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The International Maritime Organisation's Net-Zero Framework

Implications for Indian
Maritime Sector

Anurag Bisen

VIF Brief

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Published in 2025 by

Vivekananda International Foundation

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Abstract

The International Maritime Organization's (IMO) 2025 Net-Zero Framework represents a pivotal step toward decarbonising global shipping, mandating stricter carbon intensity standards through market-based and technical measures. This Issue Brief examines the implications of these regulations for India's maritime sector, which faces distinct challenges due to its aging fleet, limited green fuel infrastructure, and heavy reliance on imported technologies. Despite India's growing strategic importance in global trade and its long coastline, the country's maritime decarbonisation efforts remain constrained by financial, technological, and policy barriers. The paper evaluates India's readiness to transition toward sustainable shipping, explores infrastructure and investment gaps, and underscores the need for integrated financial policies, targeted fiscal incentives, and international cooperation. It argues for initiatives to ensure compliance with IMO targets while positioning India as a competitive, sustainable maritime hub. Recommendations aim to align national objectives with evolving global standards.

Introduction

On 11th April, the International Maritime Organization (IMO) reached a significant agreement aimed at reducing greenhouse gas (GHG) emissions from the global shipping industry. This agreement introduces a legally binding framework targeting net-zero emissions by around 2050¹ and will have far reaching implications on global shipping, including India.

The IMO Net-Zero Framework marks a global first by introducing both, compulsory emissions caps and greenhouse gas (GHG) pricing, within an entire industry sector. Endorsed by the IMO's Marine Environment Protection Committee during its 83rd session (MEPC 83), held from 7 to 11 April 2025, the framework encompasses a new fuel standard for maritime vessels and establishes a worldwide emissions pricing mechanism. These measures, scheduled for formal adoption in October 2025 and slated to take effect in 2027, will apply to large ocean-going vessels exceeding 5,000 gross tons—responsible for approximately 85% of international shipping's carbon dioxide emissions².

Key Elements of the IMO Net-Zero Framework³

The IMO Net-Zero Framework is set to be incorporated as a new Chapter 5 within Annex VI (concerning the prevention of air pollution from ships) of the International Convention for the Prevention of Pollution from Ships (MARPOL). Annex VI currently has 108 signatories, representing 97% of the global merchant fleet by tonnage. It already mandates various energy efficiency measures for ships.

1 [IMO approves net-zero regulations for global shipping](#), International Maritime Organization, 11 April 2025

2 *ibid*

3 *ibid*

The primary objectives of the Framework include aligning with the climate goals defined in the 2023 IMO Strategy on the Reduction of GHG Emissions from Ships, expediting the adoption of fuels, technologies, and energy sources with zero or near-zero GHG emissions, and facilitating a just and equitable transition across the sector⁴.

Under the proposed regulatory framework, ships will need to meet the following requirements:

- **Global Fuel Standard:** Ships will be required to progressively lower their annual greenhouse gas fuel intensity (GFI)—defined as the amount of GHG emissions per unit of energy consumed. This will be assessed using a “well-to-wake” lifecycle approach.
- **Global Economic Measure:** Vessels exceeding the established GFI thresholds will be obligated to acquire remedial units to offset their excess emissions. Conversely, ships that adopt zero or near-zero GHG technologies will qualify for financial incentives.

Ensuring Compliance: Compliance with GHG fuel intensity targets will operate on two levels: a **Base Target** and a **Direct Compliance Target**, the latter allowing ships to earn “surplus units.” Vessels emitting beyond their allowable limits will be able to balance their emissions through the following mechanisms:

- Transferring surplus units from compliant vessels;
- Using previously accumulated surplus units;
- Acquiring remedial units by contributing to the IMO Net-Zero Fund.

4 [Revised GHG reduction strategy for global shipping adopted](#), International Maritime Organization, 07 July 2023

Legally Binding Targets: The agreement introduces legally binding targets for emissions reduction. Member states are required to submit national action plans that outline how they will meet their emissions reduction goals, with a net-zero target by or around 2050.

Fuel Transition: The agreement mandates a shift towards low- or zero-carbon fuels, such as ammonia, hydrogen, and green methanol. These fuels will become the standard for new ships, and older vessels will be encouraged to retrofit or replace their engines with cleaner alternatives.

Intermediate Reduction Targets: The IMO's framework sets ambitious intermediate emissions reduction targets: -

- A **20-30% reduction by 2030** (compared to 2008 levels).
- A **70-80% reduction by 2040**. These intermediate targets will ensure that the shipping sector remains on track to meet its 2050 goal.

Emission Pricing Mechanism: Implementation of a global carbon tax on shipping, starting at \$100 per ton of CO₂ emissions above set thresholds, effective from 2027⁵.

Equity Considerations: The agreement includes provisions for financial assistance and technology transfer to developing countries to support their transition to cleaner shipping.

IMO Net-Zero Fund: The IMO Net-Zero Fund will be established to collect contributions based on emissions pricing. IMO projects annual revenues of \$11–13 billion, which will be directed the Net-Zero Fund⁶. The funds generated will be allocated to:

5 [Major nations agree on first-ever global fee on greenhouse gases with plan that targets shipping](#), AP News, 11 April 2025

6 *ibid*

- Provide incentives to low emission ships;
- Support research, innovation, infrastructure development, and equitable transition initiatives, particularly in developing countries;
- Finance training, technology transfer, and capacity-building in support of the IMO GHG Strategy; and
- Alleviate adverse impacts on vulnerable States, such as Small Island Developing States (SIDS) and Least Developed Countries (LDCs).

Shipping Sector's Contribution to Global Emissions

The global shipping sector plays an essential role in world trade, accounting for nearly 90% (by volume) of the movement of goods across borders. However, its environmental impact has long been under scrutiny due to its significant contribution to global GHG emissions approximately 3% of total global GHG emissions⁷. If the shipping sector the sector was a country, it would rank as the fifth-largest GHG emitter globally, after Russia. While efficient for transporting goods, the absolute volume of emissions from shipping is substantial and is growing at a fast pace, having increased by 20% over the past decade⁸. The sector's emissions primarily arise from the use of heavy fuel oil (HFO) in marine engines, which is highly carbon-intensive.

According to projections, if no further action is taken, emissions from the sector could increase by 50-250% by 2050, driven by the expansion of international trade. This increase would significantly undermine global climate goals and exacerbate the challenge of

7 [IMO's Fourth GHG Study](#) (2020)

8 [Review of Maritime Transport 2023](#), UN Trade and Development (UNCTAD)

limiting global temperature rise to 1.5°C.

Since the shipping sector was not implicitly included in the 2015 Paris Agreement, the IMO's decision to address this issue through a binding international agreement represents a major step in global shipping governance as well as in addressing climate change. For the first time, the industry will be subject to legally enforceable measures that will drastically alter its emissions trajectory.

India and the IMO

The IMO is a specialised agency of the United Nations responsible for developing global standards and regulatory frameworks to ensure the safety, security, and environmental sustainability of international shipping. IMO currently has 176 Member States and three Associate Members, 66 Intergovernmental Organizations (IGOs) which have observer status, and 89 Non-Governmental Organizations (NGOs) having consultative status⁹.

The 40-member Council serves as the IMO's executive body, overseeing the organisation's activities. It is elected for two-year terms, and its membership is divided into three categories: Category (a) includes ten Member States with the greatest interest in providing international shipping services¹⁰; Category (b) consists of ten States not elected under (a) but with the largest stake in international seaborne trade¹¹; and Category (c) includes twenty States¹² not

9 [Member States, IGOs and NGOs, IMO](#)

10 China, Greece, Italy, Japan, Liberia, Norway, Panama, the Republic of Korea, the United Kingdom of Great Britain and Northern Ireland and the United States of America

11 Australia, Brazil, Canada, France, Germany, India, the Kingdom of the Netherlands, Spain, Sweden and the United Arab Emirates

12 The Bahamas, Bangladesh, Chile, Cyprus, Denmark, Egypt, Finland, Indonesia, Jamaica, Kenya, Malaysia, Malta, Mexico, Morocco, Peru, the Philippines, Qatar, Saudi Arabia, Singapore and Türkiye

selected under (a) or (b), which have particular interests in maritime transport or navigation, and whose inclusion ensures geographic diversity in Council representation¹³. There is no difference in voting rights or decision-making power between these categories. All Council members, regardless of category, have equal voting rights and participate equally in decision-making processes.

However, despite representing approximately 10 percent of the global EXIM trade, India has never been a member of Category A. It has consistently been elected as Category B member to the IMO Council. In December 2023, India was re-elected, for the biennium 2024-25, to the IMO Council and with 157 out of 167 votes, India had the highest tally in its re-election to the IMO Council¹⁴.

Advocacy for Developing Nations: India, along with other developing countries, has historically advocated for considering national circumstances and providing financial and technological support to ensure a just transition.

Support for Capacity Building: India has called for increased capacity-building initiatives and technology transfer to assist developing nations in meeting the new regulations¹⁵.

India's Shipping Sector

As a key driver of India's economic growth, the shipping industry is responsible for 95 percent of the country's trade by volume and 68 percent by value¹⁶. India's maritime sector handled approximately 819 million metric tons (MT) of seaborne trade (2024), representing

13 [Structure of IMO](#), IMO

14 ANI, "[India elected again to International Maritime Organisation Council with highest votes](#)," 01 December 2023, The Times of India,

15 Krishna B Kotak & P Manoj, [Why India's re-election to the IMO Council is significant](#), ET Infra, 18 December, 2023

16 [Shipping](#)

7.9% of global seaborne trade. By 2030, India aims to handle 1.8 billion MT of trade, and by 2050, this volume is expected to rise to 2.2 billion MT, representing a 12.2% share of global trade¹⁷. This makes it crucial to implement a cohesive policy framework that supports decarbonisation, ensures adherence to global regulations, and promotes the adoption of green technologies.

Fleet Strength: India's total fleet strength stood at 1526 vessels with 13.75 million gross tonnages (GT) in 2023¹⁸. Even though this represents a 72-fold increase in GT since independence, India ranks a lowly 23rd in the world merchant fleet tonnage representing a mere 0.91 percent of the worldwide tonnage¹⁹.

Trading Profile and Vintage: Of these 1526 Indian registered vessels, 68 percent vessels were engaged in coastal trade and the remaining 32 percent (487) were engaged for overseas trade. However, in terms of load carrying, the 32 percent represented 88 percent (12.1 million tons) of Indian GT. As far as the age profile of Indian merchant shipping vessels is concerned 82 percent were over 10 years old, 61.2 percent were above 16 years and 45.5 percent of the fleet was above 20 years old²⁰.

Additionally, the maximum 55.8 percent of Indian tonnage (7.67 million GT) was in the category of Oil Tankers representing a major vulnerability since India's import dependence is over 88 percent²¹. Even though Indian companies are required to obtain a NOC from Directorate General of Shipping, India, if they charter foreign flag vessels, during FY 2022-23, Indian flagged vessels only transported

17 [Future Fuel Strategy \(FFS\) For Maritime India](#), Indian Register of Shipping, February 2025

18 [INDIAN SHIPPING STATISTICS](#), 2023, MINISTRY OF PORTS, SHIPPING & WATERWAYS

19 [Share of the world merchant fleet value by flag of registration, annual](#)

20 Indian Shipping Statistics, calculated by the author

21 [India's oil import dependency up at 88.1% in April-December as demand growth pips domestic output](#), Indian Express, January 30, 2025

approx. 23.64 percent of imported crude oil for Oil PSUs²².

Path to Decarbonisation: The path for decarbonisation for Indian ships is going to be long and expensive and will require careful planning. Considering that fuel accounts for around 30-50 percent of a vessel's operating costs²³ and currently bunker fuels make up almost 100 percent of Indian fleet mix, it would need a complete overhaul of Indian shipping industry to become net-zero compliant.

However, ships powered by fossil fuels can't just switch to using green fuels. Retrofitting existing vessels to operate on methanol or ammonia is possible, but it comes with a price tag of between US\$5 million and US\$15 million per ship, depending on the type of fuel. For older vessels, the cost may be prohibitive as they could be decommissioned before the investment is recouped, and the high expense applies even to smaller ships²⁴. Decarbonising India's shipping fleet would need a twin-pronged approach—retrofitting existing vessels with energy-efficient solutions and building new, environmentally friendly ships.

Tentative Costs: As per the '*Future Fuel Strategy for Maritime India*', published by the Indian Register of Shipping in February 2025, the projected investment for Indian fleet modernisation, encompassing retrofitting and new vessel construction, stands at INR 90,000 crore (\$11.2 billion). This is a humungous figure and would need an annual financial outgo of Rs 3600 crores for the next

22 STANDING COMMITTEE ON PETROLEUM & NATURAL GAS (2023-24), SEVENTEENTH LOK SABHA, MINISTRY OF PETROLEUM & NATURAL GAS, [REVIEW OF POLICY ON IMPORT OF CRUDE OIL](#), 23rd REPORT

23 Beatriz Jesus, Inês Abreu Ferreira, Augusto Carreira, Stein Ove Eriks-tad, Radu Godina, [Economic framework for green shipping corridors: Evaluating cost-effective transition from fossil fuels towards hydrogen](#), International Journal of Hydrogen Energy, Volume 83, 2024, Pages 1429-1447, ISSN 0360-3199.

24 [Challenging road ahead for retrofitting to dual-fuel engines](#), Maritime Impact, 16 May, 2023

25 years, to achieve net-zero emissions of the Indian fleet by 2050.

However, let's consider at a more realistic estimate. Looking at the age profile and numbers of the Indian fleet engaged in overseas trade, 173 of the 487 vessels are less than 5000 tons and will be exempted from the requirement of switching to a greener fuel. That leaves behind 314 vessels of the present Indian fleet that will need to be either retrofitted/phased out (depending on their vintage). At a budget of US\$5 million and US\$15 million per ship this would translate to US \$ 1.6 billion to US \$ 4.8 billion if all the ships were to be retrofitted today. At a median cost of US \$ 10 million it would entail an investment of Rs 27,500/-crores (US \$ 3.2 billion). Considering that India has banned tankers and bulk carriers aged 25 years old or above, both Indian registered and foreign vessels, from operation in its ports²⁵, retrofitting 314 vessels over a 25-year period would entail an annual cost (back of the envelope calculation) of approx. Rs 1100 crores (US 128 \$ million).

Both the above estimates entail significant financial expenditure for the Indian shipping engaged in overseas trade, to achieve net-zero emissions by 2050. Considering that the Government of India (GoI's) total allocation (in 2023) for the country's shipping sector was approximately Rs 2000 crores²⁶ and most of the ships deployed for overseas trade were single ship companies (105 companies with single ship deployed on overseas route with a total GT of 1.27 million)²⁷, not only it would be beyond these companies to undertake the retro fitment, it would also need significant hand holding by the GoI.

Here, it would be worthwhile to list the other challenges in the path of transition to green shipping.

25 [India Government Makes Official Ban of Ships Older Than 25 Years](#), Shipping Telegraph, 01 March 2023

26 [INDIAN SHIPPING STATISTICS](#), 2023, MINISTRY OF PORTS, SHIPPING & WATERWAYS

27 *ibid*

Challenges to Transition for Indian Shipping

Green Shipping: In India, the shift to green shipping faces obstacles related to regulation, finance, and operations, affecting different stakeholders within the maritime sector. Inconsistent regulations, insufficient infrastructure, and high capital costs complicate the broad adoption of sustainable practices. Technological challenges, fragmented supply chains, and investment risks also hinder progress, especially for shipowners, fuel producers, and logistics providers. Furthermore, poor coordination among stakeholders, with key players working in isolation, reduces the effectiveness of green initiatives²⁸.

The adoption of green ships faces critical barriers, mainly high initial costs, a lack of specialised expertise, and reluctance from stakeholders. In India, the high cost of transitioning to green shipping is driven by several factors. First, alternative fuels used in green propulsion systems are costly to produce, store, and bunker, compounded by a reliance on imported green technology components like fuel cells and batteries. These issues are worsened by infrastructure gaps and a shortage of skilled labour trained in building, retrofitting, and operating green ships, which require extensive R&D and complex engineering. Additionally, many shipowners are hesitant to invest in green retrofitting or new builds due to uncertainties about returns, especially for older vessels. The lack of awareness about the long-term cost savings and operational benefits of green ships also slows the shift toward sustainable maritime practices.

Green Fuels: The adoption of green fuels in Indian ships also faces several challenges. Various fuel options, such as LNG, methanol, biofuels, and e-fuels, come with technological complexities and infrastructure limitations, requiring significant capital investment and bunkering facilities. Supply chain issues include inefficient collection, transportation, and limited availability of sustainable

feedstocks, which compete with other industries. Economic challenges stem from the high costs of green fuels, price volatility in an underdeveloped market, and potential trade impacts due to increased operational expenses. Industry resistance is driven by the high production costs of alternative fuels, retrofitting expenses, and lifecycle concerns for existing fleets, such as the premature decommissioning of conventional ships.

Green Fuel Production Infrastructure:²⁹ Producing green fuels like hydrogen and ammonia demands substantial upfront investment. In India, the cost of green hydrogen ranges from ₹300–400 per kg (\$3.6–\$4.8), significantly higher than conventional marine fuels such as Heavy Fuel Oil (₹60–70 per kg or \$0.72–\$0.84). This gap is largely due to the need for advanced infrastructure, including electrolysers, which are crucial for green hydrogen production. Setting up these facilities costs about ₹8–10 crores (\$1–1.25 million) per megawatt. Additionally, electrolysers require ultra-pure water, necessitating further investment in purification technologies. Without major subsidies or technological advances, green fuels remain economically uncompetitive.

Port Infrastructure Modernisation:³⁰ Upgrading Indian ports to handle green fuels requires major investments in cryogenic storage, corrosion-resistant pipelines, and advanced safety systems like leak detection and fire suppression. These enhancements, costing an estimated ₹1,000–1,200 crores (\$120–145 million) per major port, are essential for safely managing fuels like hydrogen and ammonia, which demand ultra-low temperature storage. However, the high costs pose a challenge for ports with limited resources, underscoring the need for dedicated financial and policy support. Most Indian ports currently lack this infrastructure, making substantial investment necessary to align with global standards.

29 [Future Fuel Strategy \(FFS\) For Maritime India](#), Indian Register of Shipping, February 2025

30 *ibid*

Technology Gaps³¹ India's limited domestic capacity for manufacturing electrolysers, fuel cells, and cryogenic systems results in heavy reliance on imports, driving up costs and delaying implementation. Import duties and logistical hurdles further increase expenses, reducing the global competitiveness of green transition projects.

Lack of Fiscal Incentives³² India's current tax framework offers limited relief for importing green technologies or establishing renewable infrastructure at ports. High import duties on items like electrolysers and fuel cells deter investment. Although the National Green Hydrogen Mission provides performance-linked incentives for domestic electrolyser manufacturing, broader fiscal support through targeted tax breaks and subsidies is still needed.

Absence of Maritime-Specific Financial Policies: While strategic frameworks like the Maritime India Vision 2030 and Maritime *Amrit Kaal* Vision 2047 outline goals for port modernisation and sustainability, they lack dedicated financial mechanisms to support green maritime initiatives. Without focussed funding policies, translating these visions into actionable green projects remains a challenge.

Having discussed the challenges in the path of transition to green shipping, it would be worthwhile to examine the various initiatives launched by the GoI to promote green shipping and the financial strategy for the decarbonisation of Indian shipping fleet.

GoI Green Shipping Initiatives

India has shown strong commitment to maritime decarbonisation through the *Panchamrit* framework, introduced at COP-26 (November 2021) which, *inter-alia*, aims for net-zero emissions

31 *ibid*

32 *ibid*

in the maritime sector by 2070. Key initiatives include promoting renewable energy in ports, incentivising green fuel use, and investing in technologies like green hydrogen and carbon capture³³.

Shipbuilding Financial Assistance Policy (SBFAP)³⁴: The GoI released the SBFAP (2021) to incentivise the revival and modernisation of the domestic shipbuilding sector for ship orders placed in Indian shipyards between 2016 to 2026. A major dimension of this policy is its alignment with environmental sustainability goals, as it embeds specific provisions to promote the construction of energy-efficient, low-emission, and technologically advanced vessels—collectively supporting India's shift towards green shipping.

Under this policy, financial assistance is extended to Indian shipyards for each vessel constructed, calculated as a percentage of either the contracted price or the internationally benchmarked fair price, whichever is lower. The assistance began at 20% of vessel cost in FY 2016–17 and gradually reduces to 11% by FY 2025–26, thereby rewarding early adoption of advanced and environmentally sustainable shipbuilding practices. This tapering model serves to both incentivise immediate investments in green technologies and prevent frontloading of less efficient ship designs. The assistance is capped at ₹40 crore per vessel for non-specialised ships

The policy explicitly encourages the adoption of fuel-efficient propulsion systems and cleaner marine technologies. Vessels incorporating features such as LNG fuel systems, hybrid propulsion, and wind or solar-assisted technologies are eligible for preferential assistance rates, subject to administrative certification and compliance with recognised environmental standards. These incentives are especially significant in the context of rising

33 [NATIONAL GREEN SHIPPING POLICY- INDIA](#), Consultative Document

34 [Guidelines for Shipbuilding Financial Assistance Policy](#), Ministry of Shipping, 2021

international regulatory pressure to decarbonise the shipping industry, notably through mechanisms like the IMO's Energy Efficiency Design Index (EEDI) and MARPOL Annex VI emission caps.

To further promote environmentally beneficial ship types, the policy designates a category of “specialised vessels,” which are generally more aligned with green technology standards. This includes LNG and LPG carriers, Floating Storage Regasification Units (FSRUs), Floating Production Storage and Offloading units (FPSOs), Mobile Offshore Drilling Units (MODUs), and self-propelled dredgers. These vessels, due to their complexity and high value, are permitted extended delivery periods of up to six years, as opposed to the standard three-year window, thereby supporting the integration of cutting-edge, environmentally compliant technologies in their construction.

Another progressive feature of the policy is its support for the export of smaller green vessels, such as electric ferries or hybrid tugs. While vessels must typically exceed 24 meters in length to qualify for assistance, this condition is waived in the case of exports, recognizing the growing international demand for compact, clean-tech maritime solutions and aiming to enhance India's footprint in global green ship markets.

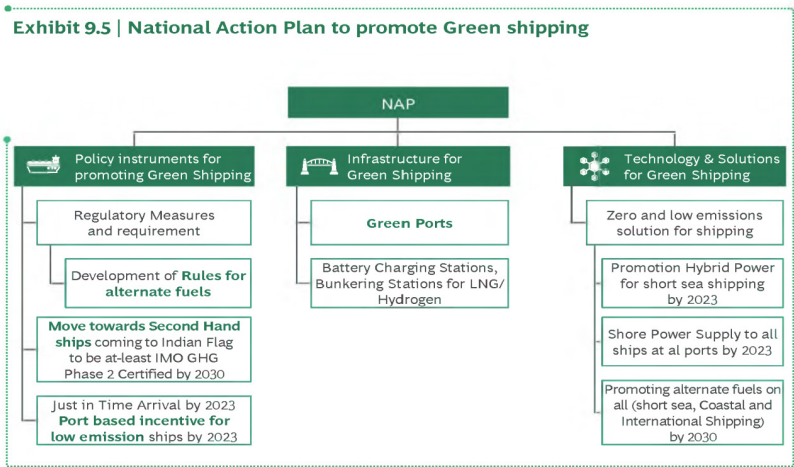
Domestically, the policy mandates significant value addition within Indian shipyards. This not only promotes indigenous capability development in green shipbuilding but also reduces the carbon footprint associated with overseas manufacturing and component imports.

Maritime India Vision 2030 (MIV 2030): MIV 2030³⁵, launched in 2012, has identified 150+ initiatives across ports, shipping & waterways sub-sectors and is a blueprint to accelerate the growth

35 [MARITIME INDIA VISION 2030](#), Ministry of Ports, Shipping and Waterways, Government of India

of India’s maritime sector by 2030. As part of the ‘*National Action Plan to promote Green Shipping*’, MIV 2030 aims to decarbonise maritime activities by integrating renewable energy solutions and promoting green shipping practices.

However, while the MIV 2030 acknowledges the importance of sustainability, it falls short in promoting alternative fuels like LNG and hydrogen or incentivising vessel retrofitting for emissions reduction. Moreover, the lack of targeted policies addressing financial barriers for shipping companies in adopting green technologies could hinder the sector’s transition to low-carbon operations.



The strategy recognises the need for port modernisation and the adoption of renewable energy, such as solar and wind power, but provides limited guidance on implementing advanced propulsion systems or alternative fuels across the wider shipping industry, leaving a gap in achieving significant greenhouse gas reductions. Additionally, MIV 2030 lacks detailed plans for establishing green shipping corridors or collaborating with global decarbonisation initiatives. Strengthening these areas is vital to aligning India’s maritime sector with international sustainability standards and ensuring long-term environmental and economic resilience. These

gaps are sought to be addressed by the recently released NGSP-CD.

National Green Shipping Policy (NGSP):³⁶ In February 2025, the GoI released the NGSP Consultative Document (CD) for India. The document is undergoing comprehensive stakeholder consultations with maritime stakeholders, policy experts, environmental groups and academic institutions and upon completion of the consultation process and subsequent approval, the Ministry of Ports, Shipping, and Waterways (MoPS&W) will formalise this document as India's National Green Shipping Policy.

Under the 'Green Ships' element of the NGSP-CD, the following proposed policy actions have been listed: -

- **Green Ship Certification & Compliance Standards:** Mandate Green Ship Certification under the Merchant Shipping Bill, aligned with India's GHG reduction goals.
- **Zero-Emission Zones (ZEZs) for Coastal & Inland Waterways:** Designate key waterways as ZEZs, restricting operations to zero-emission vessels.
- **Monitoring, Reporting, & Verification (MRV) Systems:** Create a national emissions tracking system for international compliance.
- **Skill Development & Knowledge Sharing in Green Shipping:** Partner with global institutions to train professionals in green technologies.
- **Enhancing Shipbuilding Financial Assistance (SBFA) Scheme:** Introduce tiered financial incentives for green ships and retrofitting.
- **Financial Risk-Sharing for Retrofitting:** Implement loan guarantees and insurance subsidies to reduce retrofitting risks.
- **Green Innovation Fund:** Set up a fund for research, pilot

36 [NATIONAL GREEN SHIPPING POLICY- INDIA](#), Consultative Document

projects, and technology development in green shipping.

- **Green Talent Fund:** Support specialised training, scholarships, and workforce development in green maritime fields.

As per the NGSP-CD, the following solutions outline key opportunities for overcoming critical barriers and driving India's leadership in green shipping: -

- **Efficient New Builds:** Efficiency in design, production process, and indigenisation of ancillaries/equipment.
- **Global Ship Design Hub:** Develop advanced ship design expertise to serve global demand.
- **Hybrid New Builds & Retrofit Ready Ships:** Cost-effective hybrid ships and retrofit-friendly designs for export markets.
- **Larger Industrial associations:** R&D partnerships and repurposing of infrastructure for innovation.
- **Retrofit Manufacturing Hub:** Export retrofit solutions with expertise in design, manufacturing, and service.
- **Green Fuel Infrastructure:** Domestic production, storage, and bunkering of alternative fuels.
- **Workforce Development:** Specialised training in green shipbuilding and alternative fuels.
- **Financial Incentives & Policy Support:** Green financing, tax benefits, and viability gap funding (VGF).
- **Awareness & Market Promotion:** Industry campaigns on long-term cost savings and benefits.
- **Electric Boats & Ferries:** Viability through incentives and infrastructure support.

Green fuels are central to the Indian maritime sector's decarbonisation strategy. Hydrogen and its derivatives, such as ammonia and methanol, are promising alternatives due to their scalability and potential to reduce carbon footprints. However, their adoption faces challenges, including high production costs, fuel stability, safety issues, and the need for global bunkering infrastructure.

Financial Strategy for the Decarbonisation of Indian Shipping Fleet

India's maritime decarbonisation aligns with the IMO's 2023 GHG Strategy and national climate goals. As the sector moves towards sustainability, a strong financial strategy is essential. This includes innovative funding models, global partnerships, and focussed investments to drive public-private collaboration, R&D, and infrastructure upgrades for a low-carbon maritime future. Some of the relevant recommendations outlined in the '*Future Fuel Strategy for Maritime India*', pertaining to decarbonisation of India's shipping fleet are listed below.

National Green Maritime Fund: A dedicated Green Maritime Fund with an initial ₹50,000 crore—sourced through green bonds, public contributions, and carbon pricing—can de-risk investments and attract private capital, enabling large-scale adoption of green technologies and infrastructure.

Strengthening Multilateral and Bilateral Partnerships: Collaborating with institutions like ADB, World Bank, JICA, and the Danish Maritime Authority will secure concessional finance, foster tech transfer, and support pilot projects essential for decarbonisation.

Incentive-Based Mechanisms: To drive private investment, India should offer tax holidays, accelerated depreciation, and port fee discounts for emission-compliant vessels, incentivizing early adoption of sustainable practices.

Developing a Comprehensive R&D Framework: Creating a ₹10,000 crore Green Maritime Innovation Fund will support R&D in green fuels, vessel design, and renewable technologies, with partnerships through programs like Horizon Europe and IMO's Maritime Research Fund.

Creating Infrastructure for Alternative Fuels: Developing bunkering and storage for fuels like hydrogen and ammonia at key ports (e.g., JNPT, Chennai) and leveraging international finance (GCF, EIB) will build the foundation for green fuel supply chains.

Building Capacity and Training the Workforce: Government-funded green maritime training centres (₹4,000 crore) and specialised curricula will prepare the workforce to manage new technologies and support a just transition.

Equitable Revenue Redistribution from IMO Mechanisms: India should push for a fair share of revenues from IMO Market-Based Measures to support infrastructure and capacity-building in developing nations, aligning global actions with national priorities.

Strategic Opportunities for India

The path to decarbonisation of India's maritime sector, apart from the several challenges that have been listed above, also presents India with several opportunities. These are discussed below.

Green Shipping Corridors: India is already involved in Green Shipping Corridors with other nations like the UAE and Singapore. This initiative will help India become a leader in the adoption of green fuels and sustainable shipping practices³⁷.

Shipbuilding and Technology Development: The IMO agreement provides an opportunity for India's shipbuilding industry to innovate and develop technologies for low-emission ships. India can also capitalise on the increasing demand for green technologies by significantly enhancing investment in research and development.

International Leadership: India's strong diplomatic position in the IMO negotiations will allow it to shape global maritime policy in a

37 [Union Minister Sarbananda Sonowal joins Global Maritime Leaders at Singapore Maritime Week, PIB, 25 March 2025](#)

way that supports its development goals. India's push for equity and fair transition mechanisms will ensure that the voices of developing countries are heard in global maritime governance.

Conclusion

The shipping industry's contribution to global emissions is substantial, and the April 2025 IMO agreement represents a critical step in mitigating these impacts. The effectiveness of its implementation will depend on the commitment and cooperation of all major shipping nations. However, the absence of United States, which has walked out of the agreement and challenged the enforcement against their flagged vessels by any member/port state will be a major factor despite only 6 percent of world's tonnage under their control.

While India faces challenges in aligning its fleet and infrastructure with the agreement's targets, it also stands to gain significantly from this transition. The country's active participation in the IMO and its strategic alignment with the Global South will shape the future of sustainable shipping. With proper investments in technology, infrastructure, and international partnerships, India can transform these challenges into a leadership opportunity in the green maritime economy.

About the Author



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Anurag Bisen is a veteran submariner of the Indian Navy with over 35 years of service, including the command of Sindhughosh (Kilo) Class missile submarine. Captain Bisen tenanted an 8-year tenure in the National Security Council Secretariat where as a Senior Defence Specialist he worked on a range of maritime subjects including maritime boundary and international maritime law matters, Indo-Pacific, Indian Ocean Region, Maritime and Coastal Security and Polar Issues. He was instrumental in drafting and coordinating the approval process of India's Arctic Policy, released by the Government in March 2022. Captain Anurag Bisen is a graduate of Defence Services Staff College Wellington, holding master's degrees in Defence & Strategic Studies and Telecommunication & Electronic Warfare. He is also a Bachelor of Laws (LLB) and a diploma in Russian Language from Arkhangelsk State University, Russia. Captain Bisen is currently pursuing his PhD in National Security Studies from Jawaharlal University, New Delhi. Anurag has been nominated as a permanent expert on the panel of the International Expert Group of the Lomonosov Moscow State University Marine Research Centre, Russia. He is Honorary Adjunct Faculty at the National Maritime Foundation, New Delhi as well as a Senior Advisor to the Arctic Program, Institute for Governance & Sustainable Development. Before joining VIF as a Senior Fellow, Captain Bisen was a Research Fellow at the Manohar Parrikar Institute for Defence Studies and Analyses. He has authored several papers including the recently published (2025) co-authored book '*Evolution of India's Polar Policies*'.

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