relation to evolving safety and operational requirements for new fuels. These risks can reduce operational efficiency, increase emissions and economic losses, and threaten the lives and livelihoods of communities highly dependent on maritime systems, particularly in SIDS and LDCs. Without adaptation considerations alongside mitigation finance, investments may become locked into assets that are increasingly vulnerable to future climate impacts, undermining their long-term performance and climate benefits. **Evidence from climate-resilient infrastructure shows that mitigation investments that do not account for hazards such as flooding, extreme heat and storms can face disruption, reduced performance and costly retrofits, weakening the long-term value of the original investment** (CPI, 2022).

Table 4: Pilot classification list of adaptation solutions for maritime climate finance

Key/legend: Climate Finance | Other Associated Finance | Activity Dependent

Solution	Description	Includes	Exclusions
Segment: Port infrastructure and operations			
Climate-resilient infrastructure *ISIC - 5222*	Investments in port infrastructure and operation upgrades designed to reduce climate-related risks and maintain or enhance operational continuity under future climate hazards. Includes resilience measures within maritime access, basic port infrastructure, superstructures, energy-related infrastructure, digital infrastructure and industrial and logistics terminals (IAPH, 2024).	Quay and critical-infrastructure elevation, seawalls, breakwaters, flood defense and storm-surge barriers, climate-resilient dredging, improved drainage and water management, strengthening of critical assets, climate-risk-informed design standards for new port infrastructure and operations, measures to secure freshwater supplies, including desalination where climate-risk justified.	Routine maintenance not linked to climate risk reduction, and non-port coastal protection measures without a clear port resilience objective.
Nature-based solutions (NbS) at ports *ISIC - 5222*	Investment in the protection, restoration, or creation of natural ecosystems within or adjacent to port areas that deliver adaptation benefits alongside broader ecological and community co-benefits.	Integration of green infrastructure into port design (e.g., living shorelines, vegetated buffers, permeable surfaces that reduce stormwater runoff, and urban heat). Restoration and conservation of coastal blue carbon ecosystems in port-adjacent areas, ecological restoration of degraded intertidal habitats impacted by port construction and dredging.	
Enhanced early warning systems for port operations *ISIC - 5222*	Investments in systems, technologies, and institutional capacities that provide actionable warnings of climate-driven coastal hazards (e.g., storm surge, coastal inundation, wave overtopping, extreme wind, and sea-level rise events) to protect port operations, infrastructure, and personnel.	Installation and upgrade of coastal inundation forecasting and multi-hazard early warning systems at or linked to port facilities, development of port-specific hazard impact thresholds and warning dissemination protocols aligned with national civil protection systems, investment in last-mile communication systems.	
Disaster response and emergency preparedness infrastructure *ISIC - 5222*	Investment in the physical infrastructure, equipment, and institutional systems required for maritime and port disaster preparedness and response to climate-driven hazard events, ensuring continuity of essential maritime services and protection of coastal communities in the aftermath of extreme weather.	Emergency response equipment and staging areas within port facilities for climate-related disaster scenarios, installation of backup power, communications, and water systems to maintain port functionality during and after extreme weather events, investment in climate-resilient maritime rescue and emergency response vessels for small island and coastal contexts, humanitarian logistics pre-positioning infrastructure at ports serving disaster-prone regions.	
Habitat preservation *ISIC - 5222*	Investments in technologies and management approaches designed to reduce biodiversity impacts of port reconstruction/ modification and associated ship operations on local habitats.	Habitat-sensitive construction practices, operational restrictions to reduce habitat disturbance, monitoring and mitigation systems linked to modified port assets.	

Table 4 *(cont.)*

Key/legend: Climate Finance | Other Associated Finance | Activity Dependent

Solution	Description	Includes	Exclusions
Segment: Cross-sectoral activities			
Habitat restoration	Investments that restore degraded marine and coastal habitats to strengthen ecosystem resilience to climate change and maintain the ecosystem services on which maritime infrastructure, operations and coastal communities depend.	Shoreline and intertidal habitat rehabilitation, restoration of reefs, oyster beds and other natural or engineered habitat features where these improve resilience to erosion, storms, sea-level rise, or other climate hazards.	
Support or co-management of marine protected areas (MPA) and conserved areas	Activities concerning protected and conserved area establishment which aim to reduce pressures from maritime activity.	MPA management plans, monitoring and enforcement, designation of "no anchoring" zones near sensitive habitats.	
Management of invasive species	Investments in systems, technologies, and practices used to prevent the introduction and spread of invasive species associated with maritime transport and port activities.	Biofouling management measures, inspection and compliance systems, ballast water management.	
Cross-sectoral solutions	Projects that integrate multiple climate adaptation and resilience measures across maritime infrastructure, operations, ecosystems or institutional systems and for which finance cannot be meaningfully attributed to a single solution	Integrated port or maritime resilience programs combining measures such as climate-resilient infrastructure, nature-based solutions, early warning systems, emergency preparedness, habitat resilience and climate-risk planning.	Projects attributable to a single adaptation solution; general maritime upgrades without a clearly identified climate-risk or resilience objective.
Segment: Institutional strengthening			
Marine spatial planning (MSP)	Marine spatial planning and governance processes leveraged to reduce biodiversity impacts from maritime traffic.	Spatial data collection and mapping, designation of sensitive areas, and navigational planning aligned with conservation objectives.	
Climate risk assessment and adaptation planning	Investment in the generation, analysis, and application of climate risk data to inform adaptation planning for maritime infrastructure, operations, and coastal port systems.	Port-level climate vulnerability and risk assessments covering physical hazards (e.g., sea level rise, storm surge, increased temperature, extreme precipitation), development of port and coastal infrastructure adaptation plans and resilience roadmaps, integration of climate risk data into maritime spatial planning and asset management frameworks, funding for national-level maritime risk inventories.	

Table 4 *(cont.)*

Key/legend: Climate Finance | Other Associated Finance | Activity Dependent

Solution	Description	Includes	Exclusions
Segment: Institutional strengthening *(cont.)*			
Capacity building and training for climate adaptation	Technical assistance and training that builds the capacity of port authorities, maritime administrations, coastal communities, and vessel operators in SIDS and LDCs to plan, prepare, finance, and respond to the physical impacts of climate change on maritime infrastructure, technologies, and operations, including the development of bankable projects that deliver both resilience and decarbonization benefits.	Training on climate-resilient port design and operations; preparedness for extreme weather impacts on shipping routes and port functionality; integration of adaptation into maritime education and professional training Institutional strengthening for climate adaptation planning and governance; and support to identify, prepare, and finance bankable adaptation and dual-benefit projects, including feasibility studies, investment concepts, financing strategies, and engagement with MDBs, climate funds, and other financing partners.	

3. PILOT ASSESSMENT OF MARITIME CLIMATE FINANCE FLOWS

3.1 METHODOLOGY OF THE ASSESSMENT

Tracking climate finance provides a clearer picture of where mitigation and adaptation investment is flowing across the maritime sector and helps identify gaps across geographies, solutions, and institutions. This is particularly important for SIDS and LDCs, where limited resources and financing constraints increase the need for finance to be strategically targeted.

The methodology for tracking maritime climate finance builds upon the approach of CPI's Global Landscape of Climate Finance (GLCF) (CPI, 2025b), which annually tracks global primary capital flows supporting GHG emissions reduction, the enhancement of GHG sinks, and the strengthening of resilience in human and ecological systems against the negative impacts of climate change. These flows predominantly focus on the deployment of climate solutions in the real economy but can also include support for capacity-building measures as well as for the development and implementation of policies. It consolidates data from a wide range of primary and secondary sources and tracks climate finance commitments from source to end-use sectors, classifying finance by origin, actor, instrument, and destination, allowing the assessment and identification of investment patterns and gaps[8]. The scope of each dimension is briefly explored in this section, with further details in the Annex.

3.1.1 SOURCES AND ACTORS

Financial flows are categorized as domestic or international based on where the funds are raised and spent:

1. **Domestic flows** are both raised and spent in a single country.
2. **International flows** are raised in one country and spent in another.

For both international and domestic flows, the analysis explores finance provided by public and private actors, primarily using project-level data.

1. **Private actors**[9] include corporations and commercial financial institutions investing in maritime projects, assets, operations, and technologies.
2. **Public actors** include national, bilateral, and multilateral development finance institutions (DFIs), donor governments, climate and other public funds, state-owned enterprises (SOEs), and financial institutions.

8 Given that disbursement data is often limited and inconsistently reported, commitments are tracked instead. An additional benefit of tracking commitments is that they generally capture the full amount approved for a project in the year the commitment is made, while disbursements, particularly for development finance, are often released in tranches over several years. As a result, annual disbursements may be lower than the corresponding commitment and may not reflect the project's total financing value.

9 Private finance refers to commercial capital invested by private corporations, banks, or individuals seeking market-rate returns without public intervention. It primarily covers balance-sheet operations. Private finance mobilized leveraging public funds (such as government grants or development bank loans), as covered by the OECD private finance mobilized data is not captured in this study due to aggregate-level data availability and lack of compatibility to the maritime segments identified in this work (OECD, 2025b). However, this is a sub-set of total private investment.

Philanthropies and export credit agencies may also contribute across public and private categories. The analysis of maritime climate finance places particular emphasis on international public finance. Providing comprehensive coverage of domestic public finance is challenging as government expenditure is often disclosed at an aggregated level, with limited detail on maritime activities, while climate budget tagging is not implemented consistently across governments and government departments. A full list and description of the actor categories covered is provided in Annex 5.2.

EXCLUSIONS

Investment funds and financial intermediaries are not treated as distinct actor categories in the analysis. Instead, finance channeled through these entities is captured where it can be traced to eligible real-economy maritime activities, such as investments in ships, ports, fuel infrastructure, or related technologies. The analysis does not classify an entire fund or portfolio as climate finance based solely on its stated climate commitments. Only the share directly supporting eligible mitigation or adaptation activities is counted. As disclosure and attribution are often limited, particularly for finance channeled through multiple intermediaries, these flows may be underrepresented. Further details on the treatment of funds, intermediaries, and indirect finance are provided in the GLCF methodology (CPI, 2025b).

3.1.2 FINANCIAL INSTRUMENTS

The analysis tracks financial flows by type of financial instrument such as grants, project-level debt, project-level equity, and balance sheet financing. Debt is differentiated between low-cost[10] and market-rate, while balance sheet financing captures investments made directly by companies. These categories reflect the principal instruments within the GLCF scope used to finance maritime assets, infrastructure, technologies, and related activities. Further definitions and details on the classification of instruments are provided in the Annex 5.3.

EXCLUSIONS

Financial risk management instruments, including guarantees, insurance, currency hedges, and contingent finance, are not included in the climate finance flows in this study because they involve conditional liabilities that may not result in financial disbursement. Revenue support mechanisms that primarily reimburse initial investment costs are also excluded to avoid double counting.

3.1.3 COUNTRY CLASSIFICATION

The analysis uses breakdowns by region, development status, and status as SIDS with their respective regions. See Annex 5.4 for a breakdown.

REGIONS:

Countries are grouped into nine regions covering Africa, Asia, Europe, Latin America and the Caribbean, the Middle East, North America, and Oceania (see Annex 5.4.1).

10 Low-cost debt can also include concessional and ODA loans—i.e., loans extended on terms substantially more generous than market loans. The concessionality can be achieved through interest rates below those prevailing on the market, longer maturity, longer grace periods, or a combination of these aspects. According to the OECD, the 'grant element' of ODA loans is at least 25% (OECD, 2022).

DEVELOPMENT STATUS:

Countries are classified as advanced economies (AEs) or emerging markets and developing economies (All EMDEs) based on the 2024 International Monetary Fund (IMF) World Economic Outlook classification (IMF, 2024). Countries without an IMF classification are assigned a development status using World Bank income classifications or, where applicable, the status of their associated country (World Bank Group, 2025). Classifications are updated annually. For further information, see Annex 5.4.2.

In this report, IMF classifications are further broken down to explore specific trends, creating the following classifications:

- **Advanced Economies.** As classified in the 2024 IMF World Economic Outlook.
- **Emerging Markets.** We analyze the 111 EMDEs excluding China and excluding the 45 least developed countries (LDCs) as a separate subgroup, referred to throughout the report as "emerging markets." These countries represent over half of the global population and 23% of global GDP. They have high potential to scale climate finance.
- **China.** China is discussed separately due to the relative scale of the market compared to other EMDEs, and because the trends and size of its climate flows make it a frequent outlier within the EMDE grouping, in line with CPI's approach in the GLCF methodology.
- **LDCs.** We break out the 45 LDCs, based on the UN list of least developed countries (UNCTAD, 2025b) as of the start of 2024.[11] While these countries represent 1.4% of the global economy, they include 20 of the world's 25 most climate-vulnerable countries (ND-GAIN, 2025). These countries' climate finance needs tend to be more acute due to their fiscal, economic, social, and climate risk challenges.

SIDS:

The analysis focuses particularly on SIDS, which cut across development-status categories. The SIDS classification follows the UN list of 39 SIDS States and 18 Associate Members of the UN Regional Commissions. For the SIDS-focused analysis, 38 of the 39 SIDS are covered; Singapore is excluded because it is a significant economic outlier. The 18 Associate Members are also excluded from the SIDS-focused analysis (UN OHRLLS, 2025; UNSD, 2025). Finance flows to Singapore are included in the wider analysis, with Singapore classified as an advanced economy.

- ***ODA ELIGIBILITY***

SIDS countries are also split based on eligibility for ODA (official development assistance) for additional analysis. Seven SIDS (excluding Singapore) are ineligible for ODA[12] (see Annex 5.4.2), as their GNI per capita classifies them as high-income, which is often a result of a few high-value industries (e.g., tourism) and lower population bases and does not reflect the special case for development for SIDS.

11 This does not account for Sao Tome and Principe's graduation in 2024.
12 List of ODA ineligible countries as of 2023: Antigua and Barbuda, Bahamas, Barbados, Cook Islands, Seychelles, Saint Kitts and Nevis, and Trinidad and Tobago

- ***SIDS SPECIFIC REGIONS***

SIDS countries are also split into the following regions, according to the UN: Atlantic, Indian Ocean and South China Sea (AIS), Caribbean, and Pacific (UN OHRLLS, no date) (see Annex 5.4.2).

3.1.4 DATA SOURCES

The assessment draws on data sources used in CPI's GLCF and additional sources selected to improve coverage of maritime climate finance activities. These include maritime and technology-specific datasets covering areas such as alternative fuel ships, clean shipping, maritime transport, hydrogen production, and port infrastructure.

Sources provide information at different levels of granularity, ranging from individual projects and transactions to aggregated investment and asset-level data. Where possible, project-level information was cross-checked across multiple sources and supplemented by institutional disclosures, project announcements, and other public information. Aggregate and non-financial datasets were used primarily to identify relevant activities, validate market trends, and provide context where project-level financial information was unavailable. The principal data sources and their role in the assessment are summarized in Table 5.

Table 5: Key data sources used for the assessment

Source	Coverage/use	Data level	Maritime segments
A. Data sources already used in GLCF			
OECD	Public finance from governments, agencies, DFIs, and climate funds	Project level	Port infrastructure and operations, maritime operations and technologies, shipbuilding and recycling, institutional strengthening, cross-sectoral activities
CPI surveys to DFIs (proprietary data)	DFIs	Project level and aggregated, depending on reporting	Port infrastructure and operations, institutional strengthening, cross-sectoral activities
Climate Funds Update (CFU) via Overseas Development Institute (ODI) and Heinrich Böll Foundation (HBF)	Climate funds	Project level	Port infrastructure and operations, institutional strengthening, cross-sectoral activities
BloombergNEF	Clean energy investment	Project level, mainly large-scale	Alternative low- and zero-carbon fuel production and distribution, port infrastructure and operations
BloombergNEF hydrogen dataset	Hydrogen investment	Project level	Alternative low- and zero-carbon fuel production and distribution
IJGlobal	Project finance	Project level	Alternative low- and zero-carbon fuel production and distribution, port infrastructure and operations, cross-sectoral activities
IDFC Green Finance Mapping	Development finance from IDFC members	Project level or aggregated	Cross-sectoral activities

Table 5 *(cont.)*

Source	Coverage/use	Data level	Maritime segments
B. Additional or expanded data sources for this work			
DFI websites	DFIs	Case studies	Alternative low- and zero-carbon fuel production and distribution, port infrastructure and operations, maritime operations and technologies, shipbuilding and recycling, institutional strengthening, cross-sectoral activities
BloombergNEF clean shipping dataset	Clean shipping investment	Aggregate level	Maritime operations and technologies
IJGlobal maritime transport	Maritime transport specific project finance	Project level	Maritime operations and technologies
DNV Alternative Fuels Insight	Alternative fuel ship market data	Aggregate/asset level	Alternative low- and zero-carbon fuel production and distribution
World Bank PPI database	Private participation in infrastructure	Project level	Alternative low- and zero-carbon fuel production and distribution, port infrastructure and operations

HOW DATA SOURCES ARE CLIMATE TAGGED

Mitigation and adaptation finance are often tracked using different methodologies. Mitigation finance can generally be verified against taxonomies of eligible activities, whereas adaptation finance is usually tracked through a process-based approach, as relevance depends on the specific vulnerability, exposure and resilience outcome being addressed. Determining whether a project qualifies as supporting adaptation, and how much of the embodied adaptation finance should be counted, is context-specific. Inherent in adaptation finance tracking is the need for transparent and granular information on projects and their components. However, this level of granularity is not commonly reported, making it difficult to always verify the financial amounts that directly yield adaptation and resilience outcomes. In the face of limited data transparency or granularity, CPI reverts to its principle of conservativeness.

LIMITATIONS

Several core data sources used in the assessment, including OECD data based on donor-reported climate finance, are published with an approximately two-year lag. As the assessment commenced in late 2025, the quantitative analysis covers finance flows up to 2023. More recent project announcements, market developments, and sector trends were explored as case studies.

Climate-related public expenditure, particularly spending on ports, maritime infrastructure, research, and enabling activities, is not systematically identified or consistently tagged in national budgets. Domestic public budget expenditure is therefore not comprehensively captured, and the assessment may understate the role of national and subnational governments in supporting maritime climate finance.

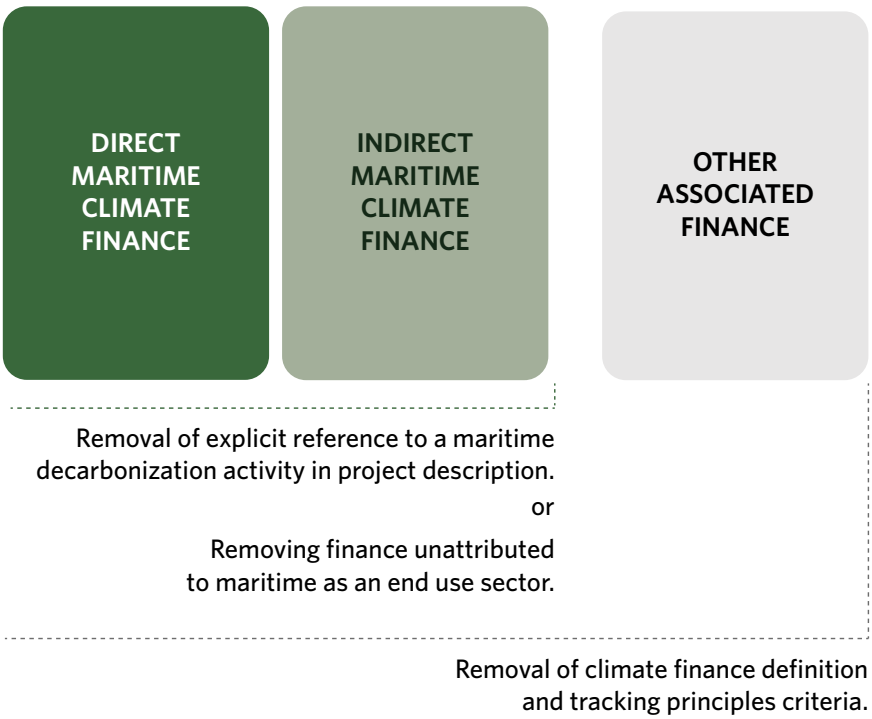
Climate-related finance provided by non-OECD countries is not systematically reported. This creates gaps in the coverage of South-South flows, including finance from major providers such as China, despite their potentially significant role in financing ports, ships, fuel production, and other maritime infrastructure.

Climate finance methodologies vary across reporting institutions - for example, MDBs and IDFC track mitigation and adaptation finance using joint climate finance tracking principles. CPI tracks and aggregates climate finance from multiple data sources by applying a robust methodology that screens eligible activities, operationalizing the UNFCCC definition of climate finance. However, it is acknowledged that differences apply in the eligibility criteria, attribution and interpretation of methodologies deployed by institutions and data sources.

3.1.5 DIRECT AND INDIRECT CLIMATE FINANCE

Climate finance is classified as direct or indirect depending on the strength of evidence verifying a project's relationship and relevance to maritime climate finance. Some projects are explicitly linked to a maritime climate activity. Others are either more aggregated or also apply to other sectors, such as the production of e-ammonia, which could also supply the agriculture sector for use in fertilizer-related activities, and cannot fully be attributed to the maritime sector, despite contributing to its decarbonization. To provide as comprehensive an overview of financing as possible, definitions and treatment methodologies have been developed to track this finance but classify either part or all of projects as indirect. This relationship, and the wider inclusion of 'other associated finance', is visualized in Figure 4.

Figure 4: Direct versus indirect versus other associated finance



DEFINITIONS AND APPLICATIONS

Direct climate finance: Includes projects or identifiable project components that explicitly target mitigation or adaptation relevant to maritime vessels, ports, shipping operations, alternative marine fuel use, or another clearly defined maritime application. Where a multiple end-use project contains an identifiable maritime component, only the relevant component is classified as direct climate finance.

Indirect climate finance: Financial flows generating benefits for maritime decarbonization or resilience that cannot be directly or fully attributed to the maritime sector.

The two principal areas where the indirect classification is applied are:

1. **Multiple end-use alternative fuel production:** where facilities for fuels such as e-ammonia are unlikely to supply just the maritime sector, and do not provide detailing of end-use agreements.
2. **Broad marine, coastal resilience, and biodiversity projects**: where project documentation does not provide sufficient detail to establish direct relevance to a specific activity of the pilot classification framework, but the activity aligns closely with these priority themes.

This has been driven by the characteristics of the gathered and processed data, where the exploration of indirect finance could be expanded further in future iterations.

3.1.6 INDIRECT FINANCE METHODOLOGIES

FUEL-SPLIT METHODOLOGY

Fuel production facilities often serve multiple end-uses but do not always disclose sectoral offtakes in project names and descriptions. The proportion of alternative fuel from the facility estimated to be serving other sectors is deemed indirect, as it does not directly contribute to maritime decarbonization but supports the development and commercialization of early-stage alternative fuels. Only the maritime-relevant portion is classified as direct climate finance. This methodology estimates the share of alternative fuel production and distribution investment relevant to maritime climate finance by using external fuel demand scenarios.

Projects are assessed in three steps:

1. **Projects dedicated to non-maritime uses** are excluded, e.g., projects dedicated to sustainable aviation fuel or fertilizer.
2. **Projects with clear evidence of a dedicated maritime** fuel supply are included in full as direct finance, e.g., projects that specify end-use in project descriptions.
3. **Projects with unclear end-use allocation are split** using the maritime sector's projected share of total demand for the relevant fuel, according to reputable scenarios (Box 1).

The pilot sought to derive demand shares from a single, comparable scenario source. However, no single source provided consistent 2030 demand shares across all relevant fuels. The methodology therefore uses the most appropriate available external scenario for each fuel type, prioritizing 2030 net-zero or 1.5°C-aligned scenarios where possible. Table 6 details the scenario and final split used to determine each fuel's direct finance split, followed by an example project.

Table 6: Direct climate finance split by fuel production facility

Fuel	Scenario and year	Source	Details	Final split
Ammonia	1.5°C 2030	IRENA (2022)	IRENA's 1.5°C scenario, where shipping becomes a meaningful source of future ammonia demand, alongside established uses and other emerging applications. The maritime share of projected ammonia demand is used to allocate a proportion of ammonia production projects.	11%
Green hydrogen **only**	Net Zero Scenario (IEA)	Lloyd's Register (2023)	Based on the Lloyd's Register (2023) scenarios, direct onboard use is assumed to be negligible unless project evidence shows otherwise. Hydrogen is therefore allocated through the ammonia production pathway - the share of hydrogen used for ammonia production (IEA, through Lloyds) is multiplied by the maritime share of ammonia demand (IRENA), giving a 0.8% maritime allocation. Green hydrogen production used to produce synthetic fuels relevant to the maritime sector was assumed to be for e-methanol, as in (Row 5) the full value of e-methanol production facilities is taken; therefore, for a conservative estimate and to confidently avoid double counting, this production pathway is excluded from split calculations of green hydrogen projects.	0.8%
Joint ammonia and green hydrogen production facilities	1.5°C 2030	IRENA (2022)	Hydrogen is assumed as an ammonia feedstock, and an 11% ammonia split is applied to the whole project	11%
Biofuels	Main case	IEA, (2025a)	Calculated by taking the projected 2030 maritime biodiesel demand over total biofuel demand in 2030. In the IEA main case, biodiesel is the principal biofuel for which a material maritime demand contribution is explicitly quantified to 2030. Other biofuels, including renewable diesel and bio-LNG, are identified as viable maritime options but are not separately quantified as material sources of shipping demand.	0.7%
E-methanol	-	-	The shipping sector is assumed to be the main demand sector for the fuel.	100%

Box 1: Example of the fuel-split methodology at the project level

The Jilin Songyuan Hydrogen Energy Industrial Park is an integrated green hydrogen, ammonia, and methanol project in Jilin Province, China.

The project has clear maritime relevance. CMB.TECH has signed an offtake agreement for green ammonia produced by CEEC Hydrogen Energy in Jilin Province, with supply linked to the CEEC Songyuan project (Ammonia Energy Association, 2025). CMB.TECH has framed the agreement as part of its ammonia supply chain strategy for green shipping (Bunker Market, 2025).

Available public evidence does not indicate that the full project output is dedicated to shipping. The evidenced shipping-linked offtake relates to green ammonia, while less detail is available on methanol offtake. It is therefore treated as a multiple end-use green ammonia project, rather than a dedicated maritime fuel production project. The joint green hydrogen and ammonia project is assessed as applying an 11% demand split, following the logic of row 3 in Table 6. The remaining 89% is classified as indirect finance.

It is to be noted that the 11% demand split is an indicative attribution intended to capture partially maritime-linked investment and should not be interpreted as a definitive estimate of maritime demand, which may vary over time and by market context. Its inclusion can provide an indicative picture of emerging fuel supply and potential maritime demand, helping inform future investment planning by identifying possible supply–demand gaps, offtake opportunities and associated infrastructure needs.

GENERAL MARINE, COASTAL RESILIENCE, OR BIODIVERSITY PROJECTS

Many projects do not provide sufficient detail to establish direct relevance to ports or maritime technologies or activities. However, such projects target general themes with consistent coverage in the pilot classification framework, such as coastal resilience, protected marine areas and biodiversity, and more. These projects are labeled as indirect cross-sector climate finance.

BENEFITS AND POTENTIAL DRAWBACKS OF INDIRECT TRACKING

This is a pilot methodology for the examination of maritime climate finance. As this approach is being piloted, applying indirect finance methodologies helps retain visibility of the full range of relevant activities while distinguishing the share attributable to the sector. Full exclusion of activities could underrepresent investment relevant to the maritime transition, limit the evidence base for future investment decisions and reduce the visibility of such activities in broader maritime sector planning. These considerations should therefore be carefully weighed against the advantages of a more restrictive classification and approach.

Examining indirect finance captures flows that support the maritime sector or marine conservation but are not explicitly linked to maritime climate finance activities (as framed in the classification framework) as their primary objective. Further research and recommendations from the pilot climate finance tracker could seek to build on initial research and improve areas of weakness identified.

- ***FUEL-SPLIT METHODOLOGY***

Applying the fuel-split methodology has two benefits. Firstly, it enables the incorporation of fuels and their precursor (i.e., hydrogen) production plants where the project's end-use purposes are not explicitly identified. Applying alternative fuel demand scenarios enables partial inclusion of these projects. Secondly, it helps to identify which types of alternative fuels are financed at the project level, providing insights on the potential supply of these fuels and a more representative view of climate finance in the maritime value chain.

However, this methodology adopts assumptions from external scenarios for the demand of alternative fuels for the maritime sector, which are dependent on uncertain future policy support and cost reductions. Demand and offtake are also likely to vary significantly from country to country, adding complexity to production facilities that is not currently captured in the methodology. As the majority of the alternative fuel production plants do not specify an end-use, many projects are exposed to such risks. A conservative approach, as outlined at the opening of Section 3.1.6, is taken to mitigate this.

APPROACH TO PILOT ASSESSMENT

Section 3.2 presents the outcomes of the pilot assessment, distinguishing between direct and indirect maritime climate finance and other associated finance where relevant. **Unless otherwise specified, all figures and findings refer to direct finance.**

3.2 PILOT ASSESSMENT OF MARITIME CLIMATE FINANCE

3.2.1 OVERVIEW OF DIRECT MARITIME CLIMATE FINANCE FLOWS

Maritime climate finance is growing rapidly from a relatively low base, and this pilot assessment establishes an initial baseline against which future progress can be measured. Finance reached USD 4.7 billion in 2023, more than doubling year-on-year, and exceeding levels recorded in previous years.[13] Despite this growth, current climate finance flows remain modest relative to estimated annual investment needs for maritime decarbonization, which are in the tens of billions of US dollars.

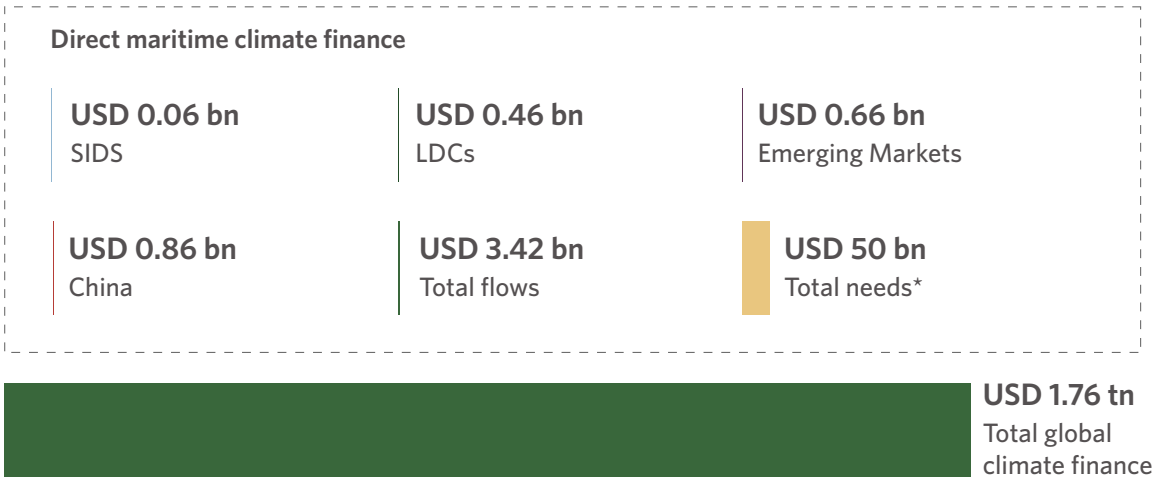
Cumulative direct maritime climate finance reached USD 10.5 billion between 2018 and 2023, equivalent to 0.14% of tracked global climate finance, indicating scope for mobilizing a larger share of existing climate finance for maritime decarbonization and adaptation activities.

SIDS and LDCs received 14% of the tracked maritime climate finance, USD 0.4 billion and USD 1.1 billion, respectively. While the absolute volumes remain relatively limited, the share of climate finance directed to the maritime sector in SIDS and LDCs is higher than the global average (1% and 0.5%, respectively). Furthermore, maritime climate finance is playing an important role in resilience in SIDS and LDCs, which together received around 68% of tracked maritime adaptation finance, largely through port infrastructure that could also support broader participation in the maritime transition.

Maritime climate finance flows are growing rapidly but remain below the level required to match estimated investment needs. Figure 5 puts maritime climate finance flows (presented as the average for 2022 and 2023 to smooth year-on-year variations) in the context of total climate finance flows and estimated annual investment needs for maritime decarbonization. It highlights a gap between current finance flows and estimated investment needs (UNCTAD, 2023a). Scaling investment across alternative fuel supply, ships, and ports can support implementation of the IMO GHG Strategy, indicating significant scope to mobilize and align climate finance flows towards the sector's transition.

13 At the time of analysis, 2023 was the latest year of data for which comprehensive data was available

Figure 5: Total climate finance versus direct maritime climate finance flows versus estimated needs, 2022/23 bi-annual averages



Note: SIDS span multiple development status categories. LDCs therefore exclude SIDS to avoid double counting. China, Emerging Markets and LDCs form the EMDE grouping (see 3.1.3). Results for China are presented separately in selected analyses due to relatively large scale compared to other EMDEs, in line with CPI's Global Landscape of Climate Finance methodology. This is a data management approach and does not imply separate treatments of individual Member States.

**USD 50 billion refers to the annual decarbonization needs required between 2030 and 2050 of Krantz et al. (2020). Estimates in UNCTAD (2023) provide a newer but wider range of investment needs, with the total ranging from USD 36-118 billion. See Section 1 - Introduction for more information.*

Maritime climate finance tracked in this study is equivalent to 0.14% of tracked global climate finance. Global climate finance totals are largely dominated by investments in sectors including energy systems, road transport, buildings and infrastructure, where technologies are commercially mature and deployed at scale. Table 7 places maritime climate finance in the context of total global climate finance across global, SIDS and LDC groupings.

Table 7: Total climate finance and direct maritime climate finance by country grouping, 2018-2023

Country grouping	Total climate finance (USD bn)	Share of total climate finance (%)	Direct maritime climate finance (USD bn)	Share of direct maritime climate finance (%)	Direct maritime share of total climate finance (%)
Global	7,741	-	10.5	-	0.14%
SIDS	37	0.48%	0.4	4%	1.0%
LDCs	216	3%	1.1	10%	0.5%

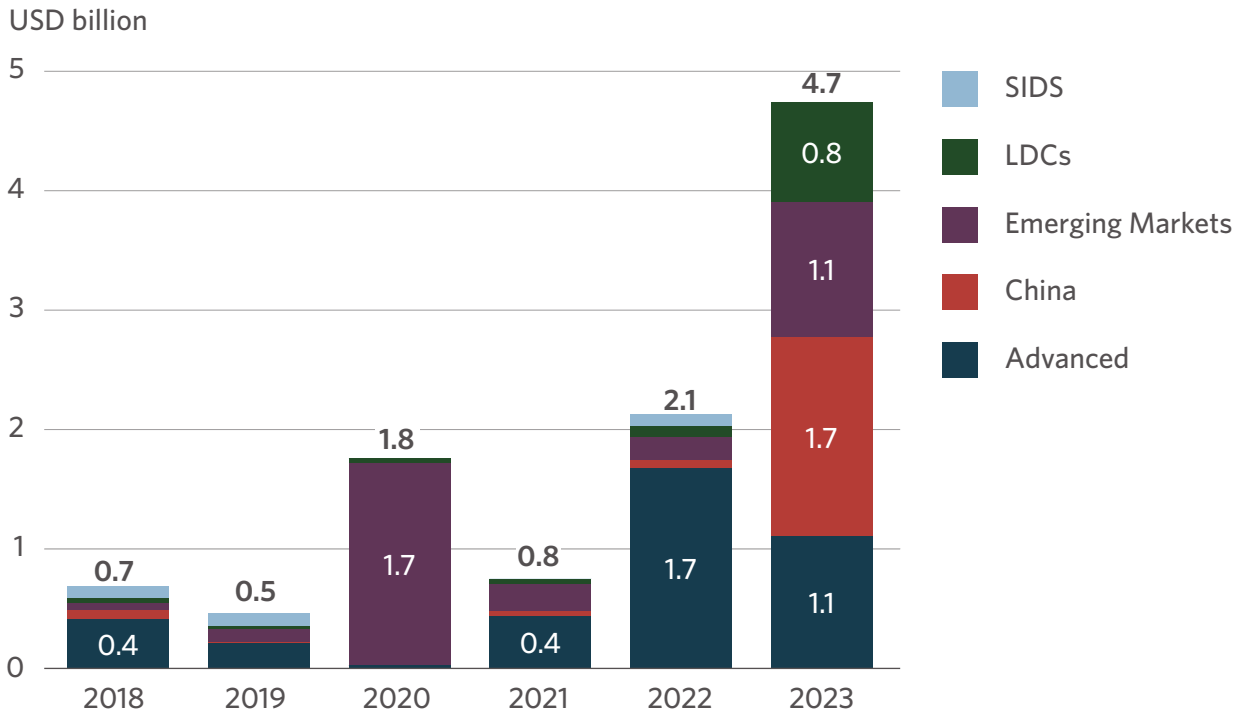
Note: SIDS span multiple development status categories. LDCs therefore exclude SIDS to avoid double counting.

Maritime climate finance has increased at a compound annual growth rate (CAGR) of 49% from 2018 to 2023, though growth has been uneven, concentrated in recent years and individual projects. As shown in Figure 6, finance declined in 2019 and 2021 before increasing sharply. Flows more than doubled from USD 2.1 billion in 2022 to USD 4.7 billion in 2023, accounting for 65% of the total rise since 2018. Finance in 2023 alone represented approximately 44% of all finance tracked over the six-year period. The fluctuating nature of flows indicates heavy influence by a few large commitments made in specific years. This concentration is particularly evident for LDCs. Around three-quarters of all finance to LDCs over

the period was recorded in 2023 (USD 830 million), driven largely by the development of the Matarbari port in Bangladesh[14]. Therefore, this does not necessarily indicate a trend.

SIDS and LDCs received 4% and 10%, respectively, of total maritime climate finance. While their overall share remains modest, maritime activities represented a comparatively larger share of the climate finance received by these country groups (Table 7). This share was around 1.0% for SIDS and 0.49% for LDCs, compared with 0.14% globally. This indicates the relative importance of maritime projects and investments within climate finance flows in these countries and the potential to build on this foundation as maritime investment needs increase.

Figure 6: Direct climate finance to maritime activities by development status



Note: SIDS span multiple development status categories. LDCs and Emerging Markets therefore exclude SIDS to avoid double counting. China, Emerging Markets and LDCs form the EMDE grouping (see 3.1.3). Results for China are presented separately in selected analyses due to relatively large scale compared to other EMDEs, in line with CPI's Global Landscape of Climate Finance methodology. This is a data management approach and does not imply separate treatments of individual Member States.

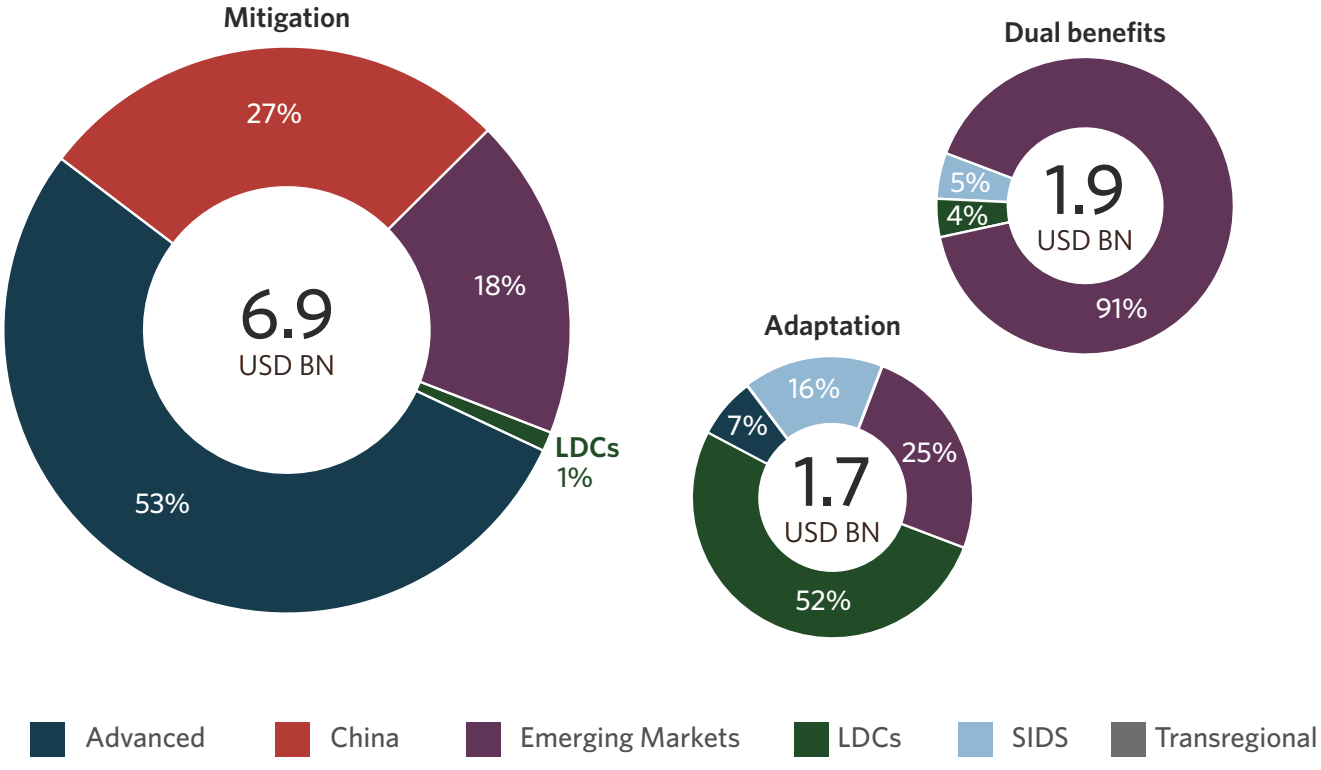
Mitigation finance is the largest share of maritime climate finance globally between 2018 and 2023, with around 80% of this going to advanced economies and China (Figure 7)**.** This concentration is consistent with the greater maturity of low- and zero-carbon maritime technologies, port investment, and alternative fuel markets in these economies. Within these markets, mitigation flows went primarily to port infrastructure and operations (41%), the production and distribution of alternative fuels (39%), and maritime operations and technologies (19%). Negligible mitigation finance went to SIDS and LDCs, at USD 22 million and USD 82 million, respectively. Given the predominantly mitigation-oriented nature of maritime climate finance, this indicates a need to strengthen planning and enabling conditions for SIDS and LDCs to access mitigation finance.

14 The port was supported through low-cost project debt provided by the Japan International Cooperation Agency (JICA). This study captures the adaptation-relevant component of the project, as reported by the OECD.

Adaptation finance flows were smaller overall, but accounted for a substantially larger share of maritime climate finance than of global climate finance, with SIDS and LDCs particularly prominent recipients. Adaptation was the smallest of the three climate objectives in absolute terms, totaling USD 1.7 billion between 2018 and 2023 (Figure 7). However, it represented 17% of tracked maritime climate finance over this period, compared with just 5% of total global climate finance across all sectors. Maritime adaptation climate finance was also more concentrated in SIDS and LDCs, which received 16% and 52%, respectively. **Pursuing resilience alongside decarbonization is particularly important in vulnerable SIDS and LDCs, where climate-related disruption to ports and transport infrastructure can undermine trade, connectivity, and essential services.** Adaptation finance can safeguard decarbonization gains while strengthening the resilience of vulnerable maritime economies, delivering important climate finance outcomes. Most adaptation finance to SIDS and LDCs supported port infrastructure, amounting to USD 957 million collectively, between 2018 and 2023.

Dual-benefit finance was concentrated (91%) in emerging markets. The remaining 9% of dual-benefit finance went to SIDS and LDCs excluding SIDS (see Figure 7). These flows largely relate to broader maritime project commitments that address both mitigation and adaptation, rather than investments focused on a single climate objective. For example, general sustainable port improvement projects may combine energy-efficiency and renewable energy deployment with measures that strengthen resilience to climate-related risks. Further analysis of the activities financed across the maritime value chain is provided in the following sections.

Figure 7: Maritime climate finance by objective (mitigation, adaptation, and dual-benefit), 2018–2023 cumulative total



Note: SIDS span multiple development status categories. LDCs and Emerging Markets therefore exclude SIDS to avoid double counting.

3.2.2 OVERVIEW OF INDIRECT MARITIME CLIMATE FINANCE AND OTHER ASSOCIATED FINANCE

All data presented represents direct maritime climate finance unless otherwise specified. This section presents the results of the analysis of indirect maritime climate finance and other associated finance relevant to maritime decarbonization and adaptation, in line with the methodological framework set out in Sections 2.1.1 and 3.1.6. Given the hard-to-abate nature of the maritime sector, a broader lens is applied to capture finance that can support its long-term transition but cannot be directly or fully attributed to a specific maritime activity. This includes indirect climate finance for multiple end-uses, such as alternative fuel production and broader marine, coastal resilience and biodiversity projects, as well as other associated green, sustainable and transition finance. Figure 4 (Section 3.1.5) provides a visual overview of direct, indirect, and other associated finance.

INDIRECT MARITIME CLIMATE FINANCE

Indirect maritime climate finance captures flows that support maritime decarbonization and resilience but cannot be fully attributed to that sector alone. This includes alternative fuel production, and marine, coastal resilience, and biodiversity projects that support maritime-relevant outcomes and building the enabling environment for maritime resilience (see Section 3.1.6). Inclusion of these flows widens the scope of maritime climate finance, representing a larger, but still very minimal, share of total climate finance (Table 8).

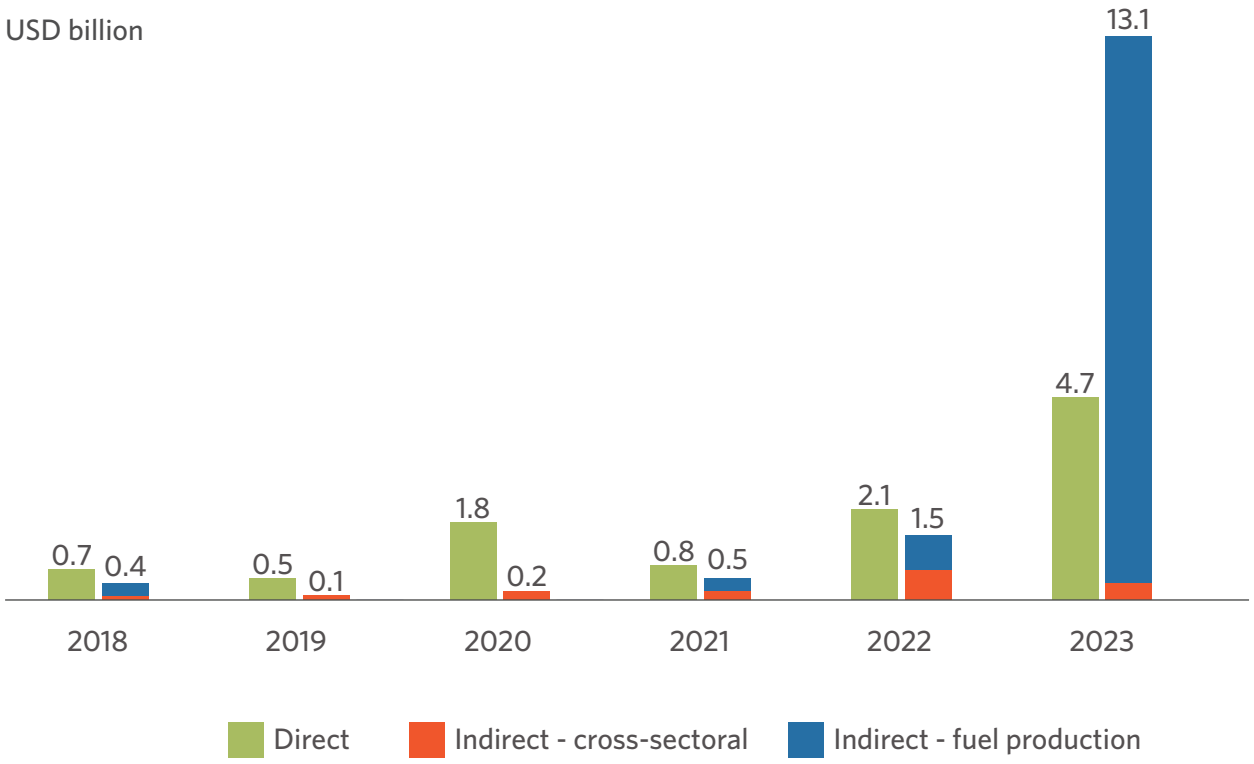
Table 8: Total climate finance and direct and indirect maritime climate finance by country grouping, 2018–2023

Country grouping	Total global climate finance (USD bn)	Share of total climate finance (%)	Direct + indirect maritime climate finance (USD bn)	Share of direct + indirect maritime climate finance (%)	Direct + indirect maritime share of total climate finance (%)
Global	7,741	-	26.3	-	0.3%
SIDS	37	0.48%	0.6	2%	1.7%
LDCs	216	3%	1.6	6%	0.7%

Note: SIDS span multiple development status categories. LDCs therefore exclude SIDS to avoid double counting.

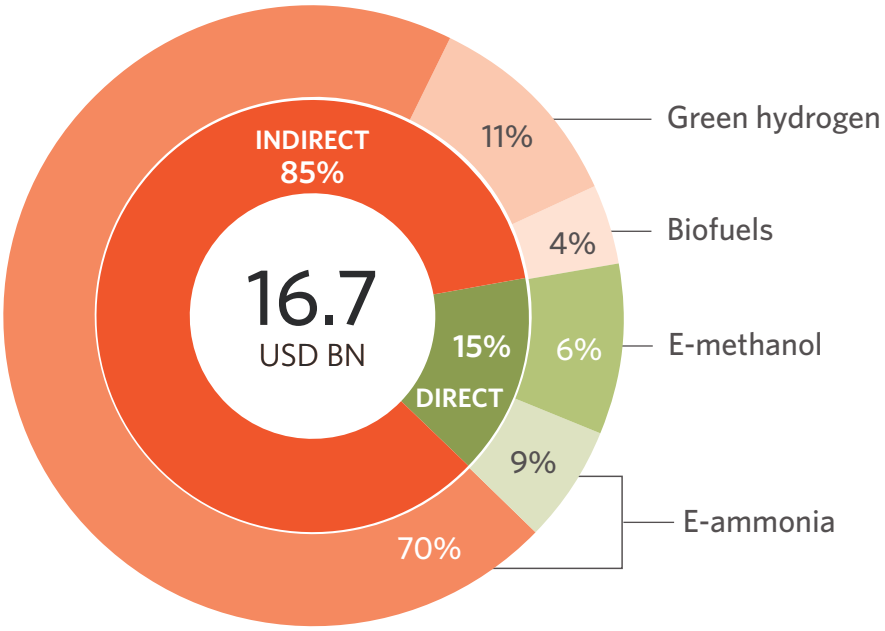
Indirect maritime climate finance rose sharply in 2023, driven by alternative low -and zero-carbon fuel production, totaling USD 14.1 billion over the tracked period. Indirect alternative low- and zero-carbon fuel production finance spiked significantly in 2023 (Figure 8). Most investment to the segment in 2023 was mobilized in China (USD 9.1 billion) of the total, followed by emerging markets (USD 3.1 billion), and advanced economies (USD 806 million). Finance to alternative low- and zero-carbon fuel production and distribution in SIDS and LDCs was negligible.

Figure 8: Direct and indirect maritime climate finance, USD billion



This growth was largely driven by e-ammonia production facilities and associated value chains outside of advanced economies, primarily in China and emerging markets. Combined direct and indirect fuel production finance totaled USD 16.7 billion between 2018 and 2023, of which 85% was classified as indirect (Figure 9). E-ammonia dominated the fuel mix, accounting for 79% of the combined total. Tracked e-ammonia projects amounted to approximately USD 13.2 billion over the assessment period. China accounted for 76% of this financing, while emerging market countries accounted for 23%. The remainder was mobilized in advanced economies. As these facilities can supply multiple end-use sectors, their full project value cannot be attributed to shipping. The fuel-split methodology (see Section 3.1.6 for more details) therefore attributes only the share associated with estimated maritime demand to indirect maritime climate finance. This resulted in approximately USD 1.5 billion being included in the maritime-relevant estimate. While these investments are not included in our maritime climate finance figures as they cannot be fully attributed to maritime use, they can help scale fuels that may be used for future shipping decarbonization, if supported by offtake, bunkering infrastructure, standards, and port readiness.

Figure 9: Direct and indirect fuel production and distribution financing, cumulative 2018–2023, by fuel type



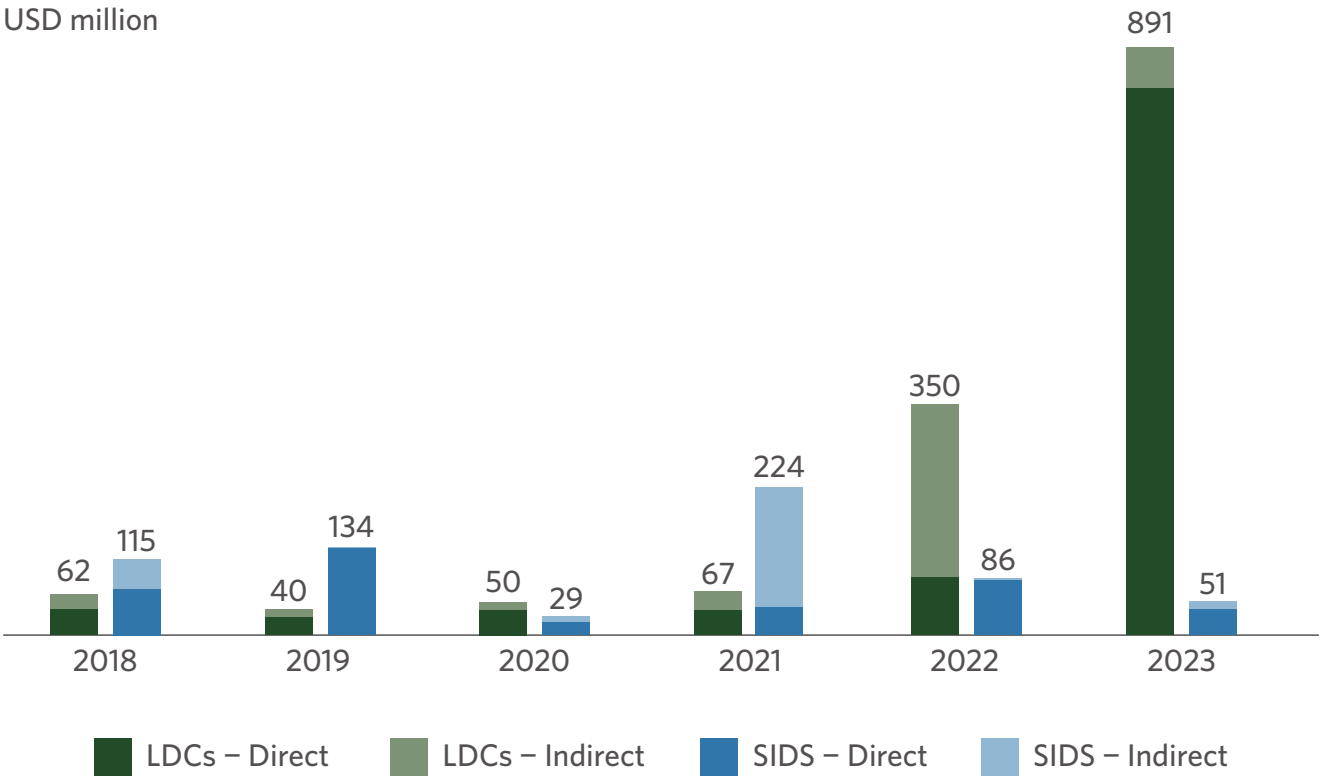
Note: Other flows, such as to green hydrogen and biofuel projects, are also tracked as direct finance; however, they total to just 0.22% of finance due to fuel split methodologies, and are therefore not visible in this figure.

Marine, coastal resilience, and biodiversity projects represent a smaller share of indirect climate finance flows, totaling USD 1.6 billion between 2018 and 2023. This subcategory highlights an important boundary issue for maritime climate finance tracking. The MDB Common Nature Finance Taxonomy was a key reference for developing the pilot classification framework, with the restoration and conservation of biodiversity and ecosystem services relevant to ports, waterways and maritime shipping[15]. However, this study classifies such activities as direct maritime climate finance only where a clear link to maritime infrastructure or operations can be established. Limited project-level information often prevents such attribution. For example, German Government funding for marine and coastal biodiversity in Thailand supports the wider maritime resilience agenda but cannot be directly attributed to a classification solution (GIZ, 2022a). Many projects within the estimated USD 1.6 billion total face similar classification uncertainty. Improved project descriptions and sector tagging could enable more consistent identification of maritime climate finance supporting resilience.

Indirect finance to SIDS and LDCs is concentrated in marine, coastal resilience and biodiversity projects, with limited participation in alternative fuel production. Between 2018 and 2023, these activities accounted for USD 244 million in SIDS, representing 98% of their indirect finance, and USD 270 million in LDCs (excluding SIDS), representing 68%. LDCs received USD 104 million in indirect alternative fuel production finance in 2022, while flows to SIDS were negligible. This contrasts with the global trend, where recent growth in indirect finance has been driven primarily by upstream alternative fuel production. The sharp increase in total maritime climate finance in 2023 was instead largely driven by direct finance to LDCs and individual large projects (Figure 10).

15 See Table 3A in Joint MDBs (2025) for more details.

Figure 10: Direct and indirect maritime climate finance to SIDS and LDCs



Note: SIDS span multiple development status categories. LDCs therefore exclude SIDS to avoid double counting.

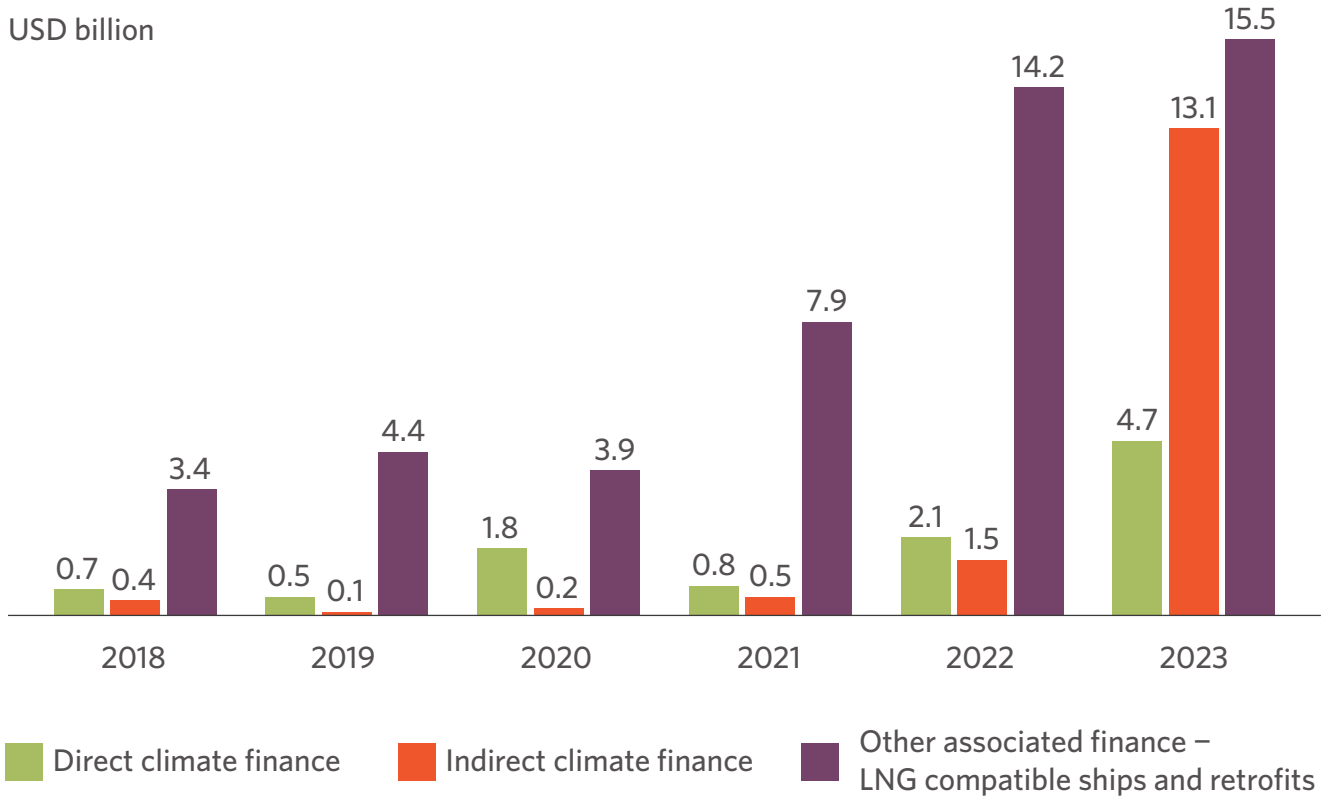
OTHER ASSOCIATED FINANCE

Other associated finance captures maritime-related flows with potential near-term GHG emission reduction potential, but which are not classified as climate finance. These activities are noted below for comprehensiveness but excluded from the rest of the assessment due to CPI's principle of not tracking activities that risk carbon lock-in (Annex 5.1).

LNG-related maritime finance has increased more than five-fold since 2018 and now significantly outweighs tracked maritime climate finance.[16] As shown in Figure 11, other associated finance rose from USD 3.4 billion in 2018 to USD 15.5 billion in 2023. Over the 5-year period, finance for LNG ships was nearly 5 times higher than direct maritime climate finance. This suggests that capital is still flowing more readily toward commercially available potential transition-fuel ships than it is toward alternative low- or zero-carbon ships, such as ammonia- and hydrogen-ready ships.

16 This only covers LNG-compatible new and retrofit vessels. Values are estimated by multiplying the number of LNG-compatible vessels (from DNV) by the respective weighted costs, based on vessel type (e.g., cruise ship, fuel carrier, etc.). The obtained data does not provide sufficient granularity to disaggregate flows by development status. Additionally, with 72% of total finance over the period labeled as 'global', meaningful regional analysis is not possible using the current form of processed data.

Figure 11: Tracked maritime climate finance and other associated finance



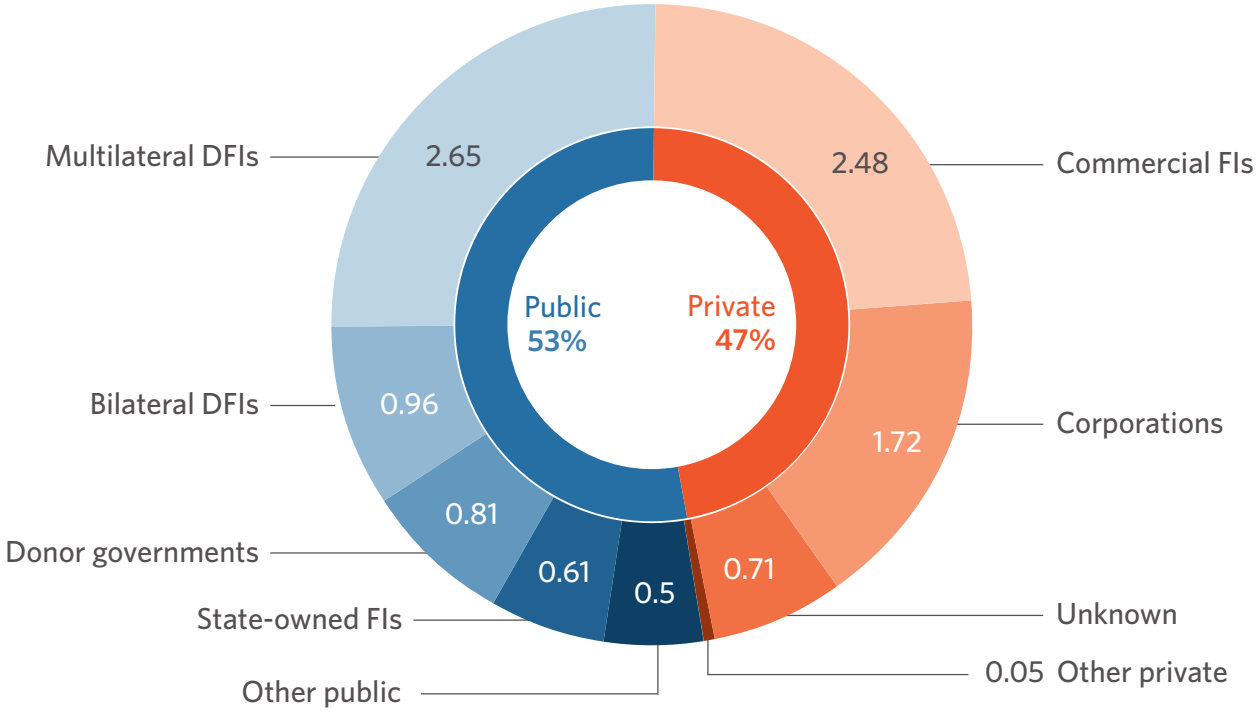
This highlights the importance of managing both transition opportunities and lock-in risks. LNG can deliver near-term benefits relative to currently used heavy fuel oils (HFOs) and may therefore play a transitional role in some contexts. As a maritime fuel, it can also have benefits for emissions and air quality, such as significantly reducing black carbon emissions (CCAC, 2019). However, these near-term benefits do not make LNG compatible with the sector's long-term decarbonization pathway. Continued reliance on fossil LNG, alongside methane emissions and the long operating lives of ships and associated infrastructure, creates risks of fossil-fuel lock-in and stranded assets as shipping transitions towards zero-emission fuels (Englert et al., 2021). LNG is therefore not treated as climate finance in this assessment, consistent with CPI tracking principles. The gap with tracked climate finance points to the need to scale investment in alternative fuels, compatible ships, and port infrastructure aligned with long-term decarbonization pathways.

3.2.3 DIRECT MARITIME CLIMATE FINANCE – SOURCES AND ACTORS

Analysis of financing sources and actors shows who is currently providing maritime climate finance, and where reliance on specific provider groups remains high. This section examines direct maritime climate finance by public and private actors from both domestic and international sources. Actor types, including DFIs, donor governments, commercial financial institutions, corporations, and state-owned entities, are also explored. This helps identify whether finance is being mobilized through market-led investment, public development finance, or a combination of both.

At the aggregate level, direct maritime climate finance is almost evenly split between public and private actors, but this masks strong differences across markets. As shown in Figure 12, private actors accounted for 47% of tracked direct finance between 2018 and 2023, while public actors accounted for 53%. Commercial financial institutions were the largest private actor group, followed by corporations and other private actors. On the public side, multilateral DFIs, bilateral DFIs and donor governments were the main providers. State-owned FIs play a larger role in China, as do state-owned enterprises, which are captured in 'other public'. Private capital is beginning to scale where there are clearer commercial opportunities, but is not yet mobilized across the maritime value chain.

Figure 12: Direct maritime climate finance by financing source and actor, cumulative 2018–2023, USD billion

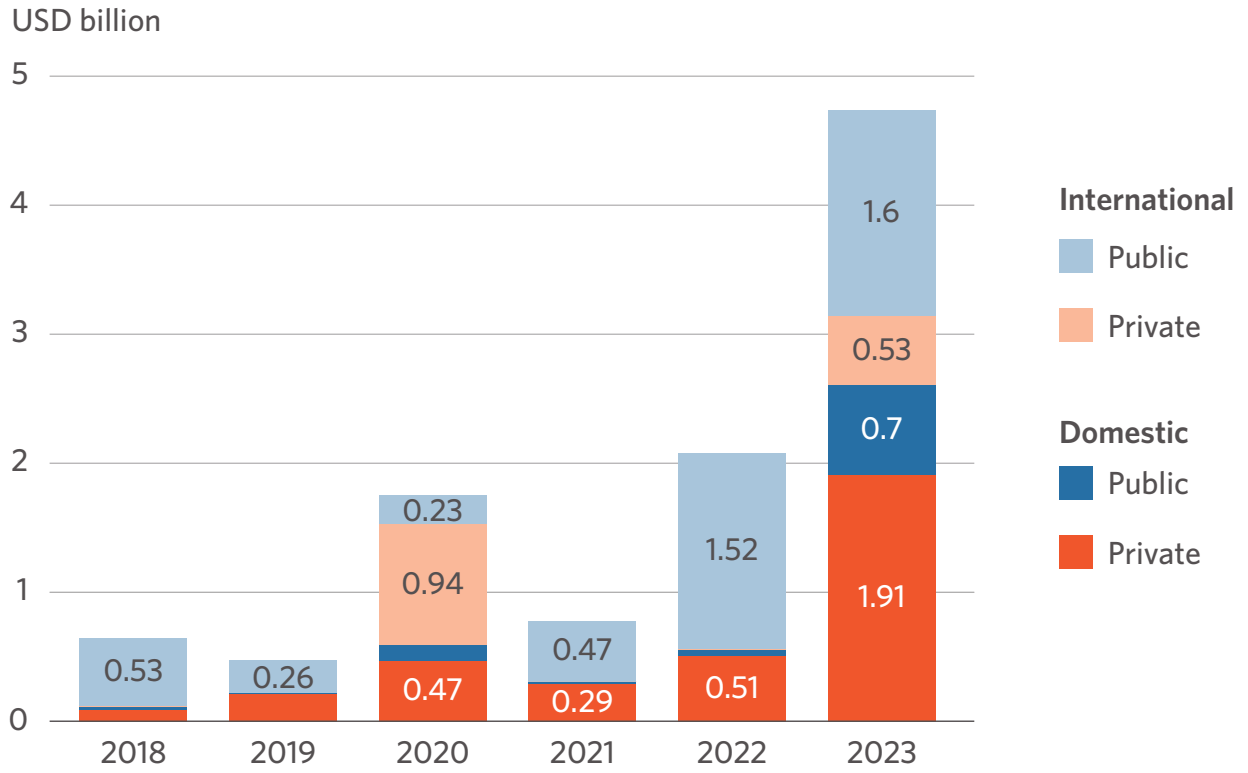


Note: Other private includes Third Sector Organizations, Funds and Institutional Investors. Other public includes State-Owned Enterprises, Export Credit Agencies, National DFIs, Multilateral Climate Funds, and Public Funds.

The rise in domestic private finance in 2023 should be interpreted carefully. As shown in Figure 13, earlier years were more reliant on international public finance, alongside some domestic private flows. In 2023, over half of tracked direct finance came from domestic actors, especially private sources. Around 50% of domestic private finance in 2023 was mobilized in China, largely driven by alternative fuel production investments and maritime-relevant renewable energy projects.[17] The shift indicates growing domestic capital formation in parts of the maritime value chain, but not yet a wider increase across all countries or activities.

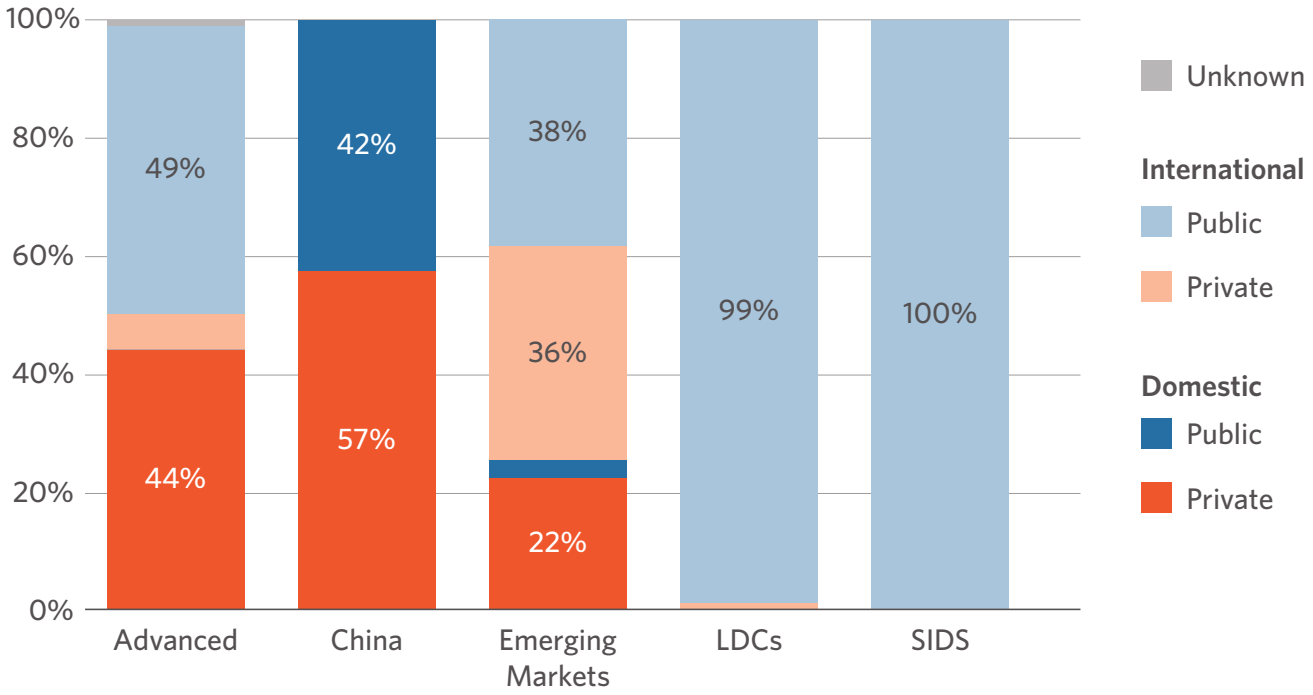
17 Domestic private institutions account for a larger share of China's maritime climate finance than of its total climate finance, as reported in the Global Landscape of Climate Finance. This partly reflects the large privately financed Envision Energy ammonia project (Case Study 2), as well as smaller renewable energy and alternative fuel projects. The classification of financing institutions can be more difficult to verify for smaller projects, but CPI systematically reviews Chinese institutions to ensure classifications reflect available public records.

Figure 13: Direct maritime climate finance by source



SIDS and LDCs present a contrasting picture, with tracked finance almost entirely dependent on international public sources. Finance to these country groupings came primarily from bilateral DFIs (53%), donor governments (26%), and multilateral DFIs (19%). More specifically, finance to SIDS was primarily sourced from multilateral providers, whereas finance to LDCs was dominated by bilateral partners, including DFIs and donor governments. Domestic budget expenditure is not yet covered in the dataset, and private domestic actors are not well captured. **However, the limited presence of private finance still points to a clear mobilization gap in countries where maritime infrastructure is critical for trade, connectivity and resilience.**

Figure 14: Direct maritime climate finance by source and country grouping, 2018–2023[18]



Note: SIDS span multiple development status categories. LDCs and Emerging Markets therefore exclude SIDS to avoid double counting. China, Emerging Markets and LDCs form the EMDE grouping (see 3.1.3). Results for China are presented separately in selected analyses due to relatively large scale compared to other EMDEs, in line with CPI's Global Landscape of Climate Finance methodology. This is a data management approach and does not imply separate treatments of individual Member States.

Overall, the observed trends for financing actors point to a dual financing challenge. Commercial capital is beginning to appear in more investable segments, such as alternative low-carbon fuel production and commercially viable infrastructure. However, SIDS, LDCs and less mature market segments rely on DFIs and donor governments. Scaling finance will require both mobilization of private capital in bankable opportunities and continued use of concessional finance, guarantees, project preparation and policy support where risks remain high. Private first movers can also play an important role by demonstrating emerging technologies in practice, helping reduce technical uncertainty and identifying the infrastructure, regulatory and safety requirements needed for wider deployment, as illustrated by the Fortescue Green Pioneer case study below.

18 China displays an outsized private participation in this figure than is observed in similar analysis in reports such as the Global Landscape of Climate Finance. In part, this is due to the presence of a large e-ammonia private project funded by Envision, as explored in Case Study 2.

Case study 1: Fortescue's demonstration of ammonia-fueled shipping

Large private-sector demonstrations can show that emerging technologies are technically feasible while exposing the regulatory and infrastructure barriers to be addressed to enable wider deployment. The private sector company Fortescue was a first mover in converting two of the four engines on its ship, the *Fortescue Green Pioneer,* to operate using ammonia in combination with conventional fuels and installing the associated fuel-delivery and safety systems. The ship sailed from Singapore to Dubai for COP28 in December 2023, where it was showcased to policymakers and industry representatives. However, it did not carry or use ammonia while in Dubai because regulatory arrangements were not yet in place, illustrating that technological development must be accompanied by appropriate fuel standards, port infrastructure and regulatory approvals (Fortescue, 2023; MPA Singapore, 2024b).

First movers can also generate operational insights to support the development of safety procedures, regulatory approvals and industry standards. In March 2024, Fortescue, with support from the Maritime and Port Authority of Singapore, DNV, Vopak and other partners, conducted the first use of ammonia in combination with diesel as a marine fuel aboard the *Green Pioneer* in the Port of Singapore. The trials tested the ship's ammonia storage and piping systems, fuel-delivery system, converted engines and seaworthiness, alongside crew training, safety drills and emergency response planning. The ship subsequently received approval from the Singapore Registry of Ships and DNV's "Gas Fueled Ammonia" notation, followed by propulsion and maneuverability trials in April and May 2024. The case demonstrates how a significant commitment by one private actor can bring together regulators, ports, classification societies, fuel suppliers and research institutions to develop practical systems for a new technology to move towards wider adoption (DNV, 2024; MPA Singapore, 2024a).

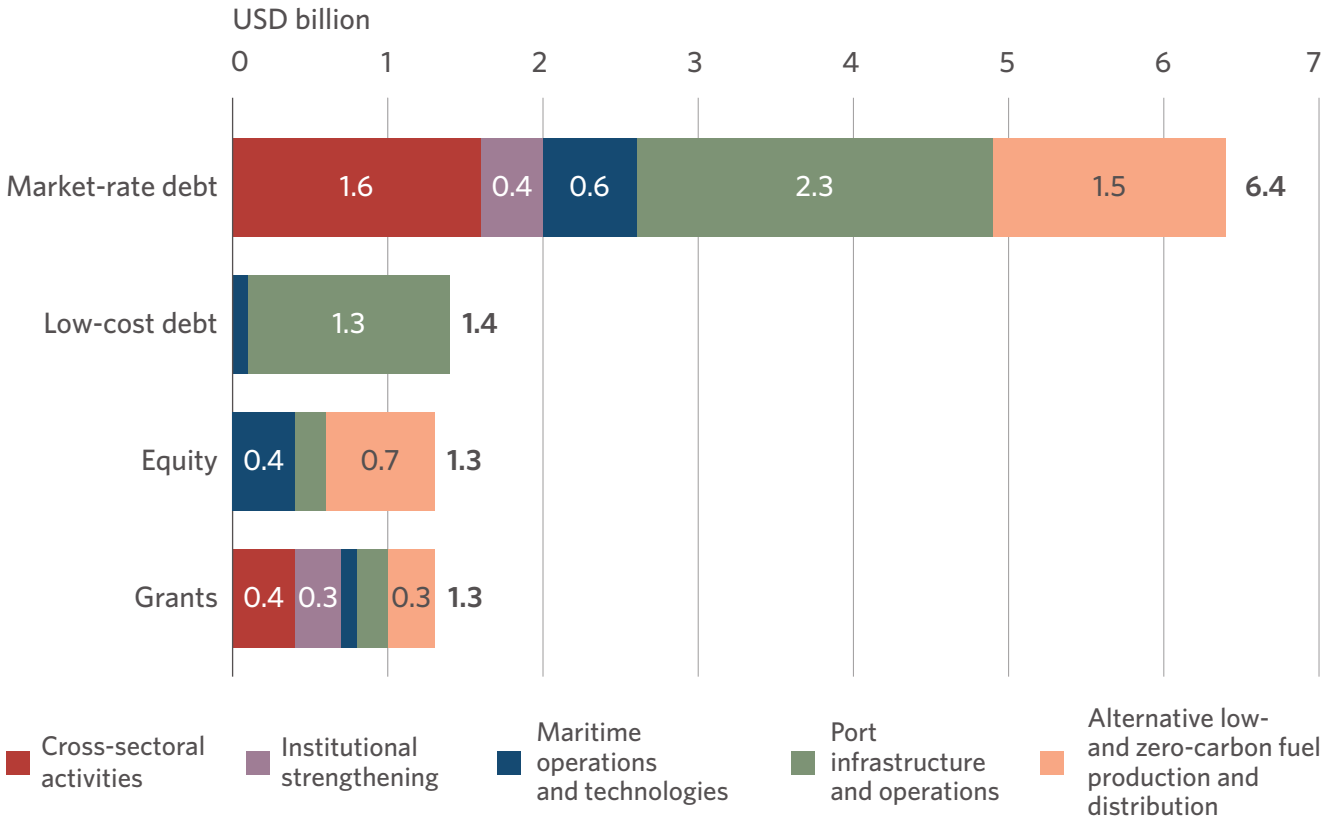
3.2.4 DIRECT MARITIME CLIMATE FINANCE – FINANCIAL INSTRUMENTS

Maritime climate activities are mostly funded using market-rate debt, with finance concentrated in more bankable activities. Market-rate debt accounted for 61% of total investment between 2018 and 2023. As shown in Figure 15, this financing accounted for USD 6.4 billion, with most directed to port infrastructure and operations (36%), cross-sectoral activities (25%), and the production and distribution of alternative low- and zero-carbon fuels (23%). Debt is being deployed where projects have clearer revenue models, larger asset bases, or borrowers that can raise finance at the corporate or portfolio level.

Concessional finance plays a smaller (around 26%) but important role. Low-cost debt financing went almost exclusively to port infrastructure and operations, helping to improve the affordability of large infrastructure projects. Grant financing was provided across the value chain, accounting for 12% of maritime climate finance and primarily supporting cross-sectoral and institutional strengthening measures. Grants are key for supporting less commercially mature activities, enabling conditions, and public-good functions. Concessional instruments can help to scale underdeveloped sectors and crowd in further finance, including private investment.

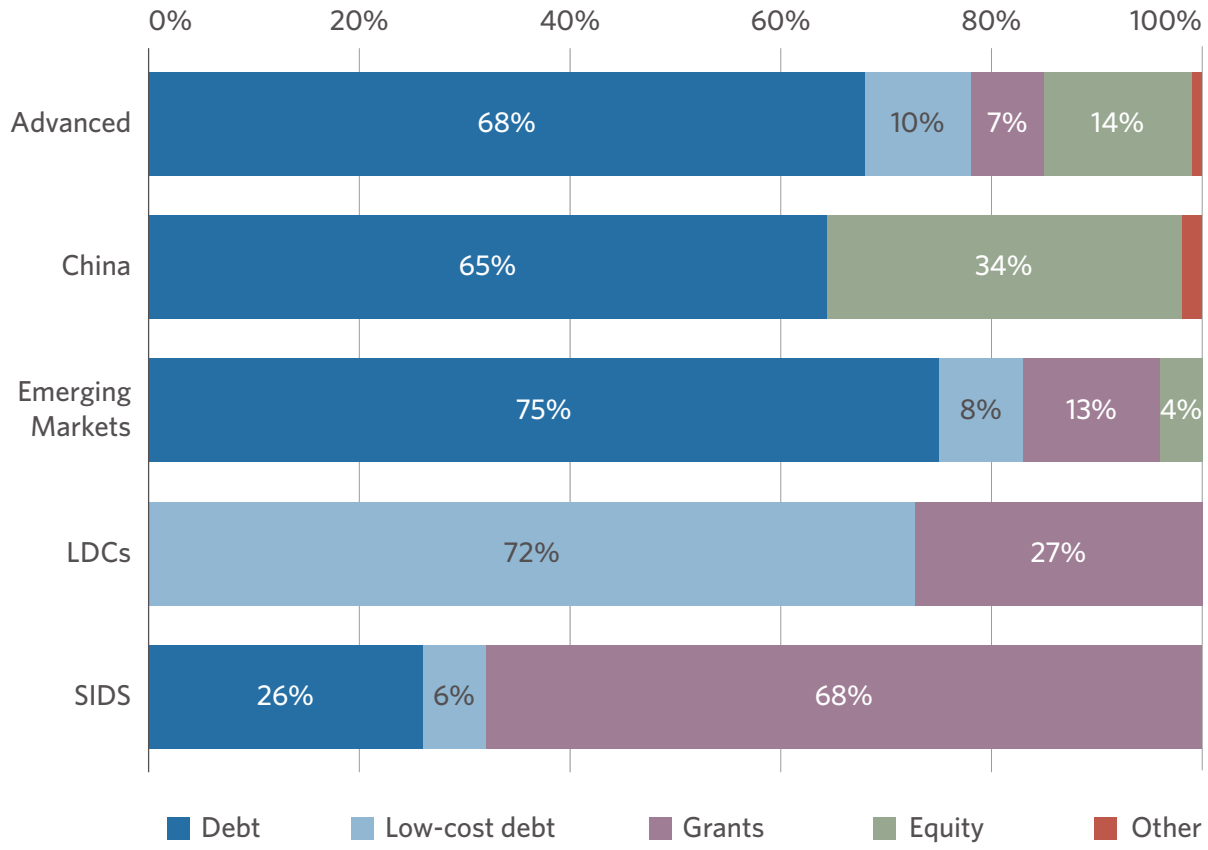
Equity played a smaller but targeted role in financing newer maritime technologies and fuel value chains. Of the USD 1.3 billion in equity tracked, around USD 0.7 billion supported alternative low-carbon fuel production and distribution, and USD 0.4 billion supported maritime operations and technologies. Together, these activities accounted for around 85% of tracked equity finance. Risk-bearing capital is particularly important for activities involving newer technologies, less-established markets, and greater commercial uncertainty.

Figure 15: Maritime climate finance breakdown by instrument, cumulative 2018–2023



SIDS and LDCs received most of their maritime climate finance through grants and low-cost debt, reflecting higher risk and affordability constraints. As shown in Figure 16, grants were the most prevalent instrument in SIDS, which received USD 265 million in grant financing between 2018 and 2023. Together, grants and low-cost debt accounted for around 74% of finance to SIDS. LDCs excluding SIDS mostly mobilized low-cost debt, amounting to USD 771 million over the same period. Low-cost debt and grants together accounted for around 99% of finance to LDCs. By contrast, maritime climate investments in advanced economies, China, and emerging markets used more market-rate debt and equity, given that these markets are more able to attract commercial capital.

Figure 16: Financial instrument shares by development status, cumulative 2018–2023



Note: SIDS span multiple development status categories. LDCs and Emerging Markets therefore exclude SIDS to avoid double counting. China, Emerging Markets and LDCs form the EMDE grouping (see 3.1.3). Results for China are presented separately in selected analyses due to relatively large scale compared to other EMDEs, in line with CPI's Global Landscape of Climate Finance methodology. This is a data management approach and does not imply separate treatments of individual Member States.

The high share of concessional finance in SIDS and LDCs, alongside the limited private finance identified in the preceding analysis, points to a need for scaling up future opportunities for private capital mobilization. Grants and low-cost debt, which lower financing costs and repayment pressure, are often appropriate for public infrastructure, resilience, technical assistance and institutional strengthening. However, additional private capital will also be needed for commercially viable maritime investments**.** Blended finance, guarantees, project preparation, and revenue-support mechanisms could help allocate risks more effectively and attract private investment, while ensuring that financing structures remain affordable and do not create unsustainable debt burdens.

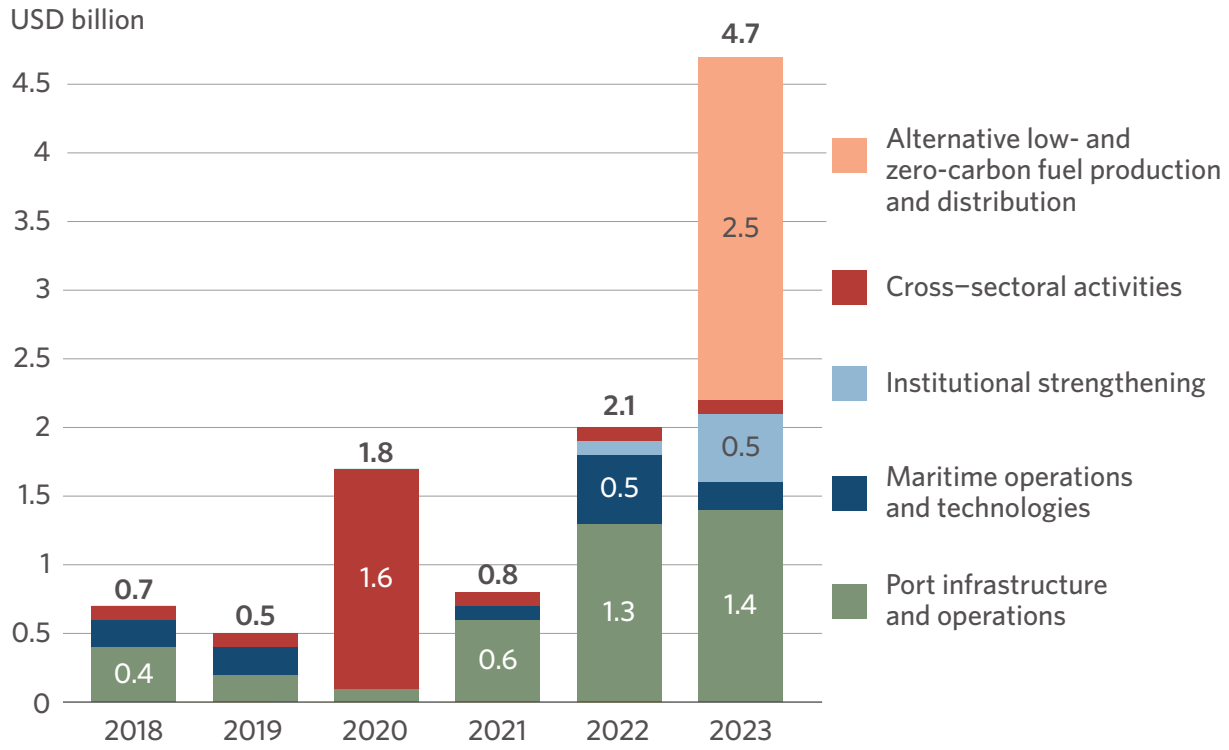
While blended finance could not be quantified separately within this pilot assessment, individual projects illustrate how concessional finance can be combined with other sources to support emerging maritime technologies. In Thailand, ADB structured financing for Energy Absolute's E Smart Bangkok Mass Rapid Transit Electric Ferries Project, the first commercial-scale electric ferry system for mass transit in Southeast Asia. The financing combined a USD 4.7 million ADB loan with a USD 3.6 million concessional loan from the Clean Technology Fund and USD 9.6 million in parallel co-financing from Japan International Cooperation Agency and the Export–Import Bank of Thailand. The financing supported 27 fully electric ferries and demonstrates how concessional capital, MDB financing and co-financing can be combined to address investment risks and support the commercial deployment of lower-emission maritime technologies (ADB, 2022).

3.2.5 DIRECT MARITIME CLIMATE FINANCE – MARITIME VALUE CHAIN SEGMENTS

Maritime climate finance is increasingly concentrated in alternative fuel production and port infrastructure, suggesting that investment is prioritizing the enabling parts of the value chain. As shown in Figure 17, direct finance increased sharply to USD 4.7 billion in 2023, driven mainly by alternative low- and zero-carbon fuel production and distribution, which reached USD 2.5 billion. Port infrastructure and operations also remained a major segment, reaching USD 1.4 billion. Together, these two segments accounted for around 83% of direct finance in 2023. This indicates that finance is scaling around fuel supply chains and infrastructure readiness, which make up 87% of investment needs, rather than across the full maritime transition (Krantz et al., 2020).

This section examines how finance is distributed across the maritime segments identified in the pilot classification framework (Section 2.3). Context and justification of these segments is available in Section 2.2. Where data quality allows, the section also considers the types of activities, solutions and technologies being financed, and how these differ by actor and instrument. The segment-level view helps identify where investment is beginning to scale and where important gaps remain, particularly in shipbuilding and recycling and vessel-side technologies.

Figure 17: Direct maritime climate finance by segment

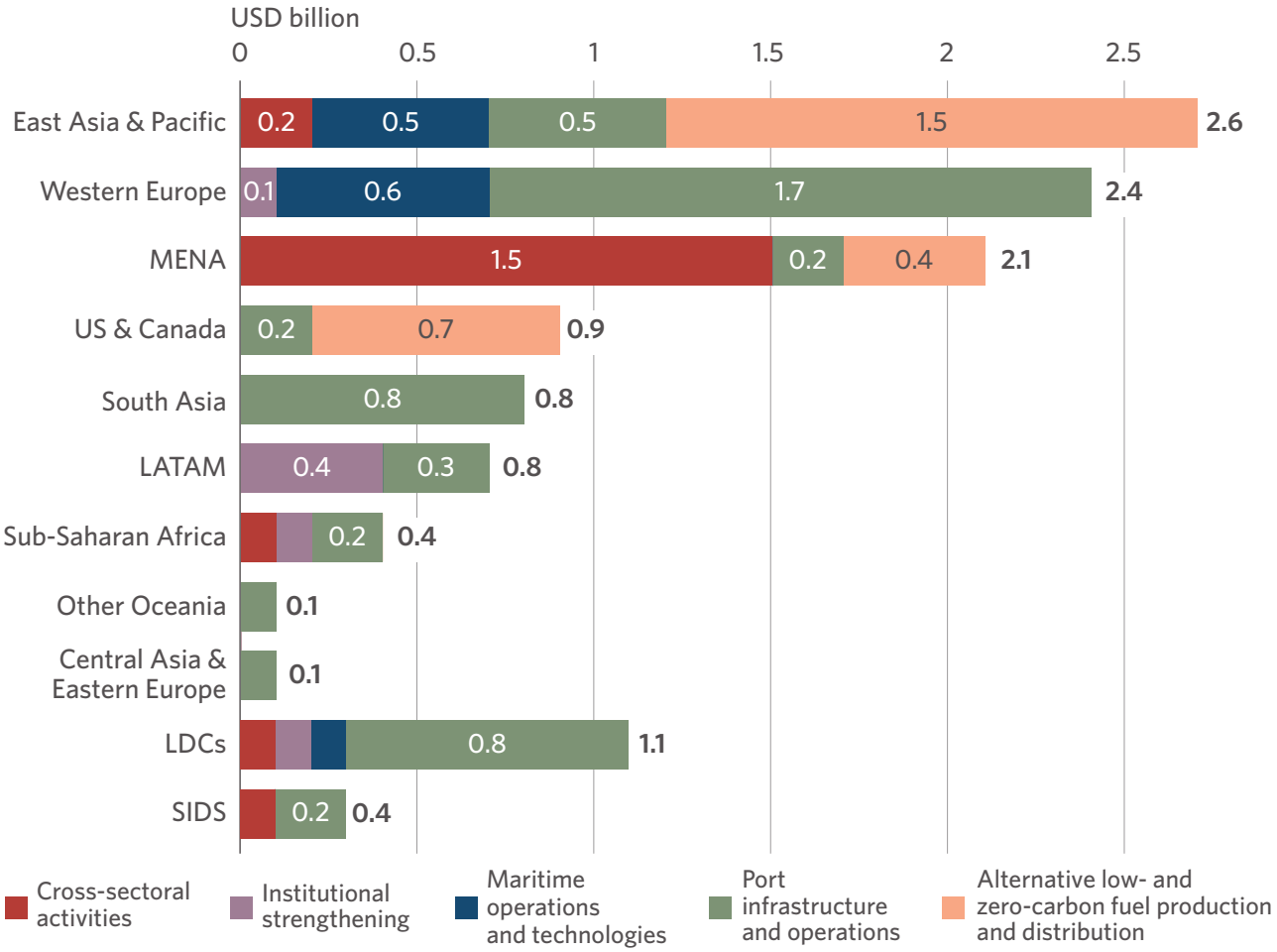


Note: See Pilot Classification Framework in Section 2.2 for detailed activities within each segment.

Regional finance is concentrated in a small number of segments and large transactions (see Figure 18). East Asia and the Pacific received USD 2.6 billion between 2018 and 2023, including USD 1.5 billion for alternative fuel production and distribution, largely driven by China. Western Europe received USD 2.4 billion, of which USD 1.7 billion supported port infrastructure and operations. In the Middle East and North Africa, the USD 1.5 billion DP World green sukuk accounts for much of the cross-sectoral finance tracked in the region (see Footnote 20 for more information). Together, East Asia and the Pacific, Western Europe and the Middle East and North Africa accounted for around two-thirds of tracked direct maritime climate finance. These concentrations show that regional totals can be strongly influenced by a limited number of large projects or financing commitments.

Port infrastructure was the largest segment in both LDCs and SIDS. It accounted for around USD 0.8 billion of the USD 1.1 billion tracked in LDCs and around USD 0.2 billion of the USD 0.4 billion tracked in SIDS. Smaller amounts supported cross-sectoral activities, institutional strengthening and maritime operations and technologies. This reflects the importance of ports to trade and connectivity in these countries, as well as the prominence of port infrastructure in SIDS' maritime climate finance. However, it also highlights the limited finance reaching alternative fuels, ship technologies, shipbuilding and recycling, potentially reflecting the constraints smaller and more remote economies face in participating as producers in these sectors.

Figure 18: Total direct maritime climate finance, 2018–2023, by region and segment, USD billion

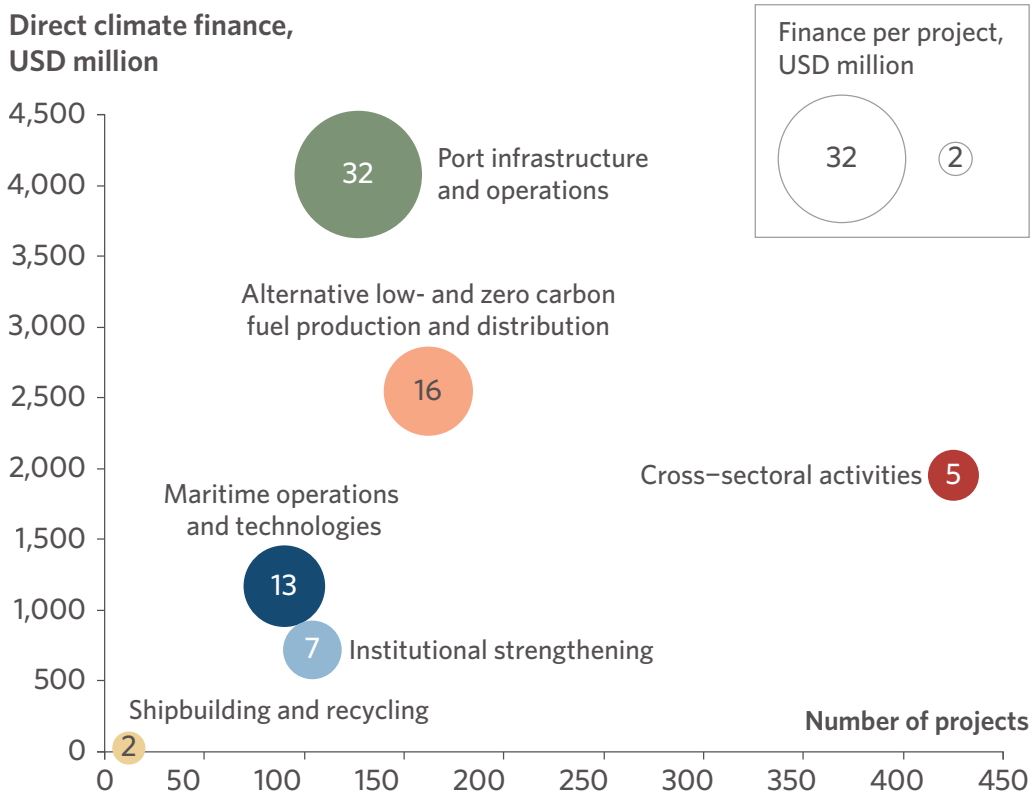


Note: SIDS span multiple development status categories. LDCs and Emerging Markets therefore exclude SIDS to avoid double counting.

The number and size of projects differ substantially across maritime segments. Around 104 institutional-strengthening projects and 90 maritime operations and technologies projects were tracked, despite the relatively low aggregate finance received by these segments. Cross-sectoral activities had the largest number of tracked projects, at 422, but averaged only around USD 5 million per project. The high number of projects relative to aggregate finance reflects many smaller technical assistance, policy, capacity-building and budget-support activities, particularly within institutional strengthening. Cross-sectoral totals can also be strongly influenced by individual large transactions.

By contrast, port infrastructure and alternative fuel production received the largest total flows and had the greatest average project sizes, at USD 32 million and USD 16 million, respectively.[19] Finance in these segments is therefore more influenced by larger transactions than in institutional strengthening and most cross-sectoral activities. Shipbuilding and recycling received negligible finance and had very few tracked projects, highlighting a significant gap in a segment that will be central to fleet renewal and the wider maritime transition.

Figure 19: Number of projects tracked vs direct climate finance value by segment, cumulative 2018–2023



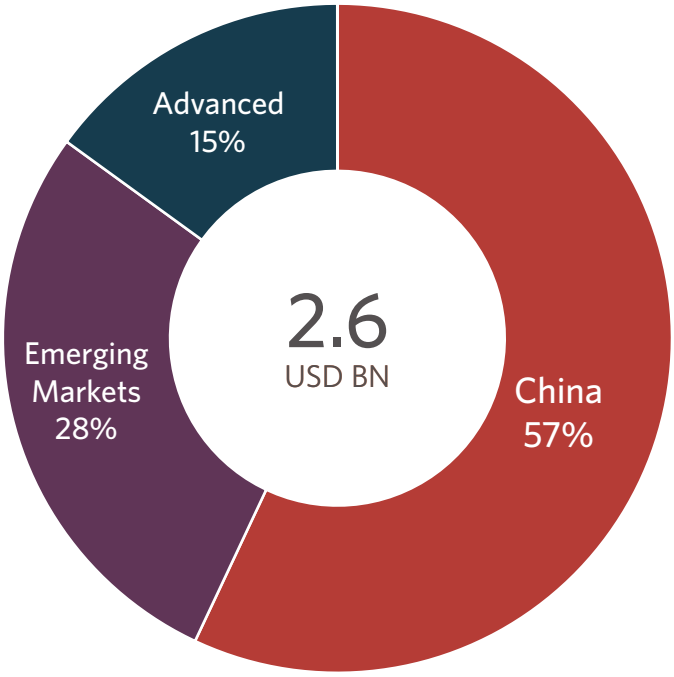
The concentration of finance in fuel production and ports also points to a need for greater coordination across the value chain. Investment in alternative fuel supply and infrastructure will need to be matched by vessel retrofits, new low-emission ships, shipbuilding capacity, offtake agreements and demand-side measures to translate these investments into maritime emissions reductions.

19 Alternative and low carbon fuel production project totals represent only the climate finance value apportioned to the maritime sector (direct finance), using total project values (direct + indirect) gives an average of USD 103 million/project.

ALTERNATIVE FUEL PRODUCTION AND DISTRIBUTION

Almost all alternative fuel production and distribution finance was tracked in 2023, showing how quickly the segment can scale when large projects reach financial close. The USD 2.5 billion investment in 2023 was primarily concentrated in e-ammonia production in China (USD 1.1 billion) and the Middle East and North Africa (USD 321 million). Funding also went to e-methanol production in the US and Canada (USD 671 million), as well as China (USD 350 million). Given that 99% of finance was tracked in a single year, there is not yet evidence of sustained annual growth. Overall, finance was highly concentrated geographically. China accounted for 57% of direct finance in the segment, emerging markets for 28%, and advanced economies for 15% between 2018 and 2023 (Figure 20, Case Study 2).

Figure 20: Alternative fuel production and distribution financing, cumulative 2018–2023, by development status



Note: SIDS and LDCs recorded negligible flows in alternative fuel production and distribution and hence are not shown in this graphic. China, Emerging Markets and LDCs form the EMDE grouping (see 3.1.3). Results for China are presented separately in selected analyses due to relatively large scale compared to other EMDEs, in line with CPI's Global Landscape of Climate Finance methodology. This is a data management approach and does not imply separate treatments of individual Member States.

Alternative fuel production also accounts for a substantial share of indirect maritime climate finance. Many production facilities have multiple potential end-uses and cannot be fully attributed to shipping. These flows are therefore excluded from the direct finance totals presented here and are analyzed separately in Section 3.2.2.

SIDS and LDCs received almost no tracked finance for alternative fuel production. If this trend continues, larger markets with greater industrial capacity may establish early positions in emerging maritime fuel supply chains, leaving SIDS and LDCs as fuel purchasers. Targeted

support could help enable them to participate in production, distribution, and bunkering opportunities, while scope for participation may vary considerably across countries according to renewable energy potential, land and water availability, domestic and regional demand, and port and grid infrastructure.

Around 77% of tracked finance in the alternative fuel segment came from private actors. Domestic private sources accounted for 64% of total finance, with domestic public and international private sources accounting for a further 21% and 13%, respectively. Private capital entered parts of the value chain where project scale, industrial policy, production capacity, and expectations of future demand are strongest. However, flows were concentrated in a small number of countries and projects, meaning that these conditions may not be readily replicated across all markets.

Case study 2: Scaling alternative fuel production in China and emerging markets

Investment data indicates that China is combining alternative fuel production capacity with broader efforts to develop domestic value chains. Projects captured in the 2023 dataset included Envision Energy's green ammonia development in Chifeng and Energy China's Songyuan Hydrogen Energy Industrial Park in Jilin. Construction of the Songyuan project began in September 2023 and is designed to integrate renewable power with green hydrogen, ammonia and methanol production (CEEC, 2025). Envision's Chifeng project also began construction in 2023 and has subsequently reached commercial-scale renewable ammonia production (Envision Group, 2025). These projects contributed to the concentration of tracked finance in China.

Although outside the tracking period and therefore not included in the finance totals, the GEF-funded *China's Green Shipping Transition Model and Demonstration* project was approved in 2025. The project has a USD 17.2 million GEF grant and USD 158.3 million in expected co-financing. It aims to establish coordinated frameworks that integrate green fuels, clean technologies and policy mechanisms into China's shipping sector (GEF, 2025). Its approach combines investment in alternative fuel capacity with the policy and market conditions needed to support maritime uptake.

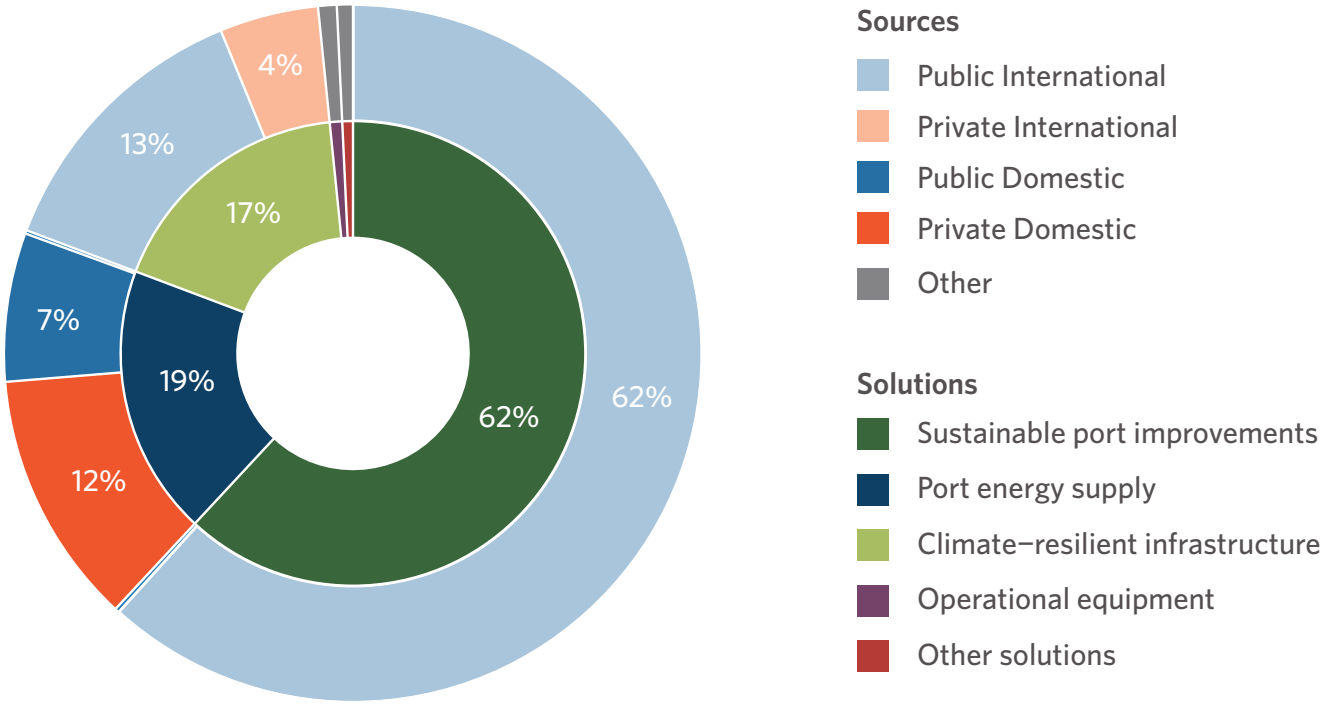
There is also evidence that alternative fuel finance is beginning to scale in other emerging markets. These markets accounted for 28% of direct finance in the segment between 2018 and 2023 (Figure 20). In Tunisia, for example, the German Government-supported WATERFuel project, which began in 2023, supports the production of synthetic e-methanol from green hydrogen (GIZ, 2023). Other programs supported by Germany have also sought to strengthen the wider regulatory, technical and investment conditions for developing green hydrogen and Power-to-X value chains in Tunisia (GIZ, 2022b). Recent evidence from DNV indicates that methanol propulsion technologies have reached a relatively high level of technical readiness, while fuel cost and availability remain important barriers to wider adoption (DNV, 2025a).

These projects illustrate early efforts to increase alternative fuel availability and position countries within future maritime fuel supply chains. However, increased investment in upstream production does not necessarily translate into greater fuel availability or use in shipping. **Scaling these fuels in shipping will require corresponding ship demand, long-term offtake arrangements, bunkering infrastructure, common standards, and supportive policy.**

PORT INFRASTRUCTURE AND OPERATIONS

Climate finance for port infrastructure and operations totaled around USD 4.1 billion cumulatively between 2018 and 2023, with annual investment increasing at a CAGR of around 30%. Finance increased particularly rapidly after 2021, doubling from USD 0.6 billion in 2021 to USD 1.3 billion in 2022 and reaching around USD 1.4 billion in 2023. This made ports one of the largest and most consistently financed segments of the maritime value chain. At the solution level, sustainable port improvements accounted for 62% of tracked port finance, followed by port energy supply (19%) and climate-resilient infrastructure (17%), as shown in Figure 21. This represents approximately USD 2.2 billion, USD 0.7 billion, and USD 0.6 billion, respectively. Operational equipment and other solutions accounted for only a small remaining share. The broad nature of the sustainable port improvements category means that more granular information on the specific technologies and activities financed remains limited.

Figure 21: Total maritime climate finance to port infrastructure and operations by solution, and respective source per solution, cumulative 2018–2023

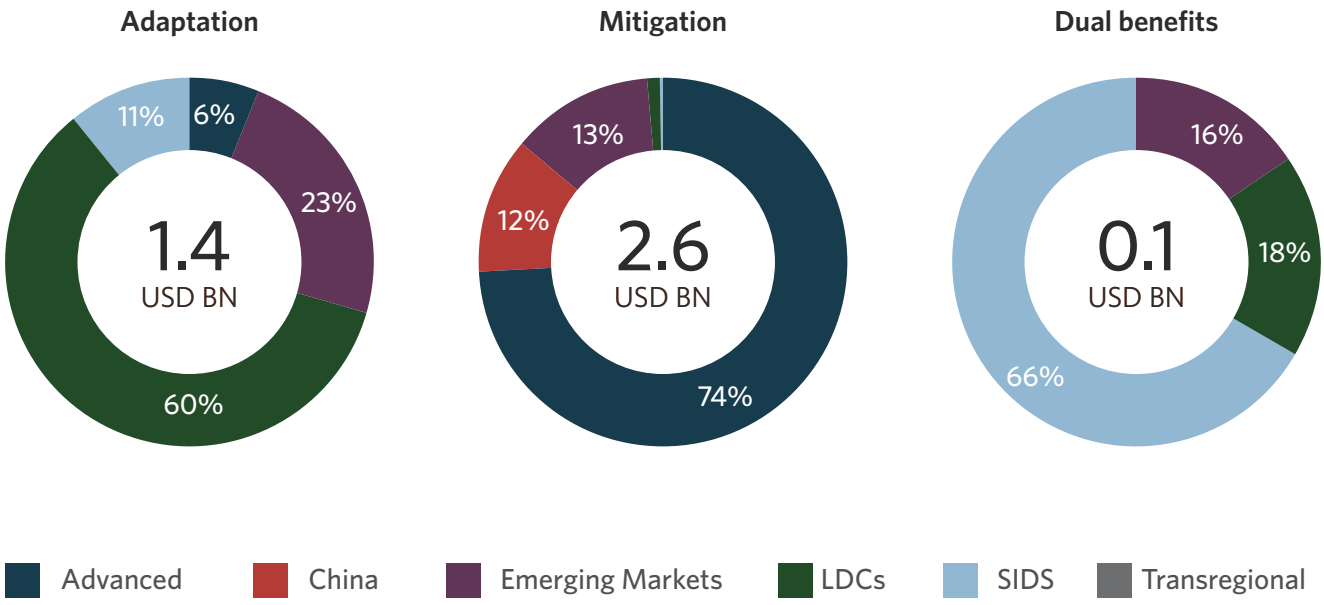


Public international sources were the primary providers of port finance, demonstrating the central role of development finance in supporting large infrastructure investments. As shown in Figure 21, public international sources accounted for around 78% of total investment volumes between 2018 and 2023. Multilateral and bilateral development financial institutions contributed nearly 62% and 29% of public international finance, respectively. This finance was predominantly delivered through loans, which represented 92% of public international flows. Approximately 56% of these loans were provided at market rates and the remainder at concessional rates. This shows that public international finance for ports is not necessarily concessional. This instrument mix reflects the capacity of some port projects to support debt financing but also highlights the importance of concessionality where revenue streams are

uncertain or where affordability and debt sustainability are concerns. Domestic finance was sourced mainly from commercial financial institutions and state-owned financial institutions, which accounted for 50% and 18% of domestic flows, respectively. Private domestic finance was also largely debt-based, with debt instruments representing 75% of the total. **The broader instrument distribution across maritime climate finance is presented in Section 3.2.4.**

Port finance primarily targeted mitigation, although ports were also the largest recipient of tracked adaptation finance (see Figure 22). Mitigation accounted for 64% of finance between 2018 and 2023, amounting to USD 2.6 billion, while adaptation represented 34%, or USD 1.4 billion. A further USD 0.1 billion was classified as addressing both objectives. Adaptation therefore represented more than twice the share of port finance than it did across maritime climate finance overall, where it accounted for around 16%. The low level of identified dual-benefit finance is notable because many port investments can combine resilience improvements with lower-emission operations. It may therefore partly reflect limitations in project descriptions and climate-objective tagging.

Figure 22: Total maritime climate finance to port infrastructure and operations by use, cumulative 2018–2023



Note: SIDS span multiple development status categories. LDCs and Emerging Markets therefore exclude SIDS to avoid double counting. China, Emerging Markets and LDCs form the EMDE grouping (see 3.1.3). Results for China are presented separately in selected analyses due to relatively large scale compared to other EMDEs, in line with CPI's Global Landscape of Climate Finance methodology. This is a data management approach and does not imply separate treatments of individual Member States.

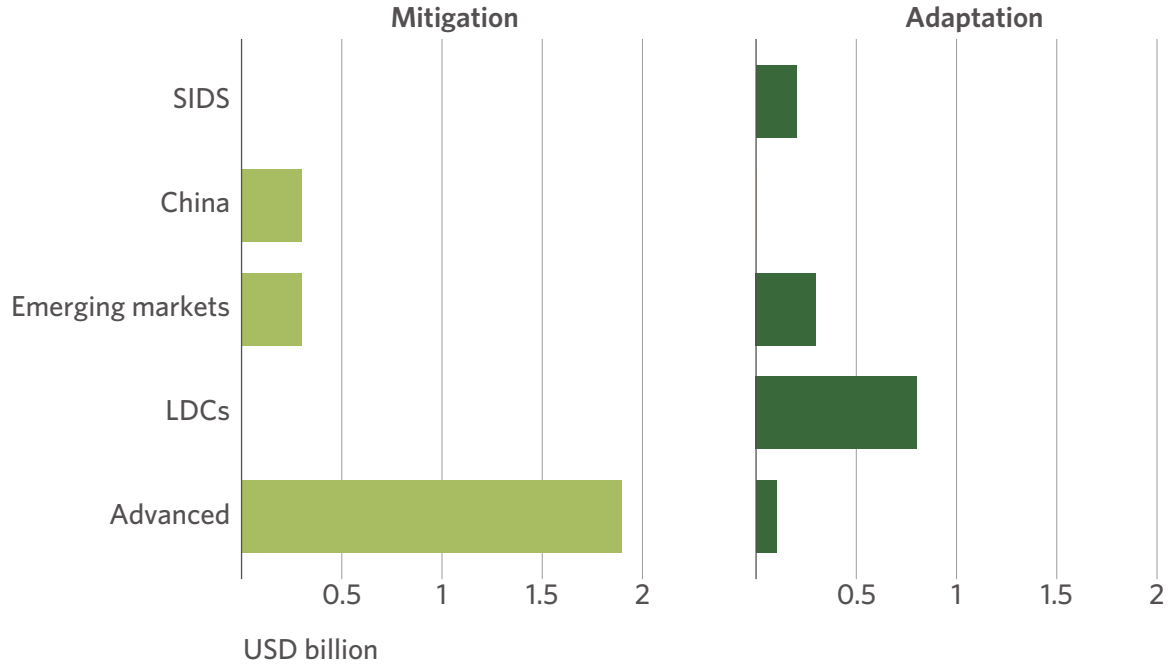
Tracked annual investment towards mitigation fluctuated considerably over the period. It increased from USD 301 million in 2018 to a peak of USD 1.2 billion in 2022 before declining to USD 634 million in 2023. The 2022 peak was largely driven by the Seine-Nord Europe Canal project, supported by an EUR 800 million EIB loan signed in 2022 to finance construction of a new 107 km inland waterway in France (EIB, 2022). Financing for onshore power supply was minimal, with only USD 1 million tracked over the period despite its importance in reducing emissions from ships at berth.

Case study 3: Blended finance for port modernization in Morocco: Marsa Maroc

Port modernization investments increasingly combine infrastructure upgrades with measures to improve operational efficiency and reduce emissions from port activities. In Morocco, the Marsa Maroc Port Modernization project, approved by the European Bank for Reconstruction and Development (EBRD) in 2024, illustrates how blended finance can support the integration of climate considerations into port expansion strategies. The project includes an EBRD senior loan of approximately EUR 63 million. The loan benefits from first-loss risk cover through the European Fund for Sustainable Development Plus (EFSD+) Municipal Infrastructure and Industrial Resilience guarantee program. It supports expansion of terminal capacity in Casablanca and Jorf Lasfar and the acquisition of cranes, including hybrid and electric rail cranes (EBRD, 2024b).

The project combines infrastructure expansion with measures addressing mitigation and resilience. More efficient electric rail cranes are expected to improve energy efficiency and reduce GHG emissions per unit of cargo handled. Civil works at the Jorf Lasfar terminal will also incorporate climate resilience measures into the quay design to reduce its sensitivity to sea-level rise. EU-funded technical cooperation complements the investment by supporting Marsa Maroc's digital transformation (EBRD, 2024a). The project sits within Marsa Maroc's broader strategic investment program of nearly MAD 21 billion between 2025 and 2030. It illustrates how financing structures that combine MDB lending with public risk-sharing can support both lower-emission port operations and more resilient infrastructure.

Figure 23: Mitigation and adaptation finance by recipient in port infrastructure and operations, cumulative 2018–2023, USD billion



Note: SIDS are shown separately and cut across development statuses. Emerging Markets refers to EMDEs excluding China and LDCs. LDCs exclude SIDS to avoid double counting. China, Emerging Markets and LDCs form the EMDE grouping (see 3.1.3). Results for China are presented separately in selected analyses due to relatively large scale compared to other EMDEs, in line with CPI's Global Landscape of Climate Finance methodology. This is a data management approach and does not imply separate treatments of individual Member States.

Adaptation finance reflects the high exposure of port infrastructure to climate risk, particularly in low-lying coastal areas which are critical for global trade. Under 1.5 degrees of warming, historical one-in-100-year extreme sea-level events could occur every one to ten years at ports in many tropical and sub-tropical regions; under 3 degrees, many will experience this several times a year (UNCTAD, 2023b). The impact of climate-related downtime at 1,320 ports is estimated to actively put USD 81 billion of global trade and USD 122 billion of economic activity at risk annually (Verschuur *et al.*, 2023). Against these risks, port infrastructure and operations accounted for 79% of total tracked adaptation flows between 2018 and 2023. Funding nearly tripled in 2023 compared to 2022 levels, reaching a peak of USD 0.8 billion. Adaptation finance for port infrastructure and operations was provided exclusively by international public sources. Bilateral development finance institutions provided USD 886 million and multilateral development finance institutions a further USD 257 million, together accounting for around 90% of tracked port adaptation finance over the 2018 to 2023 period.

SIDS and LDCs received nearly 30% of port infrastructure and operations climate finance, with financing strongly concentrated in adaptation-focused infrastructure and a small number of large projects. As shown in Figure 22 and Figure 23, SIDS and LDCs together received around 70% of port adaptation finance, compared with only around 1% of mitigation finance. They also received around 84% of the much smaller pool of dual-benefit finance. This highlights the particularly important role that resilience plays within port investment in these countries. Investment in SIDS remained relatively low throughout the period, while adaptation finance to LDCs increased nearly 21-fold between 2022 and 2023, largely due to the Matarbari Port Development Project in Bangladesh. The increase should therefore be interpreted as the effect of a major infrastructure commitment rather than evidence of an emerging trend across LDC ports. LDCs consequently received approximately USD 0.8 billion of the USD 1.4 billion total adaptation finance, while SIDS received a considerably smaller share. Looking forward, increased financing for port decarbonization will need to consider adaptation requirements alongside mitigation objectives, particularly in climate-vulnerable SIDS and LDCs. Investments in port energy and alternative fuel infrastructure will need to account for future climate risks to ensure that mitigation upgrades are resilient and do not exacerbate existing vulnerabilities.

Case study 4: Integrating mitigation and resilience in SIDS port investment: Naoero and Cabo Verde

SIDS are highly dependent on maritime connectivity, yet their ports are increasingly exposed to sea-level rise, coastal erosion and extreme weather events. Given their limited fiscal capacity and high exposure to climate risks, dedicated public climate finance is often required to support the upgrading of critical port infrastructure.

Public finance can support port investment in SIDS that responds to both climate resilience and decarbonization needs. In Naoero, the Sustainable and Reliable Connectivity Project brought together the Asian Development Bank, Green Climate Fund, and Government of Australia to finance approximately USD 65.2 million in port upgrades. Approved in 2017 and grant-financed, the project focuses on climate-resilient infrastructure improvements, including the construction of an ocean-going ship channel, a wharf with a turning berth, and a breakwater to shelter the wharf and berth from wave impacts. Beyond being primarily focused on adaptation, the project also generates mitigation benefits through more efficient maritime operations, with estimated emissions

reductions of approximately 535,000 tCO_2 equivalent over the project lifetime. In addition, part of the project also includes enabling environment reforms for the Port Authority of Naoero, as well as the establishment of a revolving maintenance fund for operations and maintenance of the port moving forward (GCF, 2026).

In Cabo Verde, planned port investments similarly combine infrastructure modernization with measures to reduce emissions and strengthen resilience. In 2026, the EU and EIB Global signed a USD 34 million investment grant under the Cabo Verde Blue Economy Sustainable Ports Facility, complementing EUR 114 million in EIB financing signed in 2024. Planned investments include onshore power supply at the Porto Grande cruise terminal and solar energy systems across several ports, alongside a new breakwater and quay and wider upgrades to port and fisheries infrastructure. The program also aims to strengthen inter-island and international connectivity (EIB, 2026).

The two investments reflect different but complementary approaches to climate-related port investment in SIDS. Naoero provides an adaptation-led example with associated mitigation benefits, while Cabo Verde plans mitigation and resilience measures within a broader port modernization program. **These cases show how port investment can address both mitigation and adaptation needs within the same financing package, reducing the risk that decarbonization investments create additional or separate resilience investment needs.**

MARITIME OPERATIONS AND TECHNOLOGIES

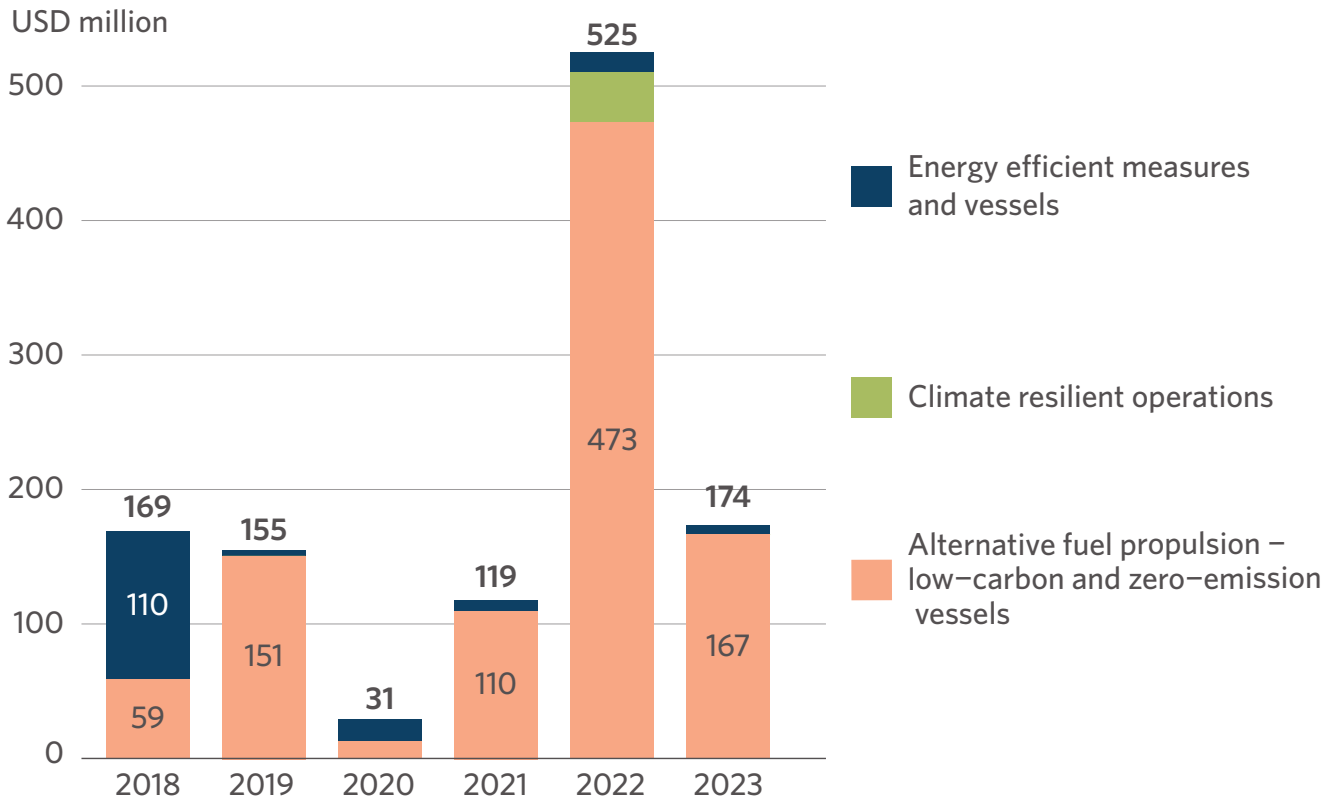
Maritime operations and technologies received around USD 1.2 billion between 2018 and 2023, with 92% of finance for mitigation. A further 6% of flows were for adaptation and 2% for dual-benefit activities. Investment was uneven over the period and peaked in 2022 at around USD 525 million. Of this amount, 90% supported alternative fuel propulsion ships, financed mainly by private domestic capital, primarily in Western Europe (USD 234 million) and East Asia and the Pacific (USD 218 million), which largely supported the development and deployment of methanol-ready ships. A subsequent drop in investment in 2023 suggests that the 2022 increase reflected a concentration of large ship investments rather than a sustained annual increase.

By contrast, energy-efficiency measures received relatively limited maritime climate finance within the tracked dataset, with identified flows relying primarily on public international sources. This finding should be interpreted cautiously and is likely to reflect the types of transactions captured by the dataset rather than the wider financing market. Smaller-scale energy-efficiency retrofits and operational measures can also be financed through shipowners' balance sheets, capital expenditure, or other commercial arrangements and may not be separately reported as climate finance. The source and instrument mix identified in the dataset should therefore not be considered representative of the broader market for ship-efficiency finance.

Energy-efficiency retrofits are an important but potentially under-captured component of ship decarbonization finance. Measures such as hull and propeller improvements, air lubrication and wind-assisted propulsion can reduce fuel consumption and emissions, while financing can face barriers including relatively small transaction sizes, existing vessel mortgages, technology-performance risks, and split incentives between shipowners and charterers. For example, the USD 35 million Fund for Energy Efficiency Technologies (Global Centre for Maritime Decarbonisation, 2025) combines catalytic and commercial capital and provides upfront

financing for vessel retrofits through a pay-as-you-save model. The EU Innovation Fund-supported SustainSea project provides another model, using a EUR 4.1 million (around USD 4.8 million) grant to de-risk wind-assisted propulsion retrofits on five cargo ships and mobilize private co-investment from shipowners (European Commission, 2023). While these initiatives largely fall outside the 2018–2023 tracking period, they illustrate the broader range of financing approaches supporting ship-efficiency investment. FEET was established after the 2018–2023 tracking period, while SustainSea began in 2023 but deployed most retrofits later. These examples illustrate financing approaches not fully captured in the assessment.

Figure 24: Total maritime climate finance for maritime operations and technologies by solution, 2018–2023



Debt and equity were the dominant financing instruments, accounting for 60% and 32%, respectively, between 2018 and 2023. These instruments were used exclusively by private domestic institutions, while public international institutions provided finance through grants and concessional loans. Since 2021, debt-based maritime climate finance has consistently represented around 60% of annual finance for maritime operations and technologies, except in 2020, when overall investment was minimal. The predominance of commercial debt and equity is consistent with the concentration of finance in capital-intensive ship investments.

Tracked vessel-side finance allocated to SIDS and LDCs remained limited, although these figures should also be interpreted cautiously as reflecting the available data. Less than USD 1 million reached LDCs and SIDS over the six-year period, primarily targeting energy-efficiency measures and climate resilience-related activities. Ship finance is particularly difficult to assign geographically, as a ship's flag, beneficial ownership, operator, financing source, and place of

construction may be associated with different jurisdictions. The low volumes attributed to SIDS and LDCs therefore partly reflect the challenges of assigning vessel-side finance to individual recipient countries. Nevertheless, ensuring access to finance for vessel upgrades and new technologies will be important for SIDS and LDCs as the sector transitions towards alternative fuels and more efficient fleets, particularly given their dependence on maritime transport and connectivity.

Case study 5: Sustainability-linked finance for energy-efficient fleet renewal – X-Press Feeders

Sustainability-linked finance can support investment in more energy-efficient ships while extending decarbonization commitments across a shipping company's wider fleet. In 2023, the IFC approved a USD 70 million sustainability-linked loan to X-Press Feeders as part of a USD 163 million debt package for the purchase of three new 7,000 TEU container ships, with a total project cost of USD 234 million. The IFC acted as lead arranger, providing long-term financing and mobilizing additional financing from other financial institutions (IFC, 2023).

The investment combines fleet renewal with improved ship energy efficiency. The three ships are expected to replace older ships in X-Press Feeders' fleet and support the company's strategy to reduce GHG emissions across its operations. The sustainability-linked structure also commits X-Press Feeders to reducing carbon emissions across its entire fleet, extending the climate objectives beyond the three ships directly financed.

The project illustrates how development finance can mobilize additional capital for energy-efficient fleet renewal while supporting the use of sustainability-linked finance in the shipping sector. The IFC also supported X-Press Feeders in structuring its first sustainability-linked loan and developing a sustainable finance framework. This provides an example of linking investment in individual ships with wider corporate decarbonization commitments (IFC, 2023).

SHIPBUILDING AND SHIP RECYCLING

Total tracked investment in shipbuilding and recycling remained very limited over the 2018–2023 period, amounting to only USD 25 million, with highly sporadic coverage across years. Shipbuilding is critical to maritime decarbonization, as decisions made during vessel design and construction can shape emissions and fuel pathways over a ship's long operational life. Ship recycling complements this transition by enabling fleet renewal and the recovery and reuse of materials, reducing demand for virgin resources.

Projects captured within this segment include investments that reduce emissions from shipbuilding facilities. For example, a 19.27 MW rooftop distributed solar PV installation at the Zhoushan Changhong International Shipyard in China entered operation in 2022. The installation covers six shipyard buildings and is expected to generate around 18.83 million kWh of electricity annually (Xinhua News Agency, 2022). This illustrates how climate finance within the shipbuilding value chain can support the decarbonization of the industrial facilities in which ships are built, alongside investment in low- and zero-emission ships and technologies.

More broadly, the low volumes identified in the tracked dataset are consistent with evidence that dedicated green finance remains relatively underdeveloped in the shipbuilding sector (OECD, 2025a)**.** China accounted for 47% of the global orderbook for alternative fuel-capable ships by compensated gross tonnage in 2024 and has become a leading location for alternative fuel conversions and energy-efficiency retrofits (OECD, 2025a). Green bonds and loans are predominantly used by leading shipbuilders, while smaller and less technologically advanced companies face barriers to accessing capital for high-cost retrofits and alternative fuel-capable ships (OECD, 2025a). Conventional ship finance, including bank debt, equity, and leasing, can support early low- and zero-emission ships but may need to be complemented by public de-risking instruments. For early ammonia-powered ships, these can include CAPEX grants to address higher upfront costs and export credit guarantees or concessional finance to reduce credit risk and improve financing terms (Global Maritime Forum, 2023b). These wider financing challenges highlight the role that targeted public and concessional finance can play in demonstrating low-carbon shipbuilding solutions, particularly in markets where commercial finance remains limited.

Case study 6: Piloting solar-electric ferry technology in the Maldives through the POISED program

The Preparing Outer Islands for Sustainable Energy Development (POISED) project illustrates how concessional climate finance can support the demonstration of low-carbon vessel technologies alongside wider renewable-energy investment in SIDS. In 2020, the ADB approved USD 10.47 million in additional financing for the program, comprising a USD 7.74 million concessional loan and a USD 2.73 million grant (ADB, 2025). The financing expanded renewable-energy systems across the outer islands while introducing several pilot applications, including a renewable-energy-operated passenger ferry.

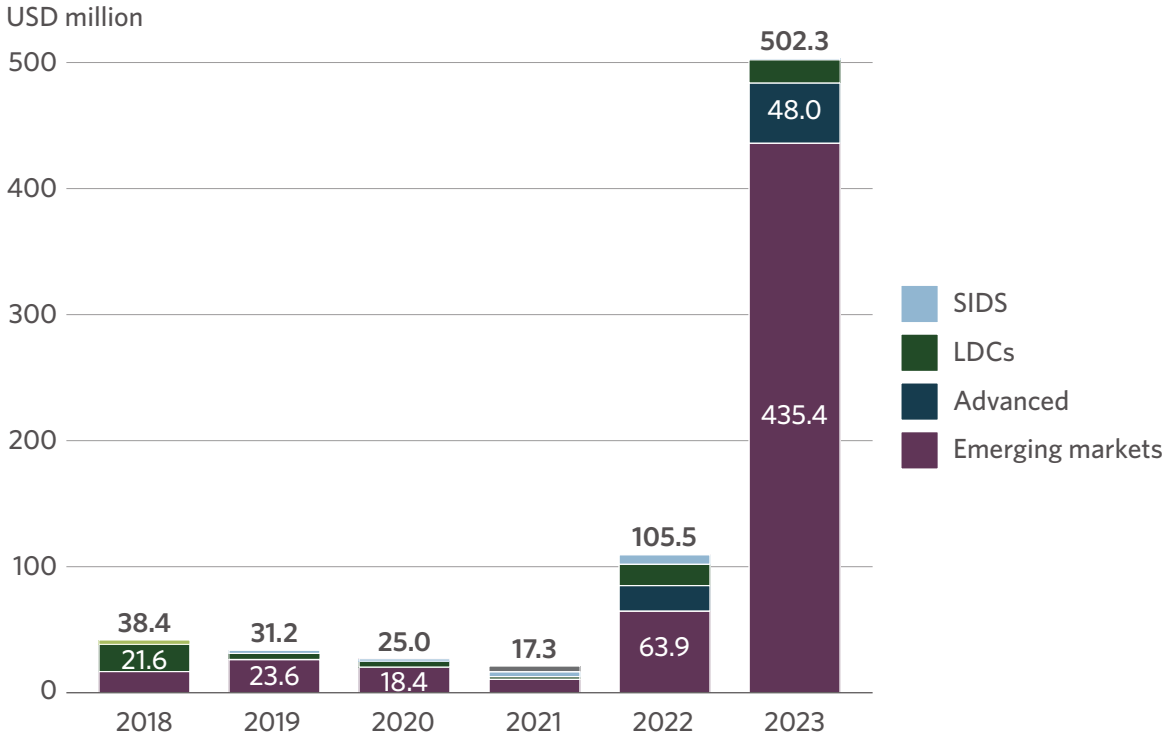
The ferry component specifically financed the design, construction and supply of a solar-powered, battery-operated catamaran passenger ferry, together with operational, maintenance and training support (Government of Maldives, 2021). The pilot demonstrates how public climate finance can support the design, construction, and deployment of low-carbon vessels, alongside the development of local capacity for their operation and maintenance. This is particularly relevant to the Maldives, where dispersed island geography makes maritime connectivity essential and dependence on imported fossil fuels remains high.

INSTITUTIONAL STRENGTHENING

Despite strong growth between 2022 and 2023, institutional strengthening represents a comparatively small component of maritime climate finance, accounting for around 7% of total flows between 2018 and 2023. Such investment can play an important role in mobilizing maritime climate finance by strengthening the ability of institutions to coordinate policy, undertake planning, develop investment pipelines, and establish appropriate finance and governance frameworks.

Finance for institutional strengthening increased sharply in 2023, although this was largely attributable to one major program. Total investment in the segment amounted to USD 720 million between 2018 and 2023. More than two-thirds of this finance was recorded in 2023 (Figure 25). Mitigation accounted for the majority of finance in this segment. Within this segment, investment in mitigation-related activities remained modest between 2018 and 2022, with annual flows below USD 60 million, before increasing significantly to USD 449 million in 2023. The concentration of finance in a single year means that this increase should not yet be interpreted as evidence of sustained growth in institutional-strengthening finance.

Figure 25: Total maritime climate finance for institutional strengthening by recipient



Note: SIDS span multiple development status categories. LDCs and Emerging Markets therefore exclude SIDS to avoid double counting.

Emerging markets accounted for most of this increase. Total institutional-strengthening finance to these markets reached USD 436 million in 2023, of which around USD 400 million was related to the Inter-American Development Bank's (IDB's) *Program to Support the Development of the Green Hydrogen Industry* in Chile. The program aims to increase public and private investment in green hydrogen and its derivatives while supporting enabling conditions, including human capital, innovation, entrepreneurship, and domestic demand (IDB, 2023).

The 2023 IDB program also shifted the financing model for this segment from predominantly grant-based support towards debt. Until 2022, tracked finance for institutional strengthening was provided exclusively through grants. The USD 400 million IDB program was financed through a loan, increasing the overall share of loans in the segment to 83% (IDB, 2023). **This demonstrates that institutional strengthening can extend beyond relatively small technical-assistance grants to larger programs designed to establish markets, strengthen enabling conditions, and catalyze subsequent investment.**

Case study 7: Strengthening maritime climate finance planning in Latin America and the Caribbean

The transition towards low-carbon and climate-resilient maritime transport requires not only investment in ships, fuels and infrastructure, but also institutional capacity to develop strategies, coordinate stakeholders and establish enabling policy frameworks. The IDB's technical cooperation project on *Pathways to Decarbonize Maritime Transport* and *Adapt Port Infrastructure to Climate Change in Latin America and the Caribbean* was approved in 2025 and therefore falls outside the dataset's 2018–2023 coverage period. It provides a more recent example of the role of institutional strengthening finance in supporting this transition (IDB, 2025).

Approved in July 2025 with a total budget of USD 250,000, the non-reimbursable technical cooperation project supports analysis of pathways for maritime decarbonization and adaptation of port infrastructure to climate change. Activities focus on generating evidence, developing policy recommendations, and supporting regional stakeholders in addressing the challenges associated with sustainable maritime operations (IDB, 2025).

By strengthening knowledge, planning capacity, and coordination among maritime stakeholders, the initiative aims to create the enabling conditions required for future investments in cleaner ships, alternative fuels and resilient port infrastructure. Such technical cooperation activities are particularly important in emerging markets, where limited institutional capacity and uncertainty around new technologies can constrain investment decisions.

Although these activities typically represent a small share of total maritime climate finance, they can help establish the policy frameworks, technical expertise and investment pipelines needed to mobilize larger-scale capital for maritime climate finance.

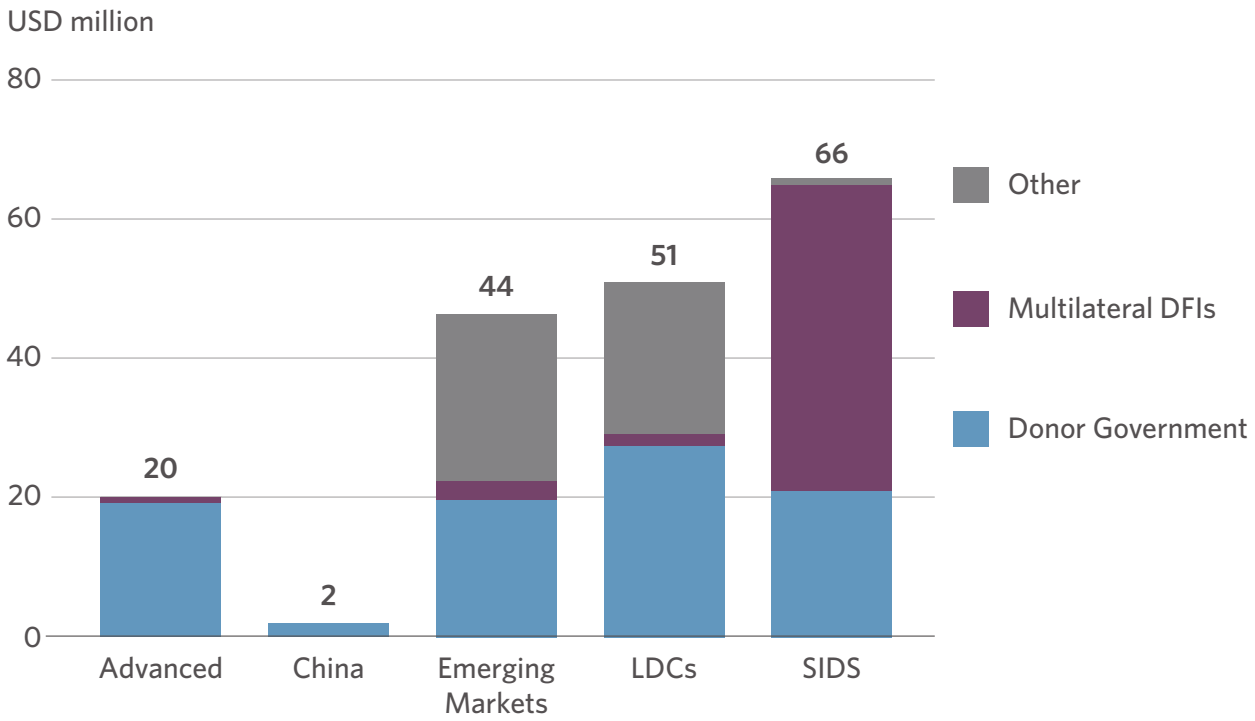
CROSS-SECTORAL

Maritime climate finance to cross-sectoral activities amounted to USD 2.0 billion between 2018 and 2023. This includes general maritime decarbonization or resilience projects with activities that cut across value chain sectors, including some marine and coastal ecosystem protection, habitat restoration, marine protected area management and other interventions with a clear link to the maritime sector (unlike indirect flows captured in Section 3.2.2). Cross-sectoral activities can support mitigation, adaptation or both objectives, depending on the stated purpose and outcomes of the investment. Investment was predominantly directed towards dual-benefit activities. This dominance is largely explained by a USD 1.5 billion bond issuance in 2020 by DP World,[20] which significantly influenced annual investment patterns and accounted for most tracked flows that year.

20 DP World issued a USD 1.5 billion, 10-year Green Sukuk in 2023 to finance eligible projects across its global port, maritime and logistics operations. Eligible categories included clean transportation, energy efficiency and renewable energy. As of June 2024, USD 1.17 billion had been allocated, primarily to clean transportation. In this analysis, this bond issuance is classified as cross-sectoral with dual-benefit objectives because the proceeds fund a portfolio of projects rather than a single maritime segment and cover both mitigation and adaptation objectives. Investments in port infrastructure, buildings, and operational systems may both reduce emissions and strengthen the resilience of assets and operations to climate-related risks (DP World, 2023, 2024; ICMA, 2024).

Adaptation finance for cross-sectoral activities totaled USD 183 million over the period, accounting for 11% of total tracked maritime adaptation finance. As shown in Figure 26, LDCs received the largest volume, followed by emerging markets, SIDS, advanced economies and China. Donor governments were an important source of adaptation finance across recipient groups, while multilateral DFIs played a particularly significant role in SIDS.

Figure 26: Cross-sectoral adaptation finance by recipient and development status, 2018–2023



Note: SIDS span multiple development status categories. LDCs and Emerging Markets therefore exclude SIDS to avoid double counting. China, Emerging Markets and LDCs form the EMDE grouping (see 3.1.3). Results for China are presented separately in selected analyses due to relatively large scale compared to other EMDEs, in line with CPI's Global Landscape of Climate Finance methodology. This is a data management approach and does not imply separate treatments of individual Member States.

SIDS and LDCs jointly received USD 117 million in cross-sectoral adaptation finance between 2018 and 2023. This represents around 64% of the segment's total adaptation finance. The concentration of cross-sectoral adaptation finance in SIDS and LDCs highlights the relevance of ecosystem protection, coastal resilience and other public-good activities in countries that are particularly exposed to climate risks. Scaling investment may require integrating ecosystem objectives into maritime and port planning, providing appropriate grant and concessional support, and strengthening project descriptions, allocation data and impact reporting, such as the project in Case Study 8, below.

Case study 8: Nature-based solutions delivering cross-sectoral benefits in port development – Jakarta Fishing Port, Indonesia

Nature-based solutions (NbS) are emerging as a promising approach to strengthen port resilience while delivering environmental and social co-benefits. By restoring or integrating natural coastal habitats, including mangroves, wetlands, dunes, reefs and strategic sediment management, NbS can complement conventional "grey" infrastructure to reduce risks from sea-level rise, coastal erosion, storm surges and flooding while supporting ecosystems.

The World Bank's Nature-Based Solutions for Ports guidance identifies categories of interventions such as working with coastal systems, restoring coastal ecosystems, integrating nature into port infrastructure, and the beneficial reuse and management of dredged sediment (World Bank, 2025b). These approaches can reduce maintenance costs, improve water quality, enhance biodiversity, sequester carbon and strengthen relationships with surrounding communities.

From a climate finance perspective, NbS illustrate the cross-sectoral nature of adaptation investments. Beyond protecting maritime assets, they generate benefits across multiple sectors, including biodiversity conservation, fisheries, tourism, disaster risk reduction, and local livelihoods. These multiple benefits can broaden the range of environmental and development objectives supported by port investment. For SIDS and LDCs, where ports are essential gateways for trade and emergency response yet highly exposed to climate hazards, NbS offer a particularly attractive pathway to enhance resilience while delivering broader economic and environmental outcomes.

The rehabilitation of Jakarta Fishing Port in Indonesia is an example that illustrates the integration of NbS into port upgrading to address climate and environmental challenges while supporting broader economic activities. Mangroves were used to support wave attenuation and water purification, helping reinforce port protection in an area exposed to subsidence and sea-level rise (World Bank, 2025b)**.** The example illustrates how nature-based measures can be incorporated alongside conventional port infrastructure while supporting the wider fisheries-related activities served by the port.

3.2.6 DIRECT MARITIME CLIMATE FINANCE – ANALYSIS OF SIDS AND LDCS

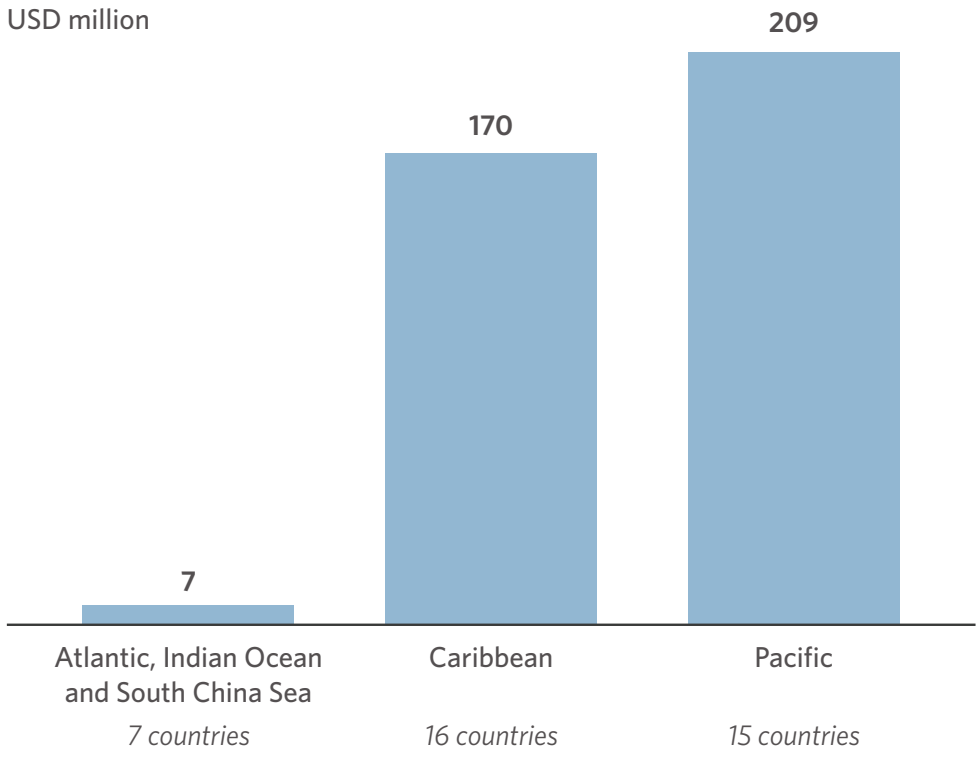
Flows of maritime climate finance to SIDS and LDCs are not evenly distributed across sub-regions, with certain regions receiving more finance focused on the port infrastructure segment than others, despite similar risk profiles and financing needs.

Within SIDS, the Pacific region received the most maritime climate finance, at USD 209 million from 2018–2023, while the Caribbean received USD 170 million. The Atlantic, Indian Ocean, and South China Sea (AIS) region received significantly less, totaling USD 7 million. These flows are concentrated in the port infrastructure segment and predominantly represent large port infrastructure improvement projects in a handful of countries. An example of these projects is the World Bank IDA's "Maritime Investment in Climate Resilience Operations I & II" in Tuvalu, which focus on improved/resilient maritime access in Tuvalu's outer islands, as well as resiliency improvements for the main international port (World Bank, 2021; DT Global, 2022).

Compared to overall climate finance flows to SIDS, maritime climate finance is small. In 2021/2022, SIDS received an average of USD 2 billion annually in international public finance for climate adaptation (CPI, 2025c) (non-maritime and maritime sectors). In contrast, from 2018–2023, SIDS received, on average, USD 65 million annually in maritime climate finance, which is approximately 3% of overall adaptation finance to SIDS. While noting that the overall adaptation finance numbers for SIDS may include maritime climate finance, this comparison highlights the relatively small scale of maritime climate finance when compared to overall adaptation finance in SIDS.

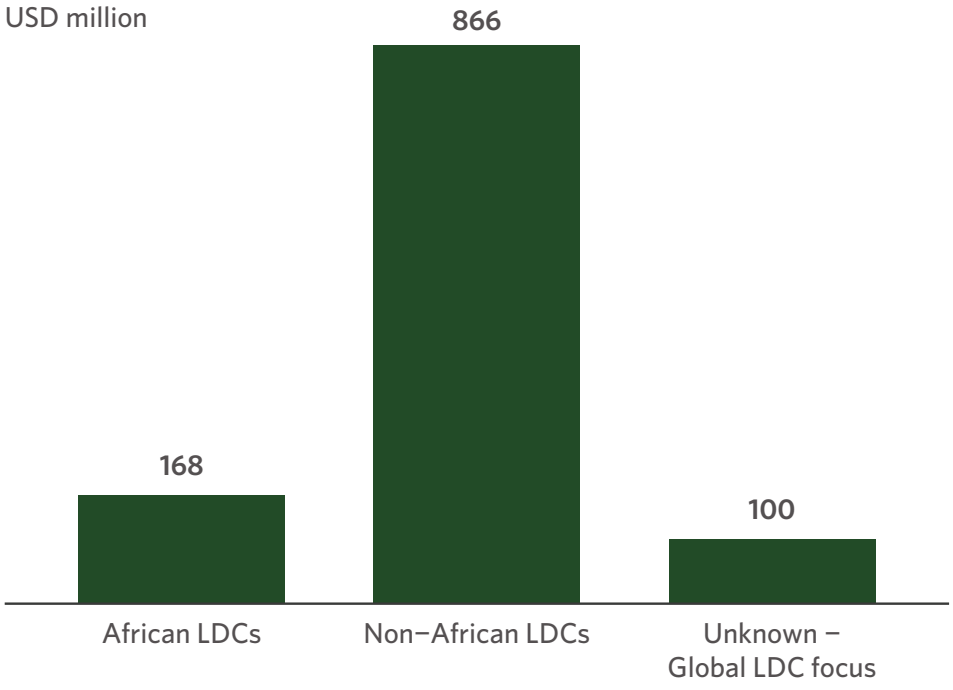
The Pacific may see higher flows of international public finance into its ports given the extremely important role of ports in island countries with smaller populations spread across remote archipelagos, which increases costs of port projects, as well as more limited domestic resources. While the Caribbean flows were smaller, this may be an indication of data availability—as country governments in the Caribbean may be investing domestic public capital into their ports. For instance, Jamaica and Belize are expanding their ports with investments of USD 80 million and USD 250 million, respectively, a portion of which may include maritime climate finance activities. In addition, the Caribbean may see more private investment into its ports, such as the Turkish company Global Ports Holding investing USD 250 million into cruise terminals in the region (Irwin-Hunt, 2026). The AIS region sees lower net flows, which is in line with trends in its overall international public adaptation finance (CPI, 2025c). While some of this variation is likely based on individual projects, the AIS region is geographically fragmented and, unlike the Pacific and Caribbean, does not have a central coordinating body or regional development banks/ climate finance funds, which may hinder access to maritime climate finance.

Figure 27: Maritime climate finance by SIDS region, 2018–2023



Among LDCs, non-African LDCs received USD 866 million in maritime climate finance from 2018–2023, with African LDCs receiving USD 168 million in that timeframe, despite the majority of LDCs being located in Africa. Similar to SIDS, this finance is focused on port infrastructure. However, this data is dominated by Bangladesh's Matarbari port development. The remaining USD 100 million in finance has a global LDC focus and consists of GEF projects focused broadly on LDCs on maritime finance, where the country destination is unspecified. Overall, the limited climate finance flows to coastal LDCs suggest a risk of under-investment in port infrastructure in these countries, compounding existing challenges in connectivity and high transport costs.

Figure 28: Maritime climate finance by LDC region, 2018–2023



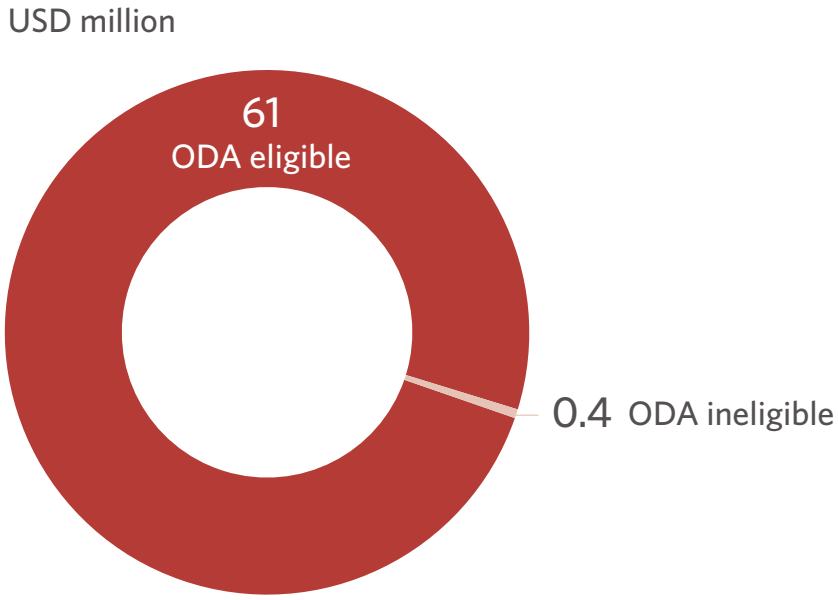
Case study 9: In Benin, AfDB and China team up to modernize and extend the Port of Cotonou

AfDB and the Autonomous Port of Cotonou signed a funding agreement of EUR 80 million in 2025 to modernize the facilities and extend the port infrastructure. The funding comes from a unique mix of resources within AfDB, including EUR 55 million from its core lending, EUR 25 million from the Africa Growing Together Fund, a special fund supported by AfDB and the People's Bank of China, and USD 18.3 million from the Canada-African Development Bank Climate Fund. Notably, the project is the first private-sector infrastructure project funded by AfDB in Benin that uses hybrid climate finance.

The funding is aimed at helping the Port implement its Master Plan for 2021-2026, which is a five-year investment program aimed at renovating and replacing obsolete port infrastructure, increasing its capacity, and improving quality of service. Resilience to climate shocks is a core element of the port's policy for integrated management of quality, security, and environment. Funding will support two key projects: the creation of a new 25-hectare terminal on reclaimed land, and a new smart, 14-hectare buffer parking area to manage lorry movements in and out of the port. (AfDB, 2025)

ODA-eligible SIDS received over 99% of all maritime climate finance in 2022/23, with ODA-ineligible SIDS receiving less than 1%. While this trend is somewhat indicative of the smaller populations of the 7 ODA-ineligible SIDS,[21] it also tracks with the understanding that loss of ODA eligibility has a negative impact on SIDS' access to climate finance – for instance, at the time of ODA graduation, SIDS are still reliant on ODA for 26% of external financing, as compared to 1% for other graduating countries (FCDO, 2024). While ODA-ineligible SIDS may have other avenues to finance the resiliency of their ports and other maritime climate finance activities, such as domestic public finance or private investment, the reduction in international public finance may exacerbate the vulnerability of this critical industry to climate shocks.

Figure 29: Average maritime climate finance in SIDS by ODA eligibility, 2022/23 average



21 Antigua and Barbuda, Bahamas, Barbados, Cook Islands, Seychelles, Saint Kitts and Nevis, and Trinidad and Tobago

3.3 DATA GAPS

The assessment provides an initial baseline of maritime climate finance, but coverage remains uneven across value-chain segments, financing sources and climate objectives. Figure 30 summarizes data coverage and key gaps. These gaps do not necessarily indicate an absence of finance; they often reflect limited disclosure, inconsistent climate tagging, and difficulties isolating maritime components within broader investments. Addressing these data gaps can help facilitate a clearer understanding of financing needs and flows, identify underserved areas, and support more targeted policy, capacity-building and investment decisions.

Figure 30: Data coverage of direct maritime climate finance, cumulative 2018–2023

	Private	Public International	Public Domestic	Unknown
MITIGATION	3,911	2,487	444	24
Alternative low- and zero carbon fuel production and distribution	1,958 ↑	34	528	N/A
Port infrastructure and operations	629 ↑	1,723	249	24
Shipbuilding and recycling	6	0	6	N/A
Maritime operations and technologies	936 ↑	124	-	N/A
Institutional strengthening	17	521	-	N/A
Cross-sectoral activities	9	86	16	N/A
ADAPTATION	8	1,713	-	N/A
Alternative low- and zero carbon fuel production and distribution	<1	0	-	N/A
Port infrastructure and operations	-	1,370	-	N/A
Shipbuilding and recycling	3	9	-	N/A
Maritime operations and technologies	<1	70	-	N/A
Institutional strengthening	<1	106	-	N/A
Cross-sectoral activities	4	158	-	N/A
DUAL BENEFITS	1,393	387	115	N/A
Alternative low- and zero carbon fuel production and distribution	<1	30	-	N/A
Port infrastructure and operations	-	109	-	N/A
Shipbuilding and recycling	1	0	-	N/A
Maritime operations and technologies	<1	18	-	N/A
Institutional strengthening	1	75	-	N/A
Cross-sectoral activities	1,392 ↑	153	115 ↑	N/A
SIDS	<1	390	-	N/A
LDCs (exc. SIDS)	7	1,056	-	N/A

USD million — Tracked comprehensively — Tracked — Limited tracking — ↑ Supplemented with additional data

The assessment identifies four priority areas to strengthen future tracking:

1. **Domestic public finance**: Climate-related public expenditure on ports, maritime technologies, resilience and enabling activities is not consistently tagged or reported at sufficient granularity. This is particularly relevant for SIDS and LDCs, although some countries use approaches such as Climate Public Expenditure and Institutional Reviews to estimate public climate spending (WRI, 2023).
2. **Adaptation and resilience finance:** Reporting approaches vary across institutions, with some tracking only incremental adaptation costs and others reporting full project values. This limits comparability and makes it difficult to isolate finance for port resilience, coastal protection, etc. Adaptation components may also be embedded within projects primarily classified as mitigation.
3. **Incremental private investment:** Investment in ship efficiency, retrofits, digital optimization and alternative fuel propulsion is often embedded within companies' wider capital or operating expenditure and is not separately disclosed. Geographic attribution is also difficult given the multinational ownership and operation of shipping assets.
4. **Shipbuilding and ship recycling:** Finance for low-carbon shipbuilding, retrofits and ship recycling is only partially captured. These activities are largely financed by private operators, shipyards, vessel owners and financiers that do not report climate-related investment consistently.

4. RECOMMENDATIONS

The pilot classification framework, climate finance assessment, and tracking methodology presented in this report provide a foundation for strengthening identification, mobilization, and monitoring of climate finance supporting maritime decarbonization. Building on these outputs, the following recommendations are intended to support the IMO, governments, development financial institutions, and other stakeholders in using the pilot classification framework, scaling investment across the maritime value chain, and strengthening the data, reporting, and monitoring systems needed to inform evidence-based policy and investment decisions, strengthen international cooperation, and advance maritime decarbonization in line with the goals of the IMO GHG Strategy.[22]

Collectively, these recommendations aim to improve effectiveness, transparency, and comparability of maritime climate finance while helping direct resources to the areas where they are most needed.

The recommendations are structured around the three key objectives of this study:

1. Strengthening the pilot classification framework so that relevant maritime climate activities are consistently identified.
2. Drawing on the assessment findings to direct finance toward underfunded segments and respond to the specific circumstances of SIDS and LDCs.
3. Formalizing the pilot approach into a maritime climate finance tracker to monitor progress and gaps over time.

Examples provided alongside recommendations are for illustrative purposes only and do not constitute an endorsement by IMO of any specific financing institution, instrument, or approach.

4.1 FURTHER DEVELOPING AND IMPLEMENTING THE CLASSIFICATION FRAMEWORK TO ADVANCE CONSISTENCY AND ALIGNMENT IN MARITIME CLIMATE FINANCE

The pilot classification framework (presented in Section 2) provides a foundation for consistently defining, classifying, and tracking investments that support maritime decarbonization. As sustainable finance taxonomies and climate finance methodologies evolve, this framework can be refined and implemented to help improve consistency across jurisdictions, strengthen interoperability with existing taxonomies and reporting systems, and support more effective investment decisions. **Greater consistency in classification can also reduce ambiguity for policymakers and investors, improve comparability of finance flows, and help direct capital towards activities that credibly support maritime decarbonization. The following recommendations outline opportunities to strengthen the framework's design, application, and alignment with international good practice.**

22 *Examples and cases provided below are for illustrative purposes only and do not constitute an endorsement by IMO of any specific financing institution, instrument, transaction or approach.*

Key findings	Recommendations
Maritime climate activities are not consistently and comprehensively defined and covered across existing financial taxonomies. Significant variation was observed within existing global frameworks, regional and national taxonomies in how maritime climate activities are scoped, structured, and reported. This can hinder the identification and assessment of eligible investments, limiting access to sustainable finance.	**Further develop and apply the pilot classification framework.** Governments, international and regional organizations, taxonomy developers, securities and financial regulators could incorporate the full maritime value chain as outlined in the framework into relevant taxonomies, including mitigation, adaptation and enabling activities. Each activity should have a clear description, eligibility boundary and, where feasible, technical criteria. The EU Taxonomy shows how maritime activities can be separately defined and assessed against activity-specific technical screening criteria, including sea and coastal transport, port-related vessels and vessel retrofits. The pilot framework could build on this approach by extending coverage across the maritime value chain, including alternative fuels, shipbuilding and recycling, and port adaptation measures (EUR-Lex, 2021). **National governments could refine taxonomy implementation to national circumstances reflecting respective socio-economic structures.** For example, greater attention should be given to the role of shipbuilding and recycling in countries where relevant, and to integrating resilience/adaptation and mitigation investments in SIDS and LDCs, reflecting their respective roles in the maritime value chain and corresponding financial frameworks.
Maritime activities are not consistently classified as climate-aligned, transitional or ineligible investments. As their climate relevance can vary over time and across national and regional contexts, without clear, time-bound criteria, taxonomies may apply inconsistent classifications, reducing comparability, creating investor uncertainty and weakening safeguards against carbon lock-in.	**Introduce time-bound classifications and country- and region-specific screening criteria.** Taxonomies should establish clear, time-bound categories for climate-aligned, transition-related, and ineligible activities, using a Green-Amber-Red framework or comparable approach. Transition-related activities should demonstrate measurable emissions reductions, a credible route to alignment, safeguards against carbon lock-in, and scheduled review dates and phase-out timelines. Screening criteria should also specify how to identify the climate-relevant share of mixed investments, while allowing thresholds to reflect national circumstances within common definitions. The ASEAN Taxonomy applies a Green-Amber-Red approach to distinguishing aligned, transitional, and ineligible activities, while allowing technical criteria to reflect different national economic and developmental circumstances. Applied to maritime finance, a low- and zero-emission vessel could be classified as Green; dual-fuel vessels as Amber, subject to time-bound emissions and transition criteria; and vessels solely transporting coal or oil as Red. **Governments, IMO, taxonomy developers and financial institutions could promote harmonization of common definitions for near-, medium- and long-term sustainable maritime fuel pathways.** This could enable more consistent financing, implementation and monitoring of activities across fuel production, distribution, bunkering and ship investments, while allowing technical thresholds to reflect national circumstances.
Limited and inconsistent activity-level reporting and disclosure lead to potentially constrained allocation of maritime climate finance. Maritime components are often embedded within broader transport, energy and infrastructure investments, limiting the ability to identify the maritime share of finance, assess taxonomy alignment and monitor climate outcomes.	**Design the taxonomy for investment classification and regulated disclosure.** Governments and taxonomy developers could work with MDBs, DFIs, commercial financial institutions, industry, and regulators to develop common activity codes, evidence requirements, and reporting templates that can be applied during project appraisal, investment approval, portfolio tagging, and ex-post reporting. The EU Taxonomy's Article 8 framework links taxonomy classification to disclosure of turnover, CAPEX and OPEX by covered companies and alignment of financing activities by financial institutions, while the EIB incorporates EU Taxonomy criteria into its green finance tracking methodology. Applied to maritime finance, port operators could disclose taxonomy-aligned CAPEX for shore power, electric cargo-handling equipment, and resilient quay upgrades, while financiers classify related loans using the same maritime activity codes. MDBs and DFIs could use the framework to identify maritime components within broader associated sectoral investments and design financing that better reflects maritime climate priorities. Securities regulators, securities and exchange commissions, and stock exchanges could progressively require in-scope shipping companies, shipyards, port operators, fuel producers, and financial institutions to disclose the proportion of their turnover, capital expenditure, operating expenditure, and financing that is taxonomy-aligned or transition-related. Requirements should be proportionate and accompanied by technical assistance, particularly in SIDS and LDCs.

Key findings	Recommendations
Fragmented definitions and methodologies for classifying maritime climate finance reduce comparability. Existing taxonomies and reporting systems differ in terminology, activity coverage, and eligibility. Given the cross-border nature of international shipping and its interconnected fuel, ship and port investments, such differences may prevent consistent application and reporting of maritime climate finance across jurisdictions and finance providers.	**Strengthen international harmonization and interoperability across maritime taxonomies and finance reporting systems.** IMO, working with governments, regional taxonomy initiatives, MDBs, the OECD, and taxonomy developers, could develop common maritime activity definitions, terminology, and reference guidance that countries can adapt while maintaining interoperability. South Africa's Green Finance Taxonomy interoperability assessment shows how common activity mappings, international standards and coordination on technical screening criteria can support cross-taxonomy comparability while retaining country-specific activities and metrics. A similar approach could be applied to maritime finance, with the IMO supporting common maritime definitions and mappings that countries can adapt to national circumstances while remaining comparable across taxonomies and finance reporting systems (Green Finance Platform, 2025). Governments and taxonomy developers could align maritime taxonomy design with internationally recognized methodologies, including IMO LCA guidelines for emissions accounting, to improve comparability across jurisdictions. OECD and international reporting bodies could improve the granularity of existing reporting systems (e.g., OECD Creditor Reporting System purpose codes) to enable maritime climate finance to be consistently identified and tracked, while distinguishing it from broader transport, energy, industry, and infrastructure investments.

4.2 SCALING UP AND TARGETING MARITIME CLIMATE FINANCE, WITH A FOCUS ON SIDS AND LDCs

The climate finance assessment (presented in Section 3.2) highlights important progress in mobilizing finance for the maritime sector, while revealing significant disparities across technologies, value-chain segments, financing instruments, and regions. **The following recommendations build on these findings to help scale investment where it is most needed, improve the use of public and private finance, and strengthen the enabling conditions required to accelerate maritime decarbonization and resilience, particularly in developing countries, SIDS, and LDCs.**

Key finding	Recommendations[23]
The pilot study establishes a baseline, showing that maritime climate finance is growing but has not yet reached the scale seen in other mature sectors and remains uneven and short of estimated needs. USD 10.5 billion in direct maritime climate finance was tracked between 2018 and 2023, equivalent to 0.14% of tracked global climate finance. A limited share of the finance reached SIDS and LDCs. Most of the tracked maritime climate finance was for mitigation and concentrated in advanced economies and China, with SIDS and LDCs receiving limited and predominantly adaptation-focused finance. Dual-benefit finance was mainly concentrated in emerging markets. This indicates substantial scope to connect a broader range of maritime decarbonization and resilience priorities with existing climate finance, while strengthening investment-ready pipelines.	**Scale up targeted maritime climate finance across the value chain, particularly in SIDS and LDCs, by strengthening project pipelines.** Mobilize greater public and private capital for maritime climate activities, with increased support to developing countries, particularly SIDS and LDCs, where current flows remain limited. Develop national maritime investment pipelines, including consideration of relevant technical standards, safety and regulatory requirements to help reduce uncertainty and support project bankability and improve alignment between available finance and country needs. Engage development finance institutions or other financing partners early to align financing with country needs and facilitate implementation. The SIDS Lighthouses Initiative shows how technical assistance, feasibility studies and project-finance capacity building can support SIDS in developing investment-ready project pipelines and connecting them with financing platforms (IRENA, 2025).[24] **Strengthen institutional capacity in both technical matters and project finance to support investment readiness.** Support countries in identifying suitable financing institutions and instruments, understanding eligibility and investment criteria, assessing concessional and risk-sharing needs, and preparing projects for financing consideration. Facilitate early engagement with development financial institutions, multilateral climate funds and other financing partners to improve alignment between project development and financing requirements. **Further assess factors underlying the comparatively low share of maritime climate finance.** Future analysis could distinguish between investment barriers, limited project pipelines and access to finance, technology and market maturity, and gaps in classification and data coverage.

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24 *Examples are provided as part of the recommendation section are for illustrative purposes only and do not constitute an endorsement by IMO of any specific financing institution, instrument, or approach.*

Key finding	Recommendations[23]
Maritime climate finance was broadly evenly split between public and private sources but marked strong differences across markets. Almost no private finance was tracked for SIDS and LDCs. **Market-rate debt accounted for more than half of tracked maritime climate finance** supporting port infrastructure and operations, cross-sectoral measures and the production and distribution of alternative fuels. Alternative fuel production and distribution, and maritime operations and technologies, were almost entirely financed through equity or market-rate debt, largely absent in SIDS and LDCs, potentially reflecting perceived or actual risks. By contrast, concessional finance was concentrated in port infrastructure and operations, while grants primarily supported enabling activities. **Findings suggest a potential mismatch between the financial instruments predominantly available to SIDS and LDCs and those financing emerging maritime segments, particularly alternative fuels, underscoring the need to support their inclusive participation in the maritime transition.**	**Match appropriate financing sources and instruments to support respective market needs.** Combine public and private finance more strategically across project stages and market needs and match financing instruments to project maturity, risk and commercial viability. Grants and concessional finance can support institutional strengthening, project preparation, and early-stage investments designed from the outset to progress beyond planning and policy development towards bankable projects. Blended finance and risk sharing through guarantees could be used to mobilize commercial finance in segments and markets where risks remain high. National governments could explore mobilizing sovereign financing instruments including green and blue bonds, debt-for-nature swaps, and sustainability-linked sovereign financing to support long-term capital for maritime climate activities. For example, Barbados' Blue Bond illustrates how guarantees can mobilize private capital alongside sovereign refinancing: Inter-American Development Bank (IDB) and The Nature Conservancy (TNC) guarantees supported a USD 146.5 million Blue Loan, reducing Barbados' financing costs from 7.2% to 4.9% and generating long-term funding for marine conservation. [25] **Identify and design projects from the outset with a pathway to progress towards investment readiness and bankability.** Strengthen project structuring, feasibility work and financial planning so that projects can progress from early-stage preparation towards financing and implementation. Engage financing partners early to improve alignment between project design and financing requirements. **Adapt financing mechanisms to countries' comparative advantages.** Financing approaches should reflect country circumstances, comparative advantages and expected maritime demand, with instruments tailored to relevant value-chain segments including fuel production, import, storage, distribution and bunkering, as well as ships, port infrastructure and maritime technologies, based on national needs and feasibility.
Maritime climate investment is expanding, but remains uneven across markets and segments, underscoring the need for coordinated, demand-driven investment planning. Alternative fuel production was largely privately financed, with some public support, and concentrated in China and advanced economies, driven mainly by e-ammonia and e-methanol, with notable investment also reaching emerging markets but limited activity in SIDS and LDCs. Port infrastructure and operations were among the largest and most consistently financed segments and relied primarily on public international finance. While port finance overall was mainly mitigation-oriented, finance reaching SIDS and LDCs was more strongly focused on adaptation and resilience. Institutional strengthening represented a smaller share, with notable participation from emerging markets. Data coverage was limited for maritime operations and technologies as well as for shipbuilding and ship recycling, thereby constraining a comprehensive assessment of financing trends in these segments.	**Scale up integrated investment across the maritime value chain.** Public and concessional finance from MDBs, multilateral climate funds, RDBs, and bilateral providers could prioritize segments and markets where financing gaps remain, including project preparation support. Establish dedicated maritime project-preparation support and investment platforms to coordinate and develop demand-driven, locally relevant investment pipelines. **Tailor investment strategies to national and regional circumstances.** National and regional strategies should assess the risks arising from current financing profiles and market trends, including through finance mapping and cross-sectoral demand assessments, to identify potential investment gaps, infrastructure mismatches and exposure to premature or underutilized assets. Financing priorities should reflect country needs and market conditions, including integration of adaptation measures where relevant. Regional approaches should be pursued where individual markets lack sufficient scale, including demand aggregation, coordinated infrastructure planning, shared fuel or bunkering infrastructure and regional procurement. The Pacific Blue Shipping Partnership shows how Pacific SIDS can coordinate national priorities and seek external climate finance as a collective investment portfolio, helping address the limited scale of individual markets (World Bank, 2023).[26]

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26 *Examples are provided as part of the recommendation section are for illustrative purposes only and do not constitute an endorsement by IMO of any specific financing institution, instrument, or approach.*

Key finding	Recommendations[23]
Participation of SIDS and LDCs across the maritime value chain remains limited and uneven. SIDS and LDCs received around 14% of direct maritime climate finance, predominantly through public grants and concessional loans. **The concentration of finance in adaptation, alongside limited mitigation finance, highlights the need to integrate climate resilience into maritime climate investments in these countries.** **The predominant reliance of SIDS and LDCs on public and concessional finance, compared with the larger role of commercial finance in the broader maritime market, suggests that growth in overall maritime climate finance alone may not ensure their effective participation in the transition.**	**Tailor support to the roles, needs and opportunities of SIDS and LDCs, while also expanding access to mitigation and dual-benefit finance.** Financing for SIDS and LDCs should support forward-looking investments that combine both adaptation and mitigation measures, including resilient and low-emission ports, essential maritime connectivity and ship efficiency, while enabling participation in emerging areas such as ship efficiency, alternative fuels and green shipping corridors, where appropriate. Investment priorities should reflect country context, including connectivity needs, market size, institutional capacity, energy systems and renewable energy potential. The Pacific Blue Shipping Partnership (World Bank, 2023)[27] provides an example of a country-driven approach that aggregates national priorities across Pacific SIDS to develop a collective investment portfolio for fit-for-purpose, resilient and low-carbon inter-island shipping. **Target public and concessional finance and improve access to a broader range of financing instruments to build pipelines and mobilize additional capital in SIDS and LDCs**. International public finance should combine grants and concessional lending with project preparation, guarantees and other risk-sharing instruments to improve project bankability and, where appropriate, crowd in commercial finance, while continuing to support investments with high public benefits and limited commercial returns. **Strengthen institutional capacity and use regional coordination.** Build capacity for project preparation, financing and engagement with financial institutions, and use regional cooperation to aggregate demand, coordinate infrastructure and address constraints associated with small market size and fragmented demand.

4.3 IMPROVING MARITIME CLIMATE FINANCE DATA, MONITORING AND REPORTING

The following recommendations focus on institutionalizing and expanding the tracker, improving data coverage and reporting practices, and strengthening its role as a decision-support tool to inform investment planning, policy development and international cooperation**. Strengthening these functions can help provide a more complete and comparable evidence base on maritime climate finance, identify financing gaps and support more targeted allocation of public and private resources.**

Key finding	Recommendation
Maritime climate priorities are not consistently integrated in national climate and financing frameworks. Limited integration across national-level climate, transport, energy and infrastructure planning constrains the translation of maritime priorities into investment-ready pipelines, **while gaps in climate budget tagging and expenditure reporting limit visibility of domestic maritime climate finance needs and expenditures.**	**Strengthen policy certainty and institutional capacity by linking maritime and climate planning directly to investment pipelines and financing strategies.** Governments could integrate maritime decarbonization and adaptation into national climate/energy/transport/finance strategies through incorporation in nationally determined contributions (NDCs), NAPs, and sustainable finance frameworks. This could enable identifying measurable targets, priority investments, financing needs, implementation responsibilities and financing strategies across the maritime value chain. Fiji links maritime decarbonization targets in its NDC to a prioritized pipeline of maritime mitigation projects and quantified financing and support needs through its NDC Investment Plan (Fiji Ministry of Economy, 2022; Fiji Ministry of Environment and Climate Change, 2025). IMO, MDBs, multilateral climate funds, and UN and regional organizations could provide technical assistance, capacity-building, and international cooperation to help governments translate climate commitments into investment-ready maritime project pipelines through strengthened project preparation, financing capacity and cross-sectoral coordination. **Strengthen national climate budget tagging and reporting for maritime climate finance.** National governments could integrate maritime decarbonization and adaptation into climate budget tagging and expenditure tracking systems, and regularly report allocations and expenditures to improve transparency of domestic maritime climate finance and comparison with international and private flows. Bahamas applies standardized Climate and Disaster Budget Tagging forms during budget preparation to classify climate-related expenditures and consolidate them into national reporting (C2EAU, 2026).

27 *Examples are provided as part of the recommendation section are for illustrative purposes only and do not constitute an endorsement by IMO of any specific financing institution, instrument, or approach.*

Key finding	Recommendation
Maritime climate finance lacks a regularly updated global monitoring framework. The pilot tracker provides a basis for monitoring finance across the maritime value chain, but its current one-off nature limits consistent assessment of financing trends, gaps, and progress over time.	**Institutionalize and operationalize the pilot maritime climate finance tracker as a regularly updated global monitoring platform.** Build on the pilot tracking framework presented in this report through regular updates, a consistent core methodology and progressive expansion of data sources and coverage. IMO could play a facilitating role in supporting its further development and wider application by relevant stakeholders, including through data sharing, stakeholder engagement and methodological improvements. IMF's PortWatch[28] illustrates how a global maritime monitoring platform can be institutionalized and continuously maintained, combining ship, geospatial and trade data for near real-time monitoring while regularly expanding data coverage, methodologies and analytical capabilities (IMF, no date). The tracker could provide a common evidence base for monitoring investment trends and financing gaps, informing policy, technical assistance, and investment planning, while maintaining methodological consistency as data sources and technologies evolve.
Project-level data remain fragmented and incomplete across maritime climate finance sources. Gaps in provider coverage, project-level information, and common reporting practices constrain consistent assessment of financial deployment and implementation. In particular, datasets do not consistently distinguish between commitments, approvals, disbursements, mobilized private finance, co-financing, and total project value, while implementation updates and historical revisions are not systematically reported.	**Improve project-level reporting and data coverage across maritime climate finance datasets.** Inclusion of data sources not yet comprehensively captured, including national development banks (NDBs), regional financial institutions, South-South cooperation providers and governments, could help expand coverage and regular information sharing. IMO could play a facilitating role, as appropriate, in supporting such engagement and expansion of data coverage and sharing. Finance providers could adopt common project-level reporting practices, covering project descriptions, financial instruments, financing amounts and expected climate outcomes, with consistent distinctions between commitments, approvals, disbursements, mobilized private finance, co-financing, and total project value. Periodic implementation updates and documented historical revisions could help maintain the accuracy and comparability of the tracker over time.
Tracking finance flows does not show whether investment is sufficient to deliver the maritime transition.	**Link maritime finance tracking with investment needs and implementation progress.** Compare tracked flows with global and regional investment needs and, as data improve, country-level and project-pipeline requirements. Use the comparison to identify financing gaps, benchmark progress and inform investment priorities across regions and value chain segments.

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5. ANNEX

Much Annex information is an extension of Climate Policy Initiative's extensive and robust tracking methodology, tailored to the maritime climate finance context. For more information, please see the Global Landscape of Climate Finance Methodology – 2025 (CPI, 2025b).

5.1 CPI PRINCIPLES

TRACKING PRINCIPLES FOR CLIMATE FINANCE APPLIED TO MARITIME DECARBONIZATION AND ADAPTATION

CPI's climate finance tracking is guided by a set of operational principles, designed to ensure robustness, comparability, and environmental integrity. All are inherent in GLCF data, a key input to this report. Specifically, for this maritime framework, one of the most relevant principles that guides our pilot classification framework is:

Do not track carbon lock-in: Flows that risk locking in high-emission pathways over their economic lifetime are excluded from "climate finance," even where short-term emission reductions could be observed. In the maritime context, this principle underpins the distinction between:

- **Low- and zero-carbon alternative fuels:** Green hydrogen, e-ammonia and advanced sustainable biofuels are classified as climate finance where lifecycle emissions are consistent with a Paris-aligned pathway.
- **Transitional fuel production and use:** Blue hydrogen, blue ammonia, and fuels such as LNG are labeled 'Other Associated Finance' because they may deliver near-term savings but carry lock-in risks via long-lived assets and upstream impacts (such as methane slip).

5.2 SOURCES OF FINANCE – ACTOR CATEGORIES

Table A.1: Public and private actors under domestic and international sources of finance

Source	Actor	Description
International	Public	**Financial flows originating from foreign governments or international public institutions.** This includes bilateral and multilateral grants and loans—for example, from the Green Climate Fund (GCF), the Global Environment Facility, and MDBs—as well as finance from export credit agencies with climate-related objectives. These flows often aim to create enabling environments and can be designed to leverage additional private investment.
	Private	**Cross-border investments from private sector entities.** This may take the form of foreign direct investment in sectors such as renewable energy or clean transportation, and private capital mobilized through public mechanisms like blended-finance vehicles or risk mitigation instruments.
Domestic	Public	**Financial resources provided by national or subnational public institutions.** This includes government budget allocations for climate-related activities, investments by SOEs, and funding from national or regional development banks. Domestic public finance can also play a catalytic role by mobilizing private investment through subsidies, guarantees, or co-financing arrangements.
	Private	**Investments made by private actors within national borders.** These can include capital expenditures by local businesses, financial institutions, households, or project developers in areas such as renewable energy, energy efficiency, or climate resilience. This type of finance may be mobilized by public policies and incentives —and, though often underreported, is essential for climate action at the national level.

Table A.2: Climate finance institution taxonomy

Actor	Institution groups	Description
Private	Corporations	Entities that invest in projects, assets, or business activities through their own capital or raised finance, typically to support commercial operations, infrastructure development, or technology deployment.
	Commercial financial institutions	Providers of private debt capital (and occasionally other instruments), including commercial and investment banks
	Households/individuals	Family-level economic entities, including high-net-worth individuals and their intermediaries (e.g., family offices investing on their behalf).
Public	Development financial institutions (national, bilateral, multilateral)	Classified by ownership and direction of finance: multilateral or regional institutions are owned by multiple countries and provide finance internationally, bilateral institutions are owned by a single country and provide finance internationally, and national institutions are owned by a single country and direct finance domestically.
	Governments (national, international)	National: Domestic financing through public budgets, carried out by central governments and their agencies. International: Public international finance from foreign governments
	National and multilateral climate funds	National climate funds are owned by the national government that established them, while multilateral climate funds are owned by the collective of countries that contribute to them. Multilateral funds are typically managed by an international organization, often in conjunction with an overseeing board or committee.
	Public funds	Institutional investors managing funds under public ownership
	SOEs and financial institutions	We classify institutions as state-owned if they are at least majority owned by a government or government agency. Although they are classified as public sector institutions, they often undertake activities of a commercial nature.
Public and private	Third-sector organizations	Philanthropic and non-profit entities that provide grants, deliver aid and services, advocate for social or environmental change, or operate as mission-driven enterprises and cooperatives that reinvest profits toward shared social or environmental objectives.
	Export credit agencies	Institutions offering trade finance to support domestic companies by limiting risks associated with trading to overseas markets

5.3 INSTRUMENTS OF CLIMATE FINANCE

Table A.3: Climate finance instruments

Instrument	Description
Grants	Transfers made in the form of cash, goods, or services for which no repayment is required.
Project-level debt	**Low-cost debt:** Loans extended at terms preferable to those prevailing on the market. We count the full amount of the loan, not the grant equivalent.[29]
	Market-rate debt: Loans extended at regular market conditions.
Project-level equity	Equity investment for ownership stake and share of profits, relying on the project's cash flow for repayment.
Balance sheet financing (debt)	Direct debt investment by a company or FI. Lenders look at the overall financial strength of the parent company.
Balance sheet financing (equity)	Direct equity investment by a company or FI. The financing for a project comes directly from the parent company's own capital

29 Low-cost debt can also include concessional and ODA loans—i.e., loans extended on terms substantially more generous than market loans. The concessionality can be achieved through interest rates below those prevailing on the market, longer maturity, longer grace periods, or a combination of these aspects. According to the OECD, the 'grant element' of ODA loans is at least 25% (OECD, 2022).

5.4 COUNTRY CLASSIFICATIONS

Regions and countries are classified based on an existing taxonomy, where development status classifications are driven by the IMF's analytical classification system. Data is processed to include filters that allow isolation of LDCs and SIDS in analysis.

This section provides an overview of the country classifications used to capture geographical and development status origins and destinations of climate finance flows.

5.4.1 REGIONS

Countries are grouped into the following regions:

- *Central Asia and Eastern Europe*
- *East Asia and the Pacific*
- *Latin America and the Caribbean*
- *Middle East and North Africa*
- *Other Oceania*
- *South Asia*
- *Sub-Saharan Africa*
- *US and Canada*
- *Western Europe*

5.4.2 DEVELOPMENT STATUS

Since 2024, countries have been assigned a "development status" based on classifications from the IMF and the UN.

The focus of this report is least developed countries (LDCs) and small island developing States (SIDS), where SIDS cut across development statuses.

- Advanced economies (AEs)
- Emerging markets and developing economies (EMDEs)
  - Least developed countries (LDCs)



SIDS

ADVANCED ECONOMIES AND EMERGING MARKETS AND DEVELOPING ECONOMIES

Both advanced economies and EMDEs are categorized following the April 2024 edition of the IMF World Economic Outlook (WEO) Database (IMF, 2024).

LEAST DEVELOPED COUNTRIES (LDCS)

LDCs are categorized as per the UN's definition (UN DESA, 2025; UNSD, 2025). LDCs are considered a subset of EMDEs, with LDCs included in all EMDE analysis unless otherwise stated.

SMALL ISLAND DEVELOPING STATES

The GLCF SIDS classification follows the UN list, which comprises 39 SIDS and 18 Associate Members of the UN Regional Commissions (UN OHRLLS, 2025; UNSD, 2025). For this analysis, the SIDS-focused assessment covers 38 of the 39 SIDS and excludes the 18 Associate Members. Singapore is excluded from the SIDS grouping because it is a significant economic outlier; however, maritime climate finance flows to Singapore remain captured in the broader analysis, where Singapore is classified as an advanced economy.

SIDS region	Country	ODA eligible
Atlantic, Indian Ocean, and South China Sea (AIS)	Cabo Verde	Yes
	Comoros	Yes
	Guinea-Bissau	Yes
	Maldives	Yes
	Mauritius	Yes
	Sao Tome and Príncipe	Yes
	Seychelles	No
Caribbean	Antigua and Barbuda	No (graduated 2022)
	Bahamas	No
	Barbados	No
	Belize	Yes
	Cuba	Yes
	Dominica	Yes
	Dominican Republic	Yes
	Grenada	Yes
	Guyana	Yes
	Haiti	Yes
	Jamaica	Yes
	Saint Kitts and Nevis	No
	Saint Lucia	Yes
	Saint Vincent and the Grenadines	Yes
	Suriname	Yes
	Trinidad and Tobago	No
Pacific	Cook Islands	No
	Fiji	Yes
	Kiribati	Yes
	Marshall Islands	Yes
	Micronesia (Federated States of)	Yes
	Naoero	Yes
	Niue	Yes
	Palau	Yes
	Papua New Guinea	Yes
	Samoa	Yes
	Solomon Islands	Yes
	Timor-Leste	Yes
	Tonga	Yes
	Tuvalu	Yes
	Vanuatu	Yes

5.4.3 UNCLASSIFIED COUNTRIES

Some countries included in the GLCF lack classification in the IMF WEO database. For countries that were not IMF members in the relevant year and therefore lack a development status, we infer classification based on their income level from the World Bank (World Bank Group, 2025). "High-income" countries are classed as "advanced economies" (AEs), while "low-income countries" (LICs) and "middle income countries" are classified as EMDEs.

Table A.4: Country classifications used for the analysis of climate finance flows

Region	Country	Dev. Status	Income Level
Central Asia and Eastern Europe	Croatia	Advanced	HIC
	Cyprus	Advanced	HIC
	Estonia	Advanced	HIC
	Latvia	Advanced	HIC
	Lithuania	Advanced	HIC
	Slovakia	Advanced	HIC
	Albania	EMDE	UMIC
	Armenia	EMDE	UMIC
	Azerbaijan	EMDE	UMIC
	Belarus	EMDE	UMIC
	Bosnia and Herzegovina	EMDE	UMIC
	Bulgaria	EMDE	UMIC
	Georgia	EMDE	LMIC
	Hungary	EMDE	HIC
	Kazakhstan	EMDE	UMIC
	Kosovo[30]	EMDE	LMIC
	Kyrgyzstan	EMDE	LMIC
	Republic of Moldova	EMDE	LMIC
	Montenegro	EMDE	UMIC
	North Macedonia	EMDE	UMIC
	Poland	EMDE	HIC
	Romania	EMDE	HIC
	Russian Federation	EMDE	UMIC
	Serbia	EMDE	UMIC
	Tajikistan	EMDE	LIC
	Türkiye	EMDE	UMIC
	Turkmenistan	EMDE	UMIC
	Ukraine	EMDE	LMIC
	Uzbekistan	EMDE	LMIC

30 This designation is without prejudice to positions on status and is in line with UN Security Council Resolution 1244 and the International Court of Justice Opinion on the Kosovo Declaration of Independence.

Region	Country	Dev. Status	Income Level
East Asia and the Pacific	Cook Islands	Advanced	Unknown
	Guam	Advanced	HIC
	Hong Kong, China	Advanced	HIC
	Japan	Advanced	HIC
	Republic of Korea	Advanced	HIC
	Macao, China	Advanced	HIC
	Niue	Advanced	Unknown
	Singapore	Advanced	HIC
	Wallis and Futuna Islands	Advanced	Unknown
	China	China	UMIC
	Fiji	EMDE	UMIC
	Indonesia	EMDE	UMIC
	Democratic People's Republic of Korea	EMDE	LIC
	Malaysia	EMDE	UMIC
	Marshall Islands	EMDE	UMIC
	Micronesia (Federated States of)	EMDE	LMIC
	Mongolia	EMDE	LMIC
	Naoero	EMDE	HIC
	Palau	EMDE	HIC
	Papua New Guinea	EMDE	LMIC
	Philippines	EMDE	LMIC
	Samoa	EMDE	UMIC
	Thailand	EMDE	UMIC
	Tonga	EMDE	UMIC
	Vanuatu	EMDE	LMIC
	Viet Nam	EMDE	LMIC
	Cambodia	LDC	LMIC
	Kiribati	LDC	LMIC
	Lao People's Democratic Republic	LDC	LMIC
	Myanmar	LDC	LMIC
	Solomon Islands	LDC	LMIC
	Timor-Leste	LDC	LMIC
	Tuvalu	LDC	UMIC
Latin America and the Caribbean	Cayman Islands	Advanced	HIC
	French Guiana	Advanced	Unknown
	Guadeloupe	Advanced	Unknown
	Martinique	Advanced	Unknown
	Montserrat	Advanced	Unknown
	Netherlands Antilles	Advanced	Unknown
	Puerto Rico	Advanced	HIC
	Antigua and Barbuda	EMDE	HIC
	Argentina	EMDE	HIC
	Aruba	EMDE	HIC
	Bahamas	EMDE	HIC
	Barbados	EMDE	HIC

Region	Country	Dev. Status	Income Level
Latin America and the Caribbean	Belize	EMDE	UMIC
	Bolivia (Plurinational State of)	EMDE	LMIC
	Brazil	EMDE	UMIC
	Chile	EMDE	HIC
	Colombia	EMDE	UMIC
	Costa Rica	EMDE	UMIC
	Cuba	EMDE	UMIC
	Dominica	EMDE	UMIC
	Dominican Republic	EMDE	UMIC
	Ecuador	EMDE	UMIC
	El Salvador	EMDE	LMIC
	Grenada	EMDE	UMIC
	Guatemala	EMDE	UMIC
	Guyana	EMDE	UMIC
	Honduras	EMDE	LMIC
	Jamaica	EMDE	UMIC
	Mexico	EMDE	UMIC
	Nicaragua	EMDE	LMIC
	Panama	EMDE	HIC
	Paraguay	EMDE	UMIC
	Peru	EMDE	UMIC
	Saint Kitts and Nevis	EMDE	HIC
	Saint Lucia	EMDE	UMIC
	Saint Vincent and the Grenadines	EMDE	UMIC
	Suriname	EMDE	UMIC
	Trinidad and Tobago	EMDE	HIC
	Uruguay	EMDE	HIC
	Venezuela (Bolivarian Republic of)	EMDE	UMIC
	Haiti	LDC	LIC
Middle East and North Africa	Israel	Advanced	HIC
	Algeria	EMDE	LMIC
	Bahrain	EMDE	HIC
	Egypt	EMDE	LMIC
	Iran	EMDE	UMIC
	Iraq	EMDE	UMIC
	Jordan	EMDE	UMIC
	Kuwait	EMDE	HIC
	Lebanon	EMDE	UMIC
	Libya	EMDE	UMIC
	Morocco	EMDE	LMIC
	Oman	EMDE	HIC
	Qatar	EMDE	HIC
	Saudi Arabia	EMDE	HIC
	State of Palestine	EMDE	LMIC
	Syrian Arab Republic	EMDE	LIC
	Tunisia	EMDE	LMIC
	United Arab Emirates	EMDE	HIC
	Yemen	LDC	LIC

Region	Country	Dev. Status	Income Level
Other Oceania	Australia	Advanced	HIC
	French Polynesia	Advanced	HIC
	New Caledonia	Advanced	HIC
	New Zealand	Advanced	HIC
	Tokelau	Advanced	Unknown
South Asia	Bhutan	EMDE	LMIC
	India	EMDE	LMIC
	Maldives	EMDE	UMIC
	Pakistan	EMDE	LMIC
	Sri Lanka	EMDE	LMIC
	Afghanistan	LDC	LIC
	Bangladesh	LDC	LMIC
	Nepal	LDC	LMIC
Sub-Saharan Africa	Mayotte	Advanced	Unknown
	Reunion	Advanced	Unknown
	Saint Helena	Advanced	Unknown
	Botswana	EMDE	UMIC
	Cameroon	EMDE	LMIC
	Cabo Verde	EMDE	LMIC
	Congo	EMDE	LMIC
	Côte d'Ivoire	EMDE	LMIC
	Equatorial Guinea	EMDE	UMIC
	Gabon	EMDE	UMIC
	Ghana	EMDE	LMIC
	Kenya	EMDE	LMIC
	Mauritius	EMDE	HIC
	Namibia	EMDE	UMIC
	Nigeria	EMDE	LMIC
	Seychelles	EMDE	HIC
	South Africa	EMDE	UMIC
	Eswatini	EMDE	LMIC
	Zimbabwe	EMDE	LIC
	Angola	LDC	LMIC
	Benin	LDC	LMIC
	Burkina Faso	LDC	LIC
	Burundi	LDC	LIC
	Central African Republic	LDC	LIC
	Chad	LDC	LIC
	Comoros	LDC	LIC
	Democratic Republic of Congo	LDC	LIC
	Djibouti	LDC	LMIC
	Eritrea	LDC	LIC
	Ethiopia	LDC	LIC
	Gambia	LDC	LIC
	Guinea	LDC	LIC
	Guinea-Bissau	LDC	LIC

Region	Country	Dev. Status	Income Level
Sub-Saharan Africa	Lesotho	LDC	LMIC
	Liberia	LDC	LIC
	Madagascar	LDC	LIC
	Malawi	LDC	LIC
	Mali	LDC	LIC
	Mauritania	LDC	LMIC
	Mozambique	LDC	LIC
	Niger	LDC	LIC
	Rwanda	LDC	LIC
	Sao Tome and Principe	LDC	LMIC
	Senegal	LDC	LIC
	Sierra Leone	LDC	LIC
	Somalia	LDC	LIC
	South Sudan	LDC	LIC
	Sudan	LDC	LIC
	United Republic of Tanzania	LDC	LMIC
	Togo	LDC	LIC
	Uganda	LDC	LIC
	Zambia	LDC	LMIC
US and Canada	Bermuda	Advanced	HIC
	Canada	Advanced	HIC
	United States of America	Advanced	HIC
Western Europe	Andorra	Advanced	HIC
	Austria	Advanced	HIC
	Belgium	Advanced	HIC
	Czechia	Advanced	HIC
	Denmark	Advanced	HIC
	Finland	Advanced	HIC
	France	Advanced	HIC
	Germany	Advanced	HIC
	Greece	Advanced	HIC
	Iceland	Advanced	HIC
	Ireland	Advanced	HIC
	Italy	Advanced	HIC
	Jersey	Advanced	HIC
	Luxembourg	Advanced	HIC
	Malta	Advanced	HIC
	Monaco	Advanced	HIC
	Netherlands (Kingdom of the)	Advanced	HIC
	Norway	Advanced	HIC
	Portugal	Advanced	HIC
	Slovenia	Advanced	HIC
	Spain	Advanced	HIC
	Sweden	Advanced	HIC
	Switzerland	Advanced	HIC
	United Kingdom of Great Britain and Northern Ireland	Advanced	HIC

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