

DOSTAS 2026

International Maritime Seminar

5th August | Kochi



Directorate General of Maritime Administration

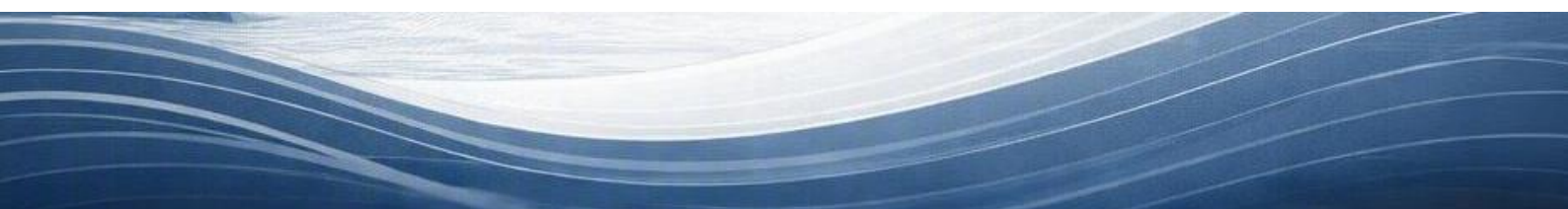
Contents

1. Present Geopolitical Situation	6
1.1. Maritime Security Environment and the Strait of Hormuz Crisis	6
1.2. Crude Oil	10
1.3. Liquefied Petroleum Gas (LPG)	13
1.4. Fertilizers	14
2. MIV-2030 & MAKV 2047 Vision	17
2.1. Maritime India Vision (MIV) 2030	17
2.2. Maritime Amrit Kaal Vision (MAKV) 2047	18
3. Indian Maritime Law – Complete Transformation	19
4. Ship Building and Repairs	37
4.1. Introduction	37
4.2. The Global Shipbuilding Market: Demand Context.....	38
4.3. India's Policy Architecture for Shipbuilding	45
4.4. Pillar 1: Shipbuilding Financial Assistance Scheme	48
4.5. Pillar 2: Maritime Development Fund.....	53
4.6. Pillar 3: Shipbuilding Development Scheme.....	55
4.7. Demand Aggregation.....	68
4.8. Ship Component Manufacturing	71
4.9. Container Manufacturing Promotion Scheme	77
4.10. Conclusion	79
5. Human Element	80
5.1. Just Transition in Maritime	81
5.2. Abandonment Scenario in India	83
5.3. Key interventions taken by DG Shipping.....	85
5.4. Towards Stronger social security for seafarers.....	89
5.5. Towards stronger welfare for seafarers	91
5.6. Steps are being taken by the DG Shipping for the welfare of seafarers	93
5.7. Seafarer welfare infrastructure - SWBAT	95
5.8. Ensuring zero tolerance for corruption in crewing	97
6. Maritime Training and Ecosystem	100

6.1.	Maritime Training Institutes Infrastructure in India	100
6.2.	Training Ecosystem	101
6.3.	Examination Reforms	102
6.4.	Creating Training Berths Initiative	102
6.5.	Sagar Mein Samman	103
6.6.	Sagar Mein Yog	103
6.7.	Mission 20%	103
6.8.	MTI Module	104
6.9.	Training Ecosystem	104
6.10.	Learning Management System (LMS)	104
6.11.	Faculty Development Programme (FDP)	104
6.12.	Digital Training and Assessment Record (Digital TAR)	105
6.13.	Centralized Attendance System (CAS 2.0)	105
6.14.	Web-Based Simulator	105
6.15.	Online Maritime Certificate Validation (OMCV)	105
6.16.	AR/VR/Mixed Reality Training	106
6.17.	Integrated Ecosystem Architecture	106
6.18.	Current Status	106
6.19.	Expected Outcome	106
7.	Age Norms	113
8.	Maritime Casualty	116
9.	Taxation Disadvantageous to Indian Flag	123
10.	Digitalisation	127
10.1.	E-Samudra	127
10.2.	E-Navik	129
10.3.	Maritime Single Window	131
10.4.	Shipbuilding scheme portal	133
10.5.	Comprehensive shipbuilding portal	135
11.	DGS to DGMA Transition	138
11.1.	Key Functional Domains of DGMA	139
11.2.	Strategic Outcomes	140
11.3.	Why This Transformation Matters	142

12.	International Cooperation	145
13.	Green Transition	154
13.1.	Imperative for Maritime Energy Transition	154
13.2.	India as a Net Green Energy Exporter & Bunkering Destination	156
13.3.	Green Maritime Corridors	157
13.4.	Study on Potential Demand and Pricing of Alternative Marine Fuels in India	158
13.5.	Green Corridor Pre-Feasibility Study under the Indo-Danish Centre of Excellence	160
13.6.	Green Ports	163
13.7.	Sustainable Indicators Framework for Indian Ports	170
13.8.	GHG Emission Scopes	172
13.9.	National Port Sustainability Council (NPSC) – Proposed	174
13.10.	Harit Sagar – Green Port Guidelines	179
13.11.	Green Tug Transition Program (GTP)	184
13.12.	Sagar Aankalan - National Benchmarking Guidelines for Mapping Logistics Performance of Indian Ports	188
13.13.	Integrated Vessel Traffic Management System (iVTMS)	195
13.14.	Just-in-Time Arrival and Digital Twin for Ports	197
13.15.	Digital Twin Pilot – VOCPA Tuticorin	199
13.16.	Shore-to-Ship Power (SPS) – Decarbonising Emissions at Berth	200
13.17.	Swachh Sagar Portal	203
13.18.	Just Transition in Maritime	204
13.19.	IMO Led Projects	207
14.	Coastal State Workshops	211
15.	Coastal Cargo Promotion Scheme	214
15.1.	Overview	215
15.2.	Incentive Structure	216
15.3.	Key Features of the Incentive Framework	218
15.4.	Expected Impact of the Coastal Cargo Promotion Scheme	218
15.5.	Incentive Design of the Coastal Cargo Promotion Scheme	219
15.6.	Incentive Mechanism under the Coastal Cargo Promotion Scheme	221

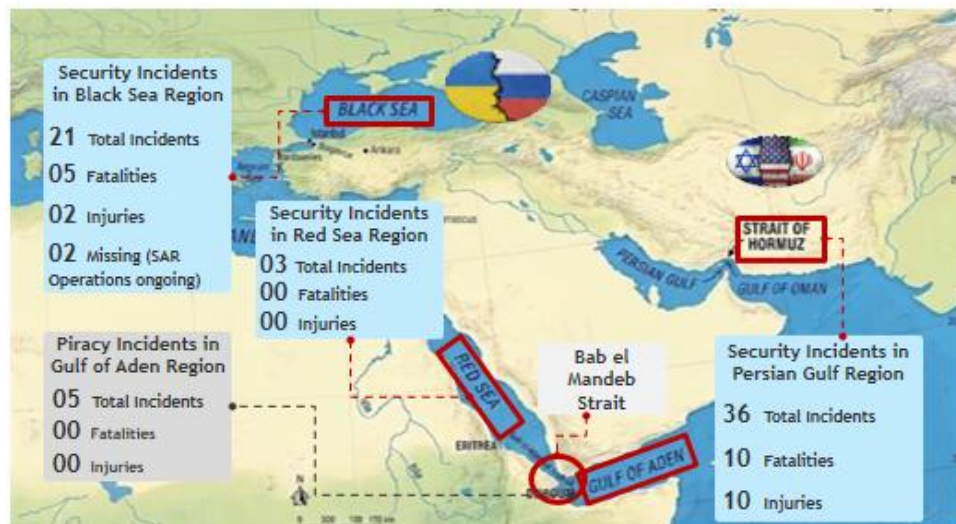
15.7.	Institutional Framework and Implementation Mechanism	224
16.	Offshore and Way Ahead	226
16.1.	Development of Indian Offshore Competency Standards	226
17.	Ship Recycling	229
17.1.	Ship Recycling.....	229
17.2.	Hong Kong Convention (HKC)	231
17.3.	ISO Standards for Ship Recycling.....	233
17.4.	Green Steel.....	234
18.	Security	236
18.1.	BoPS and ISPS Effective Implementation:	236
18.2.	Functions of BoPS:	238
18.1.	Indian Maritime Compliance Code (IMCC)	239
19.	Concluding Remarks	241
19.1.	Safety, Welfare and the Human Element	241
19.2.	Institutional and Digital Modernisation.....	241
19.3.	Economic Competitiveness and Maritime Growth	242
19.4.	Global Standing, Sustainability and Strategic Resilience	242
19.5.	Charting the Way Ahead.....	243
19.6.	Conclusion	243
		245



1. Present Geopolitical Situation

1.1. Maritime Security Environment and the Strait of Hormuz Crisis

Maritime Security Incidents Across Key High-Risk Regions-2026



3

Introduction

The global maritime domain witnessed a significant deterioration in security conditions during 2026, driven by escalating geopolitical tensions, regional conflicts, sanctions enforcement actions, and increasing threats to commercial shipping. The convergence of military activity in the Middle East, disruptions to energy supply chains, attacks on merchant vessels, and heightened naval deployments transformed several key maritime corridors into areas of elevated operational risk.

For India, a nation whose economic growth, energy security and international trade are deeply dependent on maritime connectivity, these developments assumed particular significance. More than 95% of India's trade by volume and approximately 70% by value is carried through maritime transport. Furthermore, India's dependence on imported crude oil, LPG, fertilizers and other critical commodities makes the uninterrupted functioning of international shipping routes essential to national economic stability.

Against this backdrop, the Strait of Hormuz crisis emerged as one of the most consequential geopolitical developments impacting global maritime trade during 2026. However, the crisis cannot be viewed in isolation. It formed part of a broader deterioration in maritime security across several interconnected regions, including the Persian Gulf, Gulf of Aden, Red Sea and Black Sea. Together, these developments created a complex

risk environment affecting shipping routes, commodity flows, insurance markets and global supply chains.

Emerging Maritime Security Risks Across Key Global Chokepoints

The maritime security landscape during 2026 was characterised by an increase in incidents across multiple strategic waterways. The Persian Gulf emerged as the most affected region, recording the highest number of maritime security incidents. A total of 36 reported incidents resulted in multiple fatalities and injuries, highlighting the growing vulnerability of commercial shipping operating in and around the Gulf region. The concentration of attacks in this area is particularly significant because of its role as the primary gateway for global crude oil exports originating from the Middle East.

The Red Sea, while witnessing fewer incidents in absolute terms, continued to remain an area of concern due to its strategic location along one of the world's busiest maritime corridors. The region connects the Indian Ocean with the Mediterranean Sea through the Suez Canal and serves as a critical transit route for trade between Asia and Europe. Continued instability in the region increased uncertainty for shipowners and cargo operators, contributing to elevated insurance costs and route diversions.

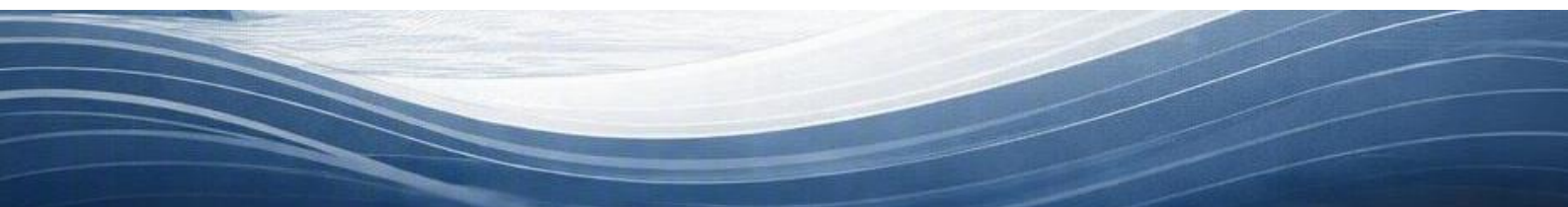
Similarly, the Gulf of Aden continued to experience security incidents associated with piracy threats and maritime instability. Although the number of incidents remained lower than historical peaks, the region continues to represent a persistent security concern due to its proximity to major international shipping lanes.

The Black Sea represented another significant source of maritime risk. The ongoing conflict between Russia and Ukraine led to continued disruptions in shipping activities, attacks on maritime infrastructure and increased operational uncertainty for vessels operating in the region. Security incidents in the Black Sea also had indirect implications for global commodity markets, particularly for crude oil, fertilizers and grain exports originating from the region.

Collectively, these developments demonstrate that maritime security challenges during 2026 were not confined to a single geography but instead reflected a broader pattern of geopolitical instability affecting global shipping networks.

The Strategic Importance of the Strait of Hormuz

Among all maritime chokepoints, the Strait of Hormuz occupies a uniquely critical position within the global energy system. Situated between the Persian Gulf and the Gulf of Oman, the Strait serves as the primary maritime outlet for several of the world's largest oil and gas exporters, including Saudi Arabia, Iraq, Kuwait, Qatar, Bahrain and the United Arab Emirates.



Approximately one-fifth of global crude oil trade and a significant share of global LNG exports transit through this narrow waterway. Consequently, any disruption in the Strait immediately affects global energy markets, shipping costs and supply chain stability.

For India, the significance of the Strait is even greater. Historically, a substantial proportion of India's crude oil imports, LPG supplies and petrochemical feedstocks have originated from producers located within the Gulf region. As a result, developments affecting the security of the Strait have direct implications for India's energy security and economic performance.

The escalation of tensions in the Middle East during 2026 therefore generated significant concern among policymakers, refiners, shipping companies and commodity traders. Market participants feared that prolonged disruptions could constrain supply availability, increase transportation costs and trigger sharp increases in global energy prices.

Impact of Geopolitical Conflict on Maritime Trade

The deterioration in regional security conditions had immediate consequences for commercial shipping operations. Military exchanges, attacks on maritime assets, threats to navigation and growing uncertainty regarding the safety of commercial vessels forced shipping companies to reassess operating practices across the region.

Shipowners increasingly sought to minimise exposure to high-risk areas by altering voyage plans, rerouting vessels and implementing additional security measures. These adjustments, while necessary from a risk management perspective, significantly increased voyage durations, fuel consumption and operating costs.

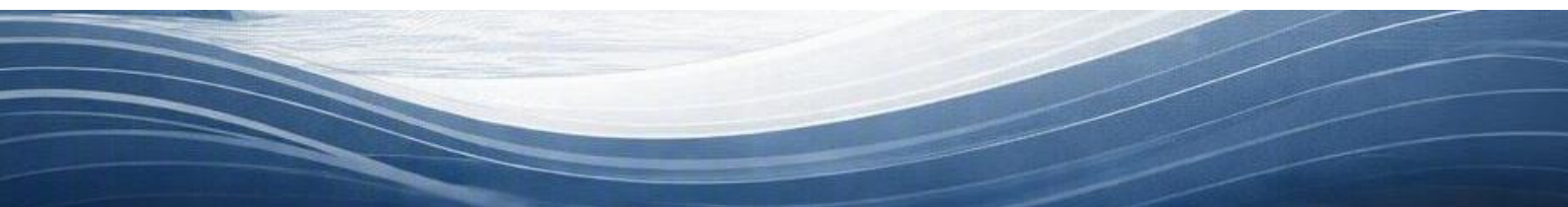
Insurance providers responded by imposing higher war-risk premiums for vessels operating in affected regions. In several cases, additional security-related charges were introduced to compensate for elevated operational risks. These increased costs were ultimately passed through global supply chains, affecting commodity prices and transportation expenses.

The cumulative impact was a significant increase in the cost of maritime trade, particularly for energy commodities heavily dependent on Gulf shipping routes.

The Maritime Dimension of Energy Security

The Strait of Hormuz crisis highlighted the increasingly interconnected nature of maritime security and energy security. While commodity markets often focus on production and supply availability, the events of 2026 demonstrated that transportation corridors are equally important components of energy resilience.

Even when production capacity remains intact, disruptions to shipping routes can significantly affect market stability. Concerns regarding the safe passage of vessels through the Strait contributed to sharp fluctuations in crude oil prices, increased freight rates and growing uncertainty across energy markets.



For major importing nations such as India, ensuring energy security therefore requires not only access to diverse suppliers but also access to secure and reliable maritime transportation routes. The crisis reinforced the importance of developing procurement strategies that incorporate both supplier diversification and route diversification.

India's Exposure to Maritime Security Risks

India's extensive dependence on seaborne trade creates significant exposure to developments in the international maritime environment. The country's growing economy relies heavily on uninterrupted access to imported energy, raw materials, fertilizers and industrial inputs, much of which is transported through regions affected by geopolitical instability.

The events of 2026 highlighted several structural vulnerabilities. First, a substantial share of India's energy imports continued to originate from regions directly affected by the crisis. Second, the majority of India's strategic cargo transportation remains dependent on foreign-flag shipping, limiting India's ability to directly influence transportation availability during periods of disruption.

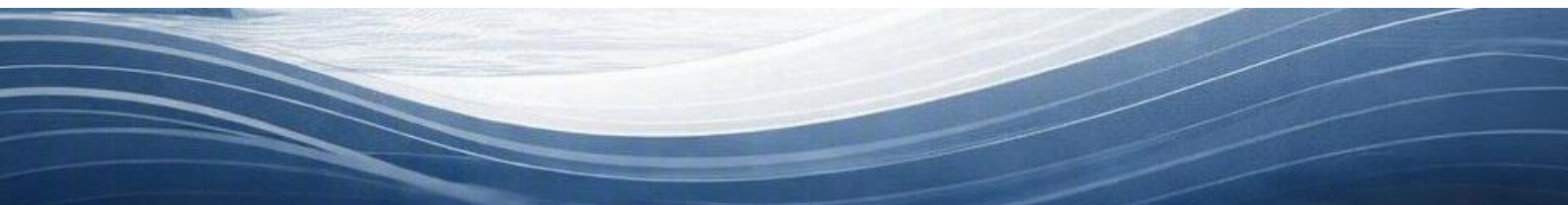
At the same time, the crisis also demonstrated the strengths of India's maritime and energy management framework. Through rapid diversification of sourcing, flexible refinery operations, proactive government intervention and the utilisation of alternative maritime corridors, India successfully maintained supply continuity despite elevated geopolitical risks.

Commodity-Specific Analysis

The maritime security environment described above provides the foundation for understanding the subsequent impacts of the Strait of Hormuz crisis on individual commodity supply chains. While the broader crisis originated from geopolitical developments in the Middle East, its consequences varied significantly across different sectors.

Crude oil markets experienced major shifts in sourcing patterns, trade routes and supplier relationships. LPG imports underwent significant restructuring as India reduced dependence on traditional Gulf suppliers and increased imports from the United States. Fertilizer supply chains faced logistical disruptions but ultimately demonstrated strong resilience through diversified procurement strategies.

The following sections examine these developments in greater detail, analysing the impact of the Strait of Hormuz crisis on crude oil, LPG and fertilizer imports, and assessing the implications for India's long-term energy security and maritime trade strategy.



1.2. Crude Oil

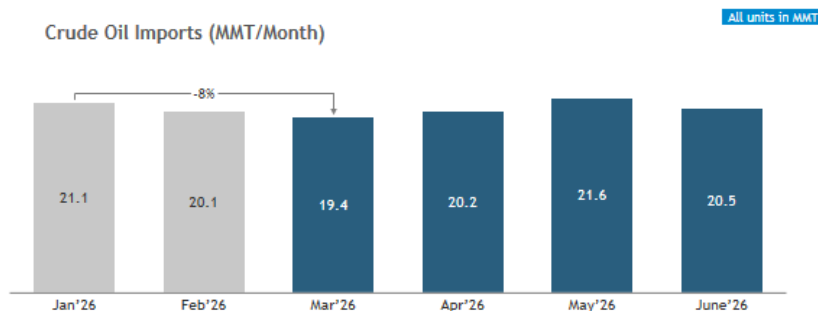
Overview

Crude oil was the most strategically significant commodity affected by the Strait of Hormuz crisis. The Strait serves as the primary gateway for exports from major Gulf producers including Saudi Arabia, Iraq, Kuwait, Qatar and the UAE, making it one of the world's most important energy chokepoints. Given India's dependence on imported crude oil for over 85% of its consumption requirements, any disruption in the region has immediate implications for energy security, inflation, trade balances and economic growth.

The escalation of geopolitical tensions during 2026 raised concerns regarding the uninterrupted flow of crude through the Gulf. Attacks on commercial shipping, military activity in the region, and fears of wider conflict led to heightened uncertainty across global oil markets. Simultaneously, sanctions enforcement against Russian crude exports created additional complexity for energy-importing countries seeking alternative supply sources.

Despite these challenges, India successfully maintained crude import volumes through rapid diversification of suppliers, effective government intervention, refinery flexibility and the utilisation of alternative maritime routes.

Alternative sourcing has helped India maintain import volumes



Source: PPAC reports, press search
Note: June figures are provisional, subject to report release by PPAC

17

India's Crude Imports Remained Stable

One of the most significant outcomes of the crisis was India's ability to maintain overall crude import volumes despite severe disruptions in traditional supply chains. Monthly imports remained broadly stable at approximately 19–22 MMT throughout the period. This stability reflected the increasing sophistication of India's energy procurement strategy and the ability of domestic refiners to adapt quickly to changing market conditions.

Alternative sourcing arrangements successfully compensated for reduced Gulf-origin imports. Indian refiners diversified procurement towards Russia, Latin America, North America and Africa, thereby preventing any significant disruption to refinery operations or domestic fuel availability.

The experience demonstrates that India's energy ecosystem has become increasingly resilient, with multiple sourcing options available to offset geopolitical shocks affecting any individual region.

Transformation of India's Crude Basket

The crisis accelerated a structural shift in India's crude sourcing pattern. Prior to the crisis, the Middle East accounted for approximately 50–60% of India's crude imports. However, disruptions in Gulf trade prompted refiners to aggressively diversify procurement.

The share of Middle Eastern crude declined sharply and was increasingly replaced by Russian, Latin American and Atlantic Basin supplies. This marked one of the most significant changes in India's import structure in recent years and reduced the country's dependence on a single geographic region. The diversification strategy not only improved supply resilience during the crisis but also laid the foundation for a more balanced and geographically diversified import portfolio in the future.

Russia Became the Primary Alternative Supplier

Russian crude emerged as the principal replacement for disrupted Gulf supplies. The share of Russian crude in India's import basket increased from approximately 23% at the beginning of 2022 to nearly 44% during the peak of the crisis.

Several factors contributed to this transition. Russian crude remained available at substantial discounts relative to international benchmarks, making it economically attractive for Indian refiners. In addition, Russian grades were compatible with existing refinery configurations and could be integrated into procurement strategies without significant operational adjustments.

The increased availability of discounted Russian crude enabled India to maintain refinery throughput, moderate fuel price pressures and avoid supply shortages during a period of heightened market uncertainty.

Risks Associated with Russian Dependence

While Russian crude played a critical role in maintaining supply security, increasing dependence on a single supplier created new vulnerabilities. During the latter stages of the crisis, sanctions enforcement against Russian energy exports intensified. Ukrainian attacks on energy infrastructure and growing scrutiny of the shadow tanker fleet increased concerns regarding the long-term reliability of Russian supplies.

Western governments expanded restrictions on vessels involved in sanctioned trade, while insurers and financial institutions imposed stricter compliance requirements. These developments increased freight costs, insurance premiums and operational risks associated with Russian crude transportation.

The episode highlighted the importance of avoiding excessive dependence on any single supplier and reinforced the need for continued diversification.

Alternative Suppliers Beyond Russia

To strengthen supply security, India increasingly explored opportunities with Atlantic Basin producers.

Brazil emerged as a reliable and scalable source of crude oil. Supported by growing pre-salt production, Brazil offers stable export volumes, commercially attractive terms and minimal geopolitical risk. Brazilian crude is well suited to Indian refineries and provides a dependable long-term diversification option.

Venezuela gained importance due to discounted heavy crude supplies and improving export availability following partial sanctions relief. Indian refiners are particularly well positioned to process Venezuelan grades. However, political uncertainty and sanctions-related risks continue to limit its long-term reliability.

Canada represents a strategically important future source. The expansion of the Trans Mountain Pipeline has opened new export opportunities to Asian markets. Canadian heavy crude aligns well with India's refinery configuration and offers supply from a politically stable jurisdiction, although logistical constraints continue to limit volumes.

Changing Maritime Trade Routes

The crisis significantly altered maritime trade patterns. Historically, Gulf-origin crude entered India primarily through the Strait of Hormuz. However, security concerns and supply disruptions reduced the importance of this corridor.

Russian crude increasingly reached India through the Red Sea route, making the Red Sea the principal shock absorber during the crisis. Simultaneously, imports from Brazil, Venezuela, Canada, the United States and Africa increasingly utilised the Cape of Good Hope route.

This diversification of maritime routes reduced India's dependence on any single chokepoint and highlighted the importance of route flexibility in ensuring energy security.

Impact on Oil Prices

Global oil markets reacted sharply to developments in the Middle East. Brent crude prices surged above USD 110 per barrel as traders priced in the possibility of major supply disruptions. The increase reflected both actual supply concerns and a substantial geopolitical risk premium.

As tensions eased and fears of prolonged disruptions subsided, prices gradually retreated to approximately USD 80 per barrel. The episode demonstrated the continued sensitivity of global energy markets to geopolitical developments in the Gulf region.

Key Takeaways

The crude oil segment demonstrated both India's strengths and vulnerabilities. Effective diversification, refinery flexibility and proactive government intervention enabled India to maintain supply security despite severe disruptions. At the same time, the crisis exposed risks associated with maritime chokepoints, foreign-flag shipping dependence and excessive concentration of imports from individual suppliers.

The experience is likely to accelerate efforts to diversify crude sourcing, strengthen strategic petroleum reserves and enhance India's maritime resilience.



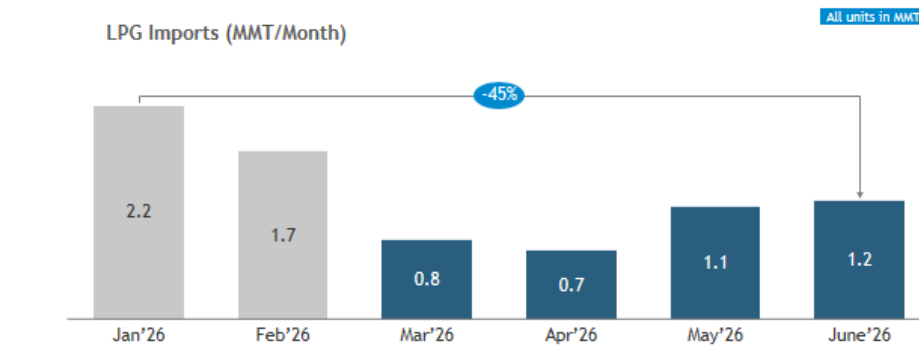
1.3. Liquefied Petroleum Gas (LPG)

Overview

LPG represents a critical component of India's energy basket, supporting household consumption, industrial operations and commercial activities across the country. India remains heavily dependent on imported LPG, with a significant proportion historically sourced from Gulf producers such as Qatar, UAE and Saudi Arabia.

The Strait of Hormuz crisis therefore had important implications for LPG supply security. Disruptions to Gulf trade routes, combined with regional instability and shipping constraints, significantly altered India's LPG sourcing patterns during 2026.

LPG imports remain ~50% below pre-war levels



Source: PPAC reports, press search
Note: June figures are provisional, subject to report release by PPAC

27

Decline in LPG Imports

The immediate impact of the crisis was a sharp reduction in LPG import volumes. Monthly imports declined by approximately 50%, falling from around 2.2 MMT in January 2026 to approximately 1.0–1.2 MMT during the peak disruption period.

The decline reflected both logistical challenges and reduced availability of Gulf-origin LPG cargoes. Given India's dependence on LPG imports, this created concerns regarding supply adequacy and price stability.

Shift Away from Gulf Suppliers

Historically, Gulf producers have dominated India's LPG import basket. However, the crisis significantly reduced supplies from traditional exporters such as UAE and Qatar.

The disruption highlighted the risks associated with concentrated sourcing and accelerated efforts to identify alternative suppliers capable of ensuring uninterrupted supply.

Emergence of the United States

The most significant development in the LPG market was the emergence of the United States as India's fastest-growing LPG supplier.

Supported by abundant shale gas production and rapidly expanding export infrastructure, U.S. LPG exports to India increased substantially during the crisis. Imports from the United States more than doubled within a short period, helping compensate for reduced Gulf volumes.

Long-Term Strategic Partnership

A major milestone was the signing of India's first structured long-term LPG supply agreement with a U.S. supplier. The agreement covers approximately 2.2 MMT annually and is expected to account for nearly 10% of India's LPG imports.

The agreement represents a strategic shift towards long-term contractual arrangements that provide greater supply certainty and reduce dependence on volatile spot markets.

Strategic Benefits of U.S. LPG

U.S. LPG offers multiple advantages, including supply reliability, transparent pricing mechanisms, deep market liquidity and limited geopolitical risk. Increased imports from the United States also strengthen broader economic and strategic ties between the two countries.

The crisis therefore accelerated a structural diversification of India's LPG procurement strategy and enhanced long-term supply resilience.

Key Takeaways

The LPG segment demonstrated the importance of supplier diversification. While import volumes initially declined sharply, rapid sourcing adjustments and the emergence of the United States as a major supplier helped stabilise the market. The crisis is likely to encourage further diversification and expansion of long-term supply agreements in the years ahead.

1.4. Fertilizers

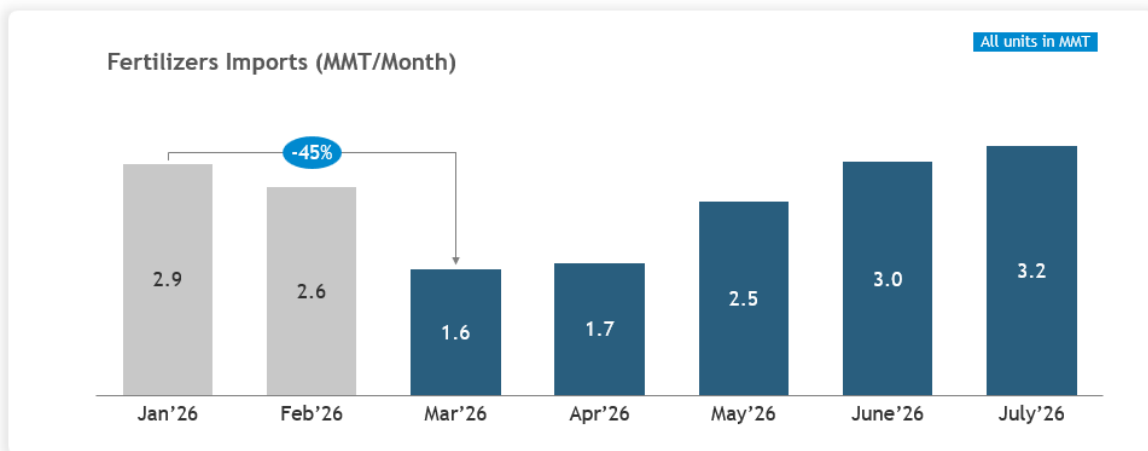
Overview

Fertilizers occupy a critical position within India's agricultural economy. Ensuring adequate fertilizer availability is essential for maintaining agricultural productivity, food security and rural livelihoods. Consequently, disruptions to fertilizer supply chains can have far-reaching economic and social implications.

The Strait of Hormuz crisis created significant challenges for fertilizer imports by disrupting shipping routes, increasing freight costs and affecting supply availability from key producing regions.



Fertilizers import fell by 45% post war, but have increased to 3+ MMT recently to stock up for Kharif season



Source: PPAC reports, press search
Note: June figures are provisional, subject to report release by PPAC

31

Immediate Impact on Imports

Following the onset of the crisis, fertilizer imports declined sharply. Monthly imports fell by approximately 45%, reflecting reduced cargo availability, longer shipping routes and increased logistical uncertainty.

The timing of these disruptions coincided with preparations for the Kharif season, raising concerns regarding input availability for farmers and potential impacts on agricultural output.

Recovery Through Diversification

India responded proactively by diversifying procurement across multiple regions. Increased imports from Russia, China, North Africa and alternative Middle Eastern suppliers helped offset disruptions associated with traditional trade routes.

As a result, fertilizer imports recovered steadily from approximately 1.6 MMT during the peak disruption period to over 3 MMT by mid-2026.

The rapid recovery demonstrates the effectiveness of India's diversified procurement network and the ability of policymakers to secure critical agricultural inputs during periods of uncertainty.

Changing Source Composition

The crisis altered the composition of fertilizer imports. Supplies from traditional Middle Eastern producers declined, while imports from Russia, China and North African countries increased significantly.

This diversification reduced dependence on any single supplier and improved resilience against future disruptions affecting individual regions.

Logistics and Freight Challenges

Although physical supply recovered, transportation costs increased substantially. Cargo diversions away from traditional routes, longer voyage distances and elevated war-risk premiums raised logistics costs across the fertilizer supply chain.

These factors increased the landed cost of fertilizer imports and created additional fiscal pressures, particularly given the importance of fertilizer subsidies within India's agricultural support framework.

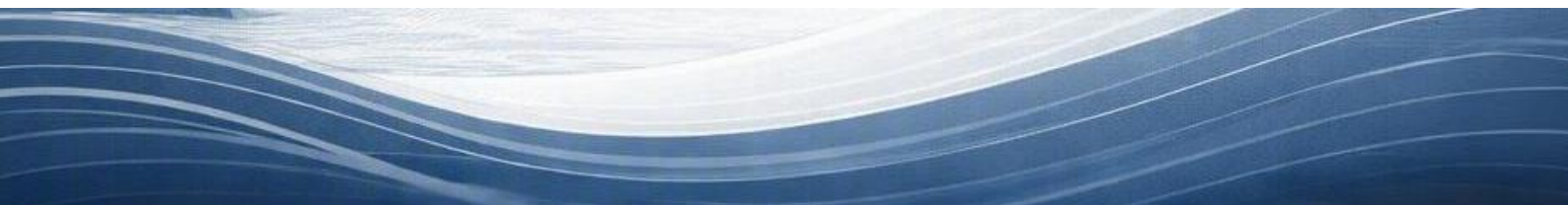
Strategic Lessons

The fertilizer segment demonstrated that supply diversification can effectively mitigate disruptions even during major geopolitical crises. However, it also highlighted the vulnerability of agricultural supply chains to maritime disruptions and freight market volatility.

Maintaining diversified supplier relationships, strengthening logistics planning and ensuring adequate inventory buffers will remain critical to safeguarding India's agricultural security.

Key Takeaways

Despite an initial decline in imports, India successfully restored fertilizer supplies through diversification and proactive procurement. The crisis reinforced the importance of resilient supply chains, diversified sourcing and effective government intervention in protecting agricultural and food security during periods of geopolitical uncertainty.



2.MIV-2030 & MAKV 2047 Vision

India's Maritime Vision - (MIV 2030 & MAKV 2047)

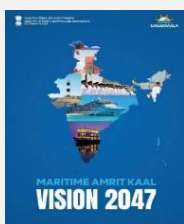


MARITIME INDIA VISION 2030



Maritime India Vision (MIV) 2030

- Position India Globally in the Top 10 Shipbuilding & repair nations (from 30k GT to 500k + GT).
- Increase the share of renewable energy at Major Ports to >60%
- Promote Waste to Wealth through ship recycling & take India from #2 to #1 in ship recycling.
- Grow India's global seafarer share from ~12% to >20% by 2030
- Achieve global-benchmark port efficiency with average vessel turnaround time <20 hours and container dwell time <40 hours at all Major Ports.



Maritime Amrit Kaal Vision 2047

- Position India among the Top 5 global shipbuilding & repair nations, while sustaining the #1 global ranking in ship recycling.
- Transition all Major Ports to carbon-neutral, future-ready ports, anchored in green fuels, electrification, shore power and digital emissions monitoring.
- Make India a global hub for green bunkering and alternate fuels, with LNG, hydrogen and ammonia infrastructure across key ports.
- Institutionalize green shipping through incentives, including port-duty differentiation and 20-30% financial support for green and retrofitted vessels.
- Deliver long-term maritime leadership through 300+ strategic initiatives across 11 focus areas, aligned with global sustainability and trade growth.

3

India's maritime transformation journey is guided by two interconnected strategic frameworks: Maritime India Vision (MIV) 2030 and Maritime Amrit Kaal Vision (MAKV) 2047. Together, these visions provide a comprehensive roadmap for positioning India as a leading global maritime nation by enhancing port infrastructure, shipping, shipbuilding, maritime manpower, sustainability, and technology-driven governance. MIV 2030 serves as the medium-term blueprint with over 150 initiatives aimed at accelerating growth, improving efficiency, and strengthening India's maritime competitiveness, while MAKV 2047 builds upon this foundation through more than 300 strategic initiatives across 11 focus areas aligned with the national aspiration of *Viksit Bharat 2047*.

2.1. Maritime India Vision (MIV) 2030

MIV 2030 seeks to transform India into a globally competitive maritime power by improving operational efficiency, increasing domestic manufacturing capability, and promoting sustainable growth. A key objective is to position India among the top 10 shipbuilding and ship repair nations, increasing annual production capacity from approximately 30,000 GT to over 500,000 GT. The vision also aims to strengthen India's leadership in ship recycling by enabling the country to move from the world's second-largest ship recycling destination to the leading position globally.

The vision emphasizes development of a future-ready maritime workforce. India currently contributes approximately 12% of the global seafaring workforce, and MIV 2030 targets increasing this share to more than 20% by 2030, supported by expanded maritime

training capacity, enhanced employability, digital certification, welfare initiatives, and greater participation of women seafarers

Sustainability is another key pillar of MIV 2030. The vision aims to increase the share of renewable energy at major ports to over 60%, promote circular economy principles through environmentally compliant ship recycling, and achieve globally benchmarked operational efficiency, including average vessel turnaround times below 20 hours and container dwell times below 40 hours. These initiatives contribute directly to reducing logistics costs and improving India's competitiveness in global trade.

2.2. Maritime Amrit Kaal Vision (MAKV) 2047

Building on MIV 2030, MAKV 2047 represents India's long-term maritime strategy for achieving global leadership by the centenary of independence. The vision aims to position India among the top five shipbuilding and repair nations globally, while maintaining the country's leadership in ship recycling. It seeks to create a resilient maritime ecosystem that supports economic growth, energy security, supply chain resilience, and the Blue Economy.

A defining feature of MAKV 2047 is its strong emphasis on sustainability and decarbonization. The vision envisages all major ports becoming carbon-neutral, future-ready ports, supported by renewable power, shore electricity, green fuels, digital emissions monitoring, and low-carbon maritime infrastructure. India is also expected to emerge as a global hub for green bunkering and alternate fuels, including LNG, hydrogen, ammonia, methanol and other next-generation fuels. Financial incentives and targeted support for green and retrofitted vessels will accelerate the transition toward environmentally sustainable shipping.

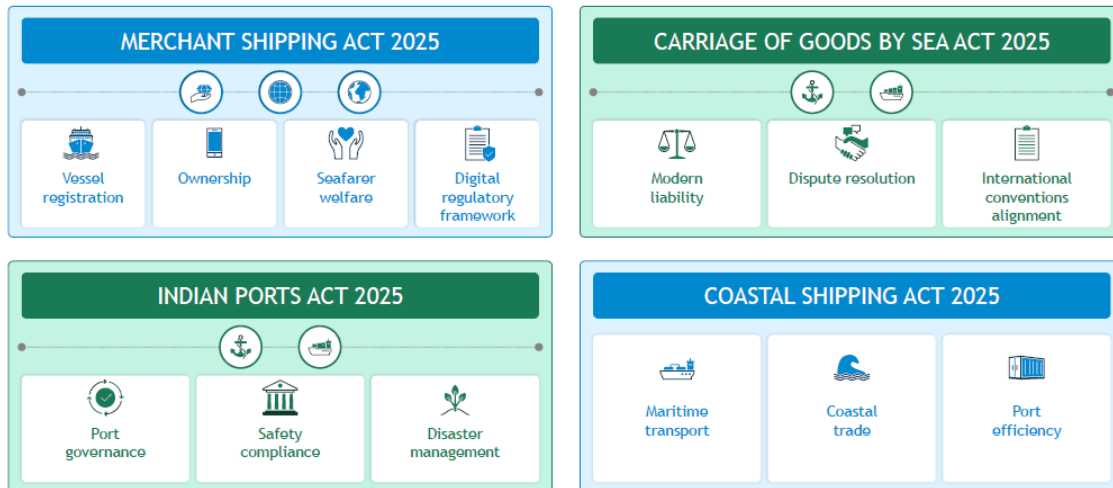
The MAKV 2047 framework encompasses 11 strategic themes, including green shipping, shipbuilding and repair, maritime clusters, coastal shipping, inland waterways, education and research, maritime professional services, technology and innovation, global maritime presence, next-generation ports, and enhancement of Indian tonnage. Through these initiatives, India seeks to establish itself as a globally respected maritime hub characterized by innovation, sustainability, efficiency, and strategic leadership.

Together, MIV 2030 and MAKV 2047 provide a phased roadmap for transforming India's maritime sector into a globally competitive, technologically advanced, environmentally sustainable, and growth-oriented ecosystem that supports national development, trade expansion, employment generation, and the vision of Viksit Bharat 2047



3. Indian Maritime Law – Complete Transformation

Indian Maritime Law - Complete Transformation



India's maritime legal framework is undergoing a comprehensive transformation through the introduction of four cornerstone legislations, namely the Merchant Shipping Act, 2025, the Carriage of Goods by Sea Act, 2025, the Indian Ports Act, 2025 and the Coastal Shipping Act, 2025. Together, these legislations seek to replace legacy provisions with a modern regulatory architecture capable of supporting India's growing maritime ambitions while addressing contemporary requirements relating to safety, trade facilitation, environmental protection, technological advancement and ease of doing business. The reform package has been designed to establish a harmonised legal ecosystem that aligns domestic maritime governance with international best practices and supports the objectives of Maritime India Vision 2030 and Maritime Amrit Kaal Vision 2047.

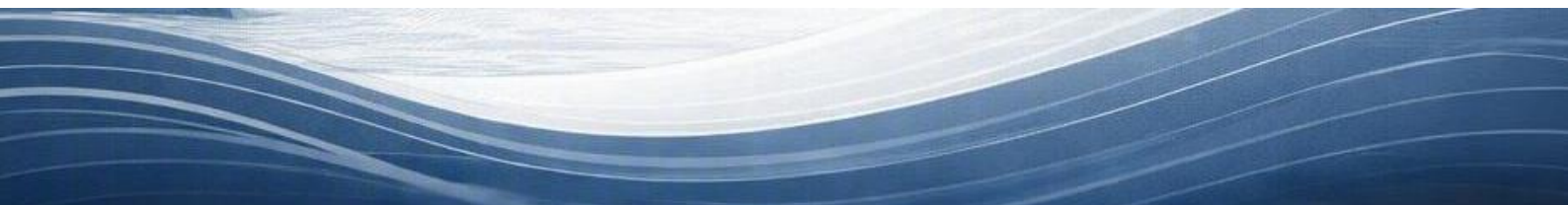
The Merchant Shipping Act, 2025 constitutes the primary legislative framework governing shipping administration in India. The Act provides a modern legal basis for vessel registration, ownership, flag administration, seafarer welfare, safety oversight and regulatory governance. The legislation incorporates contemporary maritime practices and supports the transition towards a digital-first regulatory environment by enabling electronic certification, online service delivery, digital record management and technology-enabled compliance mechanisms. The Act further strengthens India's ability as a flag State by modernising registration procedures, improving oversight mechanisms and providing a regulatory framework capable of supporting emerging maritime technologies and future shipping requirements. Simultaneously, greater emphasis has been placed on seafarer welfare and labour protections, recognising the critical role played by maritime manpower in sustaining India's position as a leading seafaring nation.

The Carriage of Goods by Sea Act, 2025 introduces a modern cargo liability and maritime commerce regime aligned with evolving international trade practices. The legislation seeks to provide greater certainty in contractual relationships between carriers, cargo owners, shippers, consignees and other stakeholders engaged in maritime trade. By establishing clearer liability provisions and strengthening dispute resolution mechanisms, the Act enhances legal predictability and reduces transactional uncertainty associated with maritime cargo movements. The alignment of domestic provisions with internationally accepted conventions further strengthens confidence among global trading partners and contributes towards creating a stable and predictable legal environment for India's growing EXIM trade.

The Indian Ports Act, 2025 modernises the legislative framework governing port administration and port-related activities. Recognising the evolving role of ports as integrated logistics and economic hubs, the Act focuses on strengthening port governance, regulatory oversight, safety management and emergency preparedness. The legislation introduces a more comprehensive framework for ensuring compliance with safety and operational standards while supporting coordinated responses to maritime incidents, environmental emergencies and disaster situations. Enhanced governance provisions are expected to improve transparency, accountability and operational efficiency across port ecosystems while ensuring that Indian ports remain resilient, secure and globally competitive.

The Coastal Shipping Act, 2025 provides a dedicated legal framework for promoting coastal cargo movement and strengthening maritime transport within the domestic economy. Coastal shipping has emerged as a critical component of India's multimodal logistics strategy owing to its potential to reduce transportation costs, improve logistics efficiency, lower carbon emissions and decongest road and rail networks. The legislation seeks to facilitate greater participation in coastal trade by providing regulatory clarity, simplifying operational requirements and creating an enabling framework for the efficient movement of cargo along India's coastline. Improved integration between ports, shipping services and coastal logistics chains is expected to enhance the attractiveness of coastal shipping as a sustainable and cost-effective mode of transportation.

Collectively, these legislative reforms represent a significant shift from fragmented and legacy maritime regulation towards an integrated and future-ready maritime governance framework. By simultaneously addressing vessel regulation, maritime commerce, port administration and coastal transportation, the reforms establish a comprehensive legal foundation for the development of a safe, efficient, technologically advanced and globally competitive maritime ecosystem. The transformation is expected to strengthen India's maritime administration, improve ease of doing business, enhance compliance with international standards and support long-term growth across shipping, ports, coastal trade and related maritime sectors.





MS Act, 2025

Section 7	Existing Position under MS Act, 1958: The Act provided for the appointment of the Director General of Shipping primarily as the regulatory authority for matters under the Act. Reform under the MS Act, 2025: DGS re-designated as the Director-General of Maritime Administration (DGMA) with an expanded statutory mandate over maritime administration and implementation of international obligations. Expected Outcome: Strengthened maritime governance and regulatory oversight and creation of modern maritime administration aligned with international best practices	Appointment of DG(MA)
Section 13	Existing Position under MS Act, 1958: No statutory framework for regulation and oversight of vessel and port security. Reform under the MS Act, 2025: Central Government empowered to establish a dedicated body for regulation and oversight of vessel and port security. Expected Outcome: A dedicated institutional framework for maritime security oversight	Vessel and Port Security
Section 14	Existing Position under MS Act, 1958: Only mechanically propelled ships required registration Reform under the MS Act, 2025: Registration extended to all seagoing vessels Expected Outcome: Better safety and regulatory oversight	Registration
Section 15(1)	Existing Position under MS Act, 1958: Vessels required to be wholly Indian-owned for the purpose of qualifying as Indian Vessel Reform under the MS Act, 2025: Central Government empowered to notify ownership threshold Expected Outcome: Greater investment and increase in Indian tonnage	Ownership of Vessel

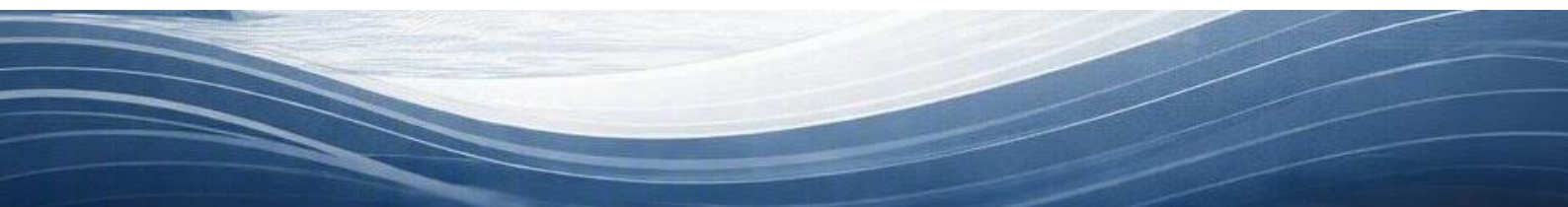
Section 7 of the Merchant Shipping Act, 2025 introduces a significant institutional reform in India's maritime governance framework by redesignating the Director General of Shipping as the Director-General of Maritime Administration (DGMA). Under the Merchant Shipping Act, 1958, the Director General of Shipping primarily functioned as the statutory authority responsible for administering matters relating to merchant shipping and implementing obligations arising under the Act. However, the rapid evolution of the maritime sector, increasing international obligations, growth of offshore activities, technological advancements, environmental responsibilities and the expanding scope of maritime governance necessitated a more comprehensive institutional structure. The new framework provides DGMA with an expanded statutory mandate encompassing broader maritime administration responsibilities, thereby enabling the authority to undertake integrated oversight of maritime development, regulatory governance, safety administration, international convention implementation and emerging maritime sectors. The reform is expected to strengthen maritime governance, improve regulatory coordination and establish a modern maritime administration aligned with international best practices and the requirements of a growing maritime economy

The Act also introduces an institutional framework for vessel and port security through Section 13. Under the previous legislative framework, there was no dedicated statutory mechanism specifically providing for a centralised regulatory and oversight structure for vessel and port security administration. The growing complexity of maritime security threats, including risks to ports, vessels, offshore facilities and associated maritime infrastructure, highlighted the need for a specialised institutional framework capable of undertaking regulatory supervision, compliance monitoring and security governance. The Merchant Shipping Act, 2025 empowers the Central Government to establish a dedicated body for regulation and oversight of vessel and port security. The provision supports the development of a more structured maritime security architecture capable

of ensuring uniform implementation of security requirements, strengthening risk management capabilities and enhancing coordination among maritime stakeholders. The expected outcome is the creation of a dedicated institutional mechanism that provides continuous oversight of maritime security matters while strengthening India's compliance with international security obligations.

A further reform is introduced under Section 14 relating to vessel registration. Under the Merchant Shipping Act, 1958, registration requirements primarily applied to mechanically propelled ships, leaving certain categories of seagoing vessels outside the scope of comprehensive registration oversight. The revised framework extends registration requirements to all seagoing vessels, thereby broadening the regulatory ambit of maritime administration. The expansion of registration coverage is intended to improve transparency within the maritime sector by establishing a more complete record of vessels operating under Indian jurisdiction. Enhanced registration requirements will support better regulatory oversight, improve safety monitoring, facilitate enforcement activities and strengthen the Government's ability to maintain accurate information regarding the national fleet. The reform also aligns registration practices with contemporary maritime administration requirements and contributes towards a safer and more accountable maritime ecosystem.

Section 15(1) addresses ownership requirements for vessel registration and introduces greater flexibility in determining ownership thresholds. Under the Merchant Shipping Act, 1958, vessels were generally required to be wholly Indian-owned in order to qualify as Indian vessels, thereby limiting opportunities for diversified investment structures and restricting participation by certain categories of investors. Recognising the need to attract greater capital into the maritime sector and support fleet expansion, the Merchant Shipping Act, 2025 empowers the Central Government to notify and prescribe ownership thresholds through a more flexible regulatory mechanism. This approach enables policy makers to respond to evolving market conditions while balancing strategic interests and maritime development objectives. The reform is expected to facilitate increased investment in shipping assets, encourage participation in vessel ownership, improve access to capital and contribute towards the growth of Indian tonnage. By providing greater flexibility in ownership structures, the provision supports the broader objective of strengthening India's presence in global shipping while creating a more attractive environment for maritime investment and fleet development.





MS Act, 2025

Section 15(1)	Existing Position under MS Act, 1958: Ownership of Indian vessels was restricted to specified categories of Indian citizens, companies and cooperative societies Reform under the MS Act, 2025: Eligibility for ownership of Indian vessels expanded to include Non-Resident Indians (NRIs), Overseas Citizens of India (OCIs), statutory bodies and such other persons or entities as may be notified by the Central Government. Expected Outcome: Broadened investment base and enhanced participation in the Indian shipping sector	Ownership of India Vessels
Section 15(6)	Existing Position under MS Act, 1958: Indian vessels could be registered only under the Indian flag and no provision existed for registration in a foreign State Reform under the MS Act, 2025: Indian vessels may be registered in a State other than India, subject to prescribed conditions. Expected Outcome: Enhanced commercial flexibility, increased Indian-controlled tonnage and improved global competitiveness of Indian shipping	Registration of India Vessels
Part III (Section 14-44) r/w draft registration rules	Existing Position under MS Act, 1958: Physical presence in India mandatory before registration Reform under the MS Act, 2025: Registration without calling at Indian port Expected Outcome: Faster and Easy Registration	Presence for Registration
Section 16	Existing Position under MS Act, 1958: BBOD registration unavailable Reform under the MS Act, 2025: BBOD registration enabled Expected Outcome: Increase in Indian Tonnage through capital light model	BBOD Registration
Section 17	Existing Position under MS Act, 1958: No framework for temporary registration of vessels imported for recycling. Reform under the MS Act, 2025: Temporary registration introduced for vessels brought to India for recycling. Expected Outcome: Promotion of India as a vessel recycling hub and better regulation of recycling of vessels in India for environmental safety	Temporary Registration

Section 15(1) of the Merchant Shipping Act, 2025 introduces a significant reform in the ownership framework applicable to Indian vessels by expanding the categories of persons and entities eligible to own and register vessels under the Indian flag. Under the Merchant Shipping Act, 1958, vessel ownership was largely restricted to Indian citizens, Indian companies and cooperative societies, thereby limiting participation from a broader range of investors and maritime stakeholders. Recognising the growing capital requirements of the shipping sector and the need to enhance India's attractiveness as a maritime jurisdiction, the new framework extends eligibility to Non-Resident Indians (NRIs), Overseas Citizens of India (OCIs), statutory bodies and such other persons or entities as may be notified by the Central Government. This reform broadens the potential investor base available to the Indian shipping sector and enables greater participation from the global Indian diaspora and institutional investors. The measure is expected to facilitate mobilisation of capital, encourage investment in shipping assets, strengthen domestic tonnage and support the long-term objective of increasing Indian ownership and control of vessels engaged in international and coastal trade.

Section 15(6) introduces a major policy innovation by permitting Indian vessels to be registered in a State other than India, subject to prescribed conditions. Under the Merchant Shipping Act, 1958, vessels qualifying as Indian vessels could only be registered under the Indian flag and no statutory mechanism existed for registration in a foreign jurisdiction while retaining Indian ownership interests. The revised framework recognises contemporary shipping business models and the global nature of fleet deployment, financing and chartering arrangements. By allowing greater flexibility in registration choices, the provision seeks to enhance the commercial competitiveness of Indian shipowners and enable them to operate more efficiently within international markets. The reform is expected to support the growth of Indian-controlled tonnage, improve access to international financing and chartering opportunities, and provide shipowners with greater flexibility in responding to market requirements while maintaining economic links with India.

Complementing these reforms, the draft vessel registration framework introduced under Part III of the Act substantially simplifies registration procedures through the removal of the mandatory requirement for physical presence in India prior to registration. Under the previous regime, registration was generally linked to a vessel's physical arrival at an Indian port, resulting in operational delays and additional compliance requirements. The new framework permits registration without the vessel necessarily calling at an Indian port, thereby introducing greater efficiency into the registration process. The measure reflects international best practices adopted by leading maritime registries where remote registration and digital documentation processes have become standard. The reform is expected to significantly improve ease of doing business, reduce administrative delays and enhance the attractiveness of the Indian registry for domestic as well as internationally operating vessels.

Section 16 introduces Bareboat Charter-cum-Demise (BBCD) registration within the statutory framework. Previously, the Merchant Shipping Act, 1958 did not provide a dedicated mechanism facilitating BBCD registration, thereby limiting the ability of Indian operators to employ internationally accepted asset-light fleet expansion models. BBCD registration is widely used across global shipping markets to allow charterers to operate vessels under a specific flag without requiring immediate ownership transfer. The introduction of a statutory BBCD registration framework provides greater flexibility to Indian shipping companies in fleet acquisition and deployment strategies while reducing capital intensity associated with vessel ownership. The reform is expected to support growth in Indian-controlled tonnage, enable more efficient utilisation of vessels and enhance competitiveness of Indian shipping companies by aligning domestic practices with global maritime financing and chartering structures.

Section 17 addresses vessel recycling by creating a dedicated framework for temporary registration of vessels imported into India for recycling purposes. Prior to this reform, there was no specific statutory provision governing temporary registration of ships brought to India solely for dismantling and recycling activities. Given India's position as one of the world's leading ship recycling destinations and the growing emphasis on environmentally sound recycling practices, the absence of a dedicated framework created operational and regulatory challenges. The new provision enables temporary registration of vessels arriving for recycling, thereby improving regulatory oversight and ensuring that recycling activities take place under a structured legal framework. The measure is expected to strengthen compliance with environmental and safety requirements, improve monitoring of vessels entering recycling facilities and support India's objective of further consolidating its position as a leading global ship recycling hub. Together, these reforms significantly modernise the vessel ownership, registration and recycling framework and contribute towards creating a more business-friendly, internationally competitive and future-ready maritime regulatory environment.



MS Act, 2025

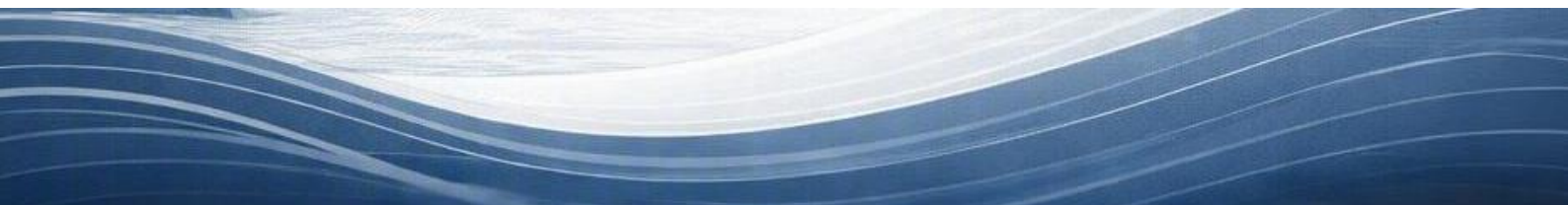
Section 47	Existing Position under MS Act, 1958: No comprehensive statutory framework for regulation, approval and oversight of Maritime Training Institutes (MTIs). Reform under the MS Act, 2025: Comprehensive statutory framework introduced empowering the DGs to regulate, approve, maritime education and training in accordance with the STCW Convention. Expected Outcome: Strengthened quality assurance of maritime education and training, ensuring globally employability Indian seafarers.	Regulation of MTIs
Section 57, 76 and 77	Existing Position under MS Act, 1958: Limited implementation of Maritime Labour Convention Reform under the MS Act, 2025: Full effect to the Maritime Labour Convention Expected Outcome: Enhanced protection of seafarers' rights and welfare in line with international standards	Implementation of MLC
Section 58	Existing Position under MS Act, 1958: The Shipping Master was empowered to hear specified disputes between seafarers and ship owners; however, the statutory framework did not provide for enforcement of such decisions as a civil court decree. Reform under the MS Act, 2025: The Shipping Master continues to adjudicate disputes between seafarers and ship owners, with decisions made enforceable as a decree of a civil court and subject to a statutory appellate mechanism. Expected Outcome: Speedy, specialised and effective dispute resolution, enhancing protection of seafarers' rights and reducing litigation	Disputes resolution
Section 92	Existing Position under MS Act, 1958: No statutory framework for arranging replacement crew on abandoned vessels where the ship owner failed to do so Reform under the MS Act, 2025: Central Government empowered to arrange replacement crew onboard abandoned Indian and foreign vessels where the ship owner fails to make such arrangements, with recovery of costs from the ship owner Expected Outcome: Protection of seafarers' welfare, continuity of safe vessel operations and compliance with the Maritime Labour Convention (MLC, 2006)	Replacement of Crew of Abandoned Vessels

Section 47 of the Merchant Shipping Act, 2025 establishes, for the first time, a comprehensive statutory framework for the regulation, approval and oversight of Maritime Training Institutes (MTIs) in India. Under the Merchant Shipping Act, 1958, maritime training was largely administered through subordinate regulations and executive mechanisms, with limited statutory backing for comprehensive regulation of maritime education providers. Given India's position as one of the world's leading suppliers of seafarers and the increasing importance of maintaining internationally accepted training standards, the need for a stronger legislative framework had become essential. The new provisions empower the maritime administration to regulate, approve and monitor maritime education and training institutions in accordance with the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW). By providing a robust legal basis for quality assurance, curriculum oversight, institutional approvals and training compliance, the reform strengthens confidence in India's maritime education system and supports the development of a globally employable seafaring workforce.

The Act further strengthens India's commitment to international labour standards through Sections 57, 76 and 77, which provide full legislative effect to the Maritime Labour Convention (MLC), 2006. Under the previous framework, implementation of MLC requirements existed through a combination of rules, administrative measures and regulatory directives, resulting in certain limitations in statutory enforceability. The Merchant Shipping Act, 2025 incorporates MLC principles directly within the legislative framework, thereby enhancing the protection available to seafarers in matters relating to working conditions, accommodation standards, welfare measures, repatriation rights, social protection and employment conditions. The reform reinforces India's obligations as a responsible maritime nation and ensures that welfare standards applicable to Indian seafarers remain aligned with internationally accepted norms. Stronger statutory recognition of labour rights is expected to improve seafarer welfare, enhance compliance by shipowners and strengthen India's reputation as a leading provider of skilled maritime manpower.

Section 58 introduces a significant enhancement in the maritime dispute resolution framework. Under the Merchant Shipping Act, 1958, the Shipping Master was empowered to hear specified disputes between seafarers and shipowners; however, the statutory framework did not provide a clear mechanism for enforcement of such decisions through civil court processes. As a result, aggrieved parties frequently had to pursue additional legal remedies, leading to delays and increased litigation costs. The revised framework retains the specialized role of the Shipping Master in adjudicating disputes relating to maritime employment and welfare matters, while providing enforceability to such decisions through a decree of a civil court, subject to the prescribed appellate mechanism. This reform strengthens the effectiveness of maritime dispute resolution by providing a faster, sector-specific and legally enforceable mechanism capable of addressing grievances efficiently. The provision is expected to reduce litigation, improve access to justice for seafarers and ensure more timely resolution of disputes arising within the maritime sector.

Section 92 addresses the welfare and protection of seafarers serving on abandoned vessels, an area that has increasingly emerged as a concern within the global shipping industry. Under the previous legislative framework, there was no explicit statutory mechanism empowering the Government to arrange replacement crews where shipowners failed to fulfill their obligations towards abandoned vessels. Such situations often resulted in prolonged hardship for seafarers, disruptions to safe vessel operations and challenges in maintaining compliance with international labour obligations. The Merchant Shipping Act, 2025 empowers the Central Government to arrange replacement crew on board abandoned Indian and foreign vessels in situations where shipowners fail to make the necessary arrangements. The provision further enables recovery of associated costs from the shipowner, thereby ensuring accountability while protecting the interests of affected seafarers. The reform aligns domestic law with the principles of the Maritime Labour Convention, 2006 and strengthens India's ability to respond effectively to cases involving crew abandonment. It is expected to enhance seafarer welfare, support continuity of safe maritime operations and reinforce India's commitment to protecting maritime labour rights in accordance with international standards.





MS Act, 2025

Sections 131 to 143	Existing Position under MS Act, 1958: Pollution prevention provisions were fragmented and there was no legislative framework for implementation of MARPOL Annex VI (Air Pollution) Reform under the MS Act, 2025: Comprehensive framework for prevention, monitoring, containment and response to marine pollution introduced. In addition, dedicated rules have been framed to implement MARPOL Annex VI (Air Pollution) for the first time. Expected Outcome: Giving full effect to the MARPOL Convention and ensuring safety of marine environment	MARPOL Convention
Sections 144 to 152	Existing Position under MS Act, 1958: Survey and certification provisions scattered across different chapters Reform under the MS Act, 2025: All survey, audit and certification provisions consolidated into a dedicated Part. Expected Outcome: Simpler compliance and harmonization of multiple survey cycles	Survey and Certification Provisions
Sections 223-230	Existing Position under MS Act, 1958: No comprehensive statutory framework for marine incident and maritime emergency response. Reform under the MS Act, 2025: Dedicated Part introduced providing for nodal authorities, emergency response plans and coordinated response mechanisms. Expected Outcome: Better disaster response preparedness	Marine Incident and Maritime Emergency Response
Section 231	Existing Position under MS Act, 1958: Marine casualty investigations were conducted through court-based investigation mechanisms. Reform under the MS Act, 2025: Central Government empowered to appoint a body to conduct marine safety investigations in accordance with the Safety Convention Expected Outcome: Independent and objective investigation of marine casualties, improved maritime safety and compliance with international obligations	Marine Casualty Investigation

Sections 131 to 143 of the Merchant Shipping Act, 2025 significantly strengthen India's marine environmental protection framework by providing comprehensive statutory backing for the implementation of the International Convention for the Prevention of Pollution from Ships (MARPOL). Under the Merchant Shipping Act, 1958, provisions relating to pollution prevention were dispersed across various chapters and lacked a dedicated legislative framework for implementation of MARPOL Annex VI relating to prevention of air pollution from ships. As environmental regulations applicable to international shipping have become increasingly stringent, the absence of a comprehensive statutory framework presented challenges in ensuring effective compliance with evolving international obligations. The new legislation establishes a dedicated framework for prevention, monitoring, containment and response to marine pollution incidents while simultaneously incorporating provisions necessary for implementation of MARPOL Annex VI for the first time. Dedicated rule-making powers have also been introduced to facilitate implementation of air emission requirements, fuel standards and pollution control measures in accordance with international practice. The reform is expected to provide full legislative effect to MARPOL obligations, strengthen environmental compliance by vessels operating in Indian waters and contribute to the protection of the marine environment through a more robust and enforceable regulatory framework.

Sections 144 to 152 introduce a major rationalisation of survey, audit and certification requirements applicable to vessels. Under the earlier legislative framework, survey and certification provisions were distributed across multiple chapters and legal provisions, resulting in procedural complexity and administrative duplication. The Merchant Shipping Act, 2025 consolidates all survey, audit and certification-related provisions into a separate and dedicated part of the legislation, thereby creating a more coherent and streamlined compliance framework. The consolidation facilitates harmonisation of statutory surveys, certification cycles and inspection requirements while reducing procedural fragmentation. A unified framework is expected to improve regulatory clarity

for shipowners, recognised organisations and maritime administrators, simplify compliance obligations and support more efficient monitoring of vessel safety and statutory requirements. The reform also aligns India's survey and certification regime with modern international maritime administration practices by promoting consistency and reducing administrative burden.

Sections 223 to 230 establish a dedicated statutory framework for marine incident management and maritime emergency response. Prior to the enactment of the Merchant Shipping Act, 2025, the legal framework did not provide comprehensive statutory arrangements dealing specifically with maritime emergencies, coordinated response mechanisms and designation of responsible authorities. Considering the increasing scale and complexity of maritime operations, offshore activities, coastal infrastructure and environmental risks, the need for a structured emergency response architecture had become increasingly important. The new provisions designate nodal authorities, provide for preparation of emergency response plans and establish coordinated response mechanisms for maritime incidents and emergencies. The framework strengthens institutional preparedness by facilitating cooperation among maritime administrations, port authorities, coastal agencies and emergency service providers. Enhanced statutory clarity regarding roles, responsibilities and response procedures is expected to improve disaster preparedness, strengthen incident response capabilities and ensure timely and coordinated action during maritime emergencies affecting safety, security or the marine environment.

Section 231 introduces a modern framework for marine casualty investigation by empowering the Central Government to appoint a dedicated body for conducting marine safety investigations in accordance with the requirements of the Casualty Investigation Code and other international obligations. Under the Merchant Shipping Act, 1958, marine casualty investigations were largely conducted through court-based mechanisms which often focused on adjudication and determination of liability. International best practices have increasingly favoured independent safety investigations aimed at identifying causal factors and preventing recurrence rather than assigning legal responsibility. The Merchant Shipping Act, 2025 aligns India's framework with this approach by providing a statutory basis for independent and objective marine safety investigations. The establishment of a dedicated investigation mechanism is expected to improve the quality of casualty analysis, facilitate timely identification of systemic safety issues and enhance compliance with international maritime obligations. The reform will contribute to strengthening maritime safety by ensuring that lessons learned from accidents and incidents are systematically captured and incorporated into future policy, regulatory and operational improvements.





MS Act, 2025

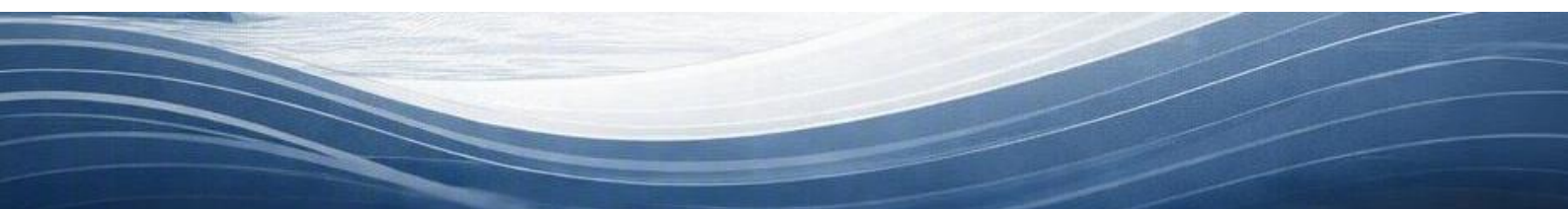
Section 281-282	Existing Position under MS Act, 1958: Minor contraventions under the Act were primarily dealt with through criminal prosecution before courts Reform under the MS Act, 2025: Civil penalty mechanism introduced for specified contraventions, with adjudication by designated officers and statutory provision for compounding, while only serious offences continue to attract criminal prosecution before courts Expected Outcome: Decriminalisation of minor procedural violations, reduced compliance burden and improved ease of doing business	Decriminalisation of minor violations
Section 311	Existing Position under MS Act, 1958: No provision dealing with abandoned vessels Reform under the MS Act, 2025: Comprehensive provisions introduced for identification, management and disposal of abandoned vessels. Expected Outcome: Enhanced environmental protection and timely removal of abandoned vessels.	Abandoned Vessels
Section 315	Existing Position under MS Act, 1958: No statutory framework for electronic filing, issuance of certificates, maintenance of records and digital transactions. Reform under the MS Act, 2025: Comprehensive statutory recognition accorded to electronic filing, issuance of certificates, licences and approvals, electronic payments, and maintenance of records and logbooks in electronic form. Expected Outcome: Digitalisation of maritime administration, reduced physical interface and improved ease of doing business.	Digitisation
Section 317	Existing Position under MS Act, 1958: No statutory requirement for disclosure of charges payable for carriage of goods by sea, resulting in limited transparency in freight-related charges Reform under the MS Act, 2025: Service providers required to disclose the various charges payable in India in the transport document, in such circumstances as may be notified by the Central Government Expected Outcome: Enhanced transparency and certainty in freight charges, improving ease of doing business for shippers and consignees	Transparency of charges

Sections 281 and 282 of the Merchant Shipping Act, 2025 introduce a significant shift in the enforcement philosophy governing maritime regulation by establishing a civil penalty framework for specified contraventions under the Act. Under the Merchant Shipping Act, 1958, minor procedural and compliance-related violations were largely dealt with through criminal prosecution before courts, irrespective of the severity of the offence. While criminal sanctions remain applicable for serious violations affecting safety, security or environmental protection, the new framework distinguishes between substantive and procedural non-compliances and permits designated officers to adjudicate specified contraventions through a civil penalty mechanism. The legislation further incorporates provisions for limited compounding of offences, enabling faster and more efficient resolution of compliance matters. The reform seeks to reduce the compliance burden on maritime stakeholders, improve regulatory efficiency and align maritime governance with contemporary ease-of-doing-business principles while ensuring that regulatory enforcement remains proportionate to the nature of the contravention.

Section 311 establishes a comprehensive legal framework dealing with abandoned vessels, an area that was not specifically addressed under the Merchant Shipping Act, 1958. Abandoned vessels often pose significant navigational, environmental and safety risks while also creating uncertainty regarding ownership, liability and responsibility for removal. The absence of a dedicated statutory mechanism frequently resulted in prolonged delays in addressing such vessels, increasing the risk of pollution incidents and disruption to port and navigational operations. The Merchant Shipping Act, 2025 introduces detailed provisions relating to identification, management, disposal and removal of abandoned vessels. By clearly delineating powers, responsibilities and procedures, the framework enables maritime authorities to take timely action in addressing vessels that have been abandoned by owners or operators. The reform is expected to improve environmental protection, enhance maritime safety and facilitate faster removal of vessels that may otherwise pose risks to navigation, coastal infrastructure and the marine environment.

Section 315 provides statutory recognition to digital governance and electronic administration within the maritime sector. Under the Merchant Shipping Act, 1958, there was no comprehensive legislative framework dealing with electronic filing, issuance of certificates, maintenance of digital records, electronic transactions or online approvals. Although several digital initiatives were implemented over time through administrative mechanisms, statutory recognition was necessary to fully support a modern digital maritime administration. The new provision accords legal validity to electronic filing of applications, issuance of licences and certificates, electronic payments, maintenance of statutory records in digital form and electronic communication between stakeholders and the maritime administration. The legal recognition of digital processes is expected to significantly reduce dependence on physical documentation and in-person interactions, improve service delivery timelines and enhance transparency across regulatory functions. By establishing a clear statutory basis for electronic governance, the Act supports the development of a fully digital maritime administration aligned with global best practices and modern expectations of regulatory service delivery.

Section 317 introduces greater transparency in freight-related charges by creating statutory obligations concerning disclosure of charges payable in connection with carriage of goods by sea. Under the Merchant Shipping Act, 1958, there was no specific requirement mandating disclosure of freight-related charges, resulting in limited transparency regarding costs incurred by shippers, consignees and cargo interests. In practice, various charges associated with maritime transportation could be imposed without a standardised framework for disclosure, leading to uncertainty and information asymmetry within the logistics chain. The Merchant Shipping Act, 2025 requires service providers to disclose the various charges payable in India in connection with transportation of goods by sea under prescribed circumstances as may be notified by the Central Government. The provision aims to enhance transparency in maritime commerce, improve predictability of logistics costs and strengthen confidence among cargo owners and trade participants. Greater visibility of freight-related charges is expected to facilitate informed commercial decision-making, reduce disputes and improve the overall ease of doing business for importers, exporters, shippers and consignees operating within the maritime trade ecosystem.





Coastal Shipping Act, 2025

Section 3	Existing Position under MS Act, 1958: Indian flag vessels were required to obtain a licence to engage in coastal trade Reform under the CS Act, 2025: Requirement of a licence for Indian flag vessels has been dispensed with. Expected Outcome: Improved ease of doing business for Indian vessels and promotion of coastal shipping	No Licence for Indian flag Vessel
Section 4	Existing Position under MS Act, 1958: No comprehensive framework for licensing foreign vessels undertaking different categories of coastal operation Reform under the CS Act, 2025: Separate licensing framework introduced for foreign vessels engaged in coastal trade and for foreign vessels chartered by Indian entities Expected Outcome: Simplified regulatory framework and reduced compliance burden for Indian vessels	Licensing framework of Foreign Vessels
Section 3 and 8	Existing Position under MS Act, 1958: No statutory mechanism permitting inland vessels to operate in sea areas under a dedicated framework Reform under the CS Act, 2025: Director-General empowered to permit inland vessels to operate at sea, subject to prescribed safety requirements and operational limits Expected Outcome: Better integration of inland and coastal shipping and modal shift to waterways	Inland and Coastal Shipping and Modal shift

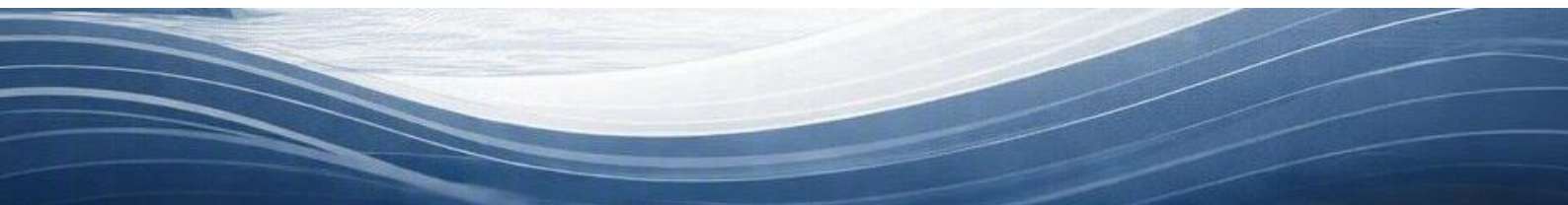
Section 3 of the Coastal Shipping Act, 2025 introduces a major ease-of-doing-business reform by removing the requirement for Indian-flag vessels to obtain a licence for engagement in coastal trade. Under the earlier framework administered through the Merchant Shipping Act, Indian vessels were required to seek licensing approvals even for participation in domestic coastal transportation. While intended to regulate coastal operations, the licensing requirement often resulted in additional procedural compliance for Indian shipowners despite their status as domestically registered vessels operating under the Indian flag. The Coastal Shipping Act, 2025 recognizes Indian-flag vessels as the primary participants in domestic coastal trade and removes the need for a separate licensing process. This reform is expected to reduce administrative burden, improve operational flexibility and create a more enabling environment for Indian shipowners to participate in domestic cargo movement. By simplifying entry into coastal trade, the provision supports the broader objective of increasing the share of coastal shipping within India's logistics network and promoting greater utilisation of Indian tonnage in domestic transportation.

Section 4 establishes a comprehensive and distinct licensing framework for foreign vessels participating in coastal trade operations. Under the earlier system, licensing provisions applicable to foreign vessels undertaking different forms of coastal operations were dispersed and lacked a dedicated statutory framework tailored to contemporary maritime commercial arrangements. The increasing use of chartered vessels, specialised offshore support vessels and foreign ships deployed to meet temporary capacity requirements necessitated a more structured regulatory approach. The Coastal Shipping Act, 2025 therefore introduces a separate licensing framework for foreign vessels engaged in coastal trade as well as foreign vessels chartered by Indian entities. The new framework provides greater clarity regarding eligibility, licensing conditions and operational requirements while ensuring that regulatory oversight remains proportionate to the nature of operations being undertaken. By clearly distinguishing between Indian and foreign vessel participation, the legislation seeks to

create a transparent and predictable regulatory regime capable of supporting coastal trade growth without compromising national maritime interests.

Sections 3 and 8 collectively introduce an important reform aimed at integrating inland waterways and coastal shipping. Historically, there was no statutory mechanism permitting inland vessels to operate in sea areas under a dedicated legislative framework. Consequently, vessels designed for inland navigation were generally unable to participate in coastal transportation even where operationally feasible. Given the Government's focus on multimodal logistics, modal shift and efficient utilisation of waterborne transport, greater integration between inland waterways and coastal shipping has become increasingly important. The Coastal Shipping Act, 2025 empowers the Director-General to permit inland vessels to operate in designated sea areas, subject to prescribed safety requirements, operational limitations and technical conditions. This provision enables a more seamless interface between inland and coastal transport networks, allowing cargo to move through integrated waterway corridors with reduced dependence on road and rail transportation.

The integration of inland and coastal shipping is expected to generate significant logistics benefits by facilitating end-to-end water-based cargo movement, reducing transportation costs and improving supply chain efficiency. Enhanced connectivity between inland waterways, coastal routes and port infrastructure can facilitate movement of bulk commodities, containers and project cargo while reducing congestion on existing land transport networks. The reform also supports national initiatives promoting modal shift towards waterways as a more fuel-efficient and environmentally sustainable mode of transportation. By creating a unified water transport ecosystem that enables interoperability between inland and coastal vessels, the Coastal Shipping Act, 2025 establishes an important foundation for expansion of domestic maritime transport and contributes towards achieving the long-term objective of increasing the share of waterways in India's freight movement system.





Coastal Shipping Act, 2025

Section 4	Existing Position under MS Act, 1958: No statutory power to prescribe crewing requirements while granting licences to foreign vessels Reform under the CS Act, 2025: Central Government empowered to prescribe Indian crewing requirements for licensed foreign vessels. Expected Outcome: Increased employment opportunities for Indian seafarers	Crewing Requirements
Section 4	Existing Position under MS Act, 1958: Safety and security requirements for grant of licence were not comprehensively codified Reform under the CS Act, 2025: Safety and security requirements expressly incorporated as statutory conditions for grant of licence Expected Outcome: Enhanced maritime safety and regulatory compliance	Safety and Security requirements for license
Section 5	Existing Position under MS Act, 1958: No comprehensive statutory procedure governing suspension, modification or revocation of licence Reform under the CS Act, 2025: Detailed procedure introduced for suspension, modification or revocation of licences after providing an opportunity of hearing Expected Outcome: Transparent and fair regulatory decision-making consistent with principles of natural justice	Procedures for suspension, medication and revocation of license

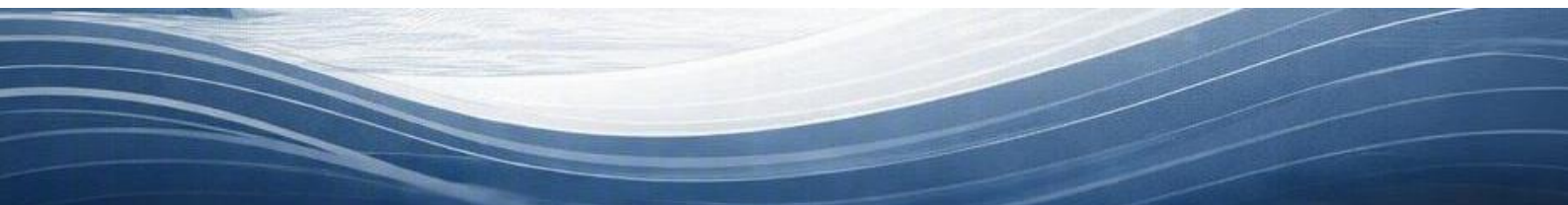
Section 4 of the Coastal Shipping Act, 2025 strengthens the regulatory framework governing foreign vessels participating in India's coastal trade by introducing explicit statutory authority relating to crewing requirements. Under the earlier framework administered through the Merchant Shipping Act, 1958, while licences could be granted to foreign vessels for coastal operations, there was no specific statutory provision empowering the Government to prescribe Indian crewing requirements as a condition of such licences. The absence of a dedicated legal framework limited the ability to leverage coastal shipping activities for domestic maritime employment generation. Recognising the need to align coastal shipping growth with national objectives relating to seafarer employment and skill development, the Coastal Shipping Act, 2025 empowers the Central Government to prescribe Indian crewing requirements for licensed foreign vessels. This provision creates an institutional mechanism through which participation of Indian seafarers in coastal trade operations can be enhanced while balancing the legitimate operational requirements of foreign operators. The reform is expected to generate additional employment opportunities for Indian seafarers, strengthen maritime skill utilisation and support India's position as a leading supplier of maritime manpower.

The Act further enhances maritime safety and security governance by expressly incorporating safety and security requirements as statutory conditions for grant of licences to foreign vessels engaged in coastal trade. Under the previous framework, safety and security considerations were addressed through various administrative and regulatory mechanisms; however, comprehensive statutory recognition of such requirements as conditions precedent for licensing was limited. Given the strategic importance of coastal trade and the increasing focus on maritime security, environmental protection and safe vessel operations, stronger statutory backing was considered necessary. The Coastal Shipping Act, 2025 therefore integrates safety and security obligations directly into the licensing framework, ensuring that foreign vessels participating in coastal operations comply with prescribed standards before being permitted to operate. The reform strengthens regulatory oversight, supports compliance

with national and international maritime safety requirements and enhances the ability of maritime authorities to ensure that only suitably compliant vessels participate in domestic shipping activities.

Section 5 introduces a detailed and transparent statutory framework governing suspension, modification and revocation of licences issued under the Act. Under the Merchant Shipping Act, 1958, there was no comprehensive legislative procedure dealing specifically with alteration or withdrawal of licences granted for coastal shipping operations. This occasionally created uncertainty regarding the exercise of regulatory powers and the procedural safeguards available to affected stakeholders. The Coastal Shipping Act, 2025 establishes a structured process for regulatory action by requiring that licence holders be provided an opportunity of hearing before any decision relating to suspension, modification or revocation is taken. By embedding principles of natural justice within the licensing framework, the legislation promotes transparency, accountability and predictability in regulatory decision-making.

The introduction of clearly defined procedural safeguards is expected to improve stakeholder confidence in the licensing regime while ensuring that regulatory interventions remain fair, proportionate and legally robust. The framework provides clarity regarding rights and obligations of licence holders and creates a balanced mechanism that protects legitimate commercial interests while preserving the Government's ability to enforce compliance where required. Collectively, these reforms strengthen the governance architecture of coastal shipping by integrating employment objectives, enhancing safety oversight and introducing transparent regulatory processes. The resulting framework supports the growth of coastal trade while ensuring that such growth is accompanied by stronger compliance, greater legal certainty and improved opportunities for participation of Indian maritime professionals.





Coastal Shipping Act, 2025

Section 8	Existing Position under MS Act, 1958: No statutory framework for long-term strategic planning for the development of coastal and inland shipping Reform under the CS Act, 2025: Central Government mandated to publish a National Coastal and Inland Shipping Strategic Plan within two years of commencement of the Act Expected Outcome: Integrated, long-term and coordinated development of coastal and inland shipping, supporting modal shift and sustainable growth of the maritime sector	National Coastal and Inland Shipping Strategic Plan
Section 9	Existing Position under MS Act, 1958: No statutory national database of coastal shipping Reform under the CS Act, 2025: National Database of Coastal Shipping established for maintaining licensing information and related records Expected Outcome: Improved transparency, digital governance and information sharing	National Database of Coastal Shipping
Sections 15-33	Existing Position under MS Act, 1958: Contraventions under the Act were primarily dealt with through criminal prosecution before courts, including punishment with fine and imprisonment Reform under the CS Act, 2025: Civil penalty mechanism introduced with adjudication by the Principal Officer, while serious criminal offences continue to be dealt with by courts Expected Outcome: Decriminalisation of procedural violations and improved ease of doing business	Decriminalisation of procedural violations

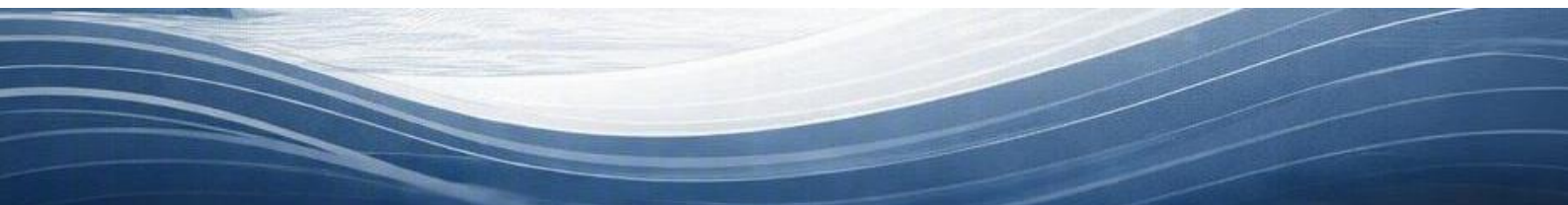
Section 8 of the Coastal Shipping Act, 2025 introduces a strategic planning framework for the long-term development of coastal and inland shipping in India. Prior to this legislation, there was no statutory mandate requiring the preparation of a comprehensive national strategy covering the growth, integration and modernisation of coastal and inland waterborne transport. As a result, development efforts were often undertaken through individual schemes and sector-specific initiatives without the benefit of a unified long-term roadmap. The Coastal Shipping Act, 2025 addresses this gap by mandating the Central Government to publish a National Coastal and Inland Shipping Strategic Plan within two years from the commencement of the Act. The proposed strategic framework is expected to provide a coordinated vision for infrastructure development, vessel deployment, multimodal integration, cargo mobilisation, digitalisation and regulatory reforms necessary for expanding waterborne transport. By establishing a formal planning mechanism, the Act seeks to ensure systematic and sustainable growth of both coastal and inland shipping while supporting the national objective of increasing the modal share of waterways within the logistics sector.

Section 9 establishes a National Database of Coastal Shipping to strengthen transparency, information management and digital governance within the sector. Under the previous framework, no statutory provision existed for creation and maintenance of a comprehensive national database containing licensing information and related records pertaining to coastal shipping operations. The absence of a centralized repository limited data availability and constrained the ability of policy makers and regulators to undertake evidence-based planning and monitoring. The Coastal Shipping Act, 2025 provides for the establishment and maintenance of a National Database of Coastal Shipping, enabling systematic collection, storage and management of operational information relating to licensed vessels, operators and other coastal shipping activities. The database is expected to improve transparency, facilitate information sharing among stakeholders and support more effective regulatory

oversight. Digital availability of reliable sectoral information will further enhance policy formulation, compliance monitoring and long-term planning for coastal trade and maritime logistics.

Sections 15 to 33 introduce a modern civil penalty framework aimed at decriminalising procedural and administrative contraventions under the Act. Under the earlier legal regime, many contraventions were addressed primarily through criminal prosecution before courts, including offences that were technical or procedural in nature. Such an approach often resulted in lengthy processes, increased compliance costs and unnecessary litigation burden for maritime stakeholders. Recognising the need for a more proportionate enforcement framework, the Coastal Shipping Act, 2025 introduces a civil penalty mechanism for specified contraventions to be adjudicated by the Principal Officer, while serious criminal offences continue to remain within the jurisdiction of courts. The reform distinguishes between procedural non-compliance and substantive violations affecting public interest, safety or security, thereby enabling regulatory resources to be focused on more significant offences.

The shift towards a civil adjudication mechanism is expected to improve regulatory efficiency, reduce delays in enforcement and strengthen ease of doing business for coastal shipping operators. By permitting faster resolution of compliance matters through designated authorities, the framework lowers transaction costs and reduces dependence on lengthy judicial processes for routine violations. At the same time, the retention of criminal sanctions for serious offences ensures that the deterrent effect of the law is preserved where necessary. Collectively, the introduction of strategic planning obligations, a national data management framework and a proportionate compliance regime reflects the broader objective of the Coastal Shipping Act, 2025 to create a modern, transparent and growth-oriented regulatory framework capable of supporting long-term expansion of coastal and inland shipping in India.

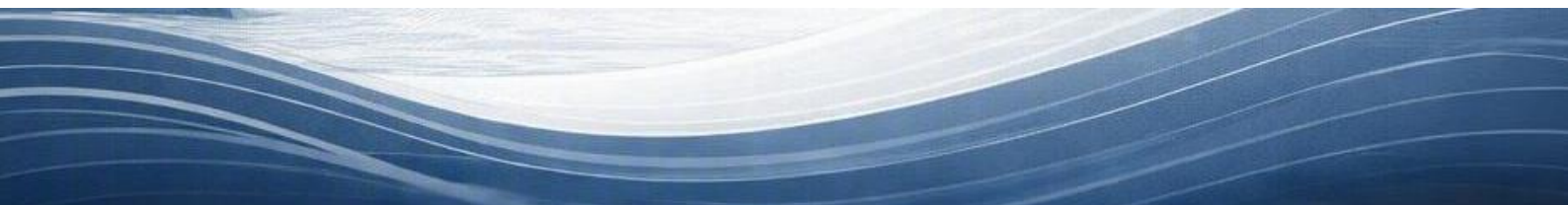


4. Ship Building and Repairs

4.1. Introduction

Shipbuilding has returned to the centre of India's maritime agenda, and it has done so at a moment of rare opportunity. The world's leading yards are committed three to five years forward, the global fleet is entering a replacement cycle weighted decisively towards larger tonnage, and owners are actively seeking capacity beyond the three nations that have long dominated the industry. India meets this moment with a coastline of over 11,000 kilometres, deep-water sites available at scale, an established steel industry, a leading global position in ship recycling and a maritime workforce recognised across the world's fleets. In September 2025 the Government of India matched that endowment with commitment, approving a programme of approximately \$7.8 Bn across four pillars to build shipbuilding capacity, capability and demand over the decade to 31 March 2036.

Section 2 establishes the demand context: the size and trajectory of the global market, the order backlog now held by the leading shipbuilding nations, the structural shift towards larger vessels, and the vessel mix through which scale and margin can both be secured. Section 3 sets out the four-pillar architecture and the incentives available at each stage of a shipbuilding investment. Sections 4 to 6 examine the three funded pillars in turn: the Shipbuilding Financial Assistance Scheme at \$2.7 Bn, the Maritime Development Fund at \$2.8 Bn, and the Shipbuilding Development Scheme at \$2.2 Bn, the last comprising greenfield cluster development and brownfield capacity expansion. Section 7 addresses the aggregation of public sector demand into a visible order pipeline, Section 8 the component manufacturing agenda on which domestic value addition depends, and Section 9 the Container Manufacturing Promotion Scheme. Section 10 draws the argument together as the conclusion.



4.2. The Global Shipbuilding Market: Demand Context

India is entering shipbuilding at a favourable point in the global cycle. Three propositions support this: the market is growing at a healthy rate after a prolonged period of stagnation, existing yards are already committed several years forward and cannot readily absorb incremental demand, and the composition of demand is shifting towards vessel classes that reward new, purpose-built capacity rather than incumbency in legacy facilities. Each is examined in turn.

Market size and the growth outlook to 2030

The global shipbuilding and repair market, measured across both commercial and defence vessels, stood at approximately \$158 Bn in 2018 and expanded to approximately \$205 Bn by 2023. It then plateaued, easing marginally to approximately \$204 Bn in 2024 before recovering to approximately \$215 Bn in 2025, which represents compound growth of only about 2 per cent a year across those two years. The market is projected to reach approximately \$262 Bn by 2030, implying compound growth of 4 to 5 per cent a year over the forecast period.

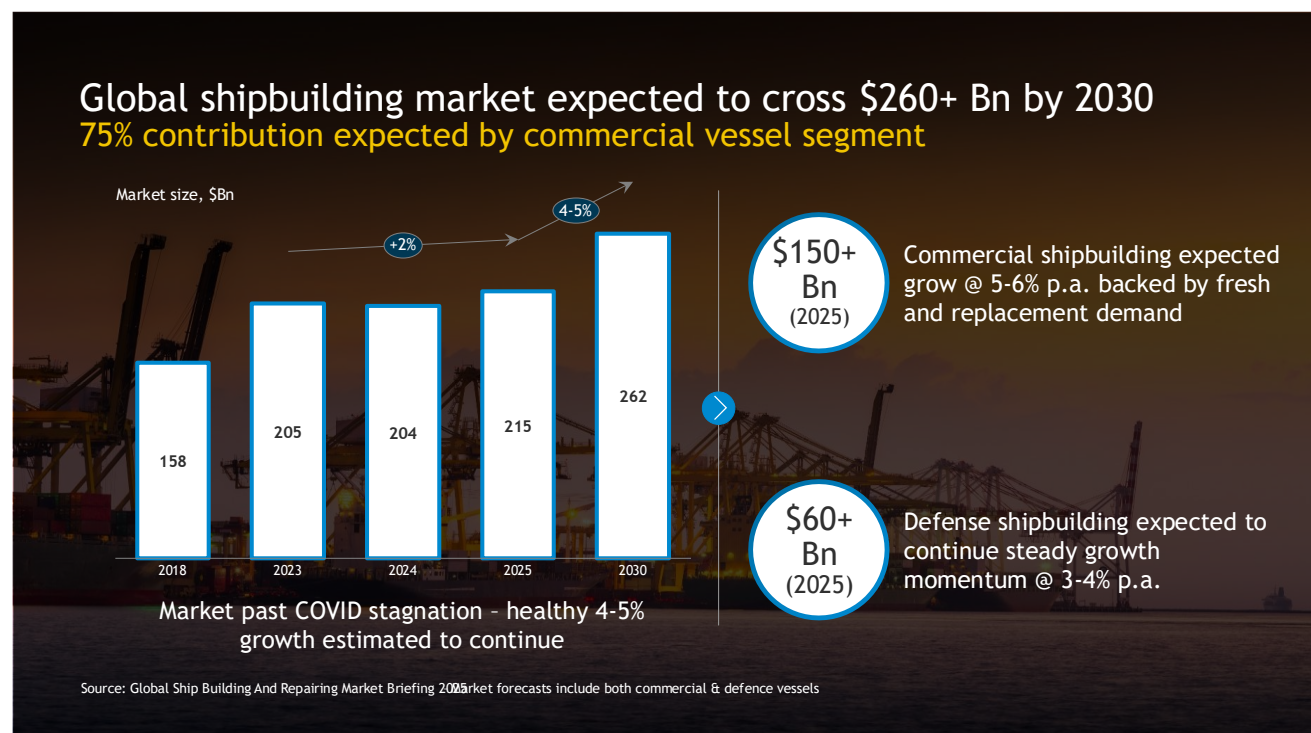


Exhibit 2.1: Global shipbuilding and repair market size, 2018 to 2030

Two features of this trajectory deserve emphasis. The first is the inflection in the growth rate. The two years from 2023 to 2025 delivered compound growth of only about 2 per cent a year and included an absolute contraction in 2024. The forward projection to 2030 assumes 4 to 5 per cent compound growth, roughly double that recent rate. The presentation characterizes this as the market having moved past COVID stagnation, with healthy growth of 4 to 5 per cent now estimated to continue. The projection therefore

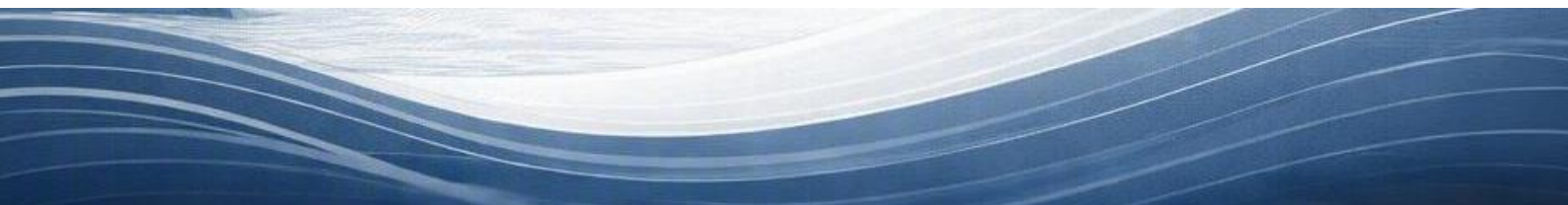
embeds an assumption of renewed expansion rather than a simple extrapolation of the immediately preceding period.

The second feature is the divergence between the two constituent segments. Commercial shipbuilding accounted for over \$150 Bn of the 2025 total and is expected to grow at 5 to 6 per cent a year, driven by a combination of fresh demand and replacement of ageing tonnage. Defence shipbuilding accounted for over \$60 Bn and is expected to grow more slowly, at 3 to 4 per cent a year, though from a base of considerable stability. Because the commercial segment is both larger and faster growing, its share of the total rises over the forecast period, and the commercial vessel segment is expected to account for approximately 75 per cent of the market by 2030.

For India, the practical significance is that the addressable opportunity is concentrated in commercial tonnage. Defence shipbuilding in India is already established, with capable public and private yards and a settled procurement relationship with the Indian Navy and Coast Guard. The commercial segment, by contrast, is where Indian participation is negligible relative to market size, and it is also the segment where growth is fastest. The policy instruments described in later sections are accordingly weighed towards commercial vessel construction, with specialised and defence-adjacent tonnage treated as a margin-enhancing complement rather than the primary target.

The shipbuilding Supercycle and order backlog

Market growth alone would not create an opening for a new entrant if existing yards had spare capacity to absorb it. The second element of the argument is therefore that the global yard base is already heavily committed. The conventional measure of this commitment is backlog duration, expressed as the ratio of the order book to the volume delivered in the most recent full year, and therefore readable as the number of years of work a yard has already secured.



Shipbuilding Supercycle | Approx 3-5 yrs of order backlog across leading global shipyards

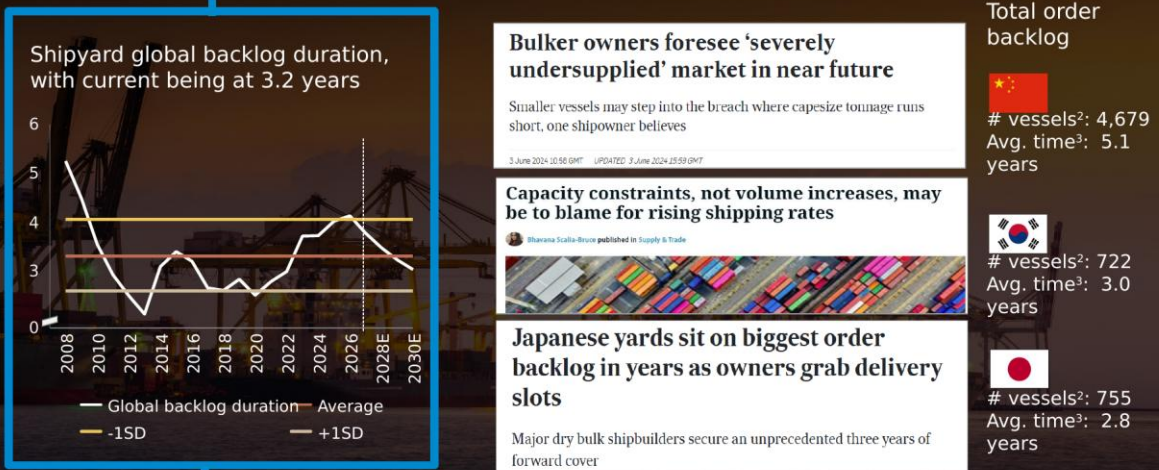


Exhibit 2.2: Global shipyard backlog duration and country order books

Global backlog duration currently stands at 3.2 years, against a long-run average of approximately 2.2 years. The measure is therefore running about one full year above its historical mean. The historical series makes the significance of this clearer: backlog duration collapsed in the years following the 2008 financial crisis, falling well below one year in the middle of the last decade as the industry worked through a severe demand contraction, and has recovered steadily since. The present position is among the strongest in the period observed.

Disaggregating the order book by the three dominant shipbuilding nations, measured on compensated gross tonnage as of 30 June 2026 against deliveries in the last full year, produces the following picture. China holds an order book of 4,679 vessels with an average backlog of 5.1 years. South Korea holds 722 vessels at an average of 3.0 years. Japan holds 755 vessels at an average of 2.8 years. Across the leading global yards, the backlog therefore runs to approximately 3 to 5 years.

The implication is direct. A shipowner placing an order at a leading Chinese yard today is negotiating for delivery around five years hence. Owners who require tonnage earlier than that, or who wish to diversify their supplier base for commercial or strategic reasons, must look beyond the incumbent three. This is the specific commercial opening that Indian capacity is intended to address. The window is, however, time bound. Backlog duration is cyclical, and the same series that shows the current elevation also shows how rapidly it can unwind. Capacity that comes on stream after the cycle turns will face materially harder market conditions than capacity that is available while owners are still

queuing. The urgency embedded in the scheme timelines described in later sections follows from this.

The structural shift towards larger vessels

The third element of the demand argument concerns the composition rather than the volume of future orders. The global fleet totals 116,041 vessels. Distributed by age, 28,089 vessels or 24 per cent are under ten years old, 39,761 vessels or 34 per cent are between eleven and twenty years, 17,408 vessels or 15 per cent are between twenty-one and thirty years, 11,120 vessels or 10 per cent are between thirty-one and forty years, and 19,663 vessels or 17 per cent are over forty years old.

Shift in global demand being witnessed towards larger vessels

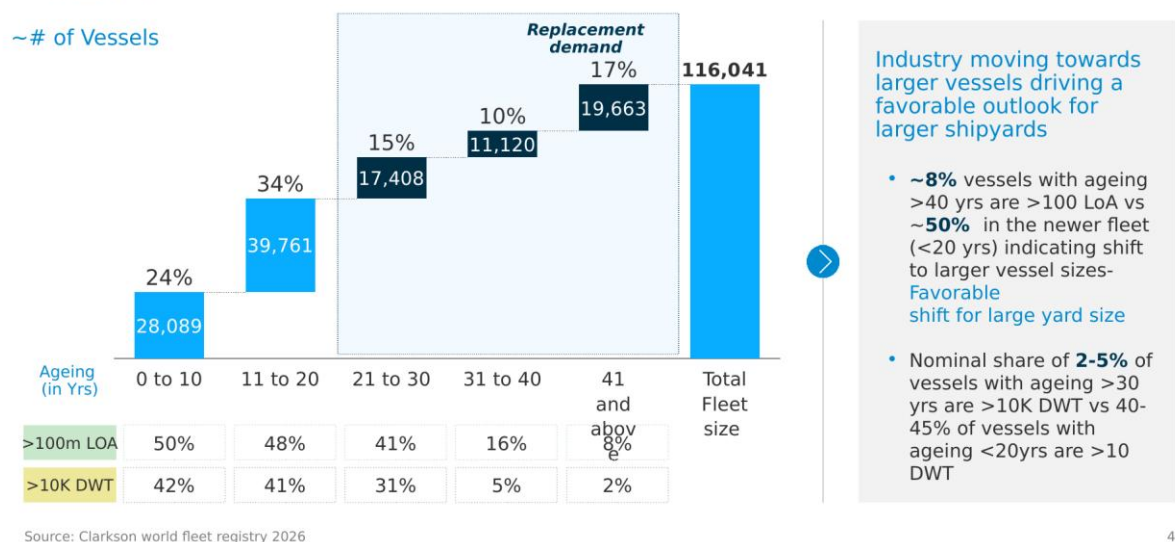


Exhibit 2.3: Global fleet by age band, with vessel size characteristics

The vessels in the older age bands constitute the replacement demand pool. What makes this pool analytically interesting is not its size but the contrast between the vessels leaving the fleet and those entering it. Among vessels over forty years old, only about 8 per cent exceed 100 metres in length overall, and only about 2 per cent exceed 10,000 deadweight tonnes. Among vessels under ten years old, approximately 50 per cent exceed 100 metres in length overall and approximately 42 per cent exceed 10,000 deadweight tonnes. The pattern holds across the intermediate bands: 48 per cent of vessels aged eleven to twenty years exceed 100 metres, falling to 41 per cent for those aged twenty-one to thirty and 16 per cent for those aged thirty-one to forty.

The fleet is therefore not simply being replaced; it is being replaced with substantially larger units. A small ageing vessel is not typically succeeded by another small vessel but is absorbed into the capacity of a larger one. This has a direct bearing on what kind of yard

India should build. Capacity designed around the dimensions of the vessels now being retired would be capacity designed for a market that is contracting. The favorable configuration is a large yard, with dock and berth dimensions, craneage and outfitting capacity suited to vessels above 100 metres in length overall and above 10,000 deadweight tonnes.

This conclusion is reflected directly in the design parameters of the greenfield clusters described in section 6.4, where the sites under development offer post-dredging depths of 10 to 16 metres and waterfronts of 1.8 to 3 kilometres. Those specifications are not incidental; they are what the size profile of future replacement demand requires.

Composition of the ageing fleet by vessel category

Having established that replacement demand favors larger vessels, the next question is which vessel categories that demand will fall into. The ageing fleet, comprising vessels in the older age bands, totals 48,191 units. Its composition by category is set out below.

Tugs, GCC, Ferries and tankers cover 70% of the ageing fleet

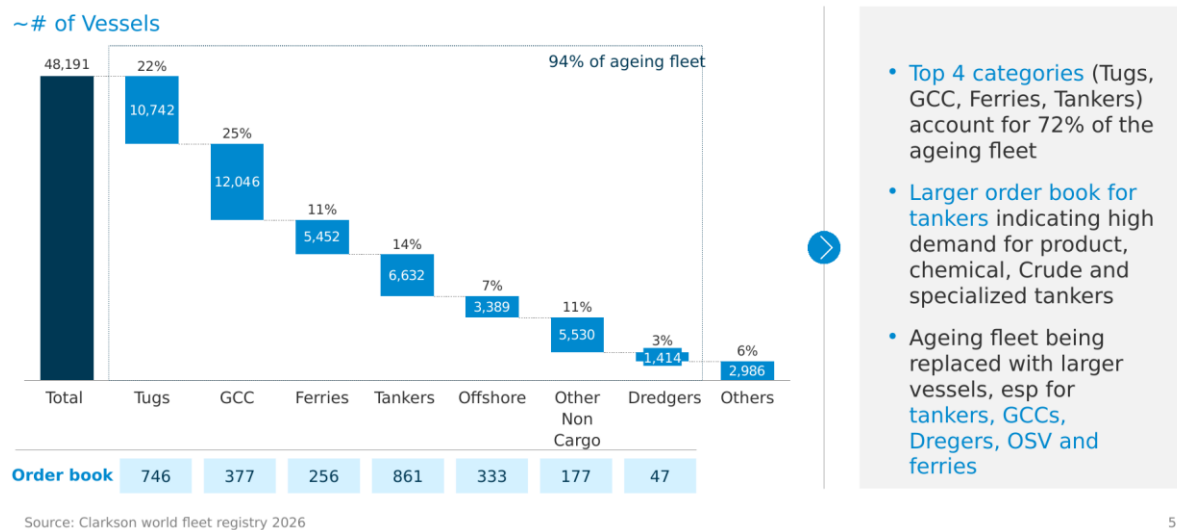


Exhibit 2.4: Ageing fleet and order book by vessel category

Vessel category	Ageing fleet (vessels)	Share of ageing fleet
General cargo carriers	12,046	25%
Tugs	10,742	22%
Tankers	6,632	14%
Other non-cargo	5,530	11%

Vessel category	Ageing fleet (vessels)	Share of ageing fleet
Ferries	5,452	11%
Offshore	3,389	7%
Dredgers	1,414	3%
Others	2,986	6%
Total	48,191	100%

Table 2.1: Composition of the ageing fleet by vessel category

Four categories, namely tugs, general cargo carriers, ferries and tankers, together account for 72 per cent of the ageing fleet. Extending the list to include offshore vessels, other non-cargo vessels and dredgers brings the coverage to approximately 94 per cent. Replacement demand is therefore concentrated rather than dispersed, which is favourable for a new entrant: a yard need not develop competence across the full spectrum of vessel types to address the bulk of the opportunity.

The order book provides a forward reading of where that demand is being placed, and it does not simply mirror the ageing fleet. The largest order book among these categories is for tankers, at 861 vessels, notwithstanding that tankers represent 14 per cent of the ageing fleet rather than the largest share. This indicates demand running ahead of pure replacement, reflecting requirements for product tankers, chemical tankers, crude carriers and specialised tanker tonnage. Order books across the remaining categories range from 47 vessels at the lower end to 746 vessels, with tugs, general cargo carriers, ferries and offshore vessels all represented.

Read together with the size analysis in section 2.3, the pattern is one of ageing tonnage being replaced by larger tonnage within the same broad categories, and this effect is most pronounced for tankers, general cargo carriers, dredgers, offshore support vessels and ferries. For Indian yards, the practical reading is that tankers and general cargo carriers offer the largest addressable volumes, while dredgers, offshore support vessels and ferries offer more specialised opportunities where domestic demand from public sector programmes, discussed in section 7, can provide an initial order base.

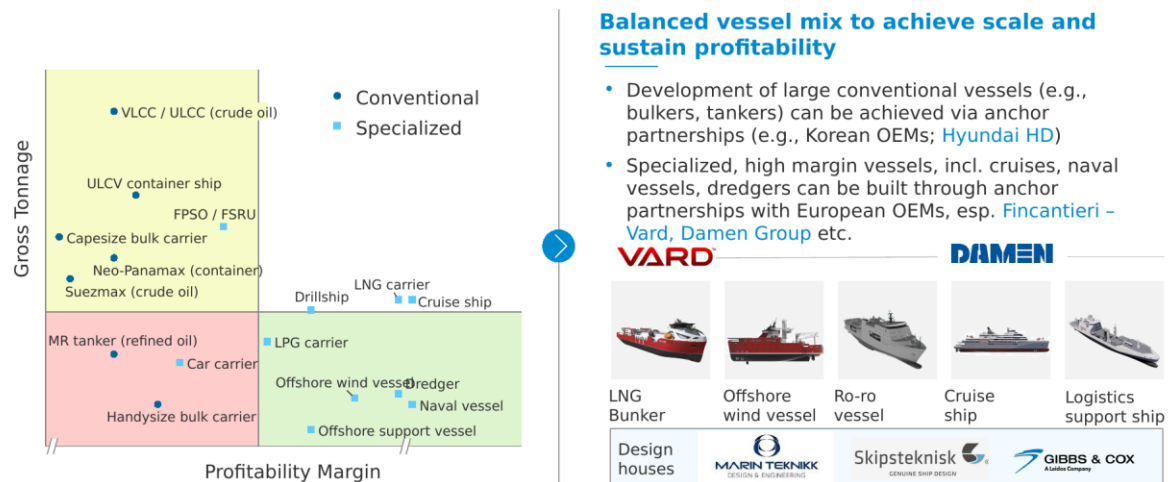
Balancing scale against margin in the vessel mix

The final element of the demand analysis addresses a tension in the strategy. The tonnage targets that India has set require volume, and volume is most readily achieved through large conventional vessels. Those vessels, however, are also the most price-competitive segment of the market, where established yards in China, South Korea and Japan

compete on cost at scale. Building only conventional tonnage would deliver gross tonnage but compress margins.

Larger vessel builds will help achieve scale targets

However, specialized vessel knowhow required to maintain margins



Matrix is indicative, not to scale

6

Exhibit 2.5: Indicative positioning of vessel types by gross tonnage and profitability margin

The exhibit positions vessel types along two axes: gross tonnage, which stands as a proxy for the contribution a vessel makes to scale targets, and profitability margin. The conventional group occupies the high-tonnage, lower-margin region and includes very large and ultra large crude carriers at around 80,000 gross tonnes, ultra large container vessels at around 60,000, Capesize bulk carriers at around 50,000, Neo-Panamax container vessels at around 45,000, Suezmax crude tankers at around 40,000, medium range refined product tankers at around 22,000, and Handysize bulk carriers at around 10,000.

The specialised group occupies the higher-margin region across a wider tonnage spread and includes floating production and storage units and floating storage and regasification units at around 52,500 gross tonnes, liquefied natural gas carriers and cruise ships at around 35,000, drillships at around 32,500, liquefied petroleum gas carriers at around 25,000, car carriers at around 20,000, dredgers at around 12,500, offshore wind installation vessels at around 11,500, naval vessels at around 10,000, and offshore support vessels at around 4,000. The matrix is indicative and is not drawn to scale.

The conclusion drawn in the address is that a balanced vessel mix is required, and that the route to both halves of that mix runs through anchor partnerships with established international builders and design houses. For large conventional vessels, the partners identified are Korean original equipment manufacturers, with HD Hyundai named specifically. For specialised, higher-margin tonnage including cruise vessels, naval

vessels and dredgers, the partners identified are European original equipment manufacturers, with Fincantieri and its Vard subsidiary and the Damen Group named specifically. Within the specialised category, five vessel types are highlighted as immediate priorities: liquefied natural gas bunkering vessels, offshore wind vessels, roll-on roll-off vessels, logistics support ships and cruise ships.

The reliance on anchor partnerships is deliberate and reflects a realistic assessment of where Indian capability currently stands. Neither large conventional nor specialised construction can be established from a standing start on domestic know-how alone. Design capability, production engineering and supply chain qualification all require transfer from builders who already possess them. This is why HD Hyundai appears not only in this analysis but also as the anchor investor in the Thoothukudi cluster discussed in section 6.4, and why the anchor shipyard requirement is written into the greenfield cluster conditions described in section 6.2.

4.3. India's Policy Architecture for Shipbuilding

The four pillars and the total outlay of approximately \$7.8 Bn

The Government of India has organised its response to the opportunity described in section 2 around four pillars, with a combined approved outlay of approximately \$7.8 Bn. Three of the four carry a specific financial allocation; the fourth is a programme of legal, policy and process reform which enables the others rather than disbursing funds itself.



Exhibit 3.1: The four pillars of the shipbuilding programme and their outlays

Pillar	Instrument	Outlay	Composition
1	Shipbuilding Financial Assistance Scheme	\$2.7 Bn	Includes the Ship Recycling Credit Note of \$0.44 Bn
2	Maritime Development Fund	\$2.8 Bn	Maritime Investment Fund \$2.2 Bn and Interest Incentivization Fund \$0.56 Bn
3	Shipbuilding Development Scheme	\$2.2 Bn	Capacity and capability development, and credit risk coverage
4	Legal, Policy and Process Reforms	-	Customs exemptions, right of first refusal, flagging reforms and related measures
	Total	Approximately \$7.8 Bn	

Table 3.1: The four pillars and their approved outlays

The three funded pillars are close to equal in scale, at approximately \$2.8 Bn, \$2.8 Bn and \$2.2 Bn respectively, and this near-parity is itself informative. It indicates that the programme does not rest on a single dominant instrument but distributes support across three distinct functions. The Shipbuilding Financial Assistance Scheme addresses the unit economics of each vessel constructed. The Maritime Development Fund addresses the availability and cost of capital. The Shipbuilding Development Scheme addresses the physical capacity to build at all. A shipyard that received only one of the three would still face a binding constraint from the other two.

The fourth pillar carries no outlay but should not be read as secondary. Customs exemptions determine the landed cost of imported components, which matters directly given the import dependence documented in section 8. The right of first refusal determines whether Indian-built and Indian-flagged tonnage has preferential access to domestic cargo. Flagging reforms determine the administrative cost of registering and operating a vessel under the Indian flag. These measures shape the commercial environment within which the funded instruments operate, and their absence would blunt the effect of the funded pillars considerably.

All dollar figures follow the denomination used in the presentation, with rupee equivalents converted at the exchange rate of Rs. 90 per dollar stated on the same slide.

Financial incentives across the shipbuilding lifecycle

The four pillars are more usefully understood not as parallel schemes but as a sequence of interventions aligned to the stages at which a shipbuilding enterprise incurs cost and faces risk. Slide 74 presents the same architecture organised along this lifecycle.

Attractive Financial incentives across the Shipbuilding lifecycle to augment project economics, approved budget of ₹ 69,725 Cr

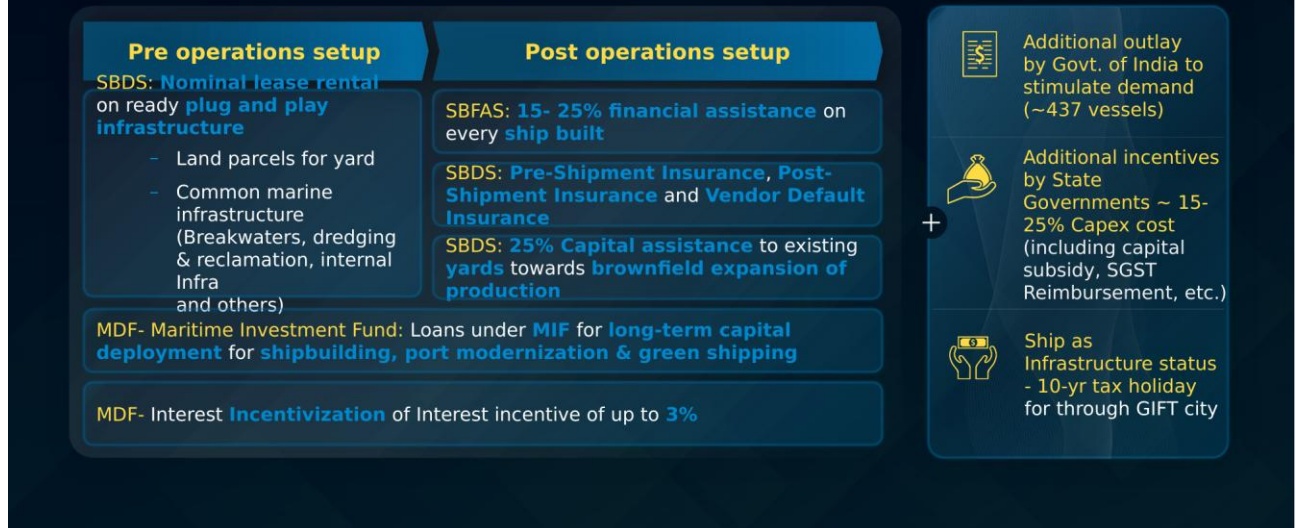


Exhibit 3.2: Financial incentives mapped across the shipbuilding lifecycle

At the pre-operations stage, before a yard has built anything, the binding constraints are land and marine access. Under the Shipbuilding Development Scheme, a yard entering a greenfield cluster obtains land parcels together with ready plug-and-play infrastructure at nominal lease rental, and the common marine infrastructure on which its operations depend, including breakwaters, dredging and reclamation and internal infrastructure, is provided rather than financed by the yard. This removes from the yard the single largest and least bankable element of shipbuilding capital cost.

At the post-operations stage, once the yard is building, four instruments apply. The Shipbuilding Financial Assistance Scheme provides 15 to 25 per cent financial assistance on every ship built. The Shipbuilding Development Scheme provides risk cover through pre-shipment insurance, post-shipment insurance and vendor default insurance, addressing the counterparty and execution risks that make shipbuilding difficult to finance conventionally. For existing yards, the same scheme provides 25 per cent capital assistance towards brownfield expansion of production capacity. The Maritime Development Fund provides loans through the Maritime Investment Fund for long-term capital deployment across shipbuilding, port modernisation and green shipping, together with an interest incentive of up to 3 per cent.

Three further elements sit outside the four pillars but materially affect project economics. The first is additional outlay by the Government of India to stimulate demand, covering approximately 437 vessels, which is the demand aggregation programme examined in section 7. The second is additional incentive from state governments, estimated at 15 to 25 per cent of capital expenditure through mechanisms including

capital subsidy and reimbursement of state goods and services tax. The third is the extension of infrastructure status to ships, which enables a ten-year tax holiday through GIFT City.

Taken together, these interact multiplicatively rather than additively. A yard in a greenfield cluster receives infrastructure at nominal cost from the Centre, capital subsidy from the state, concessional debt and interest support from the Maritime Development Fund, per-vessel assistance under the Shipbuilding Financial Assistance Scheme, insurance cover against execution risk, a visible order pipeline through demand aggregation, and favourable tax treatment on the resulting asset. It is the combination, rather than any single instrument, that is intended to close the competitiveness gap against established yards operating at far greater scale.

4.4. Pillar 1: Shipbuilding Financial Assistance Scheme

Scheme composition and the assistance rate structure

The Shipbuilding Financial Assistance Scheme is the instrument that addresses the unit economics of vessel construction. Its purpose is to bridge the cost differential between an Indian yard and an established international competitor on each individual vessel, rather than to subsidise the yard as an enterprise. The approved outlay of \$2.7 Bn comprises three components: approximately \$2.3 Bn for the extension of the financial assistance scheme itself, \$0.44 Bn for the Ship Recycling Credit Note, and approximately \$0.02 Bn for the establishment of the National Shipbuilding Mission.

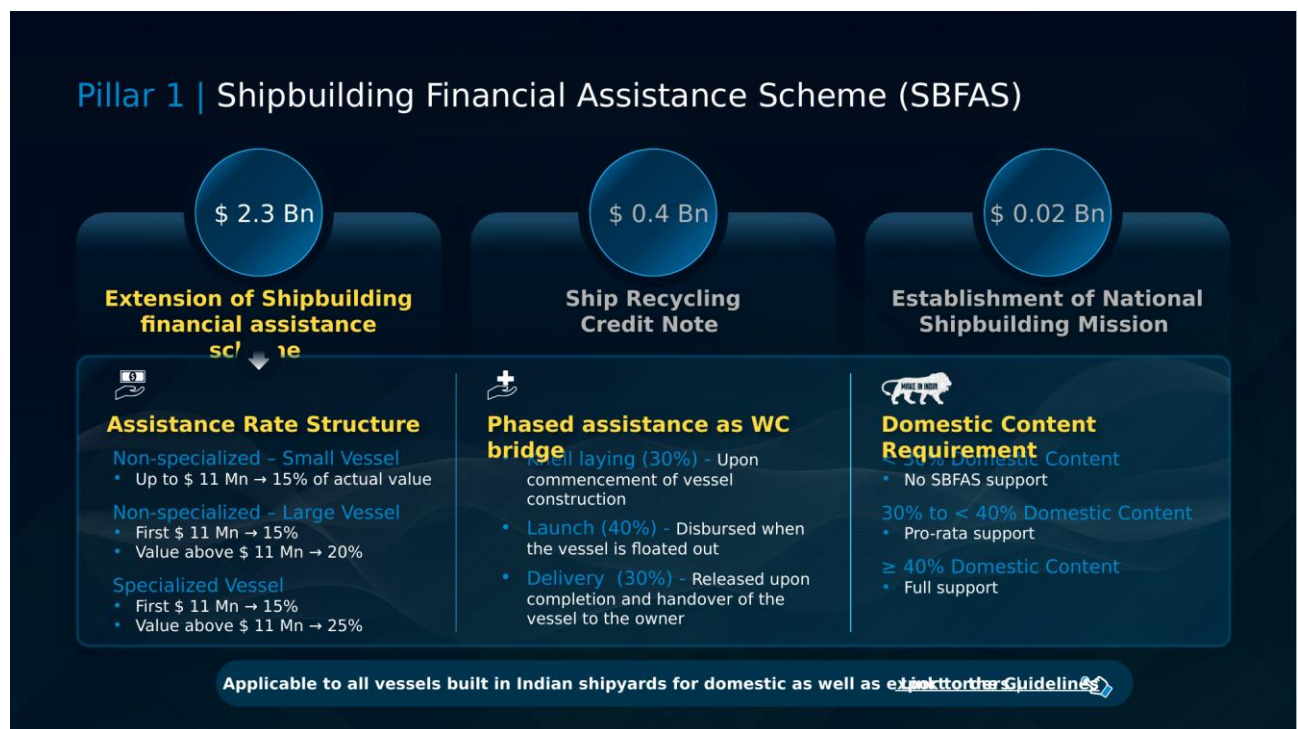


Exhibit 4.1: Shipbuilding Financial Assistance Scheme: composition and assistance structure

The assistance rate structure is tiered by vessel type and by contract value, and is deliberately weighted towards larger and more specialised vessels.

Vessel category	First \$11 Mn of value	Value above \$11 Mn
Non-specialised, small vessel (up to \$11 Mn)	15% of actual value	Not applicable
Non-specialised, large vessel	15%	20%
Specialised vessel	15%	25%

Table 4.1: Assistance rate structure under the Shipbuilding Financial Assistance Scheme

The structure carries a clear intent. A small non-specialised vessel attracts 15 per cent. A large non-specialised vessel attracts 15 per cent on the first \$11 Mn and 20 per cent thereafter. A specialised vessel attracts 15 per cent on the first tranche and 25 per cent on the balance. The marginal rate therefore rises with both size and specialisation, which aligns the incentive precisely with the demand analysis in sections 2.3 and 2.5: larger vessels are where replacement demand is concentrated, and specialised vessels are where margin is available. A yard that responds rationally to this rate structure will build the vessels that the market analysis indicates it should build.

Disbursement is phased against construction milestones, with 30 per cent released on keel laying when vessel construction commences, 40 per cent on launch when the vessel is floated out, and 30 per cent on delivery when the completed vessel is handed over to the owner. The phasing is significant beyond its administrative function. Shipbuilding is working capital intensive, with expenditure incurred across a multi-year build against payment terms that are typically back-loaded. By releasing 70 per cent of assistance before delivery, the scheme functions as a working capital bridge rather than solely as a terminal subsidy, which improves the financing profile of each contract.

Assistance is conditioned on domestic content. A vessel with less than 30 per cent domestic content receives no support. Between 30 per cent and 40 per cent, support is pro-rated. At 40 per cent or above, full support applies. This condition is the mechanism by which the scheme guards against a superficial form of success in which Indian yards become assembly points for imported packages, generating tonnage and employment at the yard while leaving the value chain offshore. The threshold connects this pillar directly to the component manufacturing agenda in section 8: unless domestic component capability develops, yards will struggle to clear the 40 per cent threshold and will receive only pro-rated support.

The scheme applies to all vessels built in Indian shipyards, for domestic and export orders alike. This is a material design choice. Restricting assistance to domestic orders would have tied Indian yards to the scale of Indian demand; extending it to exports

permits yards to compete for the international backlog identified in section 2.2, which is where the volume lies.

The Ship Recycling Credit Note: a global first

Within the Shipbuilding Financial Assistance Scheme, the Ship Recycling Credit Note is a distinct instrument and is described in the address as a global first. \$0.44 Bn has been allocated to it, with validity of ten years running from 24 September 2025 to 31 March 2036.

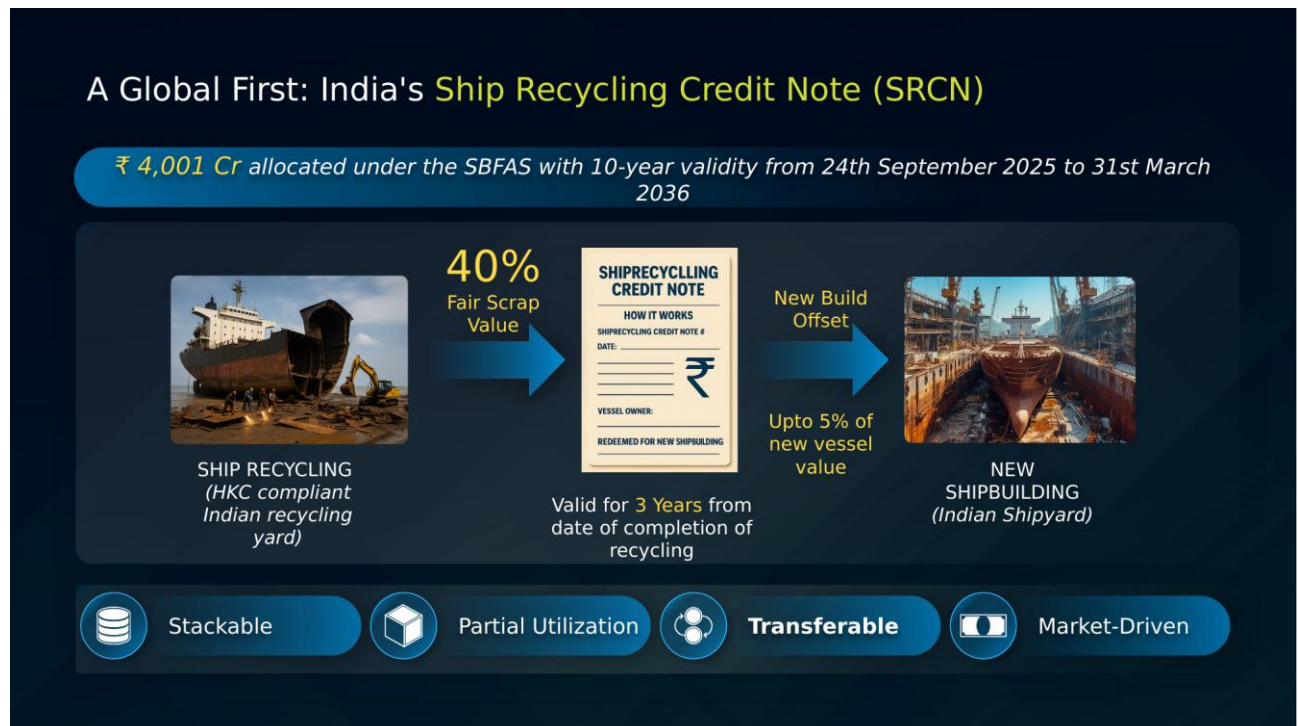


Exhibit 4.3: Structure of the Ship Recycling Credit Note

The mechanism links two activities that have historically been treated as unrelated. When a vessel is recycled at a Hong Kong Convention compliant ship recycling yard in India, the owner becomes entitled to a credit note valued at 40 per cent of the fair scrap value of that vessel. The credit note may then be applied as an offset against the cost of a new vessel built at an Indian shipyard, up to a limit of 5 per cent of the new vessel value.

The instrument carries five design features that materially widen its usefulness. It is valid for three years from the date of completion of recycling, which allows the owner time to place a newbuild order rather than requiring simultaneous transactions. It is stackable, so credit notes from multiple recycled vessels may be combined against a single newbuild. It permits partial utilisation, so a credit note need not be exhausted in one transaction. It is transferable, so an owner who recycles but does not intend to order a new vessel may transfer the entitlement to one who does. And its valuation is market-driven, being derived from published scrap prices rather than from an administratively fixed figure.

The strategic reasoning behind the instrument rests on India's position at both ends of the vessel lifecycle. India is already a leading global destination for ship recycling. It is not yet a significant shipbuilding nation. The credit note converts the established position into support for the aspirational one, by giving the owner of a vessel reaching the end of its life a financial reason to route both the disposal and the replacement through India. The transferability provision is what makes this work in practice, because the population of owners recycling tonnage and the population ordering new tonnage do not fully overlap; without transferability the instrument would only assist owners who happened to be doing both at once.

The requirement that recycling take place at a Hong Kong Convention compliant yard adds a second policy objective. It converts the credit note into an incentive for continued upgrading of Indian recycling yards to international environmental and safety standards, since only compliant yards can generate the entitlement. The instrument therefore advances shipbuilding capacity, recycling standards and lifecycle retention of value within India simultaneously.

Eligibility, valuation and redemption under the SRCN

The operating rules of the credit note are set out across three dimensions: which vessels qualify, how the credit is valued, and on what conditions it may be redeemed.

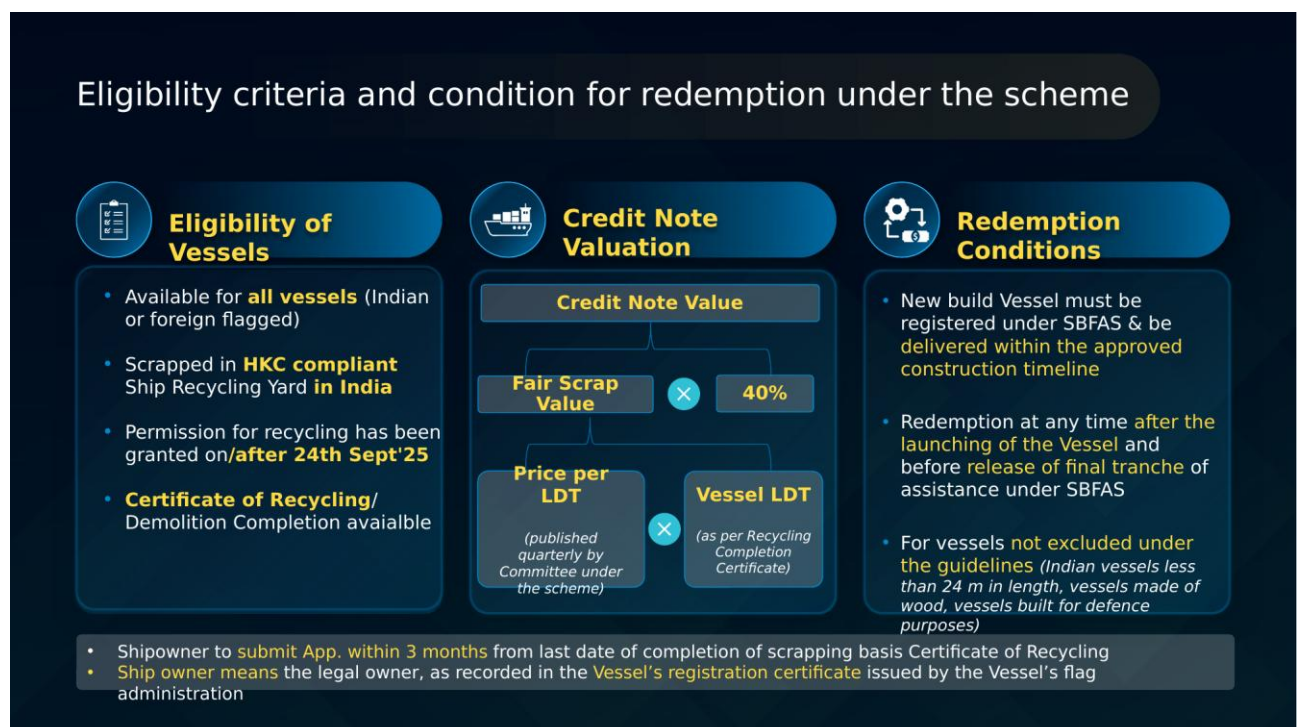


Exhibit 4.4: Eligibility, valuation and redemption conditions under the SRCN

Eligibility on the recycling side. The credit note is available in respect of all vessels, whether Indian or foreign flagged. The vessel must be scrapped at a Hong Kong Convention compliant ship recycling yard in India, permission for recycling must have

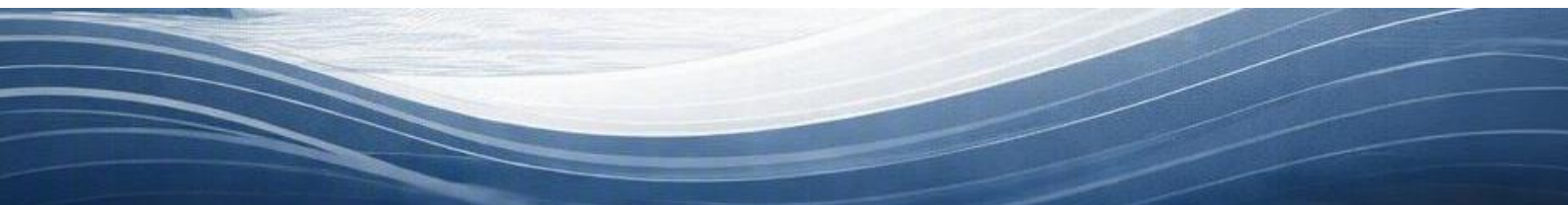
been granted on or after 24 September 2025, and a certificate of recycling or demolition completion must be available. The extension to foreign flagged vessels is a significant widening of scope, since it allows the instrument to draw international recycling volumes into Indian yards rather than merely redistributing domestic tonnage.

Eligibility on the newbuild side. The new vessel against which the credit is applied must be registered under the Shipbuilding Financial Assistance Scheme and must be delivered within the approved construction timeline. Certain vessels are excluded, namely Indian vessels of less than 24 metres in length, vessels constructed of wood, and vessels built for defence purposes.

Valuation. The credit note value is 40 per cent of the fair scrap value of the recycled vessel. Fair scrap value is itself the product of two variables: the light displacement tonnage of the vessel as recorded in the recycling completion certificate, and the price per light displacement tonne published quarterly by the committee constituted under the scheme. Anchoring the calculation to a quarterly published price rather than a fixed administrative rate means the entitlement tracks the scrap market, protecting the value of the instrument against price movement in either direction across a ten-year scheme life.

Redemption. Redemption may be effected at any time after the launching of the new vessel and before the release of the final tranche of assistance under the Shipbuilding Financial Assistance Scheme. Since the final tranche represents 30 per cent released on delivery, this defines a redemption window running from float-out to handover. The shipowner must submit the application within three months from the last date of completion of scrapping, on the basis of the certificate of recycling. For these purposes the shipowner means the legal owner as recorded in the vessel registration certificate issued by the flag administration of the vessel.

The three-month application deadline and the launch-to-delivery redemption window together impose a discipline on the instrument. The entitlement must be claimed promptly after recycling, and applied within a defined phase of the newbuild programme. This prevents the accumulation of a large stock of undated credit notes that would create an open-ended contingent liability against the \$0.44 Bn allocation, while the three-year validity still allows sufficient commercial flexibility for an owner to sequence disposal and replacement.



4.5. Pillar 2: Maritime Development Fund

Fund architecture, priority sectors and instruments

The second pillar addresses capital. Shipbuilding is capital intensive, has long gestation, and presents a risk profile that Indian commercial lenders have historically been reluctant to underwrite. The Maritime Development Fund is capitalised at \$2.8 Bn, with budgetary support extending from financial year 2026 to financial year 2036. The contribution of the Government of India is held and managed by the Shipping Maritime Finance Corporation Limited in a fiduciary capacity, within an Alternative Investment Fund structure. Against the public contribution the fund is structured to mobilise private capital, with the indicative split being 49 per cent public and 51 per cent private.

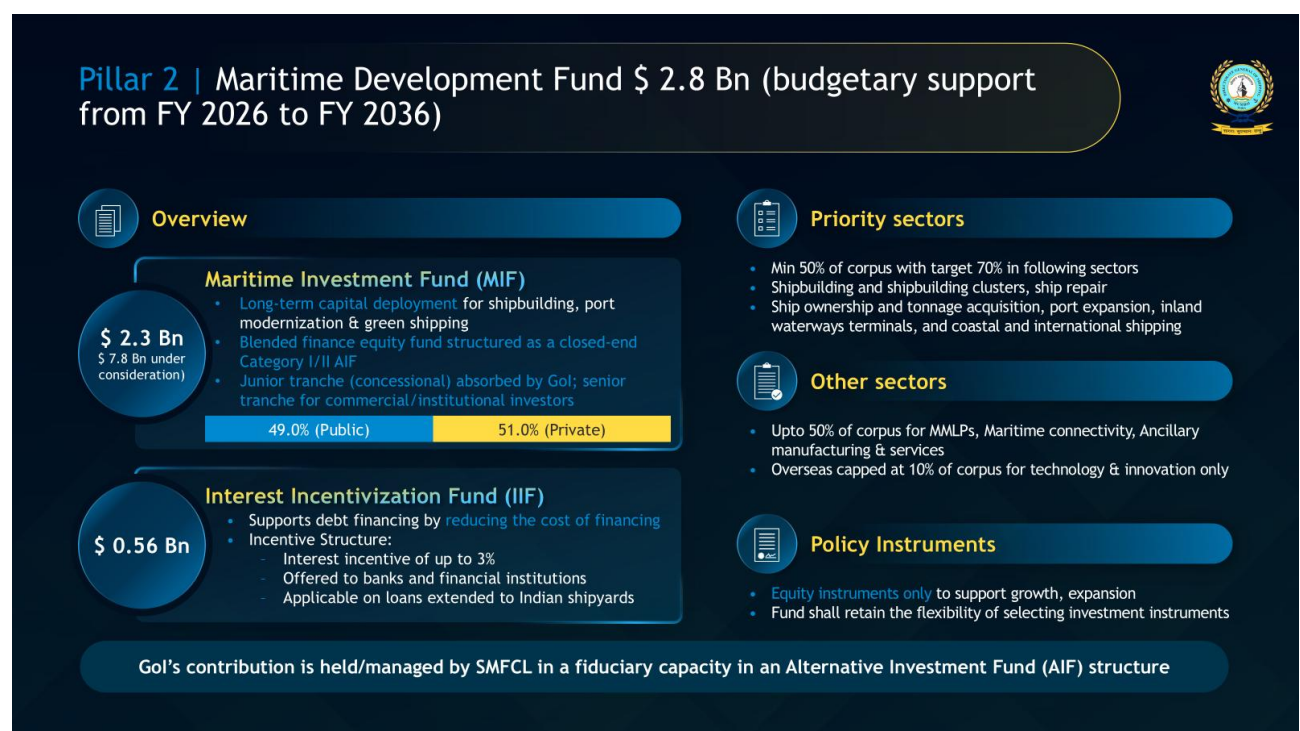


Exhibit 5.1: Maritime Development Fund: structure, sectors and instruments

The fund operates through two distinct sub-instruments addressing equity and debt respectively.

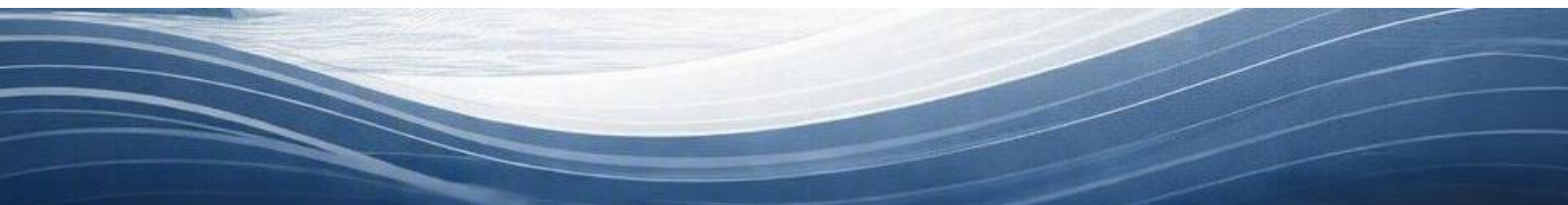
The Maritime Investment Fund, \$2.2 Bn. This is a blended finance equity fund structured as a closed-end Category I or Category II Alternative Investment Fund. Its purpose is long-term capital deployment across shipbuilding, port modernisation and green shipping. The blended structure is the essential feature: the junior tranche, which bears first loss and is therefore concessional, is absorbed by the Government of India, while the senior tranche is offered to commercial and institutional investors. This allocation of risk is what permits the 51 per cent private participation. Institutional investors are not being asked to underwrite the full risk of a nascent shipbuilding sector;

they are being offered a senior position behind a government-funded first loss cushion. Against the \$2.2 Bn committed to the fund, the presentation records a further \$7.8 Bn as being under consideration, which indicates the scale of investment the instrument is ultimately intended to mobilise.

The Interest Incentivization Fund, \$0.56 Bn. This instrument addresses the cost rather than the availability of debt. It provides an interest incentive of up to 3 per cent, offered to banks and financial institutions and applicable on loans extended to Indian shipyards. Its function is to reduce the effective cost of financing and thereby support debt provision to the sector. At an incentive of up to 3 per cent, a \$0.56 Bn allocation can support a considerably larger stock of underlying debt, which is the leverage the instrument is designed to achieve.

Deployment of the corpus is governed by sectoral rules. A minimum of 50 per cent of the corpus, with a target of 70 per cent, is to be deployed in priority sectors. These comprise shipbuilding and shipbuilding clusters and ship repair; and ship ownership and tonnage acquisition, port expansion, inland waterways terminals, and coastal and international shipping. Up to 50 per cent of the corpus may be deployed in other sectors, comprising multimodal logistics parks, maritime connectivity, and ancillary manufacturing and services. Overseas deployment is capped at 10 per cent of the corpus and is confined to technology and innovation.

On policy instruments, the fund is to use equity instruments to support growth and expansion, while retaining flexibility in the selection of investment instruments. The combination of a stated minimum for priority sectors and a higher target creates a governance structure in which the fund is bound to concentrate on shipbuilding and adjacent maritime activity while retaining the latitude to deploy across the wider ecosystem where that supports the primary objective. The narrow overseas allowance confined to technology and innovation is consistent with the technology transfer logic underlying the anchor partnership approach described in section 2.5.



4.6. Pillar 3: Shipbuilding Development Scheme

Scheme composition and allocation of \$2.2 Bn

The third pillar addresses physical capacity. Favourable unit economics and available capital are of no consequence if there is no yard capable of building vessels of the size and complexity the market requires. The Shipbuilding Development Scheme is allocated \$2.2 Bn with a validity of ten years, running until 31 March 2036.



Exhibit 6.1: Shipbuilding Development Scheme: allocation by component

Component	Allocation
Capital support for greenfield capacity expansion	\$1,110 Mn
Capital assistance to existing and brownfield shipyards towards expansion of production capacity	\$917 Mn
Shipbuilding risk coverage: pre-shipment insurance, post-shipment insurance and vendor default insurance	\$160 Mn
Capability development initiatives, including establishment of the India Ship Technology Centre	\$34 Mn
Administrative expenses	\$5 Mn
Total	\$2.2 Bn

Table 6.1: Allocation of the Shipbuilding Development Scheme by component

The allocation reveals the strategic balance the scheme strikes. Greenfield and brownfield together account for \$2,027 Mn, or approximately 91 per cent of the total, so the scheme is overwhelmingly a capacity creation instrument. Within that, greenfield receives \$1,110 Mn and brownfield \$917 Mn, a near-even division that reflects a considered choice: neither approach alone is sufficient.

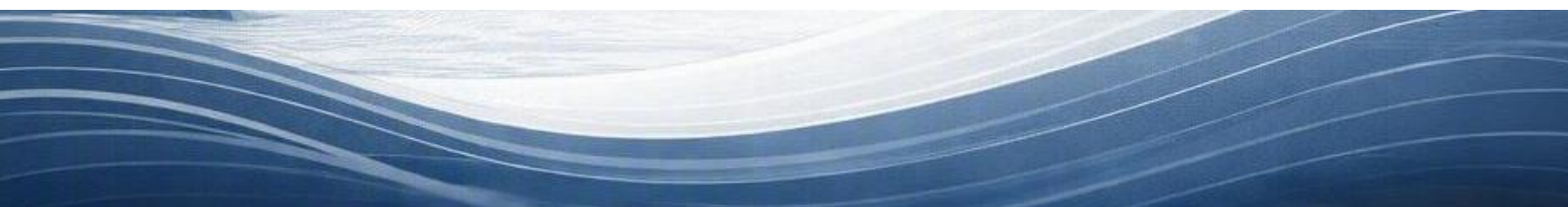
The reasoning is one of timing. Greenfield clusters can be designed from the outset for the large vessels that section 2.3 identifies as the growth segment, unconstrained by the dimensions of legacy facilities, but they take years to build. Brownfield expansion at existing yards can deliver incremental capacity considerably faster, because the yard, workforce and supply relationships already exist, but it is bound by the physical envelope of the site. Funding both allows near-term capacity to come from brownfield expansion while the greenfield clusters are under construction, which matters given the cyclical window discussed in section 2.2.

The \$160 Mn for risk coverage is small in proportion but addresses a specific market failure. Pre-shipment, post-shipment and vendor default insurance cover the risks that make shipbuilding contracts difficult to finance: that the yard fails to complete, that the buyer fails to take delivery, or that a critical supplier defaults. In the absence of such cover, lenders price these risks into the cost of debt or decline the exposure altogether. Providing the cover from public funds is a more capital-efficient intervention than subsidising the resulting interest cost.

The \$34 Mn for capability development, principally the India Ship Technology Centre, addresses the design and engineering capability that section 2.5 identifies as a binding constraint. The sum is modest relative to the scheme total but is directed at the element least amenable to purchase. Physical capacity can be built and capital can be raised; design and production engineering competence accumulates through practice and institutional continuity.

Greenfield clusters: objective, structure and conditions

The greenfield component is the more ambitious half of the Shipbuilding Development Scheme, and its design reflects the conclusion that India requires not simply new shipyards but complete industrial ecosystems around them.



Key highlight and components funded by the SBDS Greenfield scheme

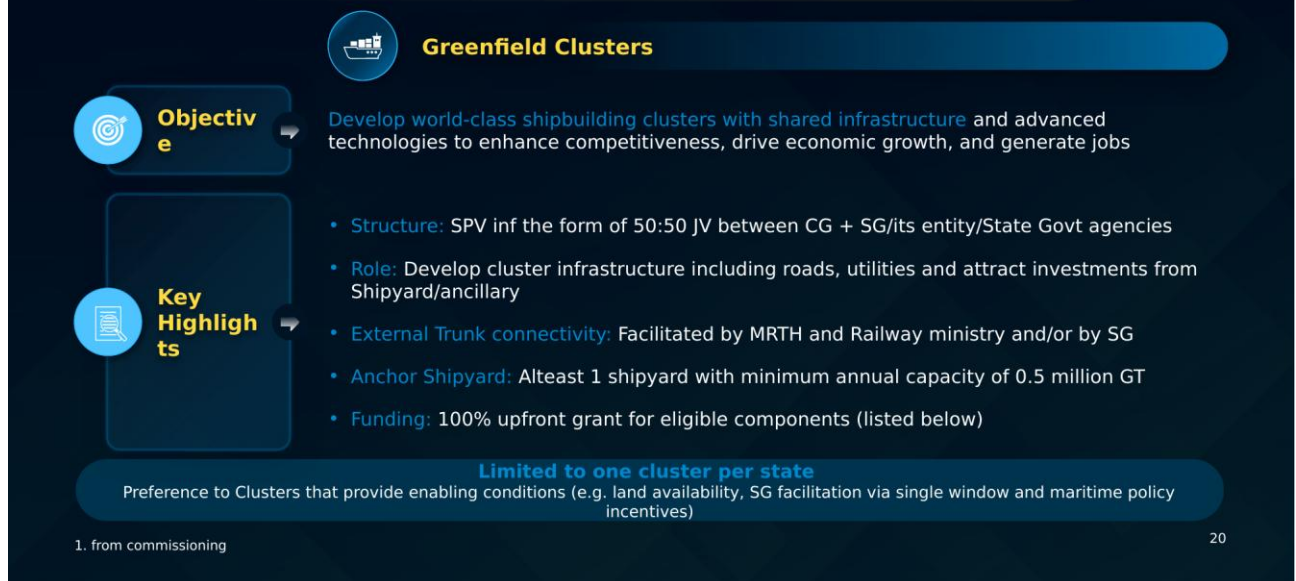


Exhibit 6.2: Greenfield cluster scheme: objective and key highlights

The stated objective is to develop world-class shipbuilding clusters with shared infrastructure and advanced technologies, in order to enhance competitiveness, drive economic growth and generate employment. The choice of a cluster model rather than standalone yards follows from the economics of shipbuilding. A yard depends on a tier of component suppliers, on block fabrication capacity, on heavy lift and marine support assets, and on a resident workforce. Where these are co-located, shared assets are used efficiently and connectivity infrastructure serves multiple users. Where a yard stands alone, each of these must be duplicated or procured at distance.

Institutional structure. Each cluster is developed by a Special Purpose Vehicle constituted as a 50:50 joint venture between the Central Government and the State Government or their respective entities or agencies. The Special Purpose Vehicle develops the cluster infrastructure, including internal roads and utilities, and is responsible for attracting investment from shipyards and ancillary industry. The joint venture structure aligns the two levels of government whose cooperation the project requires: the Centre brings the capital assistance, and the State brings land, clearances and policy facilitation.

External connectivity. Trunk connectivity beyond the cluster boundary is facilitated by the Ministry of Road Transport and Highways and the Ministry of Railways, and by the State Government. This is a deliberate allocation of responsibility. A cluster is only as useful as its links to the hinterland from which components, steel and labour arrive, and those links lie outside the remit of the Special Purpose Vehicle.

Anchor shipyard requirement. Each cluster must have at least one anchor shipyard with a minimum annual capacity of 0.5 million gross tonnes. This is the single most consequential condition in the scheme. It ensures that the cluster is built around a yard of genuine scale rather than an aggregation of small operators, and it is calibrated to the vessel size analysis in section 2.3. A yard of 0.5 million gross tonnes annual capacity is capable of building the large tonnage in which replacement demand is concentrated.

Funding. The scheme provides a 100 per cent upfront grant for eligible components, which are enumerated in section 6.3. Full central funding of common infrastructure removes from the anchor investor the cost that is hardest to justify commercially, since breakwaters and dredged channels are shared assets whose benefit cannot be fully appropriated by any single user.

Selection conditions. Support is limited to one cluster per state, with preference accorded to clusters that provide enabling conditions, including availability of land, State Government facilitation through a single window mechanism, and maritime policy incentives. The one-cluster-per-state limit prevents dilution of the allocation across too many sites, while the preference criteria create competitive pressure among states to improve their offer. Section 6.5 shows this operating in practice.

Common maritime infrastructure funded by the Centre

The 100 per cent upfront grant applies to five categories of common infrastructure, all of which are developed by the Special Purpose Vehicle and held for shared use across the cluster.



Exhibit 6.3: The five categories of common infrastructure funded under the greenfield scheme

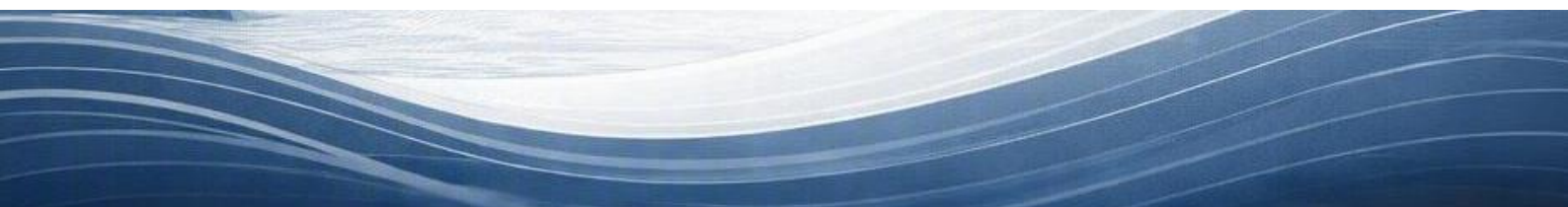
- Breakwaters, tide-independent basins and wave breakers. These provide the sheltered water without which vessel construction, launch and outfitting cannot proceed reliably through the year, and they are the classic instance of infrastructure whose cost no single yard can carry alone.
- Channel and basin development, comprising capital dredging, land reclamation, area grading and turning basins. This determines the maximum vessel size the cluster can physically handle, and therefore directly governs whether the site can serve the large-vessel demand identified in section 2.3.
- Regional shipbuilding capability development centres, providing skill training, research and development, green shipbuilding technology and certification facilities. These address the workforce and technology constraint at cluster level rather than leaving each yard to solve it independently.
- Common maritime assets, comprising shared floating cranes, barges, tugs and auxiliary marine craft serving the cluster. Such assets are registered under the Special Purpose Vehicle and used collectively for heavy lift, transport, assembly and vessel movement, and are admissible only as common-use cluster infrastructure approved by the National Shipbuilding Mission.
- Internal infrastructure, utilities and land development, including site development, rail and road connectivity within the cluster, utilities such as water supply, power distribution, drainage and firefighting systems, and social infrastructure including medical and dining facilities.

Funding is backed by 100 per cent upfront capital assistance and governed through milestone-linked release of funds with independent monitoring. The Special Purpose Vehicle oversees cluster-wise development and commences construction of the common structures. Certain items are explicitly excluded from the grant, namely the human resources of the Special Purpose Vehicle, operations and maintenance expenditure, maintenance dredging, and the cost of land, which is instead transferred to the Special Purpose Vehicle by the State Government at a nominal consideration of one rupee.

The exclusions are as instructive as the inclusions. By funding capital creation but not operation and maintenance, the scheme requires each Special Purpose Vehicle to establish a revenue model, principally through lease rentals from the anchor shipyard and ancillary units, sufficient to sustain the asset base it has been given. This is a deliberate guard against the creation of publicly funded infrastructure that subsequently deteriorates for want of a maintenance income.

Cluster locations and site characteristics

Five cluster locations across five coastal states are presently envisaged. Their physical characteristics are set out below.



Multiple shipbuilding clusters in India envisioned across strategic locations

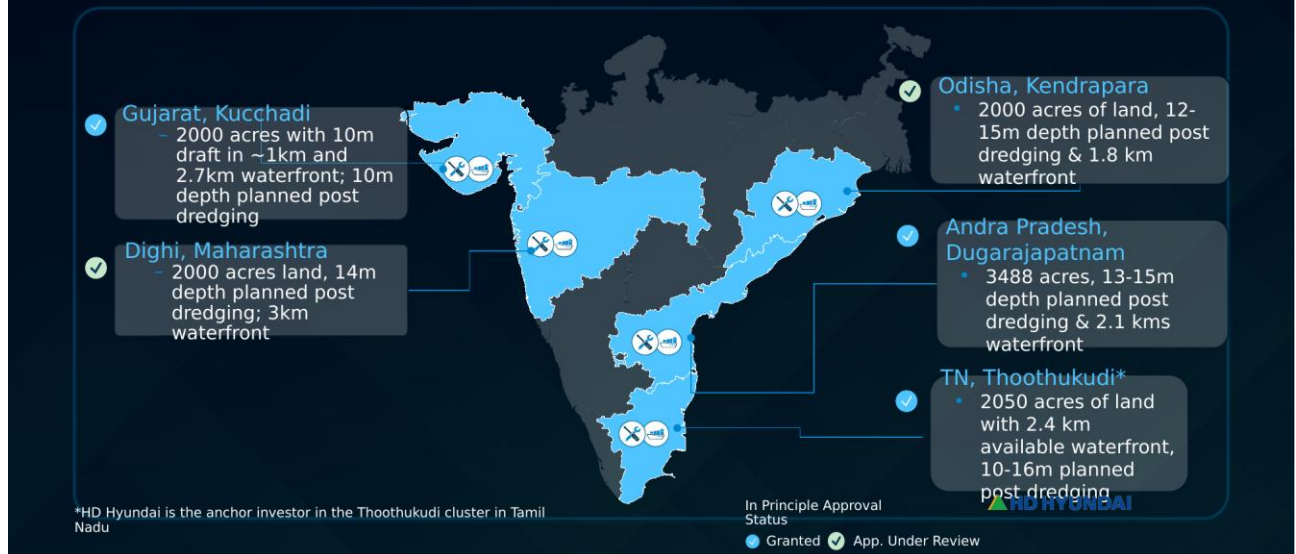


Exhibit 6.4: Envisaged shipbuilding cluster locations across coastal states

State and location	Land area	Planned depth post-dredging	Waterfront
Andhra Pradesh, Dugarajapatnam	3,488 acres	13 to 15 metres	2.1 km
Tamil Nadu, Thoothukudi	2,050 acres	10 to 16 metres	2.4 km
Odisha, Kendrapara	2,000 acres	12 to 15 metres	1.8 km
Maharashtra, Dighi	2,000 acres	14 metres	3.0 km
Gujarat, Kucchadi	2,000 acres	10 metres	2.7 km

Table 6.2: Site characteristics of the envisaged shipbuilding clusters

The sites are broadly comparable in scale, at 2,000 acres or more, with Dugarajapatnam the largest at 3,488 acres. Planned depths after dredging range from 10 to 16 metres and waterfronts from 1.8 to 3 kilometres. These parameters are consistent with the requirement to build vessels above 100 metres in length overall and above 10,000 deadweight tonnes, which section 2.3 identified as the growth segment of the market. The Gujarat site at Kucchadi is noted as presently offering a 10 metre draft over approximately one kilometre, with 10 metre depth planned after dredging.

The geographic distribution across the eastern seaboard at Dugarajapatnam and Kendrapara, the western seaboard at Dighi and Kucchadi, and the southern tip at Thoothukudi is strategically deliberate. It positions capacity to serve distinct trade routes,

spreads exposure to weather and cyclone risk, and distributes the industrial and employment benefit across five coastal states, which supports the political sustainability of a programme spanning a decade.

HD Hyundai is recorded as the anchor investor in the Thoothukudi cluster in Tamil Nadu. This is a material development in relation to the analysis in section 2.5, which identified anchor partnerships with Korean original equipment manufacturers as the route to large conventional vessel capability and named HD Hyundai specifically. The commitment demonstrates that the anchor investor model is attracting participation from precisely the class of partner the strategy contemplates, rather than remaining an aspiration.

On in-principle approval status, the presentation distinguishes between clusters where approval has been granted and those where the application remains under review. The state-level position is set out in section 6.5.

State readiness and institutional preparedness

The greenfield model depends on state-level execution, since the State Government provides land, clearances and fiscal incentives, and holds half the equity of the Special Purpose Vehicle. The presentation therefore assesses readiness across the five participating states along four dimensions: the status of the Special Purpose Vehicle, availability of the Techno Economic Feasibility Report, in-principle approval, and state policy.

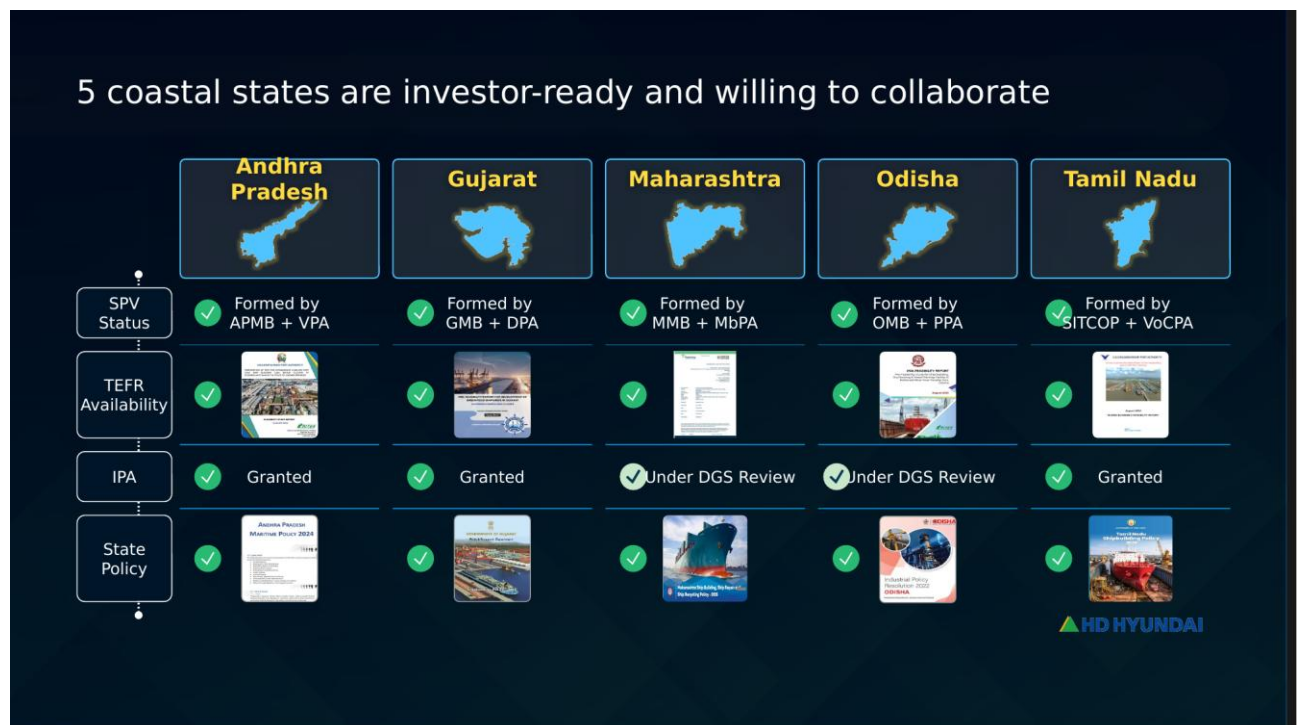


Exhibit 6.5: Readiness of the five participating coastal states

State	Special Purpose Vehicle constituted by	In-principle approval
Andhra Pradesh	Andhra Pradesh Maritime Board and Visakhapatnam Port Authority	Granted
Gujarat	Gujarat Maritime Board and Deendayal Port Authority	Granted
Tamil Nadu	SITCOP and V.O. Chidambaranar Port Authority	Granted
Maharashtra	Maharashtra Maritime Board and Mumbai Port Authority	Under review by the DGMA
Odisha	Odisha Maritime Board and Paradip Port Authority	Under review by the DGMA

Table 6.3: Special Purpose Vehicle composition and approval status by state

All five states have constituted their Special Purpose Vehicles, and in each case the vehicle pairs the State Maritime Board with a major port authority. This is a well-judged pattern. The State Maritime Board brings state jurisdiction over land, coastal regulation and state policy; the port authority brings marine engineering capability, existing waterfront assets and experience of operating regulated marine infrastructure. Neither institution alone possesses the full range of competence required.

In-principle approval has been granted for Andhra Pradesh, Gujarat and Tamil Nadu. The applications of Maharashtra and Odisha remain under review by the Directorate General of Shipping. Three of five clusters have therefore cleared the first regulatory gate. The description of all five states as investor-ready and willing to collaborate, taken with the fact that every Special Purpose Vehicle has been constituted, indicates that the constraint at this stage is regulatory processing rather than state-level willingness.

The Techno Economic Feasibility Report is the analytical foundation on which in-principle approval rests. Each report assesses technical suitability, environmental sustainability and financial viability of the proposed site. Priority is accorded to sites where land is available, where preliminary statutory and environmental clearances including environmental clearance, coastal regulation zone clearance, safety and port clearances have been secured, and where implementation readiness can be demonstrated. Feasibility work has been completed for the principal sites, including Dugarajapatnam in Andhra Pradesh, Kendrapara in Odisha, Kucchadi in Gujarat and Thoothukudi in Tamil Nadu.

The brownfield capacity expansion scheme

The second component of the Shipbuilding Development Scheme, allocated \$917 Mn, supports capacity expansion at existing Indian shipyards. Its purpose is to facilitate

capacity augmentation, modernisation and technological upgradation in order to enhance competitiveness and efficiency.

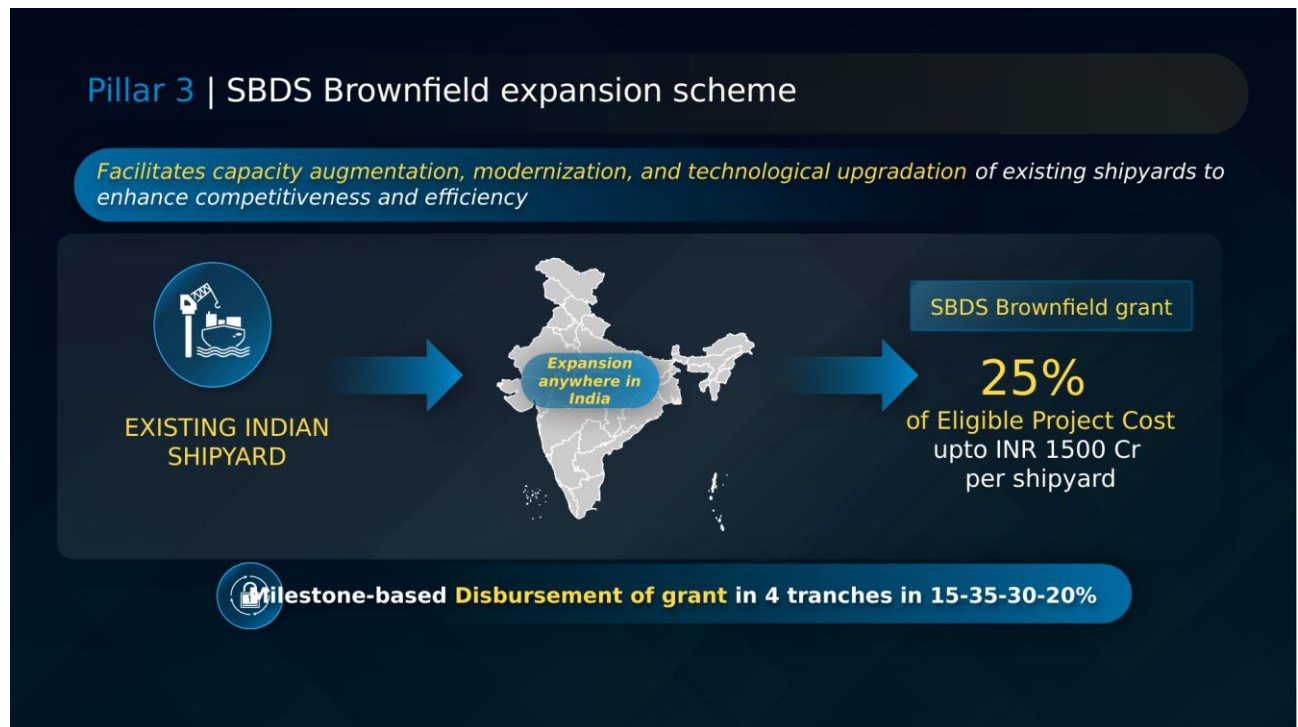


Exhibit 6.6: The brownfield expansion scheme: support structure

The grant covers 25 per cent of eligible project cost, subject to a ceiling of \$167 Mn, or Rs. 1,500 crore, per shipyard, and expansion may be undertaken anywhere in India. Disbursement is milestone based, released in four tranches of 15 per cent, 35 per cent, 30 per cent and 20 per cent.

Three features of this design merit comment. The first is the choice of a 25 per cent grant rather than fuller support. Unlike greenfield common infrastructure, brownfield expansion creates assets whose benefit accrues wholly to the shipyard that owns them. A minority public contribution is therefore appropriate: it improves project returns sufficiently to trigger investment decisions that would otherwise be deferred, while requiring the yard to commit the majority of the capital and thereby retain the commercial discipline of its own exposure.

The second is the per-shipyard ceiling of \$167 Mn. Against an allocation of \$917 Mn, the ceiling ensures that support is distributed across a number of yards rather than concentrated in one or two very large projects. It also implies a maximum supported project size of \$667 Mn, at which point the 25 per cent grant reaches the cap.

The third is the milestone-linked tranche profile, which is deliberately back-weighted in its early stages. Only 15 per cent is released at the first milestone, rising to 35 per cent at the second. This protects public funds against projects that commence but do not progress, while ensuring that the substantial releases occur once execution is

demonstrably underway. The pattern differs from the Shipbuilding Financial Assistance Scheme, where 70 per cent is released before delivery to serve as a working capital bridge. The distinction is appropriate: vessel construction under a signed contract carries a defined counterparty and delivery obligation, whereas capacity expansion carries execution risk against no external commitment.

Eligible and excluded components for brownfield support

The scheme enumerates the facilities eligible for brownfield capital assistance, together with an explicit list of exclusions.

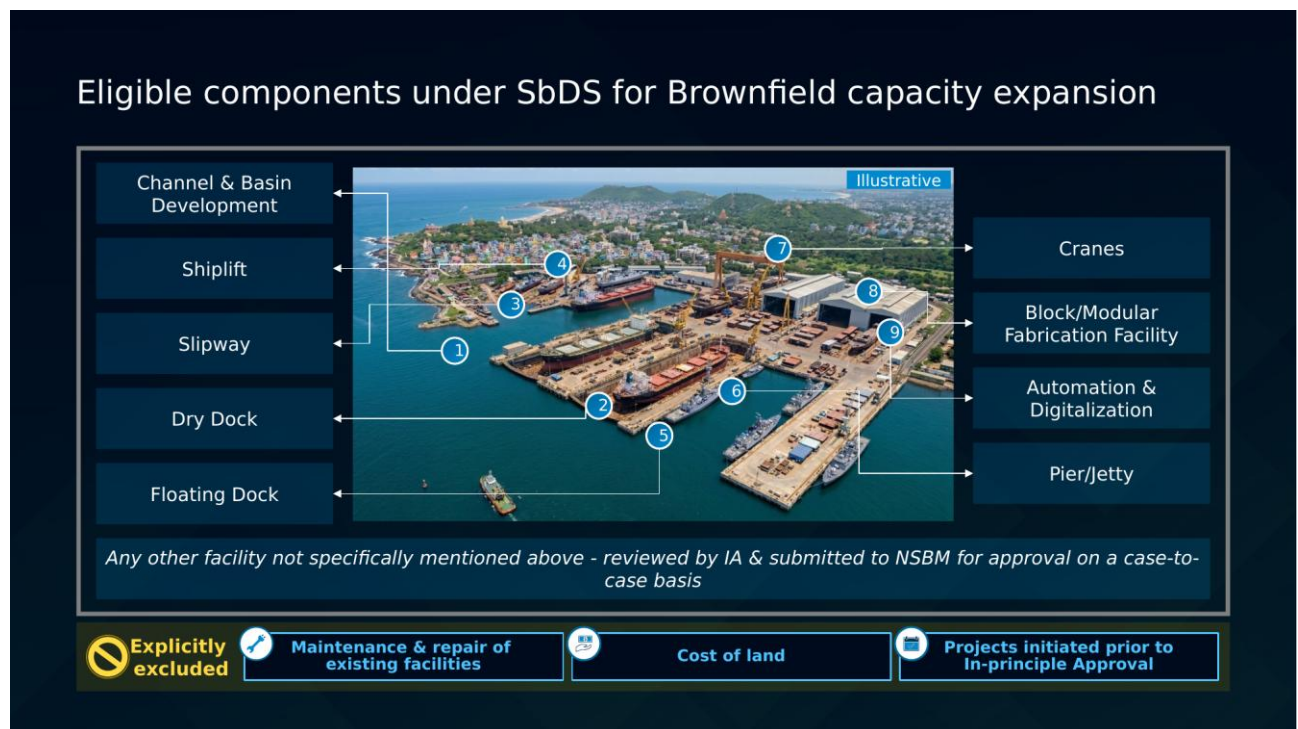


Exhibit 6.7: Eligible and excluded components under the brownfield scheme

The eligible components comprise dry docks, floating docks, slipways, shiplifts, piers and jetties, channel and basin development, block and modular fabrication facilities, cranes, and automation and digitalisation. Any other facility not specifically listed may be considered, subject to review by the implementing agency and submission to the National Shipbuilding Mission for approval on a case-to-case basis.

The composition of this list reflects a coherent view of what constrains an existing yard. Dry docks, floating docks, slipways and shiplifts determine the size of vessel a yard can accommodate and the number it can handle simultaneously. Channel and basin development determines the draft of vessel that can reach the yard at all. Piers and jetties determine outfitting capacity, which is frequently the binding constraint on throughput once hull construction capacity has been expanded. Cranes determine the weight of block that can be lifted, and therefore the degree of pre-outfitting achievable before erection, which is one of the principal determinants of build efficiency. Block and

modular fabrication facilities support the modular construction methods used by competitive international yards. Automation and digitalisation address productivity per worker.

Three items are explicitly excluded: maintenance and repair of existing facilities, projects initiated prior to in-principle approval, and the cost of land. Each exclusion is purposeful. Excluding maintenance ensures that the scheme funds additional capability rather than the upkeep a yard should fund from operations. Excluding projects initiated before in-principle approval ensures that the grant influences investment decisions rather than rewarding those already taken, which is the standard test of whether a subsidy is additional. Excluding land cost avoids the scheme becoming a vehicle for real estate acquisition, and mirrors the equivalent exclusion under the greenfield component.

The brownfield project pipeline

The brownfield component has generated a substantial pipeline. Four in-principle approvals have been issued, one application is under review, and three or more further applications are anticipated. Across eleven identified projects, the presentation records total applications of approximately \$944 Mn, equivalent to about Rs. 8,500 crore as shown on the slide, of which approximately \$239 Mn has received in-principle approval and approximately \$706 Mn is expected from seven shipyards.

4 IPAs issued, 1 app. under review with 3+ apps incoming

~₹8,000 crore Brownfield upgrade opportunities identified across eight 11 projects

	Shipyard	Investment (₹ crore)	Likely submission	Remarks/Project description
1	Titagarh Naval Systems (TNSL)	516	IPA granted	New yard at Falta, 10-12 vessels upto 160m/yr
2	Swan Defence (SDHI)	504	IPA granted	Ph1: Goliath Crane & ELL Crane
			Q4 2026	Ph2: Outfitting workshop & robotics/fabrication
3	Mat Marine	105	IPA granted	SB/SR Infra incl. slipways for +1000 GT/yr
4	Cochin Shipyard limited	920	IPA granted	Ship repair facility at Vadinar along with DPA
		35	App. Submitted	Upgradation of Mangalore facility
5	Synergy Shipbuilders N Dock Works Ltd	110-120 500-550		Upgradation of machine shops, installation of cranes and Shiplift
7	Shoft Shipyard Pvt Ltd	400-500		
7	Chowgule SBD Pvt Ltd	1,500-1,600		DD+ Slipway - from 10,000 to 25,000 DWT
8	L & T Shipbuilding Ltd	—		DPR under preparation, evaluation stage
9	Mandovi Drydocks Ltd	40, 10, 100, 50, 100, 250, 350		Expansion plan at 7 different locations
10	Square Port Shipyard Pvt Ltd	650 (Phase 1) 2,000 (Phase 2)		Ph1: Installation of floating transfer dock & 265 m jetty to handle ships up to 200 m
11	Knowledge Marine & Eng.Works	240-250		DPR under preparation
Total applications worth ~₹8,500 Cr, ~ ₹ 2150 IPA granted and ₹ 6350 apps. expected from 7 Shipyards				

Exhibit 6.8: The brownfield project pipeline by shipyard

Shipyard	Investment (\$ Mn)	Status	Project description
Titagarh Naval Systems	57	IPA granted	New yard at Falta, 10 to 12 vessels up to 160 m per year
Swan Defence	56	IPA granted	Phase 1: Goliath crane and ELL crane
Swan Defence (Phase 2)	To be submitted Q4 2026	Expected	Phase 2: outfitting workshop and robotics or fabrication
Mat Marine	12	IPA granted	Shipbuilding and ship repair infrastructure including slipways for over 1,000 GT per year
Cochin Shipyard	102	IPA granted	Ship repair facility at Vadinar with Deendayal Port Authority
Synergy Shipbuilders N Dock Works	4	Application submitted	Upgradation of Mangalore facility
Continuation of the above	12 to 13 and 56 to 61	Expected	Upgradation of machine shops, installation of cranes and shiplift
Shoft Shipyard	44 to 56	Expected	Not specified in the source
Chowgule SBD	167 to 178	Expected	Dry dock and slipway, from 10,000 to 25,000 DWT
L and T Shipbuilding	Not stated	Expected	Detailed project report under preparation, at evaluation stage
Mandovi Drydocks	4, 1, 11, 6, 11, 28 and 39	Expected	Expansion plan across seven different locations
Square Port Shipyard	72 (Phase 1) and 222 (Phase 2)	Expected	Phase 1: floating transfer dock and 265 m jetty for ships up to 200 m
Knowledge Marine and Engineering Works	27 to 28	Expected	Detailed project report under preparation

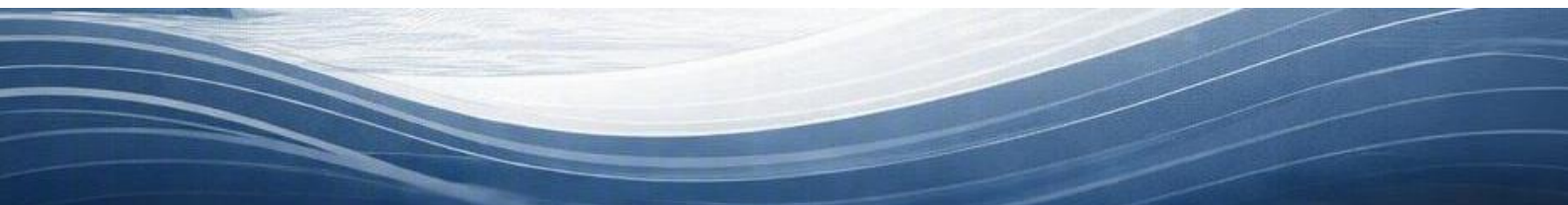
Table 6.4: Brownfield pipeline: shipyards, investment and status

The four projects that have secured in-principle approval, namely Titagarh Naval Systems, Swan Defence, Mat Marine and Cochin Shipyard, together represent approximately \$227 Mn of investment. Their character illustrates the range of the scheme. Titagarh Naval Systems is establishing a new yard at Falta with capacity for 10 to 12 vessels of up to 160 metres a year, which is a substantial addition to Indian capability for mid-sized tonnage. Swan Defence is proceeding in phases, beginning with heavy lift craneage before moving to outfitting and automation. Mat Marine is a smaller intervention addressing slipway capacity. Cochin Shipyard is developing a ship repair

facility at Vadinar in partnership with Deendayal Port Authority, which extends the scheme beyond construction into repair.

The prospective pipeline is more ambitious in scale. Chowgule SBD proposes to raise capability from 10,000 to 25,000 deadweight tonnes, which is a step change in vessel size directly aligned with the analysis in section 2.3. Square Port Shipyard proposes a two-phase development, with Phase 1 comprising a floating transfer dock and a 265 metre jetty capable of handling ships up to 200 metres. Mandovi Drydocks proposes expansion across seven locations. Several applicants, including L and T Shipbuilding and Knowledge Marine and Engineering Works, have detailed project reports under preparation.

Two observations follow. First, the pipeline is geographically dispersed across the eastern and western coasts, which is consistent with the greenfield distribution and reinforces the resilience of the overall capacity build. Second, the aggregate pipeline of approximately \$944 Mn in project investment would attract grant support of approximately 25 per cent, or roughly \$233 Mn, against an allocation of \$917 Mn. The brownfield allocation is therefore not close to being exhausted by the current pipeline, and considerable headroom remains for further applications. Readers should note that the source slide states the total pipeline as approximately \$889 Mn in its heading and approximately \$944 Mn in its footnote; this note uses the latter, which is consistent with the stated split between approved and expected amounts. The point is recorded in section 11.



4.7. Demand Aggregation

The domestic fleet expansion plan

Capacity without orders is a liability rather than an asset. A yard commissioned into an empty order book cannot retain its workforce, service its debt or descend the learning curve on which competitiveness depends. The fourth element of the programme therefore addresses demand directly, by consolidating the tonnage requirements of public sector entities into a visible and time-bound pipeline. The demand aggregation plan was launched in December 2025 and is described in the address as marking a decisive acceleration in India's shipbuilding push.

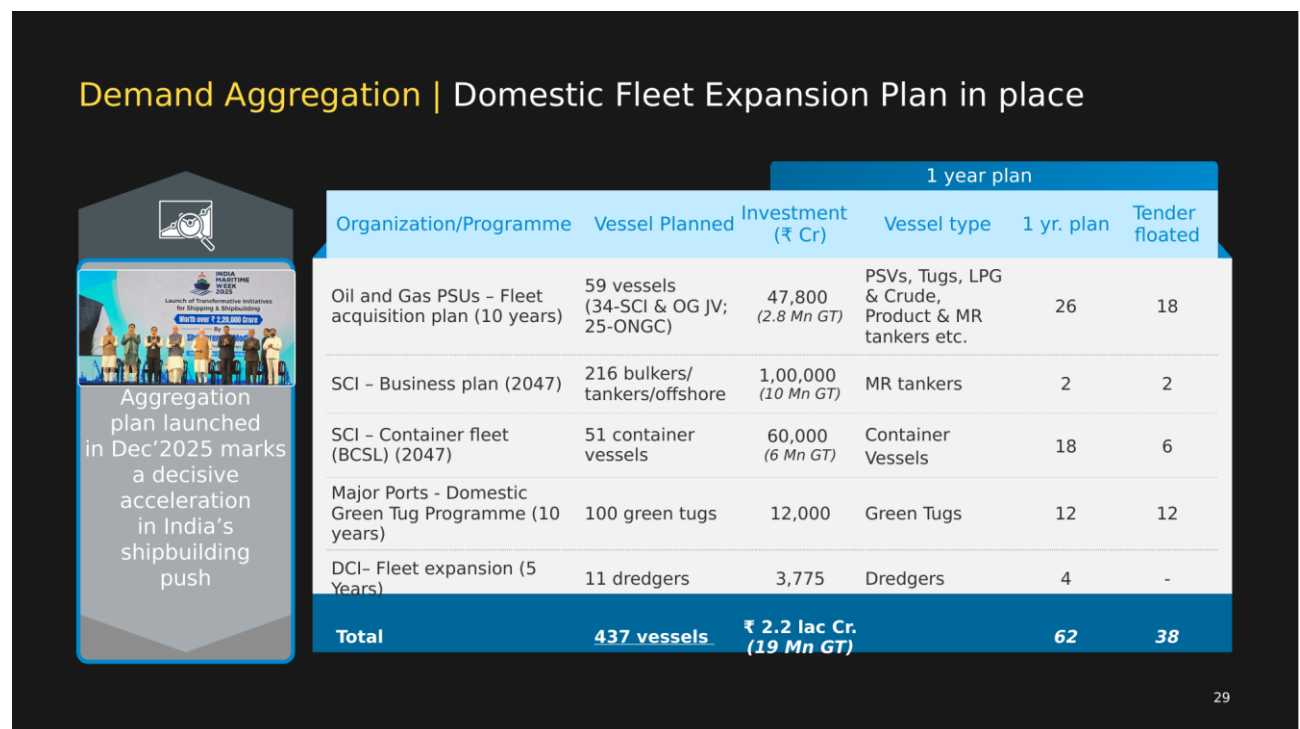


Exhibit 7.1: The domestic fleet expansion plan by organisation and programme

Organisation and programme	Vessels planned	Investment (\$ Bn)	One year plan	Tendered
Oil and gas public sector undertakings, fleet acquisition plan over 10 years	59 vessels (34 with SCI and oil and gas joint venture; 25 with ONGC)	5.3 (2.8 million GT)	26	18
Shipping Corporation of India, business plan to 2047	216 bulkers, tankers and offshore vessels	11.1 (10 million GT)	2	2
Shipping Corporation of India, container fleet through BCSL, to 2047	51 container vessels	6.7 (6 million GT)	18	6

Organisation and programme	Vessels planned	Investment (\$ Bn)	One year plan	Tendered
Major ports, Domestic Green Tug Programme over 10 years	100 green tugs	1.3	12	12
Dredging Corporation of India, fleet expansion over 5 years	11 dredgers	0.4	4	Nil
Total	437 vessels	Approximately 24.8 (19 million GT)	62	38

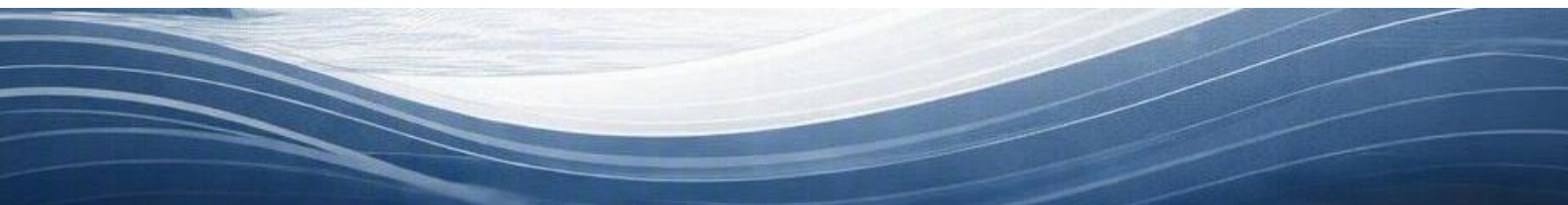
Table 7.1: Domestic fleet expansion plan: vessels, investment and tendering status

The aggregate plan comprises 437 vessels representing approximately \$24.8 Bn of investment, equivalent to about Rs. 2.2 lakh crore as shown on the slide, and 19 million gross tonnes. To place this in proportion, the investment is more than three times the entire approximately \$7.8 Bn public outlay across the four pillars. The demand side of the programme is therefore substantially larger in financial terms than the supply side support, which is as it should be: public funds are being used to make domestic construction viable, while the orders themselves are commercial procurement by entities that require the tonnage in any event.

The composition of the plan is instructive. The Shipping Corporation of India accounts for the largest element, with 216 bulkers, tankers and offshore vessels under its business plan to 2047 at approximately \$11.1 Bn and 10 million gross tonnes, together with 51 container vessels through Bharat Container Shipping Limited at approximately \$6.7 Bn and 6 million gross tonnes. The oil and gas public sector undertakings account for 59 vessels at approximately \$5.3 Bn and 2.8 million gross tonnes, comprising 34 vessels with the Shipping Corporation of India and an oil and gas joint venture and 25 with the Oil and Natural Gas Corporation, spanning platform supply vessels, tugs, liquefied petroleum gas carriers, crude carriers, product tankers and medium range tankers. Major ports account for 100 green tugs at approximately \$1.3 Bn under the Domestic Green Tug Programme, and the Dredging Corporation of India for 11 dredgers at approximately \$0.42 Bn.

The vessel mix maps closely onto the demand analysis in section 2.4. Tankers, bulkers and general cargo tonnage dominate the volume, which corresponds to the categories where global replacement demand is concentrated. Tugs and dredgers, which together account for 111 vessels, correspond to categories where the ageing fleet is large and where Indian yards already possess relevant experience at smaller vessel sizes. Container vessels represent a newer capability. The plan therefore provides both a volume base in familiar categories and a route into more demanding tonnage.

The most important columns of the table are the last two. Of the 437 vessels in the total programme, 62 fall within the one year plan and 38 have already been tendered or floated. This is the difference between an aspiration and a pipeline. The Domestic Green Tug Programme has tendered all 12 vessels in its one year plan, and the oil and gas programme has tendered 18 of 26. The Dredging Corporation of India has four vessels in its one year plan with none yet tendered. That 38 vessels are already in the market provides Indian yards with immediate, contestable order flow rather than a prospective commitment, which is what allows brownfield expansion decisions under section 6.6 to be taken on a commercial basis now.

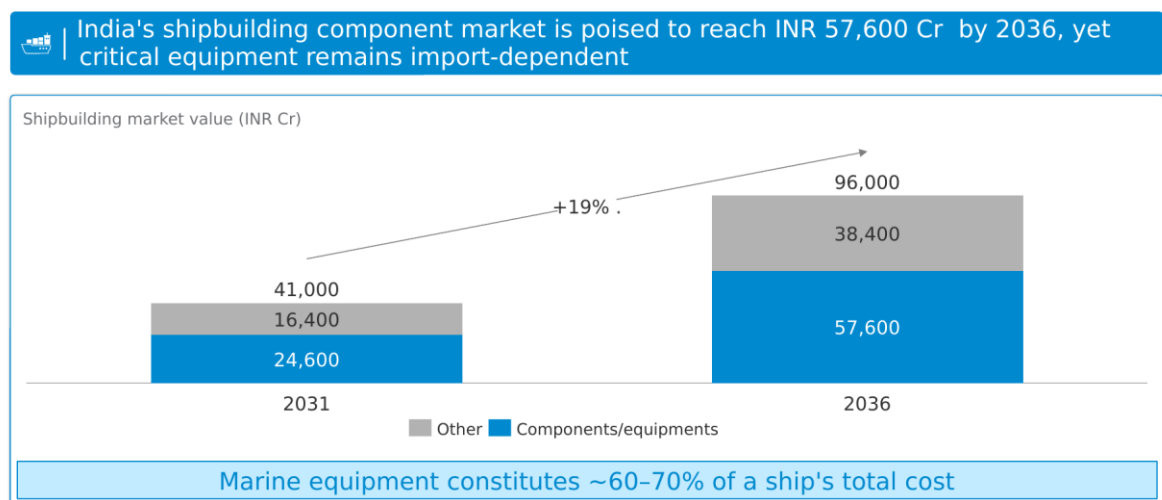


4.8. Ship Component Manufacturing

The component market and the import dependence problem

The preceding sections address the capacity to build vessels and the orders to fill that capacity. This section addresses what those vessels will be built from. It is the element of the programme with the greatest bearing on whether Indian shipbuilding generates domestic industrial value or becomes an assembly operation for imported packages.

Context | Shipbuilding Component Market



31

Exhibit 8.1: The Indian shipbuilding component market to 2036

The Indian shipbuilding market is projected to grow from approximately \$4.6 Bn in 2031 to approximately \$10.7 Bn in 2036, equivalent to Rs. 41,000 crore and Rs. 96,000 crore respectively as shown on the slide, a compound rate of approximately 19 per cent a year. Within this, the component and equipment segment is projected to grow from approximately \$2.7 Bn to approximately \$6.4 Bn over the same period.

The reason components command this share is that marine equipment constitutes approximately 60 to 70 per cent of the total cost of a ship. The hull, which is what a shipyard visibly produces, accounts for a minority of vessel value. The majority resides in the propulsion system, the auxiliary machinery, the electrical systems, the navigation and communication suite and the accommodation fit-out. A country that builds hulls but imports systems captures the smaller part of the value it appears to be creating.

This is precisely the position India currently occupies, and it is why the domestic content threshold in the Shipbuilding Financial Assistance Scheme, described in section 4.1, is set at 40 per cent with no support below 30 per cent. That threshold is not achievable

through hull fabrication and labour alone at scale; it requires domestic sourcing of equipment. The component agenda and the vessel assistance agenda are therefore mutually dependent. Absent domestic component capability, yards will find the 40 per cent threshold difficult to clear and will receive only pro-rated assistance. Absent yard demand at scale, component manufacturers lack the volume to justify investment in capability and certification. The schemes described in this section are intended to resolve that circularity from the component side while demand aggregation resolves it from the vessel side.

The systems taxonomy and where value concentrates

To make the component problem tractable, all shipbuilding components have been classified within 8 systems and 80 sub-systems. Each system is then characterised by two variables: its share of the total component value of a vessel, and the extent to which India presently depends on imports to supply it.

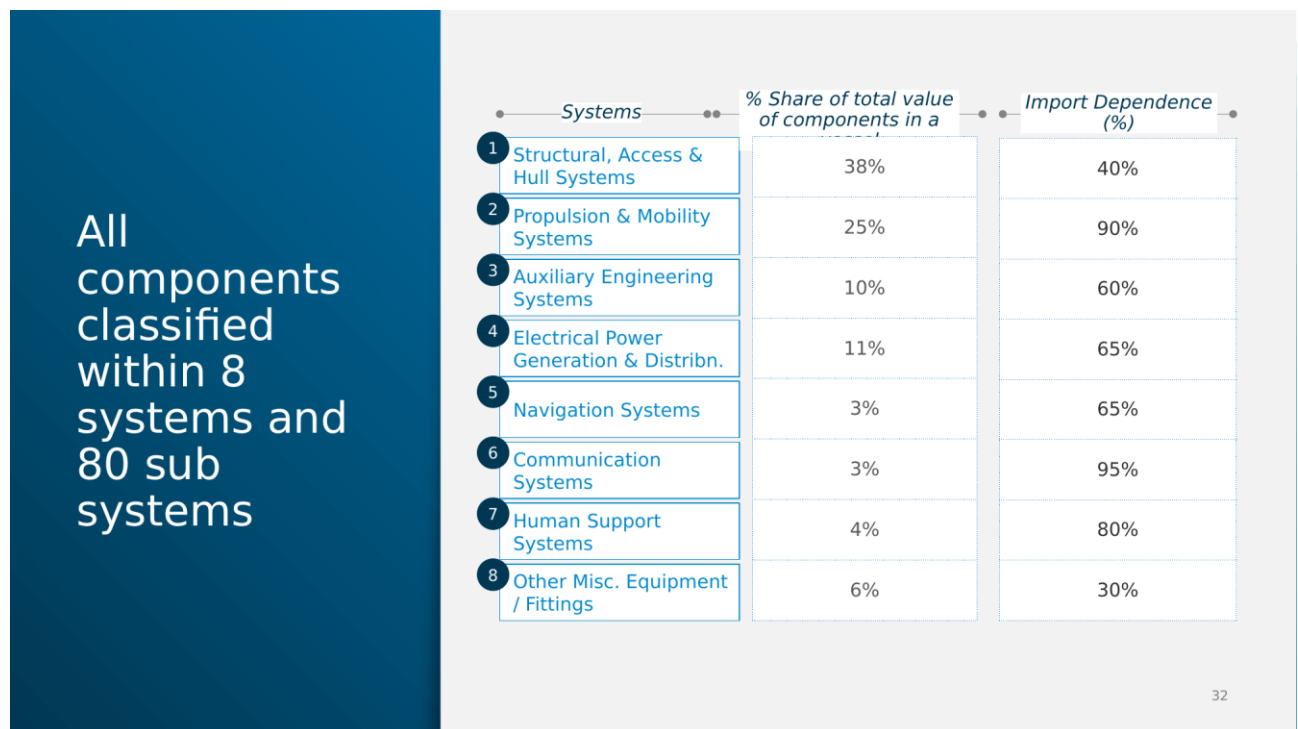


Exhibit 8.2: The eight systems by share of vessel value and import dependence

System	Share of total component value	Import dependence
Structural, access and hull systems	38%	40%
Propulsion and mobility systems	25%	90%
Electrical power generation and distribution	11%	65%

System	Share of total component value	Import dependence
Auxiliary engineering systems	10%	60%
Other miscellaneous equipment and fittings	6%	30%
Human support systems	4%	80%
Navigation systems	3%	65%
Communication systems	3%	95%

Table 8.1: The eight systems by value share and import dependence

Read together, the two columns identify where intervention matters most. Structural, access and hull systems represent the largest single share of component value at 38 per cent, and here import dependence is comparatively low at 40 per cent. This is the area of established Indian competence, resting on a domestic steel industry and existing fabrication capability. It is not the problem.

Propulsion and mobility systems present the critical exposure. They account for 25 per cent of component value, the second largest share, and import dependence stands at 90 per cent. Main engines, gearboxes and propulsion equipment are almost entirely imported. Because this is simultaneously a high-value and high-dependence category, it represents the single largest leakage of value from Indian shipbuilding, and it is also the most technically demanding category in which to establish domestic capability.

Communication systems show the highest import dependence at 95 per cent but account for only 3 per cent of component value. Navigation systems are similar, at 65 per cent dependence and 3 per cent of value. These are strategically sensitive but financially small. Human support systems, at 80 per cent dependence and 4 per cent of value, fall into a comparable category. Electrical power generation and distribution, at 11 per cent of value and 65 per cent dependence, and auxiliary engineering systems, at 10 per cent of value and 60 per cent dependence, occupy an intermediate position where both value and dependence are material.

The distribution makes clear that a uniform policy across all 80 sub-systems would be inefficient. A sub-system representing a fraction of a per cent of vessel value, where Indian industry is already capable, requires no intervention beyond removing barriers. A sub-system representing several per cent of value where no domestic capability exists requires sustained industrial development over many years. The archetype framework in section 8.3 is the response to this.

The four intervention archetypes

The 80 sub-systems have been tagged to four archetypes, defined along two dimensions: the maturity of Indian industry, measured as the number of capable domestic suppliers with a threshold of five, and the indicative share of vessel value, with a threshold of 1 per cent. Each archetype carries a distinct policy response, because the constraint in each is different.

These sub-systems tagged to 4-archetypes based on maturity of Indian Industry and share of vessel value

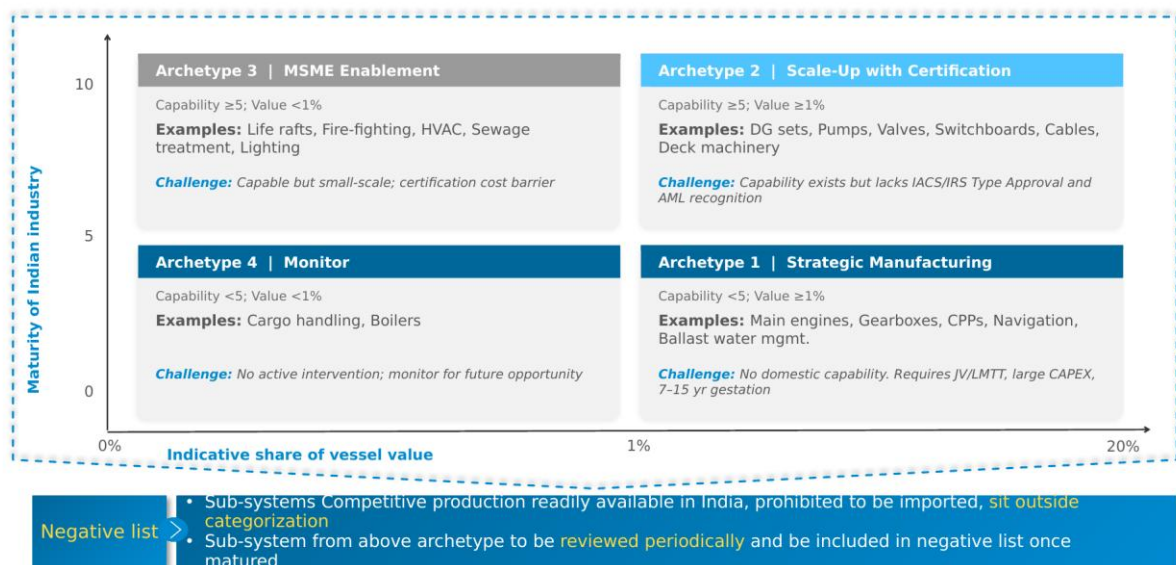


Exhibit 8.3: The four intervention archetypes for component sub-systems

Archetype 1, Strategic Manufacturing. Fewer than five capable domestic suppliers, and 1 per cent or more of vessel value. Examples include main engines, gearboxes, controllable pitch propellers, navigation equipment and ballast water management systems. The challenge is the absence of domestic capability altogether. Establishing it requires joint ventures or long-term manufacturing technology transfer, large capital expenditure, and a gestation period of 7 to 15 years. This is the hardest category and the one that maps onto the propulsion exposure identified in section 8.2.

Archetype 2, Scale-Up with Certification. Five or more capable domestic suppliers, and 1 per cent or more of vessel value. Examples include diesel generating sets, pumps, valves, switchboards, cables and deck machinery. Here capability exists but lacks International Association of Classification Societies or Indian Register of Shipping type approval and approved maker list recognition. The constraint is certification rather than manufacturing competence, and it is therefore the most tractable high-value category: the intervention required is qualification and recognition rather than industrial creation.

Archetype 3, MSME Enablement. Five or more capable domestic suppliers, and less than 1 per cent of vessel value. Examples include life rafts, fire-fighting equipment, heating, ventilation and air conditioning systems, sewage treatment plant and lighting. Suppliers are capable but operate at small scale, and the cost of certification is a barrier relative to the value of the business. The response is enablement of micro, small and medium enterprises, principally by reducing the relative burden of certification.

Archetype 4, Monitor. Fewer than five capable domestic suppliers, and less than 1 per cent of vessel value. Examples include cargo handling equipment and boilers. No active intervention is warranted; the category is monitored for future opportunity. Explicitly designating a set of sub-systems as requiring no action is a discipline that prevents the dispersion of policy attention across items that cannot justify it.

Sub-systems for which competitive production is readily available in India sit outside this categorisation altogether and are prohibited from being imported. These constitute the negative list examined in section 8.4. Sub-systems within the archetypes are to be reviewed periodically and moved to the negative list as domestic capability matures, so the framework is dynamic rather than fixed: a sub-system in Archetype 2 that completes certification and demonstrates competitive supply becomes a candidate for the negative list, and the policy attention it previously required is released.

The negative list and the indigenisation trigger

The negative list is the instrument through which indigenisation is converted from an aspiration into a requirement. Once a sub-system is placed on the list, it may not be imported, and yards must source it domestically.

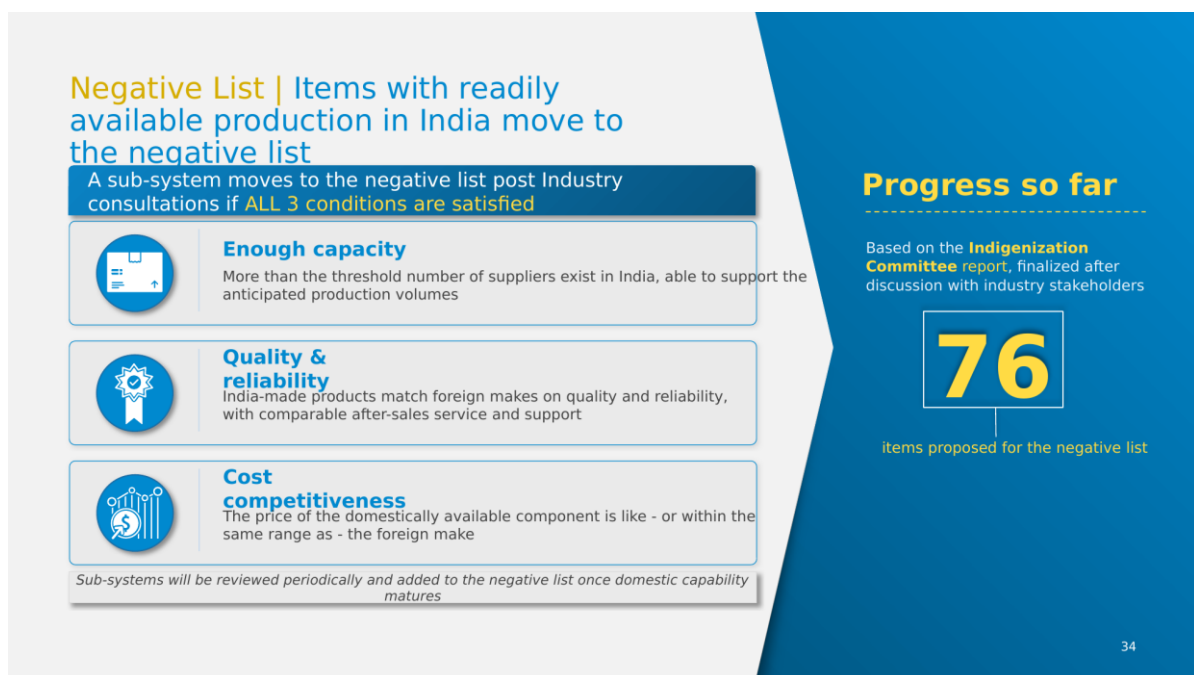


Exhibit 8.4: Conditions for inclusion in the negative list

Because the consequence is a binding restriction, the test for inclusion is demanding. A sub-system moves to the negative list, following industry consultation, only if all three of the following conditions are satisfied.

- Sufficient capacity. More than the threshold number of suppliers exists in India, and those suppliers are able to support the anticipated production volumes.
- Quality and reliability. India-made products match foreign makes on quality and reliability, with comparable after-sales service and support.
- Cost competitiveness. The price of the domestically available component is comparable to, or within the same range as, the foreign make.

The requirement that all three conditions be met, rather than any one, is what distinguishes this from a conventional import substitution measure. A restriction imposed where domestic capacity is insufficient would delay vessel delivery. One imposed where quality is inferior would compromise vessel safety and the yard's reputation with international owners. One imposed where domestic prices are materially higher would erode the competitiveness that the assistance under section 4.1 is intended to create. By requiring capacity, quality and price to be established before restriction applies, the mechanism protects the yards it is intended to support.

On progress, 76 items have been proposed for the negative list, based on the report of the Indigenization Committee and finalised after discussion with industry stakeholders. The role of industry consultation is important. Yards and component manufacturers hold the information on which the three conditions turn, and a restriction imposed without their input would risk being founded on an inaccurate view of domestic capability.

Sub-systems are to be reviewed periodically and added to the negative list as domestic capability matures. This makes the negative list the principal ratchet mechanism of the component agenda. As Archetype 2 sub-systems obtain certification and Archetype 3 suppliers achieve scale, they qualify for the list, and the domestic content share of each vessel rises. That in turn makes it progressively easier for yards to clear the 40 per cent domestic content threshold under the Shipbuilding Financial Assistance Scheme, which improves their assistance entitlement. The component agenda and the vessel assistance agenda thus reinforce one another over time.

4.9. Container Manufacturing Promotion Scheme

Scheme architecture and support components

The final instrument addressed in this section of the address concerns containers rather than vessels. Containers are the physical unit of global trade, and India has historically depended on imports for them, principally from a small number of overseas manufacturing hubs. The Container Manufacturing Promotion Scheme is a targeted support package intended to build self-reliant and globally competitive container manufacturing capacity in India.

Container Manufacturing Promotion Scheme (CMPS)

A targeted support package to build self-reliant, globally competitive container manufacturing capacity in India.

₹10,000 Cr

Total budgetary outlay under CMPS

13 Years

FY 2026–27 to FY 2038–39

1 Lakh TEUs

per Annum
Minimum group capacity threshold

₹49,500

Base Opex value for 20ft DV / HC ISO container

Support Architecture

Component A — Capex Assistance

25%

Grant of approved project cost for greenfield facilities and brownfield expansion.

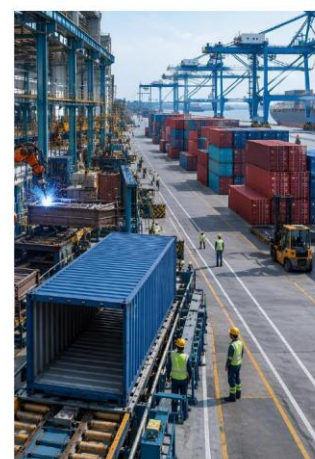
Component B — Opex Assistance

Per-container grant

Financial support for eligible containers manufactured in India and sold.

Policy Objectives

- ① Capacity creation through greenfield and brownfield manufacturing units
- ② Bridge structural cost disadvantage versus global manufacturing hubs
- ③ Reduce import dependence and strengthen EXIM supply security
- ④ Promote automation, quality consistency, jobs and ancillary growth



Strategic Outcome

Domestic availability of ISO containers to support EXIM trade, multimodal logistics and maritime supply-chain resilience.

36
8

Exhibit 9.1: Container Manufacturing Promotion Scheme: architecture and parameters

Parameter	Provision
Total budgetary outlay	\$1.1 Bn (Rs. 10,000 crore)
Scheme duration	13 years, from financial year 2026-27 to financial year 2038-39
Minimum group capacity threshold	1 lakh TEUs per annum
Base operating expenditure reference value	\$550 for a 20 foot dry van or high cube ISO container
Component A, capital expenditure assistance	25 per cent grant of approved project cost for greenfield facilities and brownfield expansion

Parameter	Provision
Component B, operating expenditure assistance	Per-container grant for eligible containers manufactured in India and sold

Table 9.1: Key parameters of the Container Manufacturing Promotion Scheme

The scheme rests on two support components addressing different economic problems. Component A provides capital expenditure assistance of 25 per cent of approved project cost, for greenfield facilities and brownfield expansion alike. This mirrors the brownfield rate under the Shipbuilding Development Scheme described in section 6.6 and reflects the same reasoning: a minority public contribution sufficient to alter the investment decision while leaving the majority of capital and the commercial risk with the promoter.

Component B provides operating expenditure assistance as a per-container grant for eligible containers manufactured in India and sold. This is the more distinctive element. Capital assistance alone would create capacity that then failed to operate competitively, because the disadvantage Indian manufacturers face against established hubs is a recurring cost disadvantage in steel, labour, scale and logistics rather than a one-time capital disadvantage. A per-container grant addresses the recurring gap directly, and by conditioning payment on containers manufactured and sold it links support to output rather than to installed capacity.

The base operating expenditure reference value of \$550 for a 20 foot dry van or high cube ISO container provides the benchmark against which the per-container grant is determined. The minimum group capacity threshold of 1 lakh TEUs per annum sets the scale of participation. This threshold reflects the economics of container manufacturing, which is a volume business where competitiveness depends on continuous production and automated fabrication. A threshold set materially lower would support sub-scale operations unable to compete once assistance concluded.

The scheme pursues four policy objectives: capacity creation through greenfield and brownfield manufacturing units; bridging the structural cost disadvantage against global manufacturing hubs; reducing import dependence and strengthening the security of export and import supply chains; and promoting automation, quality consistency, employment and ancillary industrial growth. The strategic outcome sought is domestic availability of ISO containers to support export and import trade, multimodal logistics and maritime supply chain resilience.

The thirteen-year duration, running from financial year 2026-27 to financial year 2038-39, exceeds the ten-year horizon of the shipbuilding schemes. This is consistent with the nature of the support: whereas capital assistance is a one-time intervention, the operating expenditure component must persist long enough for domestic manufacturers

to reach the scale at which the structural cost gap narrows through volume and learning rather than through subsidy.

4.10. Conclusion

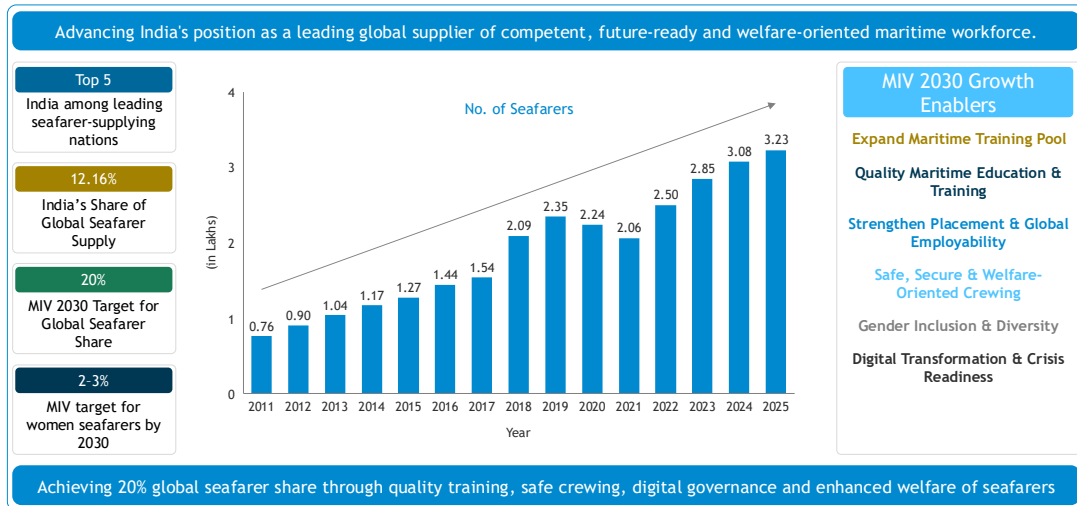
India has put in place, for the first time, a complete and internally coherent architecture for shipbuilding. The four pillars commit approximately \$7.8 Bn of public support across the full life of a shipbuilding enterprise: \$2.7 Bn to make each vessel economically viable, \$2.8 Bn to supply patient capital on terms the sector can bear, \$2.2 Bn to create the physical capacity to build at scale, and a programme of legal and process reform to ensure the commercial environment rewards those who invest. Alongside this sits a demand commitment of 437 vessels and approximately \$24.8 Bn, aggregated from public sector requirements and already entering the market. Five coastal states have constituted Special Purpose Vehicles and offered deep-water sites of 2,000 acres and more. Anchor investors of international standing have committed. This is no longer a statement of intent; it is a programme in execution, with a defined horizon to 31 March 2036.

The architecture works because each instrument answers a constraint the others cannot. Common maritime infrastructure is funded in full by the Centre, because breakwaters and dredged channels serve every user and can be financed by none. Capital assistance to individual yards is confined to 25 per cent, because the benefit accrues to the owner and the discipline of commercial exposure must remain. Assistance rises with vessel size and specialisation, because that is where the world's replacement demand is concentrated and where margin survives. Support is conditioned on 40 per cent domestic content, because tonnage built from imported systems would deliver the appearance of industrial capability without its substance. Sub-systems are moved to the negative list only when Indian capacity, quality and price have all been proven, so that indigenisation strengthens Indian yards rather than burdening them. Every provision is deliberate, and each reinforces the rest.

The opportunity before India is real and it is time-bound. The world's leading yards are committed three to five years forward, owners are seeking capacity and diversification, and the fleet now being retired is being replaced by vessels substantially larger than those it succeeds. India brings a long coastline, deep-water sites, an established steel industry, a proven position in ship recycling, and a maritime workforce of global standing. The Government of India has matched that endowment with capital, with policy, and with demand. What remains is delivery, and delivery will be measured in clusters commissioned, keels laid, components indigenised and tonnage delivered on time. The Ministry of Ports, Shipping and Waterways invites shipbuilders, investors, technology partners and coastal states to build this capability with us, and to hold us to the timelines we have set.

5. Human Element

Charting India's Maritime Rise



18

India is growing stature as a leading maritime manpower nation and outlines the pathway to achieving the Maritime India Vision (MIV) 2030 target of increasing India's share in the global seafarer workforce from 12.16% to 20%.

Over the last decade and a half, the Indian seafaring workforce has witnessed sustained growth, increasing from approximately 76,000 seafarers in 2011 to 3.23 lakh seafarers in 2025. This growth reflects India's strong maritime education ecosystem, internationally recognized certification framework, and the increasing preference of global shipowners for Indian seafarers. India today ranks among the top five seafarer-supplying nations globally, contributing 12.16% of the global seafarer workforce.

However, achieving the MIV 2030 target of 20% global share requires a strategic and holistic approach extending beyond merely increasing the number of seafarers. The focus is on creating a competent, future-ready, safe and welfare-oriented maritime workforce.

The key growth enablers identified under the Maritime India Vision include:

- Expansion of the maritime training pool through increased training capacity and wider participation in maritime careers.
- Quality maritime education and training, aligned with international STCW standards and emerging industry requirements.
- Strengthening placement opportunities and global employability through improved industry linkages and enhanced career progression pathways.

- Safe, secure and welfare-oriented crewing, ensuring protection of seafarers' rights, welfare and social security.
- Promoting gender inclusion and diversity, with a target of increasing women seafarer participation to 2-3% by 2030.
- Digital transformation and crisis readiness, including adoption of digital governance platforms and enhanced support mechanisms for seafarers.

The overarching objective is to position India not only as a source of maritime manpower but as a global supplier of high-quality, technologically competent and welfare-protected maritime professionals capable of supporting future shipping trends, including decarbonisation, digitalisation and emerging maritime technologies. *India's maritime workforce strategy is focused on achieving 20% global seafarer share through quality training, enhanced employability, robust welfare measures, safe crewing practices and future-ready digital governance systems.*

5.1. Just Transition in Maritime

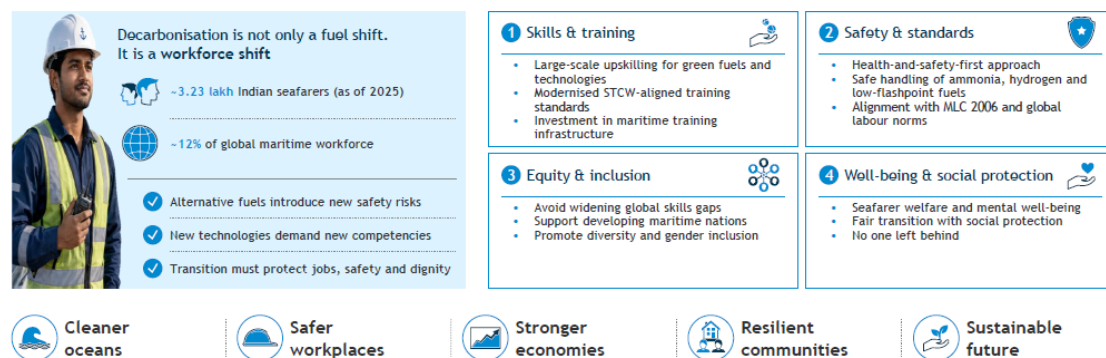
Just Transition in Maritime



Human element is of paramount importance in the maritime industry as human skills, judgement and welfare drive maritime safety.

Just transition: Putting people at the core of decarbonisation

A people-centred pathway for a safe, inclusive and resilient maritime transition



A green transition must also be a fair transition

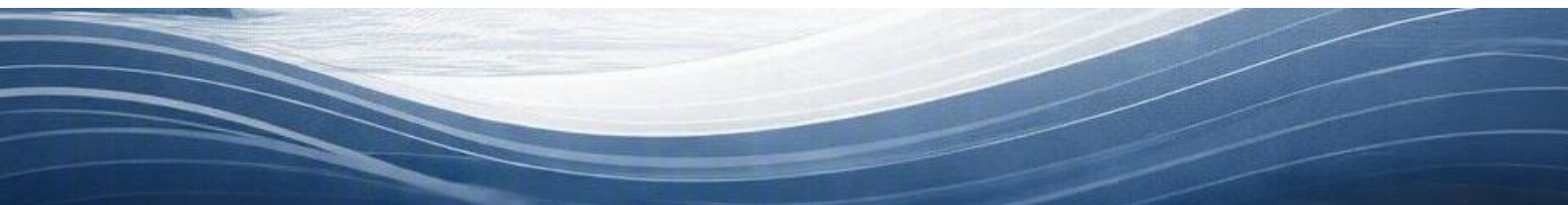
The maritime sector is entering a period of significant transformation driven by global decarbonisation objectives, adoption of alternative fuels and the emergence of new operational technologies. While much of the international discourse on maritime transition focuses on vessel technology, fuel pathways and emission reduction targets, the success of this transition will ultimately depend on the readiness, competence and welfare of seafarers and other maritime professionals who are responsible for operating these systems safely and effectively. Human skills, judgment and welfare remain the foundation of maritime safety, and therefore the transition towards low-carbon shipping must be pursued as a people-centric transformation rather than merely a technological shift.

India currently contributes a significant share of the global seafaring workforce and is recognised as one of the leading maritime manpower-supplying nations. As the shipping industry moves towards alternative fuels such as ammonia, hydrogen, methanol and other emerging energy solutions, there will be a corresponding requirement for new competencies, specialised training and enhanced safety awareness among maritime personnel. Unlike conventional fuels, many emerging fuel types involve unique handling procedures, storage arrangements and operational risks that require additional knowledge and skills. The workforce transition therefore becomes an essential element of maritime decarbonisation, with training and continuous professional development serving as critical enablers for safe adoption of future technologies.

A key component of a just transition framework is the creation of a comprehensive skills and training ecosystem capable of preparing maritime personnel for the evolving requirements of green shipping. Existing training standards will need to be continuously updated to reflect emerging industry practices, technological developments and international regulatory requirements. The introduction of specialised training programmes, simulator-based learning environments and updated competency standards will be necessary to equip seafarers with the skills required to operate vessels using alternative fuels and advanced digital systems. Continued investment in maritime training infrastructure, faculty development and research capabilities will therefore play an important role in ensuring that India remains a leading provider of highly skilled maritime professionals during the transition period.

Safety considerations assume even greater importance as the industry adopts new technologies and fuel systems. Alternative fuels introduce operational characteristics and hazards that differ from traditional marine fuels and therefore require enhanced risk management measures. A successful transition will require a proactive safety-first approach supported by robust training, updated operational procedures, specialised emergency response capabilities and strengthening of international safety standards. Alignment with the Maritime Labour Convention, 2006 and other international instruments will remain essential to ensure that technological advancement is accompanied by continued protection of seafarer rights, living conditions and occupational safety standards.

The transition must also be inclusive and equitable. There is a risk that rapid technological change may create disparities in access to skills, employment opportunities and training resources across different segments of the maritime workforce and among maritime nations. A just transition framework therefore seeks to ensure that the benefits of decarbonisation are widely shared and that no group is disproportionately disadvantaged during the transition process. Particular emphasis is required on supporting developing maritime nations, expanding access to training opportunities, promoting diversity within the maritime workforce and encouraging greater participation of women and underrepresented groups in maritime careers. Such measures will help create a resilient and inclusive maritime ecosystem capable of adapting to long-term industry transformation.



Equally important is the need to strengthen social protection and welfare mechanisms for maritime personnel. The transition towards greener shipping should not be achieved at the cost of workforce well-being. Seafarers will be required to operate increasingly sophisticated equipment while simultaneously adapting to new operational practices and regulatory obligations. Enhanced welfare measures, mental health support systems, fair employment practices and adequate social protection mechanisms will therefore be critical components of the transition process. Protecting livelihoods and ensuring workforce resilience will help maintain confidence among maritime professionals and support long-term sustainability of the sector.

A people-centred approach to maritime decarbonisation provides benefits extending beyond environmental outcomes alone. Investment in skills, safety, inclusion and welfare contributes to cleaner oceans through adoption of sustainable technologies, safer workplaces through enhanced competency and risk management, stronger economies through creation of high-skilled employment opportunities and resilient communities through long-term workforce development. By placing people at the centre of maritime transformation, the sector can ensure that environmental objectives are achieved while simultaneously strengthening safety, competitiveness and social sustainability. The concept of a just transition therefore recognises that successful decarbonisation is not solely about reducing emissions but also about creating a fair, inclusive and future-ready maritime ecosystem capable of supporting sustainable growth for generations to come.

5.2. Abandonment Scenario in India

Abandonment Scenario in India



SUMMARY AS ON DATE		Vessels (Nos.)	Seafarers (Nos.)	Key Challenges											
16.07.2026				- Large number of fraudulent and illegal agents are operating, and this leads to illicit extraction of money from seafarers, illegal deployment on vessels, fake CDC endorsement etc. - Many agents often disappear after receiving the money - Many seafarers are often left abandoned. India tops the nations with the highest number of seafarer abandonments.											
Cases Resolved (Seafarers Repatriated)	01.01.25 to 31.12.25	108	988												
	01.01.26 to till date	56	473												
Active Cases Details		Vessels (Nos.)	Seafarers (Nos.)	Stage 1		Stage 2		Stage 3		Stage 4		Stage 5		Stage 6	
				Vls	Seafarer	Vls	Seafarer	Vls	Seafarer	Vls	Seafarer	Vls	Seafarer	Vls	Seafarer
Cat. 1: P&I Valid		20	159	0	0	0	0	1	21	2	3	11	65	6	70
Cat. 2: P&I Expired		15	139	0	0	0	0	1	3	1	26	7	68	6	42
Cat. 3: Disputed		25	169	0	0	0	0	0	0	0	0	18	136	7	33
Cat. 4: Arrest/Jail/Detention		20	45	1	5	0	0	2	3	6	6	11	31	0	0
TOTAL		80	512	1	5	0	0	4	27	9	35	47	300	19	145

Seafarer abandonment continues to remain one of the most significant welfare and regulatory challenges facing the global maritime industry. Cases of abandonment arise when shipowners fail to fulfil their obligations towards crew members, including payment of wages, provision of essential supplies, repatriation arrangements and

maintenance of safe living conditions on board vessels. Such situations often leave seafarers stranded for extended periods without financial resources, adequate support systems or means of returning to their home countries. The issue has become increasingly complex due to the involvement of multiple jurisdictions, distressed shipowners, vessel detentions, legal disputes and the activities of unauthorised recruitment and placement agents.

India has witnessed a substantial number of abandonment-related cases involving both Indian seafarers and vessels connected to Indian operations. A significant share of these cases involve fraudulent and illegal recruitment agents who collect money from aspiring seafarers through unauthorised channels and subsequently arrange deployment on vessels without proper contractual protections or verification of shipowner credentials. In many instances, such agents disappear after receiving payments, leaving seafarers exposed to exploitation and increased vulnerability. The problem is compounded by the issuance of fraudulent documentation and misleading employment arrangements that make it difficult for seafarers to verify the authenticity of operators and recruitment agencies before joining a vessel.

The growing incidence of seafarer abandonment highlights the need for stronger oversight of recruitment and placement services, enhanced monitoring of vessel compliance and improved mechanisms for early identification of potential distress situations. Many abandonment cases emerge gradually through delays in payment of wages, deterioration of vessel maintenance standards, depletion of onboard supplies or prolonged detention of vessels in ports. Timely intervention by maritime authorities, port administrations and welfare organisations is therefore critical to prevent such situations from escalating into full abandonment cases. Strengthening information-sharing frameworks, improving reporting mechanisms and enhancing coordination between domestic and international stakeholders can significantly improve the effectiveness of response measures.

A key challenge in abandonment cases arises from the diverse legal and operational circumstances under which vessels become distressed. Cases may involve vessels with valid documentation but financially distressed owners, vessels with expired certifications, vessels involved in commercial disputes, or vessels under arrest and detention proceedings. Each category presents unique regulatory and welfare challenges requiring coordinated action by maritime administrations, port authorities, insurers, shipowners, flag States and labour welfare organisations. Effective management of abandonment cases therefore requires not only welfare support for affected crew members but also structured mechanisms for resolution of legal, operational and financial issues associated with the vessel.

The protection of seafarers affected by abandonment remains a central objective of international maritime labour standards, particularly under the Maritime Labour Convention, 2006. The Convention places obligations on shipowners and flag States to ensure repatriation, financial security and welfare protection of seafarers serving on board vessels. Strengthening implementation of these protections through domestic

legislation, improved enforcement and enhanced monitoring mechanisms is essential for safeguarding the rights and welfare of maritime personnel. Recent legislative reforms under the Merchant Shipping Act, 2025 further strengthen the Government's ability to intervene in abandonment situations by providing statutory mechanisms for protection of seafarers, including arrangements relating to crew replacement and recovery of associated costs from responsible shipowners.

Addressing the challenge of seafarer abandonment requires a multi-dimensional approach encompassing stronger regulation of recruitment agencies, improved monitoring of vessel operators, enhanced international cooperation and effective welfare support frameworks. Greater awareness among seafarers regarding authorised recruitment channels, stronger enforcement against fraudulent agents and continued alignment with international labour standards will be critical in reducing the incidence of abandonment cases. Such measures will contribute towards strengthening confidence in the maritime profession, protecting the rights and dignity of seafarers and ensuring that India's growing maritime workforce continues to operate within a safe, fair and internationally compliant employment environment.

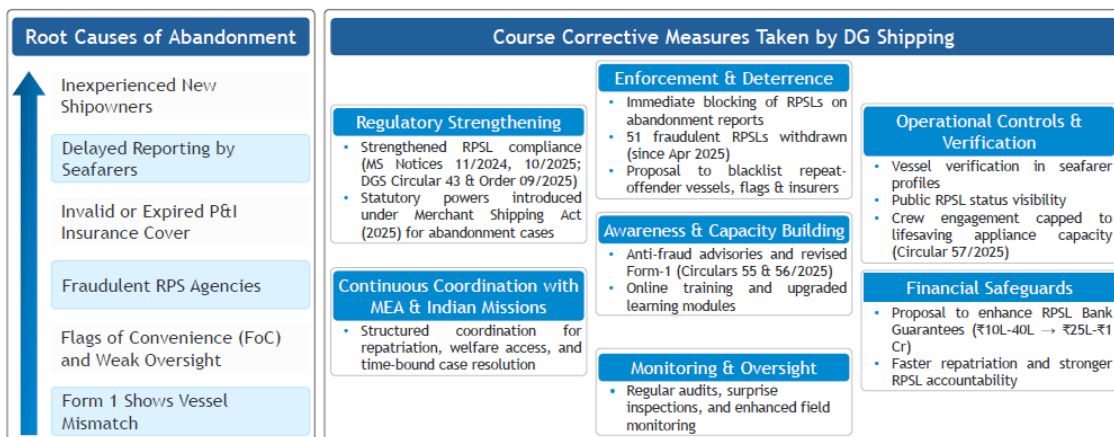
5.3. Key interventions taken by DG Shipping



Key interventions taken by DG Shipping

DG Shipping is on a mission mode to address the issue of large number of abandonment of seafarers.

As on 16th July 2026, there are **80** Vessels with **512** seafarers abandoned/ arrested.
Repatriation Summary (Jan-June 2026) **473** Seafarers Repatriated | **56** Vessels



The issue of seafarer abandonment has emerged as a priority area for the Directorate General of Shipping due to the increasing number of cases involving distressed vessels, abandoned crews and fraudulent recruitment practices. As of July 2026, a significant number of vessels and seafarers continue to require regulatory intervention, monitoring and welfare assistance, highlighting the need for a coordinated and multi-pronged response. DG Shipping has therefore adopted a mission-mode approach focused not only on repatriation and welfare support but also on addressing the systemic causes that contribute to abandonment cases.

Analysis of abandonment cases indicates that several structural challenges continue to drive the problem. A considerable proportion of cases involve inexperienced shipowners operating vessels with weak financial and operational capability. Delayed reporting by seafarers often allows problems to escalate before authorities are able to intervene. In several instances, vessels are found operating without valid or adequate Protection and Indemnity (P&I) insurance cover, thereby limiting financial security available for repatriation and crew welfare obligations. Fraudulent Recruitment and Placement Service Licensees (RPSLs) and unauthorised recruitment agencies have also contributed to cases of illegal deployment, inadequate contractual protections and misinformation provided to seafarers. In addition, certain vessels operating under flags of convenience and weak oversight regimes present increased risks relating to compliance, welfare protection and enforcement of maritime labour standards. Collectively, these factors increase the vulnerability of seafarers and contribute to the occurrence of abandonment situations requiring intervention by maritime authorities.

To address these challenges, DG Shipping has undertaken a series of regulatory strengthening measures. Various circulars, notices and administrative directions have been issued to tighten oversight of recruitment and placement practices, improve verification mechanisms and strengthen compliance monitoring. Further support has been provided through statutory provisions introduced under the Merchant Shipping Act, 2025, which establish a stronger legal framework for dealing with abandonment cases and protecting affected seafarers. These measures are intended to create a more robust regulatory environment capable of identifying risks at an early stage and facilitating timely intervention where necessary.

Enforcement and deterrence have formed another key pillar of DG Shipping's response. Immediate action has been taken against recruitment agencies linked to abandonment complaints and fraudulent activities, including suspension and withdrawal of licences. Enhanced scrutiny of repeat offenders and stronger enforcement measures have been proposed to discourage non-compliance and improve accountability across the maritime recruitment ecosystem. The objective is to create a strong deterrent against practices that expose seafarers to exploitation and increase the likelihood of abandonment situations.

Recognising that abandonment cases frequently involve foreign jurisdictions, DG Shipping has strengthened coordination mechanisms with the Ministry of External Affairs and Indian Missions abroad. Structured engagement with diplomatic missions has facilitated repatriation efforts, welfare assistance, communication with local authorities and time-bound resolution of cases involving Indian seafarers serving overseas. This coordinated approach has enabled more effective management of complex cases where assistance is required across multiple jurisdictions and regulatory authorities.

Operational controls and verification mechanisms have also been enhanced to reduce opportunities for fraudulent deployment and improve transparency. Measures have been introduced to strengthen vessel verification processes and improve visibility regarding the status of licensed recruitment agencies. Additional safeguards have been

incorporated to ensure that crew engagement processes are aligned with vessel safety and operational requirements. These interventions are expected to improve compliance assurance and provide greater confidence to seafarers seeking employment opportunities through authorised channels.

DG Shipping has also placed significant emphasis on awareness generation and capacity building. Revised documentation requirements, awareness campaigns and training initiatives have been introduced to improve understanding among seafarers regarding recruitment procedures, contractual safeguards, complaint mechanisms and welfare protections. Strengthening awareness at the seafarer level is considered essential for reducing vulnerability to fraudulent operators and ensuring that potential risks are identified and reported at an early stage.

Continuous monitoring and oversight remain central to the overall strategy. Regular audits, inspections and field-level monitoring activities are being undertaken to identify emerging risks and ensure compliance with regulatory requirements. Alongside these efforts, proposals have been developed to strengthen financial safeguards available within the recruitment ecosystem, including enhancement of financial security mechanisms and greater accountability of recruitment agencies. These measures aim to ensure availability of resources for repatriation, welfare support and timely resolution of abandonment cases while reinforcing compliance across the sector.

The combined effect of these interventions is expected to create a stronger preventive framework capable of addressing the root causes of abandonment while simultaneously improving response mechanisms when cases arise. Through regulatory reforms, stronger enforcement, international coordination, enhanced oversight and welfare-focused interventions, DG Shipping is working towards reducing the incidence of abandonment cases and strengthening protection available to Indian seafarers operating across the global maritime industry.

Challenges of life at sea lead to many death cases (including natural death) as well as missing cases



☠️ Death Cases											
	2012 - 17	2018	2019	2020	2021	2022	2023	2024	2025	2026	TOTAL
Closed	0	0	0	0	0	5	3	3	0	0	11
Pending	5	1	3	6	6	4	3	2	12	25	67
Settled	1	6	6	33	61	48	58	49	55	13	330
TOTAL	6	7	9	39	67	57	64	54	67	38	408

❓ Missing Cases											
	2015 - 17	2018	2019	2020	2021	2022	2023	2024	2025	2026	TOTAL
Closed	0	0	1	0	1	0	0	6	1	0	9
Desertion	1	2	7	2	4	2	2	5	0	0	25
Pending	0	6	0	6	2	11	13	4	4	9	55
Settled	18	6	10	6	10	16	9	15	11	2	103
TOTAL	19	14	18	14	17	29	24	30	16	11	192

Closed

Closed from ship-owners /
P&I without compensations

Pending

Under progress and pending

Settled

Case settled by ship-owners /
P&I with compensations

Life at sea continues to expose seafarers to unique occupational, environmental and operational risks that are significantly different from those experienced in shore-based professions. Long periods away from home, demanding work schedules, exposure to harsh weather conditions, isolation, fatigue, medical emergencies and limited access to specialised healthcare facilities can increase vulnerability to accidents, illnesses and other welfare-related incidents. While maritime safety standards and regulatory oversight have improved substantially over the years, fatalities and missing seafarer cases continue to be reported across the global shipping industry, requiring sustained attention from regulators, shipowners and welfare organisations.

Analysis of reported cases indicates that seafarer deaths arise from a variety of causes including natural medical conditions, accidents on board, occupational incidents, health emergencies and other operational circumstances. The nature of maritime employment often means that immediate access to advanced medical care may not always be readily available, particularly during long international voyages. Ageing crew profiles in certain segments, increasing operational demands and extended sea service periods further underline the importance of preventive healthcare, medical screening and onboard welfare measures. Effective implementation of health management systems, improved medical preparedness and timely telemedical assistance have therefore become important components of modern maritime safety management.

Cases involving missing seafarers present an additional challenge due to the operational complexity associated with investigations conducted across different jurisdictions and maritime environments. Such cases may arise from accidents, adverse weather conditions, operational incidents or other circumstances requiring extensive search, investigation and verification efforts. Resolution of these cases often involves cooperation among flag States, coastal States, shipowners, insurers, maritime administrations and law enforcement authorities. Given the complexity of maritime operations and evidentiary requirements, investigations and settlement processes associated with missing seafarer cases can often take considerable time before final closure is achieved.

The available case trends indicate that while a significant number of cases have been resolved and compensation mechanisms activated, several matters remain under investigation or pending completion. Resolution typically involves coordination among shipowners, Protection and Indemnity (P&I) insurers, maritime administrations and affected families to determine liability, verify circumstances and process applicable welfare and compensation claims. The role of financial security mechanisms provided under international maritime conventions has become increasingly important in ensuring timely support to affected families and facilitating settlement of claims arising from maritime casualties.

Recognising these challenges, international instruments such as the Maritime Labour Convention, 2006, the STCW Convention and various IMO safety regulations place considerable emphasis on seafarer welfare, occupational safety and emergency preparedness. Shipowners are required to maintain safe working environments,



implement safety management systems, provide adequate medical facilities and ensure compliance with internationally prescribed welfare standards. Continuous improvements in vessel design, onboard monitoring systems, emergency response procedures and crew training have contributed towards reducing risks; however, the inherently demanding nature of maritime operations necessitates ongoing vigilance and continuous improvement.

The growing focus on seafarer well-being has also highlighted the importance of mental health, fatigue management and social support systems. Extended contracts, social isolation and operational pressures can have adverse impacts on the overall welfare of seafarers, making preventive welfare measures an integral part of maritime safety. Strengthening welfare frameworks, enhancing access to counselling and support services, improving onboard living conditions and promoting a safety culture across the industry can play a significant role in reducing incidents and improving quality of life at sea.

Continued collaboration among maritime administrations, shipowners, welfare organisations, insurers and international bodies remains essential for addressing fatalities and missing seafarer cases effectively. Strengthening reporting mechanisms, improving data collection, enhancing accident investigation capabilities and ensuring timely settlement of claims can help provide greater protection to seafarers and their families. As India continues to expand its role as a major maritime manpower-supplying nation, sustained focus on health, safety, welfare and social protection measures will remain critical in safeguarding the interests of Indian seafarers serving across the global shipping industry.

5.4. Towards Stronger social security for seafarers

Towards Stronger Social Security for Seafarers



Seamen's Provident Fund Organisation	
Long-Term Financial Security • SPFO manages provident fund contributions made by both seafarers and employers, which are accumulated and paid out as benefits upon retirement, completion of service, or in cases of disability or death. • Improves the quality of life of seafarers by providing financial security, social protection, and long-term stability throughout their working life and after retirement. • Vision: To Provide for an institution of a Provident Fund to the Seamen as an old age retirement benefit to them and to their family members in the event of death.	

The maritime profession is characterised by unique employment patterns, prolonged periods at sea, international mobility and exposure to occupational risks that differ

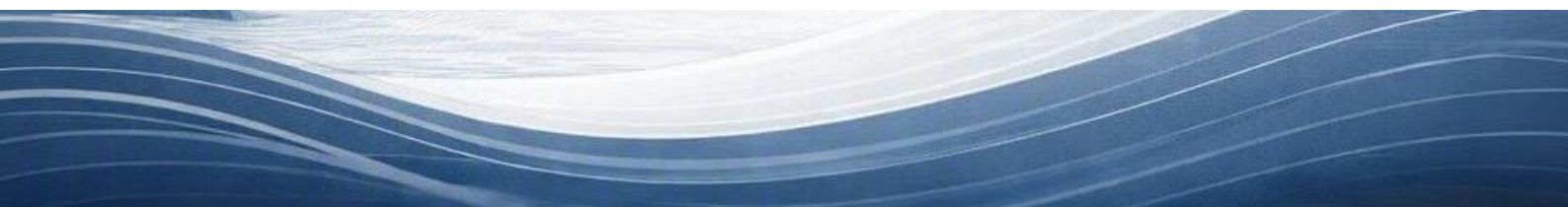
significantly from those faced in shore-based sectors. While seafarers play a critical role in facilitating global trade and ensuring uninterrupted movement of goods, their access to long-term social security and retirement benefits has historically remained a matter of concern across many maritime jurisdictions. Strengthening social protection mechanisms is therefore an important component of seafarer welfare and forms an integral part of the broader objective of creating a safe, secure and welfare-oriented maritime workforce.

The Seamen's Provident Fund Organisation (SPFO) serves as a dedicated institutional mechanism for providing long-term financial security to seafarers and their families. The organisation administers provident fund contributions made jointly by seafarers and employers during the course of employment. These contributions are accumulated over time and become available as financial benefits upon retirement, completion of service, disability or other eligible circumstances prescribed under the applicable framework. By creating a structured savings mechanism linked to maritime employment, the SPFO contributes towards income security and financial resilience throughout a seafarer's professional life.

The importance of social security within the maritime sector extends beyond retirement planning alone. Seafarers frequently spend extended periods away from their families and often face uncertainties arising from fluctuating employment cycles, evolving industry conditions and occupational risks associated with maritime operations. Access to a stable social protection mechanism therefore plays an important role in improving overall quality of life and providing financial confidence during active service as well as after retirement. A structured provident fund framework helps create a long-term savings culture while ensuring that maritime professionals have access to financial support at critical stages of their lives.

The SPFO framework also carries significant welfare implications for the families of seafarers. Maritime employment frequently involves service in international waters and exposure to circumstances beyond the control of the individual seafarer. In situations involving disability, permanent incapacity or death, the availability of accumulated provident fund benefits can provide important financial assistance to dependents and family members. Such support mechanisms strengthen social protection and help mitigate the economic impact of unforeseen events affecting maritime personnel.

The broader vision underpinning the provident fund framework is the establishment of a robust social security system that supports seafarers throughout their professional and post-retirement years. In addition to providing financial benefits, the framework contributes towards enhancing the attractiveness of maritime careers by offering greater economic security and welfare assurance. Strong social protection mechanisms also support workforce retention by improving confidence among maritime professionals and reinforcing the perception of shipping as a stable and sustainable long-term career option.



As India seeks to expand its position as a leading provider of maritime manpower and increase its share of the global seafaring workforce, strengthening welfare and social security frameworks remains a key policy priority. Measures aimed at enhancing financial security, improving retirement benefits and extending social protection are consistent with the objectives of creating a future-ready maritime workforce supported by strong welfare institutions. The continued evolution of the SPFO framework therefore represents an important step towards ensuring that seafarers not only contribute to maritime growth during their working years but also benefit from long-term economic security and welfare protection throughout their lives and beyond.

5.5. Towards stronger welfare for seafarers

Towards Stronger Welfare for Seafarers



Seafarer Welfare Fund Society (SWFS)

Welfare & Immediate Support

- The **SWFS** welfare schemes are designed to support seafarers and their families through initiatives focused on health, education, welfare infrastructure, and various financial assistance measures.
- Welfare Schemes:** A total of **12** ongoing schemes covering active seafarers, retired personnel, women seafarers, families of deceased seafarers, and children of seafarers
- Infrastructure Projects under welfare initiatives:** SWBAT - ₹ 90 Cr/-
- Insurance Coverage** for seafarers by supporting insurance premium payments through a structured and equitable system.

The welfare of seafarers extends beyond employment conditions and occupational safety and encompasses the broader objective of ensuring timely support, financial assistance and welfare protection during various stages of a seafarer's life and career. Given the unique nature of maritime employment, seafarers and their families often require support mechanisms that address health emergencies, educational needs, welfare-related contingencies and financial hardships that may arise during active service or after retirement. Strengthening welfare support systems is therefore an essential component of a resilient maritime ecosystem and contributes directly to improving the quality of life of maritime professionals.

The Seafarer Welfare Fund Society (SWFS) functions as a dedicated welfare institution focused on providing immediate assistance and welfare support to seafarers and their families. Unlike long-term social security mechanisms that primarily address retirement and pension-related needs, the SWFS is designed to provide direct welfare interventions covering health, education, welfare infrastructure and various forms of financial assistance. Through targeted welfare programmes, the organisation seeks to support serving seafarers, retired maritime personnel, women seafarers, dependents of deceased seafarers and children of maritime professionals. The welfare framework

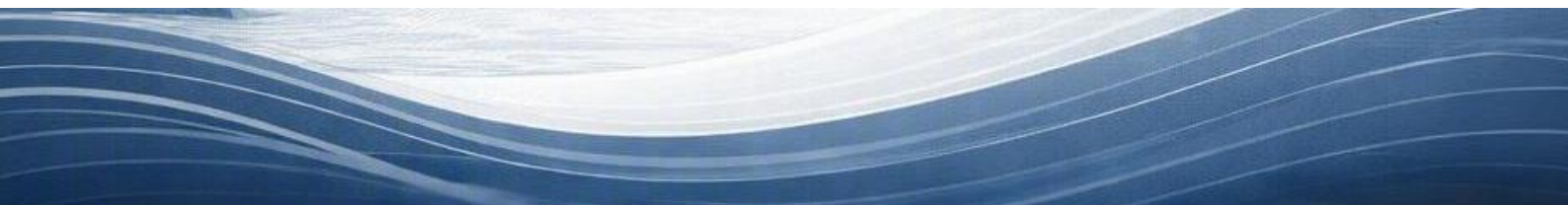
reflects the recognition that effective maritime development requires not only skilled manpower but also strong support systems capable of addressing the social and welfare needs of those employed in the sector.

The range of welfare schemes administered under the SWFS framework is intended to provide comprehensive support across different stages of a seafarer's life cycle. Assistance is extended through multiple schemes covering education support, welfare grants, family assistance measures and other welfare-oriented interventions aimed at improving the socio-economic well-being of beneficiaries. Such support mechanisms help reduce financial vulnerability and provide an additional layer of protection for seafarers and their families against unforeseen circumstances. By addressing welfare requirements beyond traditional employment-related benefits, the SWFS contributes towards strengthening social resilience within the maritime community.

A significant component of the welfare programme is the development of welfare infrastructure aimed at enhancing the quality and reach of services available to seafarers. Investments in welfare-related infrastructure enable better delivery of support services, improve accessibility and strengthen institutional capacity for addressing welfare concerns. Such infrastructure plays an important role in ensuring that welfare initiatives are not limited to financial assistance alone but are supported by sustainable systems and facilities capable of serving the long-term needs of maritime stakeholders.

The welfare framework also recognises the importance of insurance and financial risk mitigation as essential elements of seafarer protection. Maritime employment often involves exposure to occupational risks, health contingencies and uncertainties associated with international deployment. Support for insurance coverage through structured assistance mechanisms helps ensure that seafarers and their families have access to financial protection when required. Strengthening insurance accessibility improves overall welfare outcomes and complements existing social security and provident fund arrangements available within the maritime sector.

The continued strengthening of the Seafarer Welfare Fund Society aligns with broader national objectives of creating a welfare-oriented and future-ready maritime workforce. As India seeks to expand its global presence as a leading provider of maritime manpower, welfare and social protection measures assume increasing importance in attracting, retaining and supporting skilled professionals. Comprehensive welfare mechanisms help create confidence among seafarers, improve career attractiveness and ensure that maritime growth is accompanied by adequate social support systems. The SWFS framework therefore represents an important pillar of India's maritime welfare architecture by providing timely assistance, targeted support and enhanced welfare protection for seafarers and their families throughout their professional and personal lives.



5.6. Steps are being taken by the DG Shipping for the welfare of seafarers



Steps are being taken by the DG Shipping, Government of India for the welfare of seafarers

The Seafarers' Welfare Fund Society (SWFS) is an autonomous body under the administrative control of the MoPSW, dedicated to the welfare of Indian seafarers and their families. It administers welfare schemes, financial assistance, and gratuity funds to provide social security and support to active and retired seafarers.

Schemes for Active Seafarers; Schemes for Specific Category of Seafarers; Schemes for Family of Seafarers; Schemes for Deceased Seafarer; Medical Assistance/Insurance

Survivors' Benefit Scheme (SBS): Financial assistance to the family of a deceased Indian seafarer	₹ 6,00,000 (w.e.f. 01.01.2026)	Death on Board Benefit Scheme (DBBS): Support in cases of death or presumed death occurring on board	₹ 2,00,000 (w.e.f. 01.01.2026)	War Like/ High-Risk Area Scheme: Financial Assistance for death or permanent disability in High-Risk conflict zones	₹ 10,00,000
Invalidity Benefit Scheme (IBS): Support for Indian seafarers declared permanently unfit for the sea	₹ 6,00,000 (w.e.f. 01.01.2026)	Old Age Benefit Scheme (OABS): Assistance for seafarers who attain the age of 65 years on/after 01.01.2019 and age 75 on/after 01.01.2026	₹ 50,000 (Age 65) ₹ 1,00,000 (Age 75)	CoC Career Progression (Rating → Officer): One-time assistance after successful issue of Indian CoC by DG Shipping.	₹ 2,00,000
Maternity Benefits Scheme (MBS): Financial assistance for Indian women seafarers during maternity (Max: 2 deliveries)	₹ 50,000 Per delivery (w.e.f. 01.01.2026)	Ex-Gratia Support Benefit Scheme (ESBS): Additional financial aid for specific cases of abandoned / stranded seafarers.	₹ 20,000/m (Max: 12 months) (w.e.f. 01.01.2026)	Medical & Term Insurance Premium: Assistance - Reimbursement of 50% premium for Indian CDC holders meeting sea-service criteria	Up to ₹ 5,000
Family Benefit Welfare Scheme (FBWS): Provides support to dependent families of Indian Seafarers	₹ 1,00,000 (Pre-Sea Training Completion) ₹ 50,000 (Postgraduate Degree Completion)	Award to Meritorious Child of Seafarers (AMCS): Educational incentives for children of Indian Seafarers	₹ 25,000 (w.e.f. 01.01.2026)	Medical Support (Critical / Terminal Illness): One-time support; govt./recognised hospital certification	₹ 2,00,000

DGMA has taken multiple steps for the welfare of seafarers, including provisioning of welfare schemes, development of seafarers welfare infrastructure, and other welfare initiatives. 122

The Seafarers' Welfare Fund Society (SWFS) serves as the principal welfare institution dedicated to supporting Indian seafarers and their families through a wide range of social welfare, financial assistance and support programmes. Functioning under the administrative control of the Ministry of Ports, Shipping and Waterways, the Society has been established to address welfare requirements that extend beyond employment-related benefits and to provide assistance during circumstances involving illness, disability, retirement, family hardship, death or other welfare contingencies. Through a structured framework of welfare schemes and financial assistance programmes, SWFS contributes towards strengthening social security and enhancing the overall well-being of the maritime workforce.

The welfare framework administered by the Society encompasses multiple schemes targeted at different categories of beneficiaries, including active seafarers, retired maritime personnel, women seafarers, children of seafarers and families of deceased seafarers. This broad coverage recognises the diverse welfare needs that arise throughout the lifecycle of maritime employment and ensures that support mechanisms remain accessible to seafarers at various stages of their professional and personal lives. By adopting a comprehensive and inclusive approach, the Society seeks to provide meaningful assistance to beneficiaries facing different forms of financial, medical and social challenges.

A key focus area of the welfare framework is the provision of financial assistance to families affected by the death of a seafarer. Special benefit schemes have been instituted to provide support in circumstances involving death on board, presumed death at sea and other casualty-related situations. Such measures are intended to

provide immediate economic assistance to dependents and reduce financial distress for affected families. Similarly, dedicated schemes support seafarers who suffer permanent disability or are declared medically unfit for sea service, thereby ensuring that individuals whose maritime careers are curtailed due to health-related reasons receive an additional layer of financial protection.

The welfare architecture also provides support to elderly maritime professionals through old-age assistance programmes aimed at enhancing financial security after retirement. Given the unique employment characteristics of the maritime profession and the absence of continuous shore-based employment opportunities for many seafarers during later stages of life, retirement-related support remains an important component of welfare policy. Such assistance complements other social security mechanisms and contributes towards improving the long-term economic well-being of retired seafarers.

Recognising the increasing participation of women within the maritime sector, the welfare framework includes dedicated support measures tailored to their specific requirements. Assistance mechanisms have been developed to provide support during maternity and other welfare-related contingencies, thereby promoting greater inclusivity within the maritime profession. Additional welfare measures are also extended to stranded and abandoned seafarers who may require urgent assistance due to unforeseen operational or employment-related challenges. These interventions reinforce the principle that welfare protection should remain available whenever seafarers face circumstances beyond their control.

Education support forms another important pillar of the welfare framework. Financial assistance and scholarship-type benefits are extended to children of seafarers in recognition of the contribution made by maritime professionals to the national economy and global trade. Such initiatives help strengthen family welfare, encourage educational advancement and contribute towards improving long-term socio-economic outcomes for seafaring families. Measures supporting career progression and professional development have also been introduced to encourage skill enhancement and facilitate upward mobility within the maritime profession.

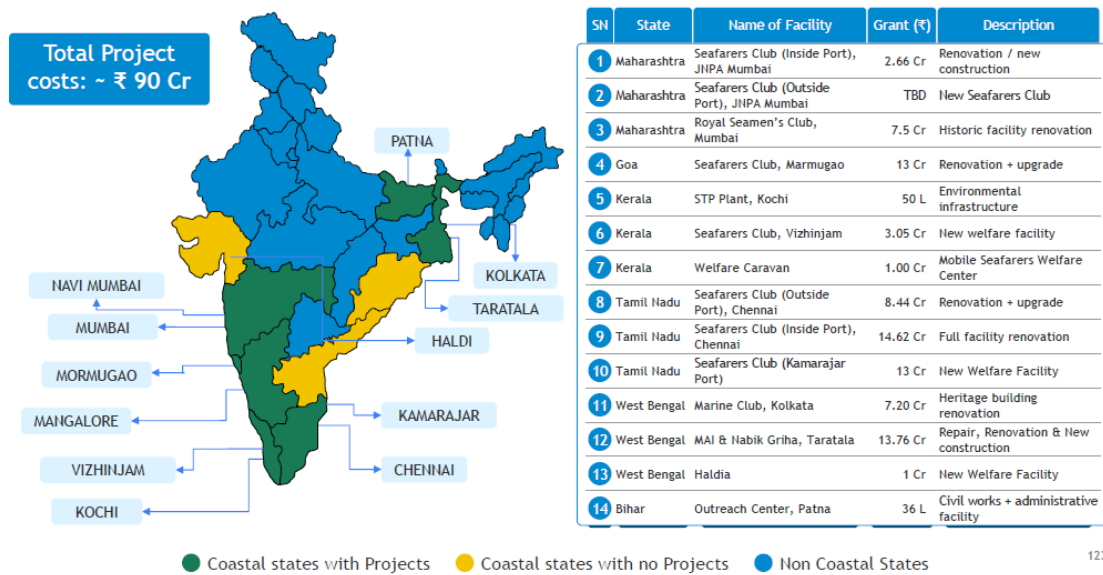
Healthcare and insurance assistance constitute a further area of intervention under the SWFS framework. Medical emergencies, critical illnesses and healthcare-related expenses can impose significant financial burdens on seafarers and their families. To address these concerns, various assistance mechanisms have been introduced to support medical treatment, hospitalisation and insurance premium payments. These provisions complement existing employer obligations and social protection arrangements while enhancing the overall welfare and financial resilience of maritime personnel.

The continued expansion and strengthening of welfare measures through the Seafarers' Welfare Fund Society reflects the Government's commitment towards creating a welfare-oriented maritime ecosystem. As India seeks to enhance its global standing as a leading maritime manpower nation, comprehensive welfare support becomes

increasingly important for attracting, retaining and protecting skilled maritime professionals. By addressing financial security, healthcare, education, family welfare and emergency assistance requirements through a structured institutional framework, the SWFS contributes significantly towards improving the quality of life of Indian seafarers and ensuring that maritime growth is accompanied by strong social and welfare safeguards.

5.7. Seafarer welfare infrastructure - SWBAT

Seafarer Welfare Infrastructure - SWBAT



The Seafarers Welfare Board and Trust (SWBAT) has undertaken a comprehensive programme for creation, modernisation and expansion of welfare infrastructure for seafarers across India. Recognising that the welfare requirements of seafarers extend beyond financial assistance and social security measures, the programme focuses on developing dedicated welfare facilities that can provide accommodation, recreation, support services, outreach activities and welfare assistance to maritime personnel and their families. With projects spread across major maritime locations and strategic coastal centres, the initiative seeks to strengthen the institutional infrastructure available to seafarers and improve access to welfare services throughout the country.

The infrastructure development programme represents a significant long-term investment in seafarer welfare and has been conceptualised to support the growing size and geographical distribution of India's maritime workforce. Welfare infrastructure projects have been planned and implemented across major maritime hubs including Mumbai, Mormugao, Kochi, Vizhinjam, Chennai, Kamarajar Port, Kolkata, Haldia and Taratala, among others. By establishing and upgrading welfare facilities in locations where seafarers frequently embark, disembark or access maritime services, the programme seeks to enhance convenience, improve service delivery and create dedicated spaces tailored to the needs of maritime professionals.

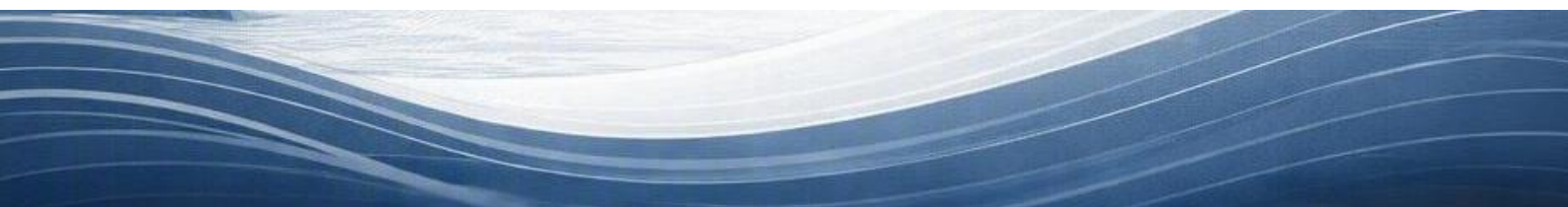
A significant component of the programme involves renovation, restoration and modernisation of existing seafarers' clubs and welfare establishments. Many of these facilities have historically served as important centres for seafarer welfare, providing accommodation, recreational amenities and support services. The ongoing infrastructure initiative focuses on upgrading these facilities to contemporary standards through modernisation of buildings, improvement of available services and enhancement of overall user experience. In several locations, new welfare infrastructure is also being developed to address increasing demand and support future growth in maritime activity.

The programme also incorporates region-specific projects designed to address local welfare and operational requirements. In addition to seafarers' clubs and welfare centres, investments have been made in supporting infrastructure and outreach initiatives intended to improve accessibility of welfare services. Mobile welfare facilities and outreach centres have been included to ensure that welfare support can be extended beyond traditional port locations and reach a wider segment of the seafaring community. Such initiatives contribute towards creating a more inclusive welfare ecosystem capable of supporting seafarers regardless of their location or stage of service.

Environmental and sustainability considerations have also been integrated within specific infrastructure projects. Investments in supporting facilities and associated infrastructure improvements seek to ensure that welfare centres are developed in a sustainable and operationally efficient manner. The emphasis on modern infrastructure complements broader efforts towards improving living conditions, promoting welfare and strengthening service delivery standards within the maritime sector.

The creation of a nationwide network of welfare facilities also supports broader objectives relating to seafarer welfare, community development and workforce sustainability. Dedicated welfare infrastructure provides a platform for delivery of educational programmes, counselling services, welfare assistance, skill development initiatives and community engagement activities. These facilities help strengthen social support systems available to seafarers and their families while creating opportunities for enhanced interaction between maritime stakeholders and welfare institutions.

The SWBAT infrastructure initiative forms an important pillar of India's maritime welfare framework and complements other welfare measures implemented through the Seafarers' Welfare Fund Society, social security institutions and regulatory initiatives. By investing in permanent welfare infrastructure across major maritime centres, the programme aims to improve quality of life for seafarers, strengthen welfare delivery mechanisms and ensure that India's growing maritime workforce is supported by modern, accessible and sustainable welfare facilities. The initiative reflects a long-term commitment to creating a welfare-oriented maritime ecosystem in which seafarers and their families have access to the institutional support necessary for their well-being and professional development.



5.8. Ensuring zero tolerance for corruption in crewing

Ensuring Zero Tolerance for Corruption in Crewing



- » DG Shipping upholds a strict Zero Tolerance policy against corruption, fraud, and unethical practices in all operations.
- » Robust systems are implemented to ensure transparency, accountability, and integrity in recruitment and welfare processes:
 - Strict monitoring of RPSL agencies
 - Digital verification mechanisms
 - Clear compliance guidelines
- » Awareness initiatives conducted to educate stakeholders on:
 - Identifying corrupt and fraudulent practices
 - Avoiding illegal payments and middlemen
 - Rights and protections of seafarers
 - Reporting mechanisms and grievance redressal
- » Strong grievance redressal framework:
 - 24x7 support channels
 - Time-bound resolution of complaints
 - Whistleblower protection measures
- » Continuous audits and inspections to:
 - Detect irregularities
 - Enforce compliance standards
 - Strengthen systemic quality assurance
- » DG Shipping ensures that quality and integrity go hand-in-hand, creating a corruption-free ecosystem for seafarers' welfare.






The Directorate General of Shipping has adopted a policy of zero tolerance towards corruption, fraud and unethical practices within the maritime recruitment and crewing ecosystem. The integrity of the recruitment process has a direct bearing on seafarer welfare, safety and employment opportunities, and therefore ensuring transparency and accountability across recruitment channels has emerged as a key regulatory priority. Fraudulent recruitment practices not only result in financial losses for seafarers but also expose them to risks such as illegal deployment, non-compliant employment contracts, abandonment and exploitation. In response, DG Shipping has undertaken a series of institutional, technological and awareness-based interventions aimed at strengthening governance within the crewing sector.

A central component of this initiative has been the strengthening of oversight mechanisms applicable to Recruitment and Placement Service Licensees (RPSLs). Regulatory supervision has been enhanced through stricter monitoring, periodic inspections and improved compliance verification processes. Digital verification mechanisms have been introduced to promote transparency and facilitate authentication of recruitment-related information. These reforms enable seafarers to verify the legitimacy of recruitment agencies and reduce the possibility of engagement through unauthorised intermediaries. Enhanced compliance requirements and monitoring systems also assist the maritime administration in identifying irregularities at an early stage and taking corrective action where necessary.

Recognising that prevention is as important as enforcement, DG Shipping has also placed considerable emphasis on awareness generation and stakeholder education. Various outreach initiatives have been conducted to educate seafarers regarding fraudulent recruitment practices, illegal fee demands and risks associated with unauthorised agents. Awareness programmes focus on strengthening understanding of

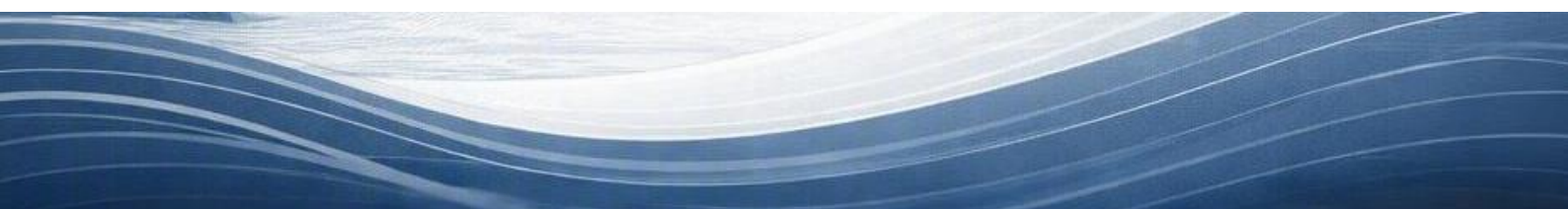
recruitment procedures, employment rights, grievance mechanisms and available protections under Indian and international maritime regulations. By improving awareness among seafarers, the administration seeks to reduce vulnerability to exploitation and encourage informed decision-making while seeking employment opportunities.

An effective grievance redressal framework has been developed to ensure timely assistance and corrective action in cases involving complaints against recruitment agencies or related stakeholders. Dedicated support mechanisms, structured complaint handling procedures and time-bound resolution processes contribute towards improving confidence within the maritime workforce. Such mechanisms enable seafarers to report suspected irregularities and seek assistance without undue delay. Strengthening grievance redressal systems also promotes accountability among recruitment agencies and supports a more responsive regulatory environment capable of addressing emerging concerns in a timely manner.

Continuous audits and inspections form another important pillar of the overall strategy. Regular compliance assessments allow regulators to identify operational deficiencies, evaluate adherence to prescribed standards and verify implementation of regulatory requirements. Inspections also serve as an important quality assurance mechanism by ensuring that recruitment practices remain aligned with legal and ethical standards. Through sustained monitoring and enforcement, DG Shipping seeks to create a culture of compliance that discourages unethical practices and promotes professionalism across the maritime recruitment ecosystem.

The strengthening of recruitment governance is also linked to broader objectives relating to seafarer welfare and maritime safety. Recruitment irregularities can have far-reaching consequences extending beyond employment-related issues and may contribute to abandonment cases, contractual disputes, welfare concerns and operational safety risks. Ensuring that seafarers are recruited through authorised channels and deployed on compliant vessels is therefore an important element of safeguarding the overall integrity of the maritime sector. Increased transparency within recruitment processes supports not only seafarer welfare but also enhances confidence among shipowners, international employers and other maritime stakeholders.

The combined approach of regulatory oversight, digital verification, stakeholder awareness, grievance handling and continuous monitoring reflects the commitment of DG Shipping to establishing a corruption-free, transparent and accountable maritime recruitment system. By strengthening governance across the crewing value chain and promoting ethical recruitment practices, the administration seeks to protect the rights and interests of Indian seafarers while creating a safer and more trustworthy maritime employment environment. These initiatives contribute towards the broader objective of building a welfare-oriented maritime ecosystem founded on integrity, compliance and responsible governance.





Maritime Crewing

Human element is of paramount importance in the maritime industry as human skills, judgement and welfare drive maritime safety.

CHALLENGES FACING SEAFARERS

Abandonment of Seafarers

- 80 active abandonment/arrest cases involving 512 seafarers
- Repatriation, wage and welfare concerns.

Deaths and Missing and Casualties

- 408 death cases and 192 missing cases tracked
- Compensation, family support and welfare intervention.

Fraud & Corruption in Crewing

- Illegal recruitment practices and fraudulent RPSLs
- Zero Tolerance for Corruption in Crewing.

INTERVENTIONS & WELFARE BODIES | Zero tolerance for corruption in crewing

Seafarers Assistance and Facilitation Counter

Dedicated seafarer helpdesk and grievance support.

Digital Interventions

E-Navik: 24x7 Grievance Redressal Module, Crisis Management Module, RPSL Module

Seafarer Welfare Fund Society (SWFS)

- 12 welfare schemes for seafarers and families covering Death, disability, maternity, education and insurance support
- Welfare assistance up to ₹10 lakh in high-risk cases

Seamen's Provident Fund Organization

- Provident fund and retirement security
- Long-term financial protection.

Welfare Infrastructure - SWBAT

- ₹90 Cr welfare infrastructure programme
- Seafarer clubs, welfare centres and outreach facilities²
- 14 projects across major maritime locations

6. Maritime Training and Ecosystem



Goals

- **Ensure world-class maritime training standards** through effective regulation, accreditation, and monitoring of Maritime Training Institutes (MTIs).
- **Develop a globally competent Indian seafarer workforce** by aligning training and certification with STCW and international maritime standards.
- **Promote quality, safety, and professionalism** in maritime education through standardized curricula, qualified faculty, and robust assessment systems.
- **Drive innovation and modernization in maritime training** by encouraging the adoption of advanced technologies, simulators, e-learning, and industry-relevant courses.
- **Enhance employability and career opportunities for Indian seafarers** by continuously updating training frameworks to meet evolving global shipping industry requirements.

6.1. Maritime Training Institutes Infrastructure in India

- India has a **robust network of 176 DG Shipping-approved Maritime Training Institutes (MTIs)**, comprising **81 Pre-Sea Institutes** and **95 Post-Sea Institutes**, strategically located across the country.
- The **Pre-Sea training ecosystem** offers **7 approved courses** with a total annual intake capacity of **23,717 candidates**, including **9,636 officer trainees** and **14,081 rating trainees**.
- The **Post-Sea training infrastructure** supports the upskilling and certification needs of serving seafarers through **89 specialized courses** (52 Modular, 20 Simulator-based, and 17 Competency courses) with an annual approved intake of **22,264 candidates**.
- Maritime institutes are concentrated along India's coastal and maritime hubs, with significant presence in **Maharashtra, Tamil Nadu, Kerala, Gujarat, West Bengal, and Delhi-NCR**, ensuring nationwide access to maritime education and training.
- The extensive MTI infrastructure enables India to produce a **steady pipeline of globally competent seafarers**, supporting the growth of the shipping industry while maintaining compliance with **STCW and international maritime training standards**.

6.2. Training Ecosystem

- **DGMA's Training Ecosystem** is a flagship digital transformation initiative aimed at creating a **unified, cloud-based platform** for maritime education, training, assessment, certification, and compliance management.
- The platform integrates **seven critical modules** into a single ecosystem, including Learning Management System (LMS), Faculty Development Programme, Digital Training & Assessment Record (TAR), Web-Based Simulators, Online Certificate Validation, Centralized Attendance System, and AR/VR-enabled training.
- By leveraging **advanced technologies, real-time monitoring, and data-driven decision-making**, the ecosystem will enhance transparency, standardization, quality assurance, and operational efficiency across India's maritime training sector.
- The initiative supports the objectives of **Maritime India Vision 2030 (MIV-2030)** and **Amrit Kaal Vision 2047 (AKAM-2027)** by modernizing maritime education and aligning training delivery with global best practices.
- Through the Training Ecosystem RFP, DG Shipping aims to onboard a **Master System Integrator (MSI)** to design, develop, implement, operate, and maintain the integrated platform for all maritime stakeholders.

- The project follows a **Zero Cost to Government model**, wherein operational sustainability will be achieved through stakeholder-driven revenue mechanisms without imposing any budgetary burden on the Government.
- Once implemented, the Training Ecosystem will significantly improve **training quality, faculty development, certification processes, digital governance, and employability of Indian seafarers**, strengthening India's position as a global maritime manpower hub.

6.3. Examination Reforms

- **DGMA has introduced a comprehensive end-to-end digital examination system** covering the entire candidate journey, from registration and eligibility assessment to examination, evaluation, re-evaluation, and data management.
- The reformed system integrates key processes such as **seat booking, candidate verification, misconduct monitoring, question bank management, examination conduct, result processing, and secure record storage** into a single digital platform.
- Advanced security features including **biometric authentication, CCTV surveillance, online proctoring, encrypted question papers, and digitized answer script evaluation** enhance the integrity, transparency, and credibility of examinations.
- The initiative promotes a **uniform examination experience across all Mercantile Marine Departments (MMDs)** while improving operational efficiency, reducing manual intervention, and strengthening governance.

6.4. Creating Training Berths Initiative

- **DGMA has launched a dedicated initiative to address the shortage of mandatory shipboard training berths for Indian maritime cadets.**
- The initiative focuses on creating additional training opportunities through **industry collaboration, dedicated training vessels, MTI-industry partnerships, and innovative policy interventions.**
- **96 training berths** have been created onboard **MV Swaraj Dweep** in collaboration with the Andaman & Nicobar Administration and Shipping Corporation of India (SCI) to support GP Rating and CCMC trainees.
- DG Shipping is promoting **structured linkage between Maritime Training Institutes (MTIs) and shipping companies** to ensure greater availability of sea-time training opportunities and smoother cadet progression.

- A **Training Berth Mapping System** is also being developed to digitally track and verify training berths, improving transparency, traceability, and regulatory oversight.
- The initiative aims to **bridge the training berth gap, improve employability, and enable timely completion of mandatory sea service requirements for Indian seafarers.**

6.5. Sagar Mein Samman

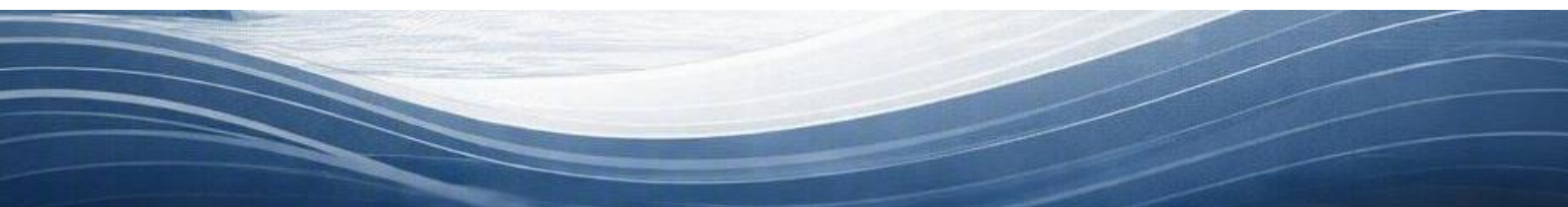
- **Sagar Mein Samman** is a flagship initiative of DG Shipping aimed at promoting **gender inclusivity, safety, and equal opportunities** for women in the maritime sector.
- The initiative focuses on creating a supportive and respectful work environment through policy reforms, stakeholder engagement, and industry-wide awareness.
- Financial assistance of **₹1 lakh per candidate** is provided through the Maritime Training Trust (MTT) to encourage women to join pre-sea maritime courses.
- The programme supports India's vision of significantly increasing female participation in the maritime workforce and developing a more diverse seafaring community.

6.6. Sagar Mein Yog

- **Sagar Mein Yog** promotes the physical, mental, and emotional well-being of seafarers through structured yoga and wellness practices.
- The initiative includes development of a dedicated maritime wellness curriculum, training programmes, and nationwide implementation across maritime stakeholders.
- It aims to reduce stress, improve resilience, and enhance the overall health of seafarers serving at sea.
- The programme supports safer, healthier, and more productive shipboard environments.

6.7. Mission 20%

- **Mission 20%** aims to significantly increase India's share of the global seafaring workforce and strengthen India's position as a leading maritime manpower supplier.
- The initiative focuses on expanding training capacity, creating additional training berths, improving employability, and enhancing industry participation.



- It promotes modernization of maritime training, adoption of digital technologies, and alignment with global industry requirements.
- The mission supports the development of a larger pool of highly skilled and globally competitive Indian seafarers.

6.8. MTI Module

- The **MTI Module** is a comprehensive digital platform developed to streamline the regulation and management of Maritime Training Institutes (MTIs).
- It provides end-to-end digital workflows for institute approvals, course management, inspections, faculty management, and STCW compliance monitoring.
- The module enables dynamic batch sizing, online applications, digital inspections, INDoS management, and automated compliance tracking.
- By reducing manual intervention, the system improves transparency, efficiency, and ease of doing business for maritime training institutions.

6.9. Training Ecosystem

The Training Ecosystem is envisaged as a unified, cloud-based digital platform that integrates the entire maritime training, assessment, competency development, and certification lifecycle into a single ecosystem. The initiative aims to strengthen training quality, enhance transparency, enable real-time regulatory oversight, and align maritime education with the objectives of Maritime India Vision 2030 and Amrit Kaal Vision 2047. The model seeks to move away from fragmented, institute-specific systems towards a standardized, technology-enabled framework operating under centralized DGS governance.

6.10. Learning Management System (LMS)

The LMS will serve as the foundational layer of the Training Ecosystem, providing a centralized platform for delivery of maritime courses, assessments, learning content, and regulatory compliance. It will standardize training delivery across all MTIs, support blended and remote learning, ensure DGS-approved content, and integrate seamlessly with attendance, assessment, certification, and trainee progression workflows. The LMS is intended to create a uniform national learning environment aligned with STCW requirements while providing DGS with real-time visibility into training activities.

6.11. Faculty Development Programme (FDP)

The Faculty Development Programme is designed to create a national framework for continuous professional development, competency assessment, certification, and

performance governance of maritime faculty. The platform will facilitate faculty registration, competency mapping, skill-gap analysis, training, certification renewal, and performance monitoring. By introducing structured and technology-enabled faculty development, the FDP seeks to improve instructional quality, ensure consistency across MTIs, and establish a culture of continuous learning aligned with international best practices.

6.12. Digital Training and Assessment Record (Digital TAR)

The Digital TAR Book aims to digitize and modernize the statutory onboard training records maintained by cadets and seafarers. The system will replace paper-based records with secure digital workflows that enable real-time monitoring of onboard training progress, competency assessment, and task completion. Through integration with certification systems and training platforms, the Digital TAR will improve traceability, reduce administrative delays, strengthen auditability, and enhance the integrity of the training and certification process.

6.13. Centralized Attendance System (CAS 2.0)

CAS 2.0 is envisioned as a nationwide facial biometric attendance platform for candidates, faculty, and institutes. The system will provide tamper-proof attendance verification, prevent impersonation and proxy attendance, and enable real-time monitoring by DGS and MMDs. Beyond attendance collection, CAS 2.0 will function as a regulatory assurance tool, supporting compliance enforcement, institutional accountability, and enhanced confidence in the authenticity of maritime training delivery.

6.14. Web-Based Simulator

The Web-Based Simulator will provide cloud-hosted, scenario-based simulation training and assessment capabilities that complement physical simulators. It will enable cadets and seafarers to undertake realistic operational and emergency scenarios through standardized digital environments accessible from any location. The module will support competency-based assessment, reduce dependency on physical simulator availability, improve accessibility, and provide objective, data-driven evaluation of candidate performance.

6.15. Online Maritime Certificate Validation (OMCV)

The OMCV platform will provide secure, real-time validation of maritime certificates and credentials issued to seafarers. Through digital authentication, QR-code-based verification, API integrations, and audit trails, the module will replace manual verification processes and strengthen confidence in Indian maritime certifications. The platform is expected to improve verification efficiency, reduce fraud risks, and facilitate seamless

acceptance of certificates by shipping companies, port authorities, regulators, and other stakeholders globally

6.16. AR/VR/Mixed Reality Training

The AR/VR/Mixed Reality component will introduce immersive and interactive training experiences covering ship familiarization, machinery operation, navigation, safety drills, emergency response, and other operational scenarios. By simulating real-world maritime conditions in a controlled environment, the platform will enhance practical learning, improve safety awareness, and strengthen competency development. The solution is intended to supplement conventional training methods by providing scalable, technology-enabled experiential learning opportunities.

6.17. Integrated Ecosystem Architecture

A key feature of the Training Ecosystem is the integration of all seven components into a single interoperable platform managed by a Single Master Integrator. Data generated across learning, attendance, faculty development, onboard training, simulation, assessments, and certification will flow seamlessly between modules, enabling real-time dashboards, analytics, automated workflows, and comprehensive regulatory oversight. This integrated architecture will provide end-to-end visibility of a seafarer's training journey while reducing fragmentation, enhancing governance, and improving the overall efficiency of maritime training and certification in India.

6.18. Current Status

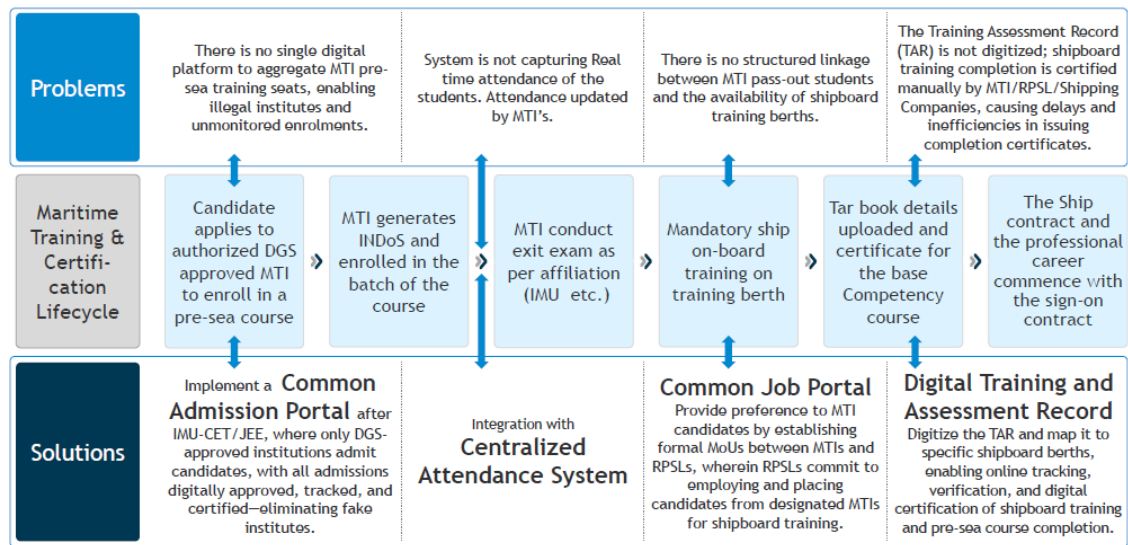
The Request for Proposal (RFP) for implementation of the Training Ecosystem has been published, with multiple vendor responses and queries received. The project proposes a Design-Build-Finance-Operate-Maintain (DBFOM) model under which a Single Master Integrator will design, develop, integrate, host, operate, and maintain the ecosystem. The Government of India will bear no implementation cost, with the platform operating through an approved service-based or transaction-based commercial model. The expected timeline envisages implementation and go-live of the ecosystem within 12 months, followed by operation and maintenance for an initial five-year period.

6.19. Expected Outcome

The Training Ecosystem is expected to establish a standardized, technology-enabled national framework for maritime training, skilling, assessment, faculty development, and certification. By integrating all critical training functions into a unified digital ecosystem, the initiative aims to improve training quality, strengthen certification integrity, enhance regulatory oversight, reduce administrative inefficiencies, and reinforce India's position as a leading global supplier of skilled seafarers.



Maritime Training & Certification Lifecycle



127

India's maritime training and certification framework plays a critical role in sustaining the country's position as one of the leading suppliers of maritime manpower globally. However, the existing training lifecycle continues to face several operational and governance challenges arising from fragmented processes, limited digital integration and inadequate visibility across various stages of a seafarer's professional journey. These challenges impact efficiency, transparency and regulatory oversight while creating delays and administrative burdens for students, training institutes, recruiters and shipping companies. Addressing these gaps has therefore become a key component of the broader maritime digital transformation agenda being pursued by the Directorate General of Maritime Administration.

One of the primary challenges within the current training ecosystem is the absence of a unified digital platform for managing admissions into DGMA-approved Maritime Training Institutes (MTIs). The existing system relies on decentralised admission processes undertaken independently by training institutes, resulting in limited visibility regarding admissions, intake capacities and student enrolments. This fragmentation creates opportunities for unauthorised admissions and reduces the ability of regulators to monitor enrolment practices effectively. The lack of a single admission interface also creates inefficiencies for students seeking admission into approved training programmes and complicates the process of maintaining accurate records across multiple institutions.

The training ecosystem also faces challenges relating to attendance monitoring and regulatory oversight. Current attendance data is largely maintained at the institute level and does not provide regulators with real-time visibility regarding trainee participation and compliance. Dependence on institution-based reporting mechanisms can limit

effective monitoring and verification while increasing the risk of inconsistencies in attendance records. The absence of a centralised attendance monitoring framework therefore affects transparency and reduces the effectiveness of regulatory supervision within the training sector.

A further challenge arises from the lack of a structured mechanism linking training completion and availability of mandatory shipboard training opportunities. Practical sea-time training remains an essential requirement for professional competency development and certification. However, the existing framework does not provide a formal system that integrates graduating trainees, recruitment agencies and shipping companies for allocation of training berths. This gap often creates uncertainty for candidates seeking onboard training opportunities and contributes to delays in commencement of sea service. The absence of a transparent and coordinated mechanism for berth allocation has therefore emerged as a significant concern within the maritime training ecosystem.

The current Training Assessment Record (TAR) process also remains heavily dependent on manual documentation and verification procedures. Shipboard training records are maintained through physical documentation and require multiple stakeholders, including training institutes, recruitment agencies and shipping companies, to certify completion of training requirements. This process can result in delays, administrative inefficiencies and challenges in verification of records. The absence of a fully digital training record system limits traceability and restricts the ability of regulators and employers to monitor training progression through a secure and transparent platform.

To address these challenges, a comprehensive digital transformation framework is being developed for the maritime training ecosystem. A Common Admission Portal is proposed to create a single digital interface for admissions into DGMA-approved training institutes. The portal would enable all admissions to be conducted, monitored and verified through a centralised platform, thereby improving transparency, reducing opportunities for unauthorised enrolment practices and strengthening regulatory oversight. A unified admission framework would also enhance convenience for students and provide reliable data for policy making and capacity planning.

The proposed reforms also envisage integration with a Centralized Attendance System capable of providing real-time attendance monitoring across approved institutions. By leveraging digital attendance technologies and centralised reporting mechanisms, the system would improve transparency, facilitate compliance monitoring and strengthen confidence in training delivery standards. Enhanced regulatory visibility would enable more effective supervision while reducing dependence on manual reporting processes.

To address the shortage and allocation challenges associated with onboard training opportunities, a Common Job Portal framework is proposed to establish structured

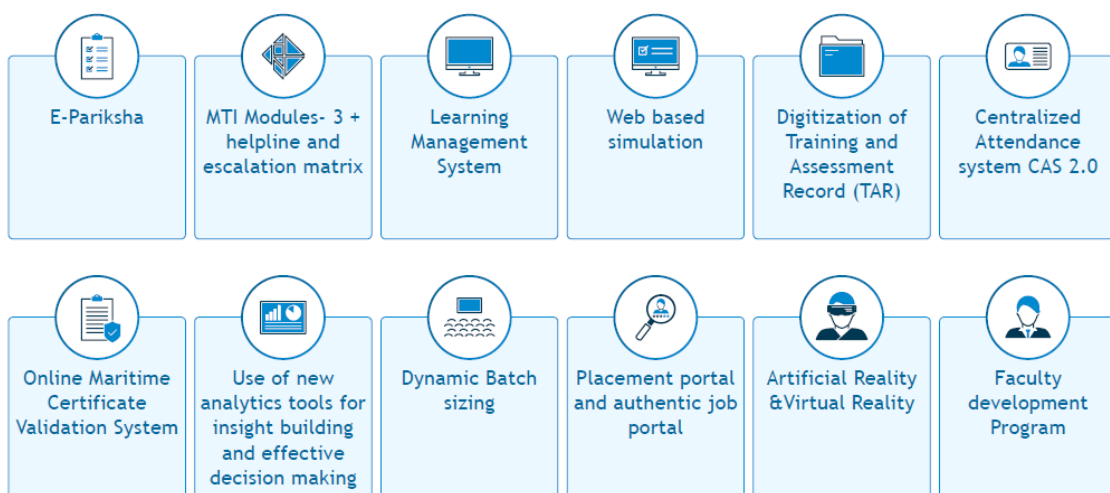
linkages between maritime training institutes, recruitment agencies and shipping companies. The proposed system would facilitate transparent matching of trainees with available shipboard training berths and support more efficient deployment of candidates for mandatory sea-time requirements. Such an approach would improve employability, reduce delays in career progression and strengthen coordination among stakeholders involved in maritime training and crewing.

The transformation framework further proposes digitisation of the Training Assessment Record through a Digital Training and Assessment Record system. The proposed platform would electronically capture training progress, shipboard assignments, competency achievements and assessment records throughout the training lifecycle. Digitalisation of TAR records would improve traceability, facilitate online verification and enable efficient issuance of certifications upon completion of prescribed requirements. The system would strengthen integrity of training records, reduce administrative delays and support the creation of a seamless end-to-end digital training ecosystem aligned with global best practices.

Through the implementation of these reforms, the maritime training and certification framework is expected to evolve into a fully integrated, technology-enabled ecosystem capable of supporting regulatory oversight, improving transparency and enhancing service delivery. The resulting system will strengthen governance across the training lifecycle while creating a more efficient pathway from maritime education to professional employment, thereby supporting India's objective of expanding its global maritime workforce and strengthening its position as a leading maritime manpower nation.



Digital Initiatives in Training



The maritime training ecosystem is undergoing a comprehensive digital transformation aimed at improving transparency, strengthening regulatory oversight and enhancing the quality of maritime education and certification processes. As India seeks to increase its share of the global seafaring workforce and align maritime education with evolving international requirements, the adoption of digital technologies has become essential for creating a modern, efficient and globally competitive training framework. The proposed digital initiatives seek to address process fragmentation, improve stakeholder integration and create a seamless end-to-end training and competency management ecosystem.

One of the cornerstone initiatives is the development of E-Pariksha, an end-to-end digital examination platform designed to modernise maritime assessments and certification processes. The system seeks to integrate candidate registration, eligibility verification, examination conduct, evaluation and result processing within a single digital environment. By reducing manual intervention and standardising assessment procedures, the platform is expected to improve transparency, examination integrity and operational efficiency. Digital examination systems also facilitate better monitoring, faster processing of results and enhanced governance of competency assessments across the maritime sector.

The MTI Module forms another important component of the digital framework and is intended to provide an integrated platform for regulation and management of Maritime Training Institutes. The module enables digital processing of institute approvals, course administration, faculty management, inspections and compliance monitoring. Structured helpdesk systems and escalation mechanisms will further improve responsiveness and facilitate timely resolution of stakeholder concerns. By digitalising interactions between training institutions and the maritime administration, the initiative strengthens regulatory oversight while improving ease of doing business for maritime training providers.

To improve delivery of maritime education, a national Learning Management System is being developed to provide a standardised digital learning environment across institutions. The platform will support delivery of training content, assessments, learner progress monitoring and integration with certification systems. The initiative seeks to ensure consistent training quality across institutions while enabling greater access to learning resources and supporting blended training models. The Learning Management System will also facilitate continuous updating of training content in line with evolving industry requirements and international standards.

Simulation-based learning is being strengthened through the introduction of web-based simulation tools. These platforms will provide remote access to training scenarios and practical exercises that complement traditional classroom instruction and physical simulator facilities. Such systems can enhance competency development by enabling

candidates to undertake scenario-based learning and assessment through standardised digital environments. Improved accessibility to simulation tools is expected to strengthen training quality while supporting competency-based learning methodologies.

The Digital Training and Assessment Record (TAR) initiative seeks to modernise and digitise shipboard training documentation and competency records. Under the existing framework, much of the training documentation process remains dependent on manual certification and record verification. Digitalisation of TAR records will enable secure tracking of onboard training activities, facilitate verification of training completion and create a transparent record of competency progression. The initiative is expected to reduce administrative delays, improve traceability and strengthen confidence in the training and certification process.

The Centralized Attendance System (CAS 2.0) aims to introduce real-time attendance monitoring across maritime training institutions through modern verification technologies. By providing tamper-resistant attendance records and centralised visibility for regulators, the system strengthens compliance monitoring and enhances confidence in training delivery standards. A centralised attendance framework will support more effective oversight of training institutions and contribute to overall governance improvements within the maritime education sector.

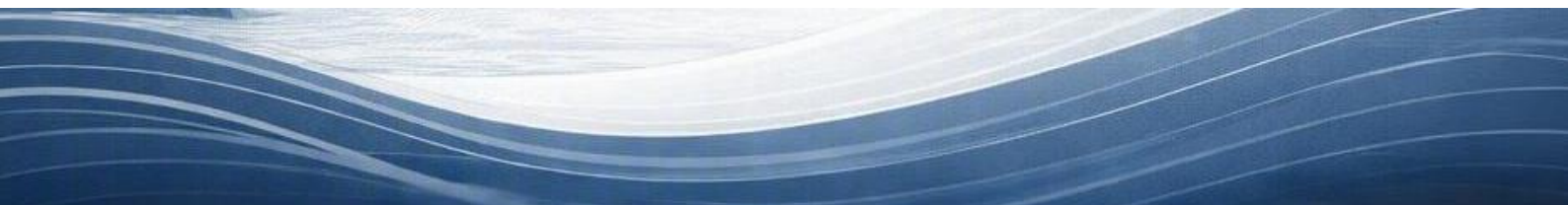
Additional digital initiatives have been conceptualised to support verification, workforce development and data-driven decision-making. The Online Maritime Certificate Validation System will facilitate secure real-time validation of maritime certificates and credentials, reducing dependence on manual verification and strengthening confidence in Indian certifications globally. Advanced analytics tools are proposed for generating actionable insights from training and certification data, thereby supporting evidence-based policy formulation and more effective regulatory interventions. Dynamic batch sizing mechanisms will allow training capacities to be managed more efficiently in response to evolving industry requirements and institutional capabilities.

To improve employability and strengthen linkages between training and employment, a dedicated placement and authentic job portal is proposed. The platform will facilitate engagement between candidates, recruitment agencies and shipping companies through a transparent and verified environment. By improving access to legitimate employment opportunities, the initiative seeks to support career progression while reducing vulnerability to fraudulent recruitment practices. Enhanced integration between training institutions and employers will contribute towards improving placement outcomes and strengthening the maritime manpower ecosystem.

Future-ready technologies such as Artificial Reality and Virtual Reality are also being incorporated into the training ecosystem to provide immersive learning experiences covering ship familiarisation, operational procedures, emergency response and safety

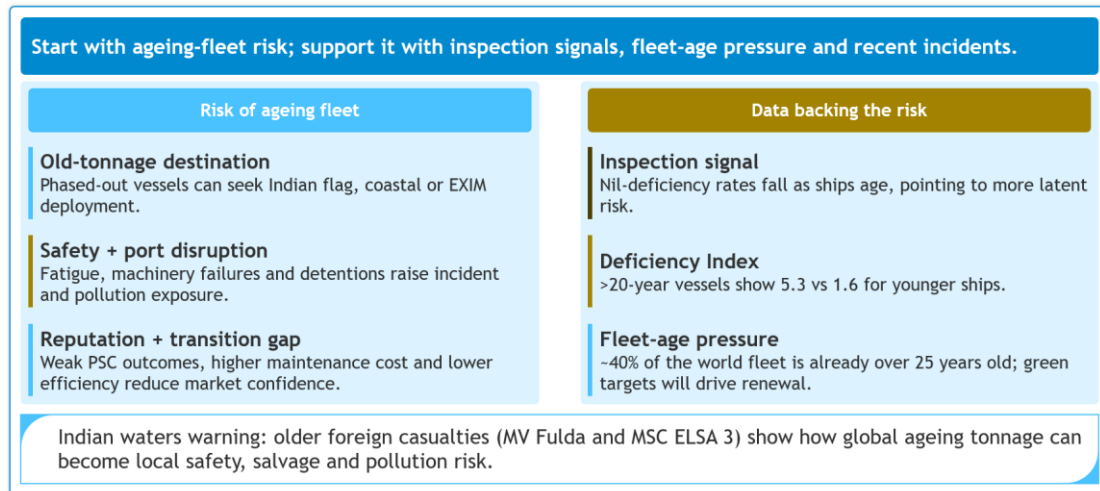
training. Such technologies support practical competency development while reducing constraints associated with physical training infrastructure. Simultaneously, a dedicated Faculty Development Programme is being introduced to strengthen instructional quality through structured competency enhancement, training and performance development for maritime educators. Investment in faculty capability remains essential for ensuring that technological advancements in training are supported by equally strong human resources.

Collectively, these initiatives represent a transformational shift from fragmented and largely manual training processes towards a fully integrated digital maritime training ecosystem. The resulting framework is expected to improve transparency, strengthen quality assurance, enhance employability, support regulatory oversight and align maritime education with the objectives of Maritime India Vision 2030 and Maritime Amrit Kaal Vision 2047. By leveraging technology across the entire training and certification lifecycle, India seeks to reinforce its position as a leading global maritime manpower nation while ensuring higher standards of competency, governance and service delivery.



7. Age Norms

Age Norms



India's merchant fleet has progressively aged due to sustained reliance on second-hand vessel acquisitions and limited induction of new tonnage. As per the IIM Indore study, nearly 44% of Indian-flagged vessels are over 20 years of age, compared to a significantly lower share globally. Older vessels exhibit substantially higher safety deficiencies, machinery failures, structural fatigue, detention risks and operational inefficiencies, making fleet modernisation an important policy objective for ensuring safe and sustainable growth of the maritime sector. The study further indicates that vessels above 20 years of age have significantly higher deficiency indices and lower nil-deficiency rates during inspections, demonstrating a clear relationship between vessel age and safety performance.

The need for age norms has become particularly relevant in light of recent maritime incidents in Indian waters involving older foreign-flagged vessels. In July 2025, the 26-year-old Hong Kong-flagged tanker **MV Fulda** suffered a major explosion off Deendayal Port, Gujarat, during gas-freeing operations after discharge of methanol cargo. The incident caused extensive structural damage and necessitated emergency intervention to prevent a larger maritime casualty. Similarly, in May 2025, the 28-year-old Liberian-flagged container vessel **MSC ELSA 3** capsized off Kochi despite possessing valid statutory certifications and having undergone regulatory inspections. The casualty resulted in significant marine pollution and demonstrated that periodic inspections and certification alone may not be sufficient to mitigate risks associated with ageing vessels. These incidents underline the heightened safety, environmental and operational risks posed by over-age tonnage and reinforce the requirement for preventive age-based controls.

In the absence of age-related restrictions, India faces the risk of becoming a destination for vessels phased out from other jurisdictions due to safety, environmental or

commercial considerations. Age norms serve as a safeguard against the induction of obsolete and substandard vessels that may no longer find acceptance in other major maritime markets. Such controls are particularly important in the context of ongoing proposals that could reduce licensing scrutiny for certain categories of vessels operating in Indian waters. Without age-based filters, older international vessels may continue to enter Indian maritime trades despite being progressively excluded from other markets.

Global maritime practice demonstrates that age-related controls are a widely accepted regulatory mechanism for maintaining fleet quality. Major international registries such as **Marshall Islands** generally do not permit registration of vessels older than 20 years without special approval and additional inspections. **Malta** restricts first-time registration of trading ships beyond 20 years of age, while **Cyprus** does not permit registration of cargo vessels and offshore units above 25 years and mandates inspections for vessels above 15 years. **Panama** has introduced restrictions on registration of older tankers and bulk carriers to improve fleet quality, and **China** imposes age-based eligibility criteria for several vessel categories while restricting operation of over-age foreign vessels. Similarly, cargo-handling nations such as **Malaysia, Vietnam, and the United Arab Emirates** have established age thresholds or enhanced survey requirements for older ships before permitting registration. These international examples demonstrate that age norms are an accepted instrument for maintaining safety, environmental compliance and overall fleet quality.

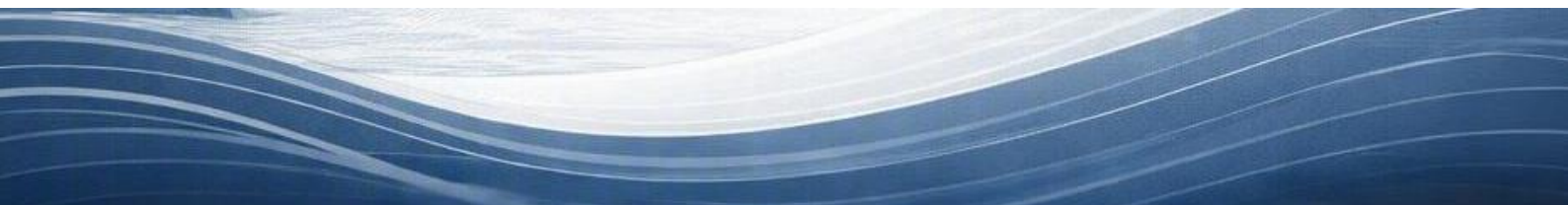
Commercial practices adopted by global charterers and oil majors also reflect a preference for younger vessels. Organisations such as ADNOC, Saudi Aramco, ExxonMobil and BP impose stringent vetting requirements and age-linked restrictions, typically requiring additional surveys and condition assessments once vessels cross 15-20 years of age. In contrast, Indian chartering practices historically did not incorporate comparable age-related conditions, allowing older vessels greater access to domestic cargo opportunities. Consequently, vessels unable to secure employment in international markets may continue to find commercial opportunities in India, thereby increasing the presence of ageing tonnage in Indian trade. Age norms help address this imbalance by establishing a minimum quality benchmark for vessels operating under the Indian flag or through licensing arrangements.

Beyond safety considerations, age norms are essential for facilitating fleet modernisation and supporting India's long-term maritime development objectives. Older vessels are generally less fuel-efficient, more emission-intensive and often unable to meet evolving international environmental standards. The IIM Indore study highlights that ships beyond approximately 25 years become increasingly uneconomical when higher maintenance costs, lower efficiency and emerging carbon-related compliance costs are considered. Fleet renewal through induction of younger and technologically advanced vessels is therefore critical for enhancing competitiveness, reducing environmental impact and aligning with India's sustainability commitments.

Age norms also play a broader developmental role within the maritime ecosystem. Shipping operates as a cyclical industry where fleet renewal, shipbuilding and ship

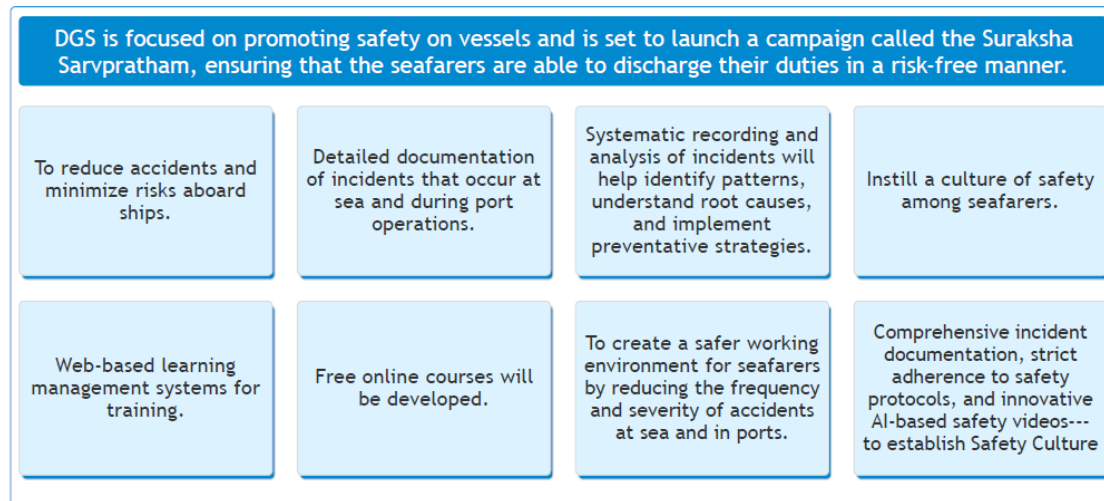
recycling are intrinsically linked. Timely retirement of ageing vessels creates demand for replacement tonnage, which can stimulate domestic shipbuilding and support associated maritime industries. Government initiatives such as the Shipbuilding Financial Assistance Scheme, Shipbuilding Development Scheme and Ship Recycling Credit Note have been introduced to support this transition. Age norms provide the regulatory impetus required to ensure that these incentives translate into actual fleet renewal, thereby contributing to the objectives of Maritime India Vision 2030 and Maritime Amrit Kaal Vision 2047.

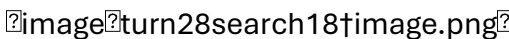
The implementation of age norms through DGS Order No. 06 of 2023, supported by a phased transition framework, seeks to ensure that vessels operating under the Indian flag or through Indian licensing arrangements meet minimum quality standards while allowing adequate time for industry adjustment and fleet renewal. The policy therefore serves as a critical instrument for enhancing maritime safety, preventing the influx of obsolete tonnage, promoting environmental sustainability and supporting the creation of a modern, efficient and globally competitive Indian shipping ecosystem.



8. Maritime Casualty

Safety First - Suraksha Sarvapratham



Maritime safety remains the fundamental pillar of sustainable shipping operations and is central to the protection of seafarers, vessels, cargo and the marine environment. Despite significant advancements in ship design, navigation systems and regulatory standards, accidents and operational incidents continue to occur across the global maritime industry. Analysis of maritime incidents consistently demonstrates that many accidents arise from a combination of operational, procedural and human factors which can be mitigated through stronger safety culture, continuous learning and proactive risk management. Recognising this need, the Directorate General of Shipping has proposed the**“Suraksha Sarvapratham” (Safety First)** initiative as a focused campaign aimed at strengthening safety awareness and promoting a culture of accident prevention across the maritime sector.  (Image: Suraksha Sarvapratham safety campaign)

The initiative is founded on the principle that seafarers should be able to discharge their professional responsibilities within a safe and risk-controlled working environment. While compliance with statutory safety requirements remains essential, the campaign seeks to move beyond regulatory compliance towards the development of a behavioural safety culture where safety considerations become an integral part of everyday shipboard operations. The overarching objective is to reduce accidents, minimise occupational risks and improve overall safety performance both at sea and during port operations. By strengthening safety awareness at all levels of the maritime workforce, the initiative seeks to contribute towards safer and more resilient maritime operations.

A key component of the programme involves systematic recording, documentation and analysis of maritime incidents. Effective safety management depends on the ability to

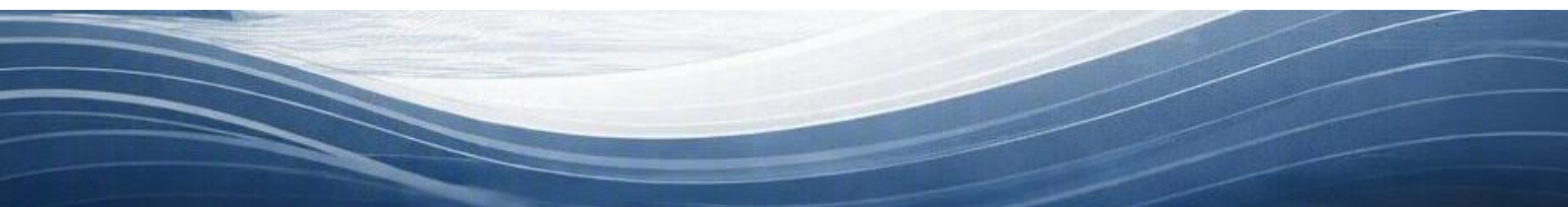
learn from operational experiences, identify recurring patterns and understand the root causes of accidents and near-miss events. Comprehensive documentation of incidents provides valuable information that can be used to strengthen preventive measures, improve procedures and support evidence-based decision making. The initiative therefore promotes structured reporting and analysis mechanisms that facilitate continuous improvement in safety performance across the maritime sector.

The campaign also emphasises the use of modern digital learning tools to expand access to safety education and awareness programmes. Web-based learning platforms are proposed to provide seafarers with convenient access to safety-related training materials and learning resources. Such digital systems can facilitate continuous professional development while ensuring that safety messages are disseminated consistently across different segments of the maritime workforce. The flexibility offered by online learning platforms is expected to enhance participation and improve accessibility of safety training programmes for seafarers operating across diverse locations and schedules.

To support widespread awareness generation, dedicated online safety courses are proposed as part of the initiative. These courses will focus on promoting best practices in operational safety, hazard identification, risk assessment and safe working procedures. Enhanced emphasis on practical learning and real-life case studies can contribute towards greater understanding of safety risks and help seafarers adopt preventive approaches in day-to-day operations. Such interventions are expected to strengthen individual competencies while supporting the development of a stronger safety culture throughout the maritime ecosystem.

The initiative further envisages the adoption of technology-enabled solutions for safety promotion and behavioural change. Digital communication tools, awareness campaigns and innovative educational content can be utilised to reinforce safety messages and encourage greater engagement among maritime personnel. The use of modern training methodologies and emerging technologies can support more effective dissemination of safety information while making learning materials accessible, interactive and relevant to operational realities faced by seafarers.

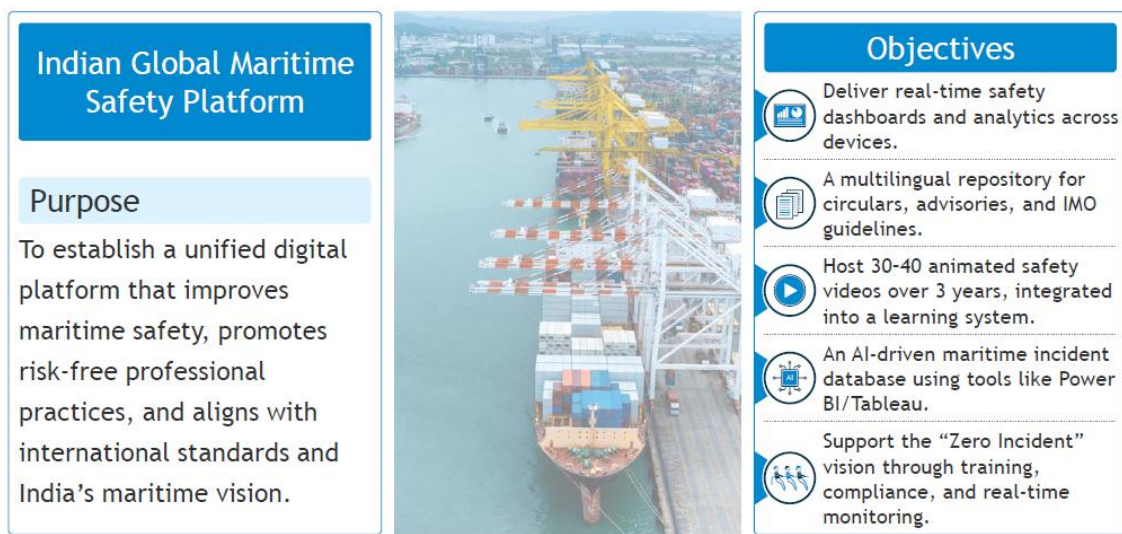
An equally important aspect of the programme is the promotion of a proactive safety culture across vessels, ports and maritime organisations. Safety culture extends beyond procedures and equipment and depends heavily on attitudes, awareness and continuous commitment from all stakeholders. Encouraging reporting of hazards, sharing lessons learned from incidents, promoting open communication and embedding safety considerations into routine operational practices are essential components of a mature safety culture. The initiative therefore seeks to create an environment in which safety is viewed as a shared responsibility and a core value across the maritime sector.



By combining incident analysis, digital learning, awareness generation and behavioural interventions within a single framework, the Suraksha Sarvapratham initiative aims to create a comprehensive and sustainable safety improvement programme. The initiative aligns with broader objectives relating to seafarer welfare, operational excellence and maritime safety governance. Through continuous education, enhanced reporting systems and stronger engagement with maritime stakeholders, the campaign is expected to contribute towards reducing accidents, improving workplace safety and fostering a culture where safety remains the highest priority in all maritime operations.



Indian Maritime Global Safety Platform



135

Maritime safety management is increasingly dependent on the ability to collect, analyse and disseminate safety-related information in a timely and structured manner. While regulatory inspections, audits and safety management systems provide the foundation for maritime risk management, the growing complexity of shipping operations requires a more integrated and technology-driven approach for monitoring safety performance. Recognising this requirement, the Indian Global Maritime Safety Platform has been conceptualised as a unified digital ecosystem aimed at strengthening maritime safety, promoting risk-free operational practices and supporting continuous improvement across the maritime sector.

The proposed platform seeks to create a centralised repository for maritime safety information by integrating data relating to safety incidents, advisories, regulatory circulars, training resources and operational best practices within a single digital framework. At present, safety-related information is often distributed across multiple channels, making timely access and effective utilisation challenging for stakeholders. A unified platform would improve accessibility and ensure that seafarers, shipping companies, maritime training institutes and regulatory authorities have access to

consistent and up-to-date safety information. The initiative therefore supports a more coordinated and proactive approach to maritime safety governance.

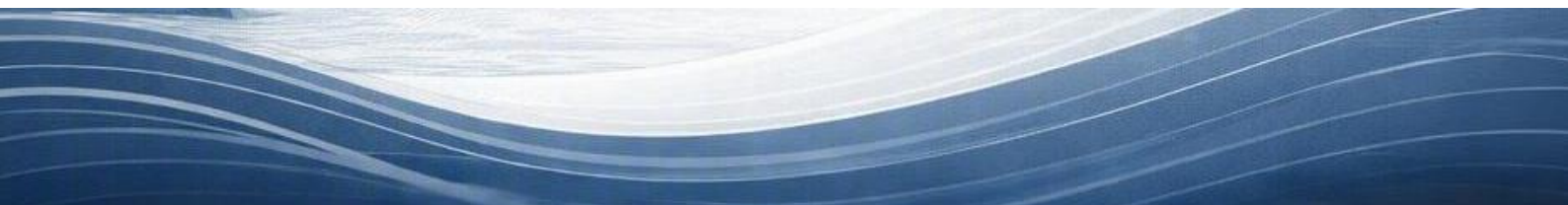
One of the key features envisaged under the platform is the creation of real-time safety dashboards and analytical tools capable of providing actionable insights to maritime stakeholders. Modern shipping operations generate substantial volumes of operational and safety-related data, which can be leveraged to identify trends, monitor performance and support preventive interventions. Through digital dashboards and analytics, the platform can facilitate improved understanding of accident patterns, high-risk operational areas and emerging safety concerns. Such insights can assist regulators and industry stakeholders in developing targeted safety measures and strengthening risk management frameworks.

The platform is also expected to function as a multilingual repository for safety-related information, including circulars, advisories, regulatory guidance and relevant international standards. Easy access to safety documentation is critical for ensuring consistent implementation of regulatory requirements and promoting awareness among maritime personnel. By consolidating information from domestic and international sources within a structured and accessible framework, the platform can strengthen dissemination of safety knowledge and encourage greater compliance with prescribed standards and procedures.

A significant component of the initiative involves integration of safety training and awareness programmes through digital learning tools. The platform proposes development and hosting of animated safety videos and interactive learning resources that can be utilised by seafarers and maritime institutions for continuous professional development. Visual and technology-enabled learning methods can improve engagement, enhance understanding of safety concepts and facilitate wider dissemination of best practices. The integration of safety content within a broader learning framework supports the objective of embedding safety awareness throughout the maritime workforce.

Advanced technologies and data analytics are expected to play an important role in enhancing the effectiveness of the platform. The development of a digital incident database supported by modern analytical tools will facilitate systematic recording and analysis of maritime incidents, near misses and safety observations. Enhanced analytical capability will support identification of recurring issues, determination of root causes and development of preventive measures aimed at reducing operational risks. Data-driven safety management can therefore contribute significantly towards strengthening safety performance across vessels, ports and other maritime operations.

The platform aligns closely with the broader objective of achieving a “Zero Incident” safety culture within the maritime sector. While elimination of all operational risks may not be feasible, continuous monitoring, proactive intervention and effective dissemination of safety information can substantially reduce the likelihood and severity of accidents. The integrated approach combining training, analytics, compliance



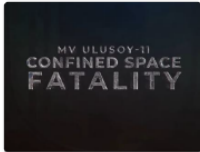
monitoring and real-time information sharing provides a strong foundation for fostering a culture of prevention and continuous safety improvement. Such a framework encourages stakeholders to move beyond reactive responses towards a more predictive and preventive safety management approach.

The Indian Global Maritime Safety Platform represents an important step towards the digital transformation of maritime safety governance in India. By bringing together safety information, learning resources, incident analytics and stakeholder engagement within a single ecosystem, the initiative seeks to strengthen maritime safety standards and support safer working environments for seafarers. The platform is expected to contribute towards improved regulatory oversight, enhanced safety awareness and more effective risk management while reinforcing India's commitment to international maritime safety standards and its long-term vision of creating a safe, sustainable and globally competitive maritime sector.

Safety Videos



The Casualty Safety Video Series is a key safety awareness initiative of the Directorate General of Shipping aimed at reinforcing the principle that safety at sea is non-negotiable. The series is designed to sensitise seafarers to real-world operational risks through structured analysis of past marine casualties.







Scan the QR Code for
Safety Video Series-
Directorate General
of Shipping

Objectives

- » Promote a strong safety culture onboard ships
- » Highlight lessons learnt from past marine casualties
- » Enhance risk awareness during shipboard operations
- » Encourage strict adherence to safety procedures and best practices

The Directorate General of Shipping has launched the **Casualty Safety Video Series** as a focused safety awareness initiative aimed at strengthening the safety culture across the maritime sector through structured learning from past marine casualties. Maritime accidents often arise from a combination of technical failures, operational shortcomings, procedural deviations and human factors. While statutory regulations and safety management systems establish the framework for safe operations, sustained reduction in accidents requires continuous learning and dissemination of lessons derived from actual incidents. The Safety Video Series has therefore been developed as an educational tool that converts lessons from real maritime casualties into easily accessible learning content for seafarers, maritime trainees and shipping professionals.

The initiative focuses on analysing actual maritime incidents and presenting the sequence of events, contributory factors and root causes in a structured and easy-to-understand format. Case studies relating to confined space fatalities, tug capsizes

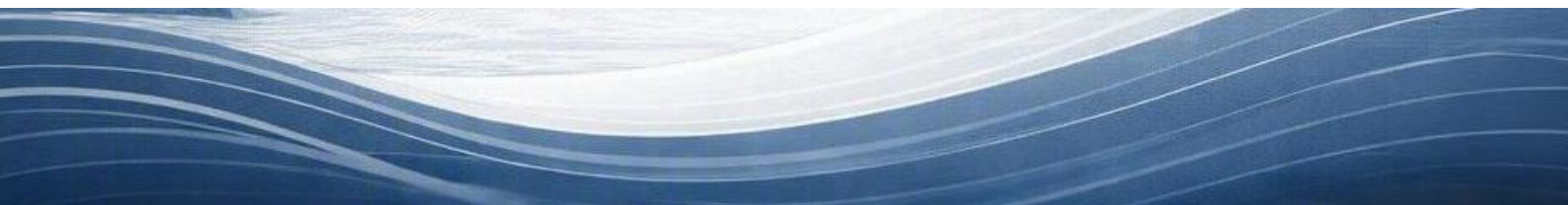
incidents, hopper tank accidents and other operational casualties are examined in detail to highlight the circumstances that led to the occurrence of the event. By reconstructing incidents and examining safety failures, the programme enables maritime personnel to gain practical understanding of risk scenarios that may arise during routine operations. Such exposure to real-world case studies strengthens hazard awareness and promotes a proactive approach towards accident prevention.

A major objective of the programme is to inculcate a stronger safety culture onboard vessels by reinforcing the principle that safety must remain the foremost priority in all maritime operations. Accident investigations frequently reveal that incidents could have been prevented through adherence to established procedures, effective communication, proper supervision and timely risk assessment. The Safety Video Series therefore places particular emphasis on behavioural aspects of safety by encouraging personnel to develop greater vigilance, exercise professional judgment and follow approved operational practices. Through repeated exposure to lessons learned from previous casualties, the initiative seeks to strengthen individual and organisational commitment towards safe operations.

The programme also contributes towards enhancing operational risk awareness among seafarers working in diverse operational environments. Maritime operations involve activities such as cargo handling, machinery maintenance, confined space entry, mooring operations, towing operations and navigation in challenging conditions, all of which carry inherent risks. By illustrating how seemingly routine activities can result in serious accidents when risk controls are compromised, the videos serve as practical training aids that help personnel recognise hazards before incidents occur. Improved understanding of operational risks contributes to better decision-making and supports implementation of preventive safety measures.

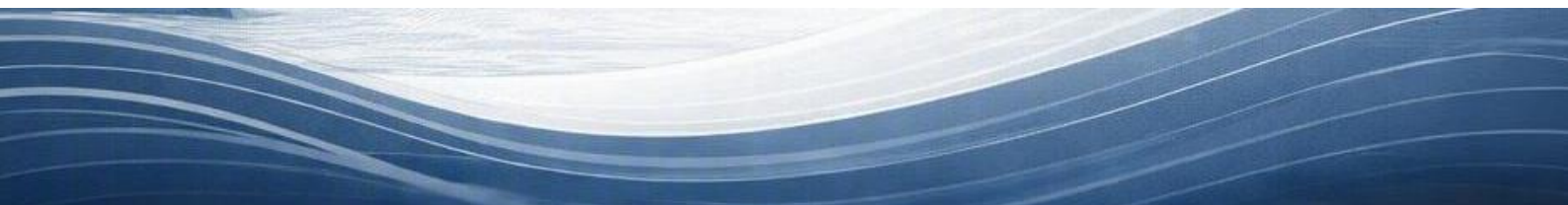
An important feature of the initiative is its role in translating accident investigation findings into actionable learning outcomes. Investigation reports often contain valuable recommendations and technical observations which may not always reach operational personnel in an easily understandable format. Through the use of visual storytelling and structured case analysis, the Safety Video Series bridges this gap by converting technical findings into practical safety lessons that can be readily applied in shipboard operations. This approach enhances knowledge retention and facilitates wider dissemination of safety-related information across the maritime workforce.

The initiative is also intended to encourage strict adherence to safety procedures, permit systems and established best practices. Many maritime casualties involve deviations from approved procedures, inadequate preparation or insufficient compliance with safety requirements. By demonstrating the consequences of such failures through actual case studies, the programme reinforces the importance of compliance at every stage of vessel operations. Greater awareness regarding procedural discipline and safety



responsibilities can significantly contribute towards reducing the likelihood of accidents and improving overall operational standards.

The Safety Video Series forms part of the broader effort being undertaken by the Directorate General of Shipping to create a learning-oriented and prevention-focused maritime safety ecosystem. The use of digital awareness tools complements other initiatives relating to incident reporting, safety analytics, training modernisation and promotion of a safety-first culture. By continuously disseminating lessons learned from past casualties and encouraging adoption of safer work practices, the initiative supports the long-term objective of reducing accidents, improving seafarer welfare and enhancing safety performance across the maritime sector.



9. Taxation Disadvantageous to Indian Flag

India's maritime sector is a strategic backbone of national trade, logistics and energy security, with nearly 95% of India's trade by volume and 70% by value moving through sea transport. However, despite India's coastline, port network, seafaring workforce and growing shipbuilding potential, the domestic shipping ecosystem has not been able to fully capture maritime value within the country. A significant portion of Indian-owned tonnage continues to remain registered under foreign jurisdictions, while activities such as ship financing, leasing, ship management and related maritime services are often structured outside India. The report identifies less competitive taxation, regulatory complexity and limited access to globally aligned financial ecosystems as key reasons for this leakage of maritime value from India.

The existing taxation framework is hampering Indian shipping at the stage of ship ownership and flagging itself. Under the current framework, Indian-flag vessels entering Indian waters for the first time are subjected to 5% IGST on the assessable value of the vessel, even where the vessel is intended for international operations. In contrast, foreign-flag vessels entering India for international transportation are treated as conveyances and are not subjected to a comparable tax burden. This creates a structural disadvantage for Indian-flag vessels at the point of acquisition and entry, as the Indian owner is required to bear a substantial upfront tax outflow before the vessel becomes revenue-generating. Although the IGST paid may be available as input tax credit, the large vessel value and long useful life of the asset result in prolonged working capital blockage, with industry inputs indicating that around INR 450 crore is currently blocked in ITC on this account.

This tax treatment affects ownership decisions and discourages Indian flagging. Indian shipping companies are incentivised to own or flag vessels outside India where such upfront IGST is not payable, thereby weakening Indian tonnage and reducing domestic value capture. The report notes that earlier, under the pre-GST regime, import of Indian-flag vessels did not attract comparable indirect tax, but the introduction of GST resulted in a 5% IGST levy on such vessel imports. Further, leading maritime jurisdictions such as Singapore and Norway follow a tax-neutral approach and do not levy customs duty or VAT/GST on cargo vessels used in international shipping. The Indian framework therefore places Indian-flag vessels at a disadvantage compared to both foreign-flag competitors operating in Indian trade and global jurisdictions that support fleet acquisition through tax neutrality.

The direct tax framework also constrains ship owning and leasing. The tonnage tax regime in India does not fully reflect modern maritime business models. Income from incidental activities is included within the tonnage tax regime only up to 0.25% of turnover from core shipping operations, and income beyond this threshold is taxed under normal provisions. This is not aligned with present commercial realities where ship management, technical supervision and integrated maritime services are linked to core shipping operations. The low cap discourages the development of India as a maritime service hub and limits the ability of Indian shipping companies to expand high-value

ancillary activities from India. In contrast, jurisdictions such as the United Kingdom, Denmark, Netherlands, Cyprus and Singapore provide broader or more favourable treatment for ship management activities under their regimes.

The chartering limit under India's tonnage tax regime further reduces operational flexibility. Indian tonnage tax companies are restricted from having chartered-in vessels exceeding 49% of the total net tonnage operated, effectively requiring at least 51% owned tonnage. This restricts Indian companies in short-duration, specialised or market-responsive shipping contracts, where chartering is often commercially necessary. Foreign shipping companies do not face a similar restriction and can adjust fleet deployment more flexibly. Global regimes such as the United Kingdom and Cyprus allow higher charter-in thresholds of up to 75%, with further flexibility in certain cases, thereby giving operators greater commercial agility.

Taxation is also affecting ship operations by increasing recurring costs for Indian-flag vessels. One key issue is TDS on wages of seafarers employed on Indian-flag vessels. The report notes that differential withholding tax treatment affects the take-home pay of Indian seafarers when compared with employment on foreign-flag vessels, encouraging skilled seafarers to migrate to foreign operators. Indian shipping companies are then compelled to gross up wages or adopt tax equalisation arrangements to retain crew, increasing operating costs and weakening competitiveness against foreign operators. This has direct implications for crew availability, cost of operations and the ability of Indian-flag vessels to compete in coastal and international trades.

Maintenance, repair and overhaul taxation adds another operational disadvantage. Where Indian shipping lines procure MRO services from foreign service providers, IGST is payable under reverse charge as import of service. Further, when the vessel is re-imported after repairs or dry docking abroad, IGST is again payable on the repair cost along with freight and insurance, resulting in double taxation of the same repair activity. This treatment emerged after the 2021 amendments, whereas earlier overseas ship MRO physically performed outside India was not liable to GST in India. Foreign-flag vessels do not face comparable indirect tax exposure in many maritime jurisdictions, making Indian-flag vessels less cost-competitive for the same trade.

Bunker fuel and input tax credit restrictions further raise operating costs. Bunker fuel prices at Indian ports are higher than major global bunkering hubs, and fuel constitutes a significant part of vessel operating expenses. More importantly, GST paid on inputs such as bunker fuel, spares and stores is restricted from input tax credit under the 5% GST structure for ocean freight. As a result, GST on fuel becomes a direct operational cost for shipping companies in India. The report compares this with other transport modes, where rail, road and air freight do not bear a similar GST cost on primary fuel inputs. Ocean freight is therefore placed at a tax disadvantage, even though shipping is among the most efficient modes of freight movement.

The taxation framework also affects EXIM trade and India's ability to retain freight earnings. The report notes that nearly 96% of India's EXIM cargo is carried by foreign-flag

vessels, reflecting structural disadvantages faced by Indian operators. Where Indian shipping becomes uncompetitive due to upfront IGST, seafarer TDS, MRO double taxation, bunker cost disadvantages and restricted ITC, Indian cargo continues to be carried predominantly by foreign-flag vessels. This results in freight earnings flowing outside India instead of being retained within the domestic economy. The report estimates that improving competitiveness of Indian shipping could support potential savings of up to USD 30 billion by retaining freight expenditure within India.

Shipbuilding is similarly affected by taxation and fiscal design. Payments made by Indian shipping companies to foreign OEMs or service providers for ship repair, maintenance and dry-docking services may attract withholding tax in India, often at higher domestic rates where treaty benefits are not practically availed. The report notes that this increases the cost of repair and dry-docking services in India, reduces the competitiveness of Indian shipyards, and may result in tax costs being passed on to Indian yards or shipping companies. Since India has limited domestic capability for larger vessel dry docking and depends on foreign expertise in several areas, such withholding tax treatment undermines the development of domestic ship repair and shipbuilding capacity.

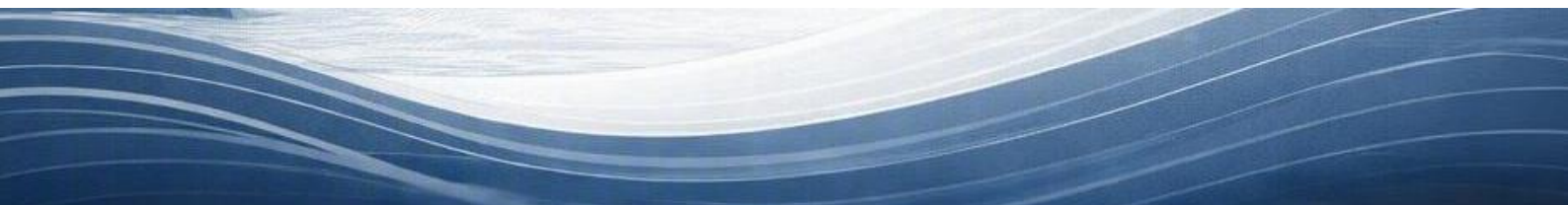
In addition, the current R&D tax framework does not adequately incentivise innovation in shipbuilding and maritime engineering. The earlier 200% weighted deduction for approved in-house R&D expenditure has been phased down to normal deduction, and the report notes that there is no specific provision for the shipping sector where in-house R&D is undertaken. This weakens incentives for indigenous ship design, marine equipment development, propulsion systems and green maritime technologies. Countries such as China and Singapore provide enhanced R&D deductions or super-deduction structures, whereas India's reduced incentive environment discourages investment in research, technology and local capability creation in a capital-intensive sector.

Taxation of Government incentives also dilutes support for shipbuilding. The report notes that schemes such as the Shipbuilding Financial Assistance Scheme, Shipbuilding Development Scheme and Maritime Development Fund are intended to support capital asset creation and strengthen the shipping sector. However, financial assistance provided under such schemes is practically being subjected to income tax at corporate rates. This reduces the effective value of Government support available for project execution, capacity expansion and technology development, thereby weakening the objective of creating a globally competitive Indian shipbuilding ecosystem.

The impact extends to ship recycling and fleet renewal as well. The report identifies that the current framework treats vessel disposal as a separate transaction instead of recognising acquisition, operation and disposal as part of a continuous shipping lifecycle. This creates friction when vessels are sold, replaced or phased out for fleet renewal, environmental compliance or operational efficiency. The absence of lifecycle-based treatment discourages timely replacement of older vessels and slows the transition towards modern and efficient tonnage. Leading maritime jurisdictions adopt a

lifecycle-based approach where acquisition, operation, maintenance, retrofit and disposal are treated as interconnected stages of the shipping business, enabling smoother fleet renewal and better alignment with environmental and safety requirements.

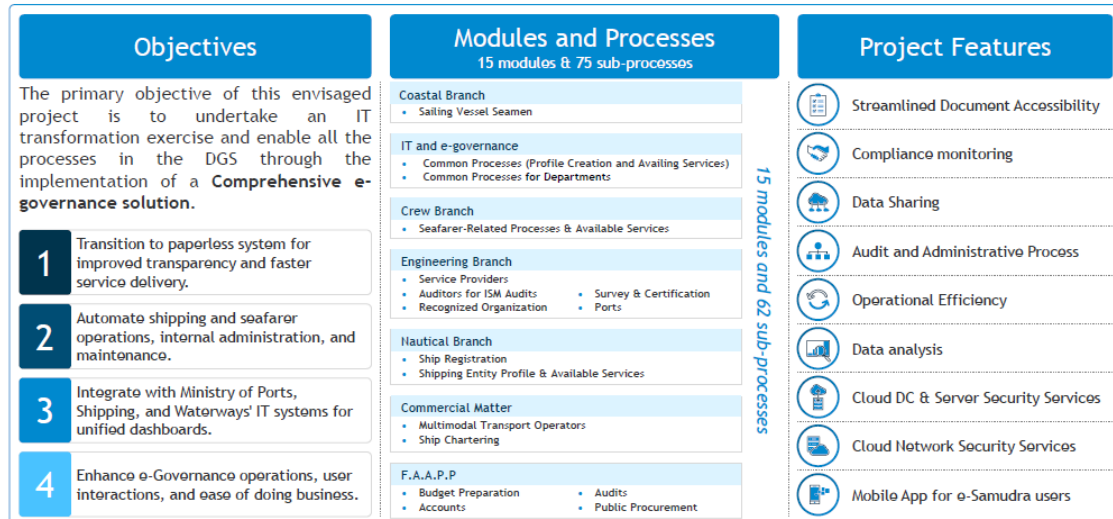
Taken together, the taxation issues across ship owning, operations, EXIM freight, shipbuilding, repair and fleet renewal create a cascading disadvantage for Indian shipping. Upfront IGST increases capital cost, narrow tonnage tax provisions restrict business diversification, charter-in limits reduce operational flexibility, TDS on seafarers raises wage costs, MRO taxation creates double levy, bunker-related GST and restricted ITC increase voyage cost, and taxation of shipbuilding incentives reduces the effectiveness of Government support. These issues collectively make Indian-flag vessels less competitive than foreign-flag vessels, encourage Indian owners to flag or structure operations outside India, reduce domestic freight retention, and weaken the development of India's shipbuilding and maritime services ecosystem. A more tax-neutral, lifecycle-oriented and globally benchmarked framework is therefore essential to directly support Indian flagging, domestic tonnage growth, shipbuilding, ship repair, maritime employment, freight retention and long-term competitiveness of the Indian shipping ecosystem.



10. Digitalisation

10.1. E-Samudra

E-Samudra



The Directorate General of Shipping has initiated the e-Samudra programme as a comprehensive digital governance platform aimed at transforming maritime administration through end-to-end digitisation of regulatory processes, stakeholder services and internal workflows. The initiative is designed to support the transition from fragmented and paper-based systems to an integrated digital ecosystem capable of providing seamless service delivery, improving transparency and strengthening regulatory oversight. As the maritime sector continues to expand in scale and complexity, there is an increasing need for technology-enabled governance frameworks that can efficiently support shipping operations, seafarer services, vessel administration and maritime regulatory functions. The e-Samudra platform has therefore been conceptualised as a foundational pillar of maritime digital transformation within the Directorate General of Shipping.

The primary objective of the initiative is to create a comprehensive e-governance solution that integrates multiple functions and processes under a unified digital architecture. The platform seeks to enable paperless processing, automated workflows, secure data management and improved service delivery across the maritime administration. By digitising regulatory and administrative functions, e-Samudra aims to reduce processing timelines, improve stakeholder convenience and enhance transparency in service delivery. The shift towards digital governance also aligns with broader national objectives relating to digital transformation, ease of doing business and efficient public service delivery.

A significant feature of the platform is its extensive coverage of maritime regulatory functions through multiple digital modules and sub-processes. The system is designed to support activities across various branches including coastal shipping administration, seafarer services, engineering and survey functions, ship registration, certification, commercial shipping matters and internal administrative processes. By integrating these diverse functions within a common digital environment, the platform facilitates seamless information flow and reduces dependency on isolated systems. The resulting interoperability is expected to improve efficiency while enabling better coordination across different departments and functional areas.

The implementation of e-Samudra will support complete transition towards paperless operations for a wide range of maritime services. Digital submission of applications, electronic processing of records and online issuance of approvals and certificates will significantly reduce physical documentation requirements. In addition to improving convenience for stakeholders, paperless processing enhances traceability, reduces administrative burden and contributes towards more environmentally sustainable governance practices. Greater transparency in workflows can also improve accountability and strengthen confidence among maritime stakeholders interacting with the administration.

Another important objective of the platform is the automation of shipping and seafarer-related processes. Automation of routine activities enables more efficient management of applications, approvals, records and regulatory transactions while reducing the possibility of manual errors and process delays. The initiative also seeks to strengthen integration with digital systems maintained by the Ministry of Ports, Shipping and Waterways and other government entities, thereby facilitating exchange of information and creation of unified monitoring frameworks. Such integration will support data-driven decision-making and improve visibility across various maritime functions.

The platform incorporates several features aimed at strengthening governance, compliance monitoring and operational efficiency. Enhanced document accessibility, digital record management and data-sharing capabilities will facilitate easier access to information while maintaining appropriate security and governance safeguards. Integrated compliance monitoring functions will improve regulatory oversight and support timely identification of non-compliance issues. The platform also enables structured audit and administrative processes, thereby strengthening institutional governance and improving overall effectiveness of maritime administration.

Technology-enabled data analysis forms an important component of the e-Samudra framework. The availability of consolidated data across multiple functions provides opportunities for generating insights that can support policy development, operational planning and performance monitoring. Analytical capabilities can assist administrators in identifying trends, monitoring service delivery performance and evaluating the effectiveness of regulatory interventions. Such data-driven governance approaches contribute towards more informed decision-making and continuous improvement in administrative processes.

Given the critical nature of maritime regulatory information, the platform has also been designed with strong emphasis on digital security and system resilience. Cloud infrastructure, network security measures and secure data management practices are intended to support business continuity, protect sensitive information and ensure reliability of digital services. The inclusion of mobile application support further improves accessibility by enabling stakeholders to access services and information through multiple digital channels. This enhances user experience and facilitates greater adoption of digital services across the maritime community.

Through the implementation of e-Samudra, the Directorate General of Shipping seeks to establish a modern digital governance ecosystem capable of supporting future maritime growth while improving service delivery, compliance management and ease of doing business. The platform represents a major step towards creating a transparent, efficient and stakeholder-centric maritime administration aligned with the objectives of Maritime India Vision 2030 and Maritime Amrit Kaal Vision 2047. By integrating regulatory functions, automating processes and enabling data-driven governance, e-Samudra is expected to significantly strengthen the effectiveness and responsiveness of maritime administration in India.

10.2. E-Navik

E-Navik



24x7 Grievance Redressal Module 1. Dedicated platform for stakeholder grievances (seafarers, shipping companies, etc.) 2. Automated logging, tracking, and resolution of complaints 3. Ensures transparency, accountability, and swift response	Maritime Training Institute (MTI) Module 1. Centralized system for MTI approvals, seafarer profile generation, and certification updates 2. Ensures compliance with the latest training regulations 3. Improves the quality of seafarer education and certification
Crisis Response Module 1. Critical tool for handling maritime emergencies 2. Real-time registration and management of crises by authorized officials 3. Coordination with relevant agencies for a unified response 4. Enhances readiness, minimizes risks, and ensures safety	Recruitment and Placement Services License (RPSL) Module 1. Oversees licensing and regulation of seafarer recruitment and placement agencies 2. Streamlines the application and renewal process for RPS licenses 3. Monitors and enforces compliance to prevent malpractices

The e-Navik platform represents a major component of the Directorate General of Maritime Administration's digital transformation agenda and is designed to function as an integrated digital ecosystem for seafarer services, stakeholder engagement, regulatory oversight and emergency response. As the maritime sector becomes increasingly digitised, there is a growing need for centralized platforms capable of delivering efficient services, strengthening governance and improving interaction between the maritime administration and stakeholders. The e-Navik initiative seeks to address these requirements by bringing together multiple operational and welfare-related functions within a unified digital framework.

A key component of the platform is the 24x7 Grievance Redressal Module, which is intended to provide a dedicated mechanism for receiving, tracking and resolving grievances raised by maritime stakeholders, including seafarers, shipping companies and other users of maritime services. The module seeks to improve transparency, accountability and responsiveness by enabling digital registration and monitoring of complaints throughout the resolution lifecycle. Automated workflows and tracking mechanisms will facilitate timely action on grievances while providing stakeholders with greater visibility regarding the status of their submissions. The initiative is expected to strengthen confidence in administrative processes and ensure more efficient handling of stakeholder concerns.

The platform also incorporates a dedicated Maritime Training Institute (MTI) Module aimed at streamlining administration and oversight of maritime training institutions. The module is designed to support functions such as institute approvals, seafarer profile management, certification updates and regulatory compliance monitoring. By centralizing information relating to maritime education and training, the system enhances transparency and facilitates more effective supervision of training activities. The module is expected to improve adherence to evolving training standards while supporting consistent delivery of maritime education and certification services across approved training institutions.

Another significant component is the Recruitment and Placement Services License (RPSL) Module, which focuses on regulation and monitoring of recruitment and placement agencies operating within the maritime sector. Recruitment agencies play a critical role in connecting seafarers with employment opportunities, and effective oversight is essential for protecting seafarers from fraudulent practices and ensuring compliance with applicable regulations. The module digitises licensing, renewal and compliance-related processes, enabling improved monitoring and more efficient administration of recruitment agencies. Enhanced regulatory oversight through the platform is expected to strengthen transparency and contribute towards prevention of malpractice within the crewing ecosystem.

The Crisis Response Module represents an important welfare and emergency management tool within the e-Navik framework. Maritime operations frequently involve situations requiring coordinated response across multiple agencies, including accidents, emergencies, abandonment cases, welfare incidents and other crisis situations affecting seafarers and vessels. The module is designed to facilitate real-time registration, monitoring and management of crisis events by authorised officials. By establishing a digital mechanism for coordination and information sharing, the system supports timely intervention and strengthens preparedness for handling maritime emergencies. Improved coordination among relevant agencies can enhance the effectiveness of response measures while helping minimise risks and safeguard the welfare of affected personnel.

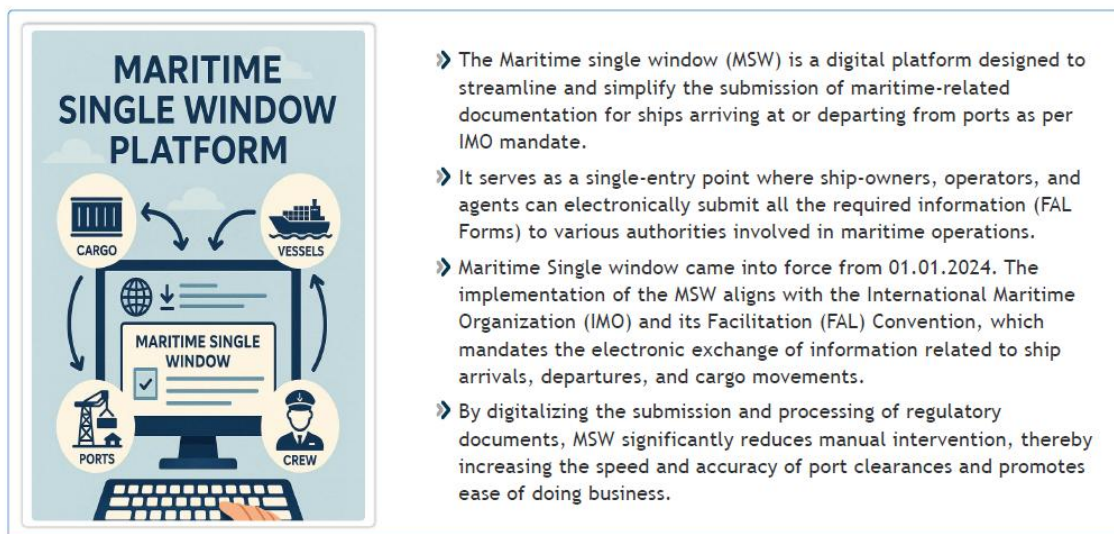
Collectively, the various modules within e-Navik contribute towards creating a more responsive, transparent and digitally enabled maritime administration. The platform

strengthens service delivery by integrating welfare functions, regulatory oversight, training governance, grievance handling and crisis management within a common digital environment. Such integration improves operational efficiency, reduces administrative delays and facilitates data-driven decision-making across multiple areas of maritime administration. The initiative also aligns with broader objectives relating to ease of doing business, seafarer welfare and digital governance under Maritime India Vision 2030 and Maritime Amrit Kaal Vision 2047.

The implementation of e-Navik is expected to significantly improve stakeholder experience while strengthening institutional capacity within the maritime administration. By providing digital access to services, improving monitoring capabilities and enhancing coordination across different functional areas, the platform establishes a modern governance framework capable of supporting the evolving needs of India's maritime sector. The initiative represents a key step towards creating a more efficient, transparent and stakeholder-centric maritime ecosystem supported by technology-enabled governance and service delivery.

10.3. Maritime Single Window

Maritime Single Window



The Maritime Single Window (MSW) represents one of the most significant digital reforms undertaken in the maritime sector to facilitate paperless and seamless exchange of information relating to ship arrivals, departures and cargo operations. The platform has been developed in accordance with the International Maritime Organization's Facilitation (FAL) Convention, which mandates electronic transmission and exchange of information between ships and shore authorities. Traditionally, shipowners, operators and agents were required to submit similar information separately to multiple regulatory agencies, resulting in duplication of effort, increased compliance burden and delays in processing. The Maritime Single Window seeks to eliminate these inefficiencies by providing a unified digital interface through which all required information can be submitted once and shared electronically with relevant authorities.

The platform functions as a single-entry digital gateway for stakeholders involved in maritime transport and port operations. Through the system, shipowners, operators, masters and shipping agents can electronically submit mandatory information and FAL forms required by various government agencies. The digital integration of multiple authorities into a common platform reduces the need for repetitive submissions and manual document handling while ensuring greater consistency and accuracy of information. This approach aligns with international best practices and supports the global trend towards digitalisation of maritime logistics and port clearance processes.

The implementation of the Maritime Single Window marks a major step towards compliance with international facilitation requirements and strengthening India's position as a modern maritime nation. By aligning domestic procedures with IMO standards, the platform facilitates smoother interaction between ships and regulatory authorities while enhancing operational efficiency within the port ecosystem. The initiative also supports international shipping companies operating in Indian waters by providing standardised and predictable digital processes consistent with global maritime practices. Such alignment is important for improving stakeholder confidence and strengthening India's attractiveness as a maritime and logistics destination.

A major advantage of the system lies in its ability to significantly reduce manual intervention in regulatory and administrative processes. Digital submission and processing of information eliminates dependence on physical documentation and enables faster transmission of data across agencies. Reduction in manual processing not only improves speed but also enhances data quality, minimises errors and strengthens transparency. Automated workflows facilitate quicker review and approval processes, thereby contributing to more efficient port clearances and reduced vessel turnaround times. These improvements directly support operational efficiency within ports and shipping operations.

The platform also contributes to enhanced coordination among various authorities involved in maritime operations. Multiple government departments and regulatory entities require information relating to vessel arrivals, cargo movements, crew details and operational clearances. The Maritime Single Window enables these agencies to access and utilise information from a common digital source, thereby improving coordination and reducing delays caused by fragmented communication channels. Better information sharing supports faster decision-making and strengthens the overall effectiveness of maritime administration.

From an ease-of-doing-business perspective, the introduction of the Maritime Single Window is expected to generate substantial benefits for the shipping and logistics sector. Simplification of documentation requirements, reduction of administrative burden and faster processing timelines help reduce compliance costs and improve predictability of port-related procedures. These improvements are particularly important for supporting trade facilitation, enhancing logistics competitiveness and creating a more efficient environment for shipping operators and maritime stakeholders. The

initiative therefore contributes not only to regulatory modernisation but also to broader economic objectives relating to trade and logistics efficiency.

The Maritime Single Window forms an integral part of India's broader digital transformation agenda within the maritime sector. Together with initiatives such as e-Samudra, e-Navik and other digital governance platforms, the system supports the creation of an integrated and technology-enabled maritime ecosystem. By facilitating seamless exchange of information, enhancing transparency and improving service delivery, the platform contributes towards strengthening maritime governance while supporting the objectives of Maritime India Vision 2030 and Maritime Amrit Kaal Vision 2047. The initiative represents an important milestone in the development of a modern, efficient and globally aligned maritime administration capable of supporting the future growth of India's maritime economy.

10.4. Shipbuilding scheme portal

End-to-end digitized process via DGS shipbuilding portal

Application submission

Tracking

Digital issuance

Redemption

shipbuilding.dgshipping.gov.in

The Directorate General of Maritime Administration is increasingly leveraging digital technologies to improve governance, transparency and service delivery across various segments of the maritime sector. While significant progress has been achieved through initiatives such as e-Samudra, e-Navik and the Maritime Single Window, the shipbuilding sector also requires a dedicated digital ecosystem capable of supporting efficient implementation of government support schemes and facilitating stakeholder interaction. In response to this requirement, a dedicated DGS Shipbuilding Portal has been developed to provide an end-to-end digital platform for administration of shipbuilding-related schemes and initiatives.

The portal has been designed to digitise the complete lifecycle of scheme administration and stakeholder interactions, thereby eliminating dependency on manual processes and physical documentation. Traditionally, applicants seeking benefits under shipbuilding incentive schemes were required to submit documents through multiple stages involving manual scrutiny, physical correspondence and extensive follow-up. Such processes

often resulted in administrative delays and limited visibility regarding the status of applications. The digital platform addresses these challenges by providing a single integrated interface for application submission, processing, tracking and management. This contributes to greater transparency while significantly improving ease of doing business for stakeholders engaged in the shipbuilding sector.

A key feature of the portal is the ability to facilitate online submission of applications relating to various shipbuilding support measures and incentive schemes. Through a structured digital workflow, applicants can upload required documents, complete prescribed forms and submit requests electronically without physical interaction with multiple offices. Standardisation of the application process improves consistency, reduces administrative burden and supports faster processing of requests. The digital platform also enables easier record management and creates an auditable trail of all transactions undertaken through the system.

The portal further introduces real-time tracking and monitoring capabilities, allowing applicants and administrators to monitor the progress of applications through different stages of evaluation and approval. Improved visibility of application status enhances transparency and reduces uncertainty often associated with manual processing systems. Stakeholders are able to track developments electronically while administrators can monitor workflow efficiency and identify bottlenecks requiring intervention. Such transparency contributes towards greater accountability and improves confidence in scheme administration processes.

Digital issuance of approvals, certificates and related documentation represents another important component of the platform. By replacing traditional paper-based processes with electronically generated approvals and records, the portal improves operational efficiency while reducing processing timelines. Digital issuance also strengthens authenticity, improves accessibility and facilitates easier retrieval of records when required. The resulting reduction in paperwork and administrative effort contributes towards a more efficient and user-friendly regulatory environment.

The portal also supports digital management of redemption and benefit disbursement processes associated with government support schemes. Effective management of incentive claims requires accurate tracking, verification and documentation of eligibility conditions. Integration of these activities within the digital platform enables more efficient administration, improves traceability and supports timely processing of eligible claims. Such capabilities are particularly important for schemes aimed at promoting domestic shipbuilding, fleet modernisation and maritime industrial development.

The implementation of the DGS Shipbuilding Portal aligns with broader national objectives relating to ease of doing business, digital governance and promotion of maritime manufacturing capabilities. Government initiatives such as the Shipbuilding Financial Assistance Scheme, Ship Recycling Credit Note Scheme and other shipbuilding support measures require efficient and transparent administrative mechanisms to maximise their effectiveness. A dedicated digital platform strengthens

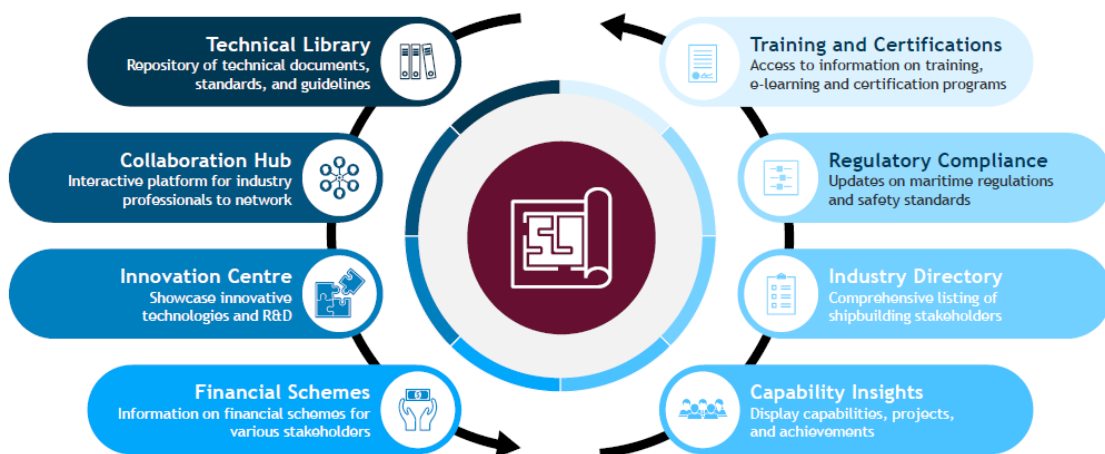
implementation capacity while improving accessibility and convenience for industry stakeholders seeking to participate in these programmes.

The portal also supports the long-term objective of creating a more competitive and investment-friendly shipbuilding ecosystem in India. By reducing administrative complexity, improving transparency and providing a predictable digital interface for interactions with the maritime administration, the platform contributes towards a more enabling business environment. Enhanced digital governance can encourage greater participation by shipyards, vessel owners and investors while supporting the broader objectives of Maritime India Vision 2030 and Maritime Amrit Kaal Vision 2047 relating to domestic shipbuilding capacity enhancement and maritime industrial development.

Through end-to-end digitisation of application processing, tracking, approvals and benefit administration, the DGS Shipbuilding Portal represents an important step towards modernising governance within the shipbuilding sector. The platform reinforces the commitment of the maritime administration towards technology-enabled service delivery and provides a transparent, efficient and stakeholder-centric mechanism for implementation of shipbuilding support initiatives.

10.5. Comprehensive shipbuilding portal

Comprehensive Shipbuilding portal development underway as a single digital gateway to integrate India's entire shipbuilding ecosystem



India's shipbuilding ecosystem is characterised by the participation of multiple stakeholders including shipyards, vessel owners, equipment manufacturers, classification societies, training institutions, financial institutions, technology providers and government agencies. While several policy initiatives have been introduced to support sectoral growth, information relating to schemes, regulations, technical standards, research activities and stakeholder capabilities often remains distributed across multiple sources. The absence of a unified digital platform limits collaboration, increases information asymmetry and creates challenges for industry participants seeking access to opportunities, guidance and institutional support. To address these

challenges, a comprehensive Shipbuilding Portal is being developed as a single digital gateway to integrate and strengthen India's entire shipbuilding ecosystem.

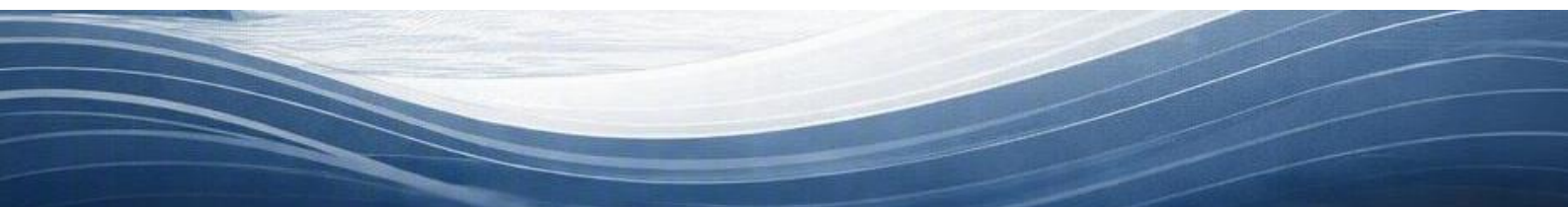
The proposed platform is intended to function as a central repository of information and services relevant to all stakeholders across the shipbuilding value chain. By bringing together technical resources, regulatory information, industry databases, training opportunities, financial assistance schemes and collaboration tools within a single digital environment, the portal seeks to improve accessibility and reduce fragmentation of information. The initiative aligns with the broader objectives of creating a modern, technology-enabled and industry-focused maritime ecosystem capable of supporting long-term growth in domestic shipbuilding and ship repair activities.

A key component of the portal is the development of a Technical Library that will provide access to technical documents, design standards, guidelines, regulations and reference materials relevant to shipbuilding and related maritime industries. Easy access to updated technical information is critical for improving industry knowledge, strengthening compliance and facilitating adoption of best practices. The Technical Library is expected to serve as an important knowledge resource for shipyards, designers, engineers, researchers and regulators while supporting standardisation and quality enhancement across the sector.

The platform also envisages establishment of a Collaboration Hub to facilitate interaction among industry stakeholders. Shipbuilding projects often require close coordination among multiple participants including shipyards, designers, equipment suppliers, classification societies, academic institutions and research organisations. The proposed collaboration framework will provide opportunities for networking, knowledge sharing and partnership development, thereby strengthening industry linkages and supporting collective capacity building. Improved stakeholder connectivity can contribute significantly towards innovation, project execution and long-term sectoral growth.

Innovation and technology development form another important pillar of the proposed portal. Through a dedicated Innovation Centre, the platform seeks to showcase emerging technologies, research initiatives and indigenous innovations relevant to shipbuilding and marine engineering. The initiative will promote greater visibility of research and development activities while encouraging adoption of advanced technologies and innovative solutions across the industry. By creating a forum for exchanging ideas and disseminating technological advancements, the portal can support competitiveness and facilitate development of a stronger domestic marine technology ecosystem.

The portal will further provide information relating to various Financial Schemes and support mechanisms available to industry participants. Access to funding support, incentive programmes and financial assistance schemes remains an important factor influencing investment decisions and sectoral growth. Consolidation of information relating to such schemes within a single platform will improve awareness among stakeholders and facilitate more effective utilisation of available government support

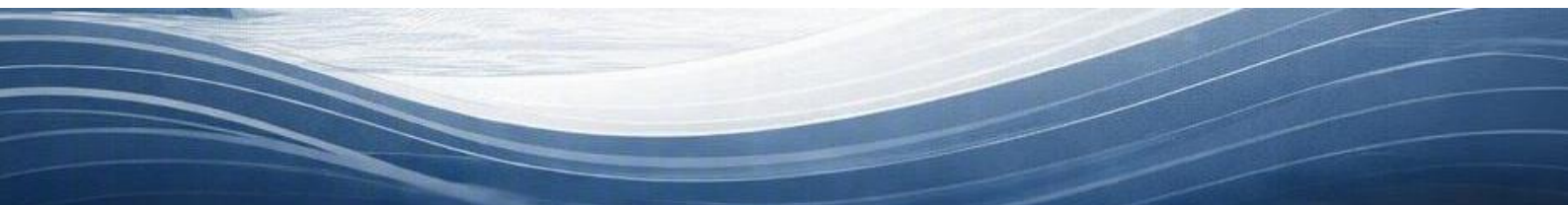


measures. Enhanced visibility of financial assistance opportunities is expected to support expansion of domestic shipbuilding capacity and encourage greater industry participation.

Human resource development and regulatory awareness are also integral components of the proposed ecosystem. Dedicated sections relating to Training and Certifications will provide information on relevant courses, skill development programmes, certification pathways and e-learning opportunities. Simultaneously, the Regulatory Compliance component will keep stakeholders informed regarding maritime regulations, safety requirements and evolving compliance standards applicable to shipbuilding and ship repair activities. Improved access to training and regulatory information will contribute towards workforce development and strengthen overall industry compliance.

To improve visibility across the industry, the platform also proposes creation of an Industry Directory and Capability Insights framework. The Industry Directory will provide a structured listing of shipbuilding stakeholders, while the Capability Insights module will showcase projects, facilities, achievements and technical capabilities of participating organisations. Such features can facilitate business development, enhance transparency regarding available capacities and support collaboration among industry participants. Increased visibility of domestic capabilities will also help promote Indian shipyards and service providers before potential customers and investors.

The comprehensive Shipbuilding Portal represents a strategic step towards creating an integrated and digitally connected shipbuilding ecosystem in India. By combining technical resources, industry networking, innovation promotion, financial support information, training opportunities and regulatory guidance within a single platform, the initiative seeks to create a collaborative environment capable of supporting growth across the shipbuilding value chain. The proposed framework will contribute towards strengthening domestic capabilities, improving ease of doing business and advancing the objectives of Maritime India Vision 2030 and Maritime Amrit Kaal Vision 2047 relating to shipbuilding, maritime industrial development and global competitiveness.

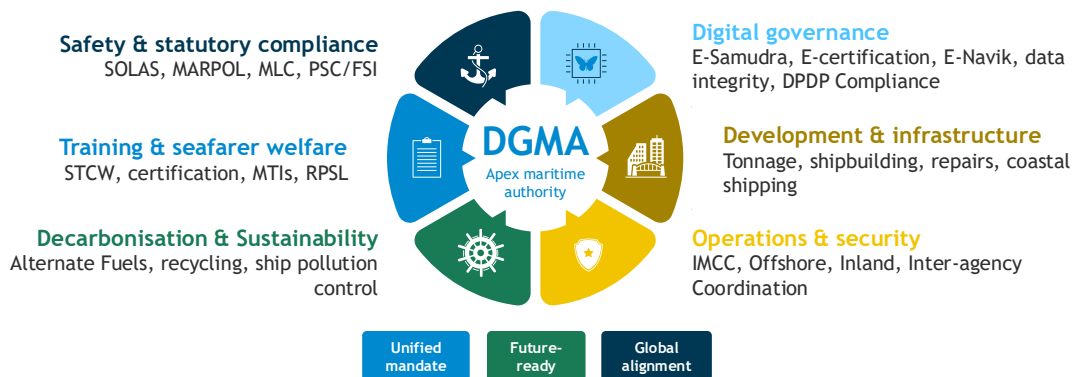


11. DGS to DGMA Transition

DGS to DGMA Transition



The proposed redesignation & restructuring aligns with the objectives of **Maritime India Vision 2030** and **Amrit Kaal Vision 2047**, while supporting India's expanding role in global maritime forums such as **IMO, ILO, and UNFCCC**. It aims to enhance functional clarity, strengthen inter-Wing collaboration, and improve stakeholder engagement to effectively address emerging priorities including sustainability, climate change, automation, and maritime digitization.



165

The proposed transition from the **Directorate General of Shipping (DGS)** to the **Directorate General of Maritime Administration (DGMA)** is a transformational reform in India's maritime governance architecture. It is not merely a change in nomenclature, but a strategic restructuring intended to create a modern, integrated, technology-enabled, and globally benchmarked maritime administration capable of supporting India's maritime ambitions over the coming decades.

The redesignation is closely aligned with the objectives laid down under **Maritime India Vision 2030 (MIV 2030)** and **Amrit Kaal Vision 2047**, which seek to position India as a global maritime leader, strengthen the blue economy, enhance maritime sustainability, and improve India's competitiveness within the international shipping ecosystem. The existing DGS framework was created under the Merchant Shipping Act, 1958 and was primarily focused on merchant shipping regulation. However, maritime governance today extends far beyond traditional shipping and requires a more holistic institutional mechanism.

The new DGMA structure is therefore envisioned as the apex maritime authority responsible not only for shipping regulation, but also for coordinating broader maritime development, sustainability initiatives, digital governance, maritime safety, security, and international representation. The restructuring will improve organizational clarity, facilitate inter-wing coordination, and create dedicated capacity for emerging maritime priorities such as decarbonization, digitalization, offshore operations, and climate resilience.

11.1. Key Functional Domains of DGMA

1. Safety and Statutory Compliance

At its core, DGMA will continue to ensure compliance with major international maritime conventions including SOLAS, MARPOL, MLC, Load Line Convention, Ballast Water Management Convention, Anti-Fouling Systems Convention, and other IMO instruments. It will strengthen Port State Control and Flag State Inspection mechanisms while extending oversight beyond traditional merchant shipping to newer categories of maritime assets.

2. Training and Seafarer Welfare

DGMA will oversee standards under the STCW Convention, maritime education and training institutions, seafarer certification systems, welfare measures, recruitment and placement services, and welfare protections for Indian seafarers, including those serving on foreign-flagged vessels. The emphasis will be on creating a globally competitive maritime workforce while ensuring international labour compliance.

3. Decarbonisation and Sustainability

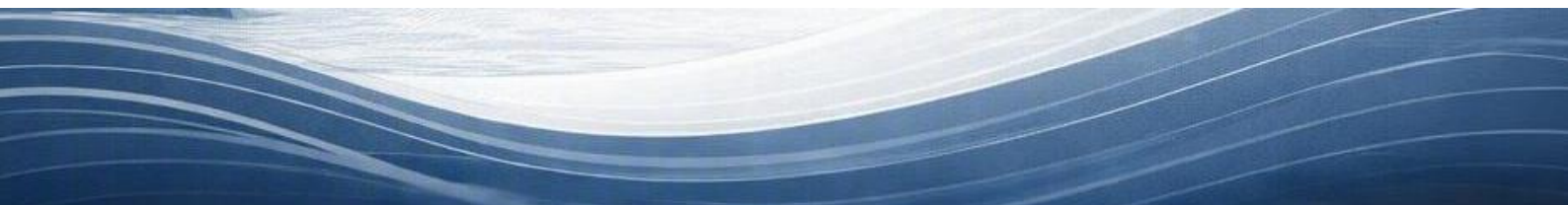
As global shipping transitions toward low-carbon operations, DGMA will play a leading role in promoting green shipping practices, alternate marine fuels, ship recycling compliance under the Hong Kong Convention, pollution control measures, and implementation of evolving IMO greenhouse gas reduction targets. The authority is expected to become a key enabler of India's maritime sustainability agenda.

4. Digital Governance

The future maritime administration will operate through digital-first systems such as e-Samudra, e-Certification, e-Navik, digital licensing systems, maritime databases, dashboards, and electronic compliance mechanisms. These reforms are intended to improve transparency, reduce processing timelines, eliminate paper-based workflows, strengthen data integrity, and support compliance with the Digital Personal Data Protection framework.

5. Maritime Development and Infrastructure

DGMA will support national efforts in shipbuilding, ship repair, coastal shipping, maritime clusters, transshipment hubs, and maritime infrastructure development. This represents a significant broadening of scope compared with the traditional regulatory mandate of DGS.



6. Maritime Operations and Security

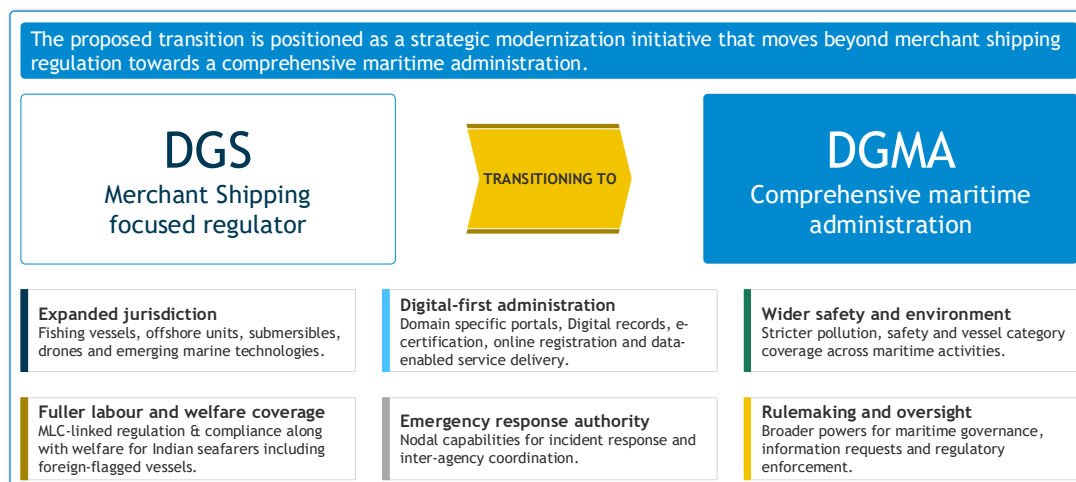
The authority will also assume a more active role in offshore operations, maritime emergency response, marine incident coordination, inland navigation oversight, and inter-agency maritime coordination. Statutory provisions under the Merchant Shipping Act, 2025 strengthen the maritime administration's ability to coordinate national-level maritime responses.

11.2. Strategic Outcomes

The transition is designed to achieve three strategic outcomes:

- A **Unified Mandate** that integrates fragmented maritime responsibilities under a single apex authority.
- A **Future-Ready Organization** capable of addressing emerging technological, environmental, and operational challenges.
- **Global Alignment** with maritime administrations operating in leading maritime nations such as Singapore, Australia, Norway, and the United Kingdom.

DGS to DGMA Transition



166

Historically, DGS was designed primarily as a regulatory body for merchant shipping activities. While it has successfully discharged its statutory responsibilities for decades, the maritime sector has rapidly evolved, encompassing offshore operations, digital maritime services, environmental governance, inland waterways integration, maritime security, and advanced vessel technologies. These new realities require a broader institutional framework than that provided under the Merchant Shipping Act, 1958.

The proposed DGMA therefore represents a modern maritime governance model that aligns with international best practices and provides comprehensive oversight over the entire maritime ecosystem.

Expanded Jurisdiction

One of the most significant changes is the expansion of jurisdiction. Under the Merchant Shipping Act, 2025, the maritime administration will extend oversight beyond traditional merchant vessels to include fishing vessels, offshore units, submersibles, drones, autonomous maritime technologies, and emerging vessel categories. This reflects the changing nature of maritime activities and India's expanding blue economy ambitions.

Digital-First Administration

DGMA will adopt a digital-first governance model through integrated digital platforms supporting registration, certification, compliance monitoring, inspections, licensing, document management, and service delivery. This shift will significantly improve efficiency, transparency, and ease of doing business while reducing administrative burdens on stakeholders.

Wider Safety and Environmental Coverage

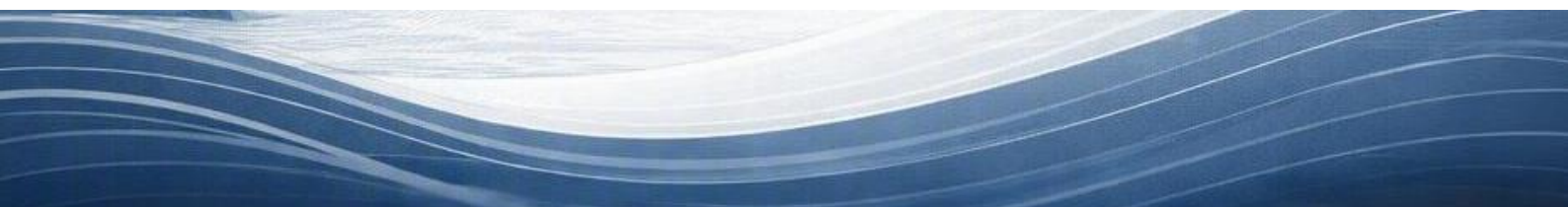
Unlike the existing framework, which is heavily centred on merchant shipping, DGMA will adopt a broader maritime safety and environmental governance mandate. Enhanced responsibilities will include pollution response, ballast water management, waste reception facilities, environmental audits, green shipping initiatives, and implementation of international climate commitments.

Fuller Labour and Welfare Coverage

The transition introduces stronger compliance with the Maritime Labour Convention (MLC) and extends labour protections and welfare measures to Indian seafarers serving on foreign-flagged vessels. This significantly enhances India's ability to protect its maritime workforce regardless of vessel registration.

Emergency Response Authority

The Merchant Shipping Bill, 2024 provides statutory authority for coordinated maritime incident response and inter-agency resource mobilization. This will enable DGMA to function as a nodal authority during maritime emergencies and environmental incidents, thereby enhancing national preparedness and response capability.



Enhanced Rulemaking and Regulatory Oversight

DGMA will be empowered with broader regulatory and oversight powers covering registration, compliance monitoring, maritime information requests, enforcement actions, and delegated rulemaking. These enhanced powers are intended to support a more responsive and contemporary regulatory framework aligned with international standards.

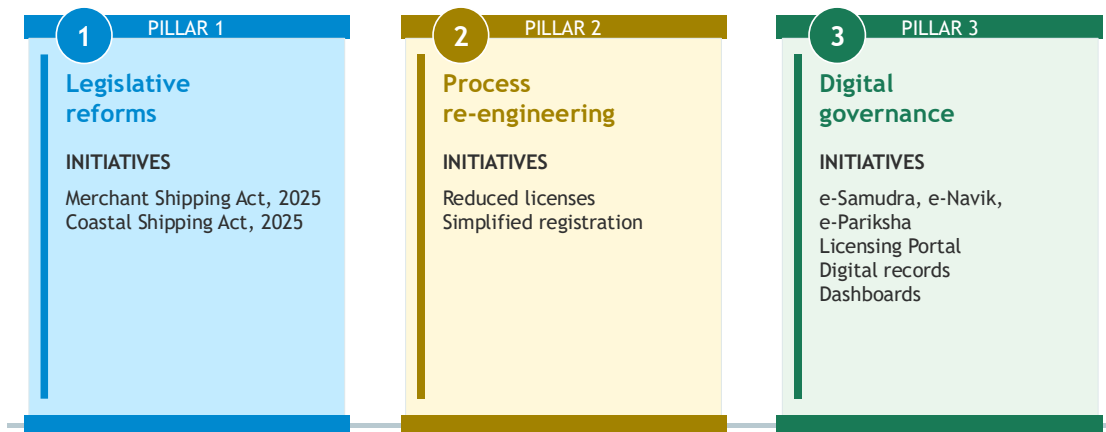
11.3. Why This Transformation Matters

The transition is essential because India's maritime ambitions now extend far beyond traditional shipping regulation. To achieve the goals of Maritime India Vision 2030 and Amrit Kaal Vision 2047, India requires an institution capable of regulating, developing, coordinating, digitizing, and modernizing the complete maritime ecosystem. DGMA is intended to provide that institutional platform.

DGMA EoDB Transformation Framework



Three coordinated streams connect statutory reform, process simplification and digital enablement.



167

The Ease of Doing Business transformation framework outlines how DGMA will modernize maritime governance through three mutually reinforcing pillars: legislative reforms, process re-engineering, and digital governance. These pillars collectively provide the foundation for a simplified, transparent, and technology-enabled maritime administration.

Pillar 1: Legislative Reforms

The first pillar focuses on modernization of the legal framework governing maritime activities.

The recently passed **Merchant Shipping Act, 2025** and **Coastal Shipping Act, 2025** seek to replace legacy provisions with contemporary legislation that reflects modern operational realities, international conventions, technological developments, and environmental obligations. The objective is to establish a comprehensive legal framework capable of supporting future maritime growth while improving regulatory certainty and reducing ambiguities.

Key reforms include:

- Expanded jurisdiction across maritime sectors.
- Enhanced environmental and safety responsibilities.
- Improved labour and welfare protections.
- Greater regulatory flexibility.
- Simplified ownership and registration provisions.
- Stronger enforcement and emergency response mechanisms.
- Decriminalization and rationalization of minor procedural violations where appropriate.

Pillar 2: Process Re-engineering

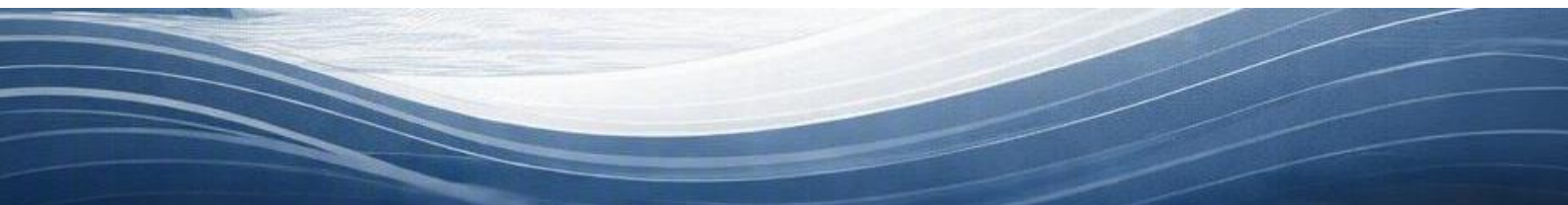
The second pillar focuses on simplifying regulatory procedures and removing legacy inefficiencies.

Historically, stakeholders have faced lengthy approval timelines, documentation burdens, and fragmented processes. DGMA aims to redesign these processes from first principles to create faster, transparent, stakeholder-centric services.

Key initiatives include:

- Rationalization of licensing requirements.
- Reduction in duplicative approvals and inspections.
- Streamlined vessel registration processes.
- Simplified certification procedures.
- Faster service delivery timelines.
- Improved coordination among maritime agencies and stakeholders.
- Standardized workflows supported by digital tools and dashboards.

The intended outcome is a maritime regulatory environment that promotes investment, reduces compliance costs, and supports India's position as a globally competitive maritime nation.



Pillar 3: Digital Governance

The third pillar focuses on comprehensive digitization of maritime administration.

International best practices indicate that future maritime administrations must be built around integrated digital ecosystems. DGMA intends to develop an end-to-end digital environment that supports regulatory oversight, stakeholder services, data analytics, and evidence-based policymaking.

Major initiatives include:

e-Samudra

A unified maritime platform providing integrated service delivery, application processing, approvals, and stakeholder interfaces.

e-Navik

A digital ecosystem dedicated to seafarer services, certification, training records, competency management, and welfare administration.

e-Pariksha

A digitized examination and assessment framework supporting maritime education and certification processes.

Licensing Portal

An integrated portal supporting online licensing, renewals, approvals, inspections, and compliance management.

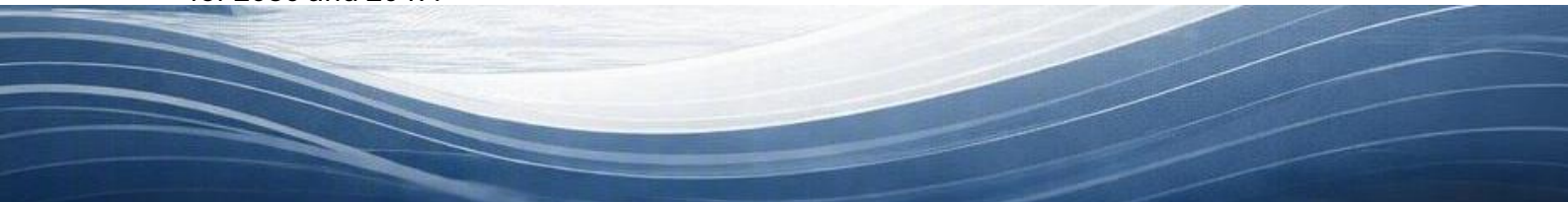
Digital Records and Data Governance

Creation of centralized maritime databases enabling seamless access to vessel, seafarer, certification, and regulatory records while improving transparency, accuracy, and data-driven decision-making.

Dashboards and Analytics

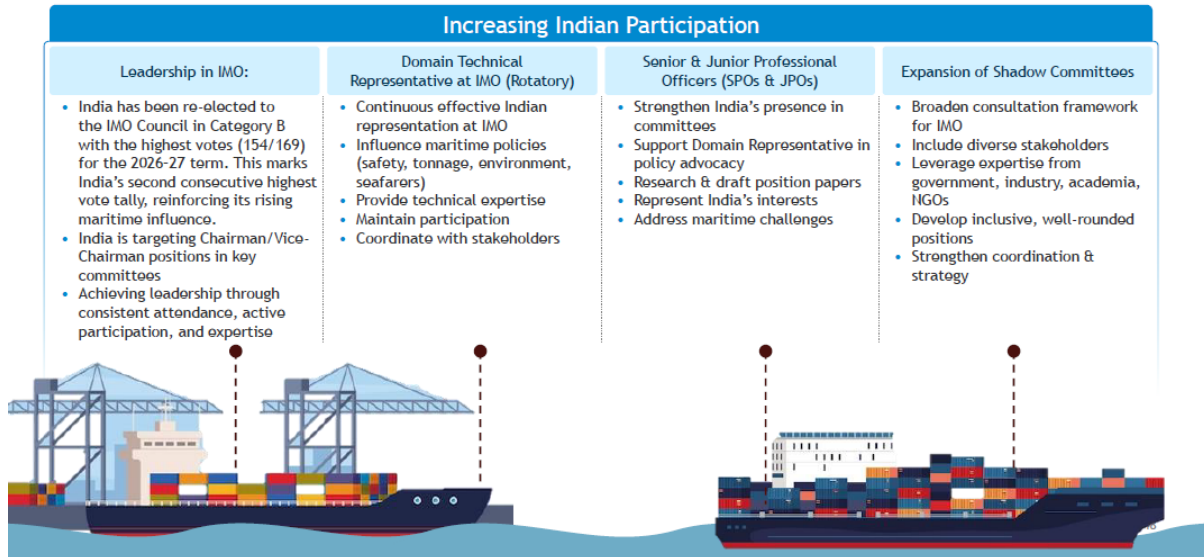
Real-time monitoring dashboards will support operational oversight, performance management, policy evaluation, risk identification, and stakeholder service tracking.

Together, these three pillars establish the foundation for an institution that is legally modern, operationally efficient, and digitally empowered. The EoDB framework is therefore not merely a digitization exercise but a comprehensive governance transformation that supports safety, sustainability, transparency, competitiveness, and maritime sector growth while positioning India to achieve its long-term maritime vision for 2030 and 2047.



12. International Cooperation

Strategic Engagements with IMO



India's maritime manpower strength has emerged as one of the country's most significant maritime assets, and sustained growth in seafarer numbers has necessitated a corresponding strengthening of India's engagement with international maritime regulatory institutions. As the global maritime industry undergoes rapid transformation driven by decarbonisation, digitalisation, seafarer welfare reforms, emerging technologies and new environmental standards, active participation in international rule-making has become essential for safeguarding national interests and ensuring that the perspectives of developing maritime nations are adequately represented. In this context, India has adopted a strategy of deeper and more sustained engagement with the International Maritime Organization (IMO), with the objective of increasing its influence in global maritime governance and contributing more actively to international policy formulation.

India's growing stature within the IMO is reflected in its continued election to the IMO Council under Category B, reaffirming international recognition of the country's importance in global shipping and maritime affairs. Continued representation at the Council level enables India to participate directly in key discussions relating to international maritime regulation, shipping safety, environmental protection, maritime security and seafarer welfare. The increasing support received from member states further reflects growing confidence in India's contributions to maritime governance and strengthens the country's ability to advance priorities relevant to developing maritime economies. Through active engagement, technical expertise and consistent participation, India continues to expand its profile within international maritime institutions.

A key element of the strategy involves strengthening India's technical participation across various IMO committees, sub-committees and working groups. Effective engagement within these forums is essential because many of the detailed technical standards governing global shipping are developed at the committee level. Enhanced participation allows India to contribute expert inputs on issues relating to safety standards, tonnage regulations, environmental compliance frameworks, seafarer training requirements and emerging maritime technologies. Active technical representation also enables India to assess potential regulatory implications at an early stage and ensure that international developments remain aligned with national interests and operational realities.

The strategy further emphasises development of a stronger pool of maritime professionals capable of supporting India's representation at the IMO. Increased participation by subject matter experts, technical specialists and maritime professionals contributes to better policy advocacy and more effective engagement in negotiations. Dedicated efforts are being undertaken to strengthen institutional expertise, support preparation of technical position papers and enhance India's ability to participate meaningfully in specialised discussions across multiple maritime domains. Building such expertise is particularly important as international maritime regulations become increasingly complex and interconnected with broader issues of climate change, energy transition, technology adoption and global trade facilitation.

Another important component of the engagement framework is the expansion of consultation mechanisms through wider stakeholder participation. Maritime regulations increasingly influence a broad range of stakeholders including government agencies, shipping companies, port operators, maritime training institutions, research organisations, industry associations and civil society organisations. Strengthening consultation processes enables diverse perspectives to be considered before positions are formulated for international deliberations. Such an approach supports development of balanced and well-informed policy positions while ensuring that regulatory proposals reflect practical industry realities and national development priorities.

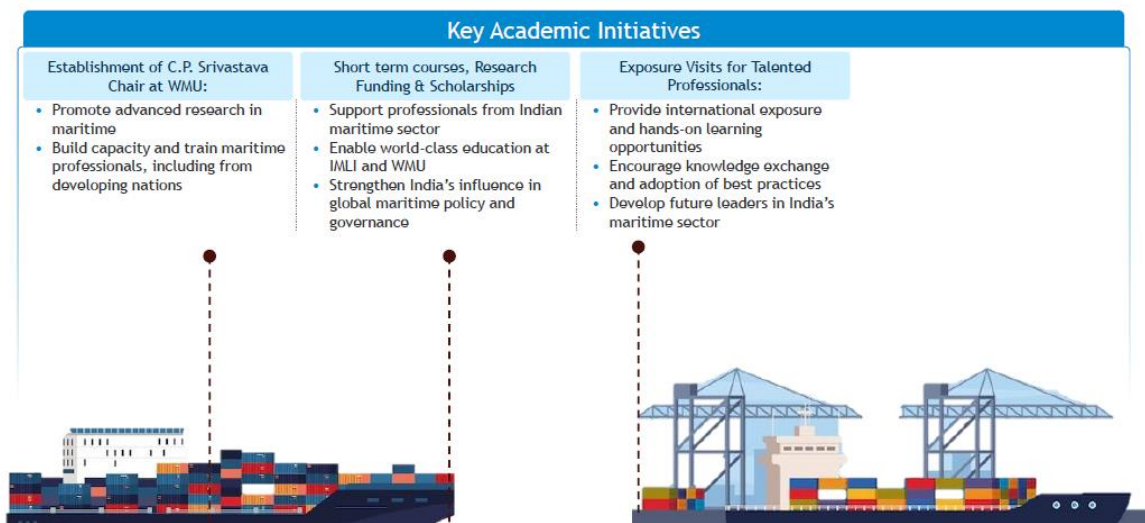
Broader stakeholder engagement also contributes to improved coordination and continuity in India's international maritime representation. Inputs from industry, academia and specialised technical institutions can strengthen India's ability to evaluate emerging regulatory proposals and assess their potential implications for domestic shipping, ports, maritime training and associated sectors. The creation of structured consultation frameworks further promotes transparency and enables more comprehensive preparation for participation in international meetings and negotiations. Enhanced coordination across stakeholders ultimately contributes towards more coherent and effective representation at the IMO.

The strengthening of India's engagement with the IMO is aligned with the broader objectives of Maritime India Vision 2030 and Maritime Amrit Kaal Vision 2047, which seek

to position India as a leading maritime nation. As India's shipping sector expands and its contribution to global maritime manpower continues to grow, meaningful participation in international maritime governance becomes increasingly important. Enhanced engagement will enable India not only to influence future maritime regulations but also to contribute actively towards shaping a safer, more sustainable and inclusive global maritime ecosystem. Through sustained technical participation, stronger institutional capacity and broader stakeholder involvement, India aims to reinforce its role as a responsible and influential maritime nation within the international community.



Strategic Engagements with IMO



India's growing presence in international maritime governance must be supported by a strong academic and research ecosystem capable of generating technical expertise, policy inputs and future maritime leaders. While participation in regulatory forums such as the International Maritime Organization (IMO) is essential for safeguarding national interests, long-term influence in global maritime governance also depends on the availability of institutions, professionals and research capabilities that can contribute meaningfully to international policy discussions. Recognising this requirement, several academic initiatives are being proposed to strengthen India's intellectual engagement with international maritime affairs and build institutional capacity for sustained participation in global maritime governance.

A key initiative under consideration is the establishment of a distinguished academic leadership role at the World Maritime University (WMU), one of the foremost institutions supporting global maritime education, research and capacity development under the IMO framework. Such an initiative would facilitate stronger academic engagement between India and international maritime institutions while creating opportunities for deeper collaboration in maritime research, policy development and human resource capacity building. Enhanced engagement with globally recognised academic institutions

can support development of expertise in specialised areas such as maritime law, environmental regulation, shipping economics, maritime safety, seafarer development and emerging maritime technologies.

Strengthening academic partnerships also provides an opportunity to contribute towards capacity building within the wider global maritime community, particularly among developing maritime nations. India's experience as a major seafaring nation, emerging maritime economy and active participant in international shipping positions it to play an increasingly important role in supporting knowledge exchange and technical cooperation programmes. Academic collaboration can contribute towards training maritime professionals, strengthening institutional capabilities and promoting wider dissemination of best practices across the international maritime sector.

Another important area of focus is the development of scholarship programmes, research funding mechanisms and specialised short-term training opportunities aimed at supporting maritime professionals. Access to advanced education and specialised training at institutions such as the World Maritime University and the IMO International Maritime Law Institute (IMLI) can significantly strengthen professional expertise and enhance India's ability to participate effectively in international maritime policy formulation. Targeted support for deserving professionals will contribute towards creation of a larger pool of experts capable of representing India's interests in international regulatory discussions while simultaneously strengthening domestic maritime administration and policy development capabilities.

Research support also plays a critical role in enabling evidence-based policy making. Many of the issues currently under discussion at international forums involve complex technical, legal, environmental and economic considerations. Strengthening maritime research capabilities can help generate data-driven policy inputs, support formulation of national positions and improve understanding of emerging international developments. Enhanced research capacity further enables India to contribute original thought leadership to global maritime discussions while ensuring that domestic policy decisions are informed by rigorous analysis and international best practices.

The strategy further envisages providing exposure opportunities and international engagement for talented maritime professionals. Participation in international programmes, academic exchanges, conferences, research collaborations and specialised training initiatives can significantly enhance professional capabilities while broadening understanding of global maritime developments. Such exposure helps facilitate transfer of knowledge, encourages adoption of best practices and strengthens professional networks across the international maritime community. These benefits extend beyond individual participants and ultimately contribute to strengthening institutional capacity within the broader maritime ecosystem.

Developing a pipeline of future maritime leaders is another important objective of these initiatives. As global shipping becomes increasingly complex and interconnected with issues such as climate change, sustainability, technological transformation and international trade, there is an increasing need for maritime professionals who possess interdisciplinary expertise and international exposure. Investments in higher education, research and leadership development will help create a cadre of professionals capable of contributing to both domestic maritime development and international maritime governance. Such a talent pool will support India's long-term maritime ambitions and further strengthen its role in international maritime organisations and policy-making forums.

Collectively, these academic initiatives complement India's broader strategy of enhancing participation within the International Maritime Organization and strengthening its global maritime influence. By investing in research, education, scholarships, institutional partnerships and professional development, India seeks to build a sustainable foundation for long-term engagement in international maritime governance. These measures will contribute towards creating a knowledge-driven maritime ecosystem capable of supporting national maritime priorities, advancing international cooperation and reinforcing India's position as a leading maritime nation.



Strategic Engagements with IMO



India's growing engagement with the International Maritime Organization (IMO) requires a coordinated and institutionally supported mechanism capable of bringing together inputs from multiple stakeholders while ensuring continuity in policy formulation and international representation. As discussions at the IMO increasingly cover complex subjects such as decarbonisation, alternative fuels, seafarer welfare, autonomous vessels, maritime safety and environmental compliance, the need for structured consultation and knowledge management has become more pronounced. To strengthen

India's participation in these processes, a dedicated digital platform is being proposed to support coordination, stakeholder engagement and policy development across various IMO committees and working groups.

The proposed Shadow Committee Portal is envisaged as a comprehensive digital platform that will serve as a centralized repository for information relating to India's engagement with the IMO. The platform will facilitate systematic documentation of India's participation in various IMO committees, sub-committees and working groups while providing a structured mechanism for monitoring activities, tracking submissions and recording key outcomes. By institutionalising knowledge and preserving historical deliberations, the portal is expected to create continuity in policy engagement and strengthen institutional memory across successive delegations and stakeholder groups.

A key objective of the portal is to improve coordination among the diverse stakeholders that contribute to formulation of India's positions on international maritime issues. Maritime policy discussions increasingly require inputs from multiple domains, including government ministries, maritime administrations, shipping companies, port authorities, industry associations, academic institutions, research organisations and specialised technical experts. The portal will provide a common platform through which these stakeholders can share views, exchange technical inputs and participate in structured consultations on matters under consideration at the IMO. Such an approach is expected to improve the quality, consistency and comprehensiveness of India's submissions and interventions in international forums.

The platform will also enhance transparency in the process of international maritime engagement. Through systematic recording of committee proceedings, stakeholder inputs, policy positions and follow-up actions, the portal will enable better visibility regarding India's contributions and ongoing work at various IMO forums. Improved transparency can facilitate greater stakeholder participation, strengthen accountability and encourage wider dissemination of information relating to international maritime developments. This is particularly important given the increasing impact of IMO decisions on domestic shipping, maritime training, environmental compliance, shipbuilding and associated maritime sectors.

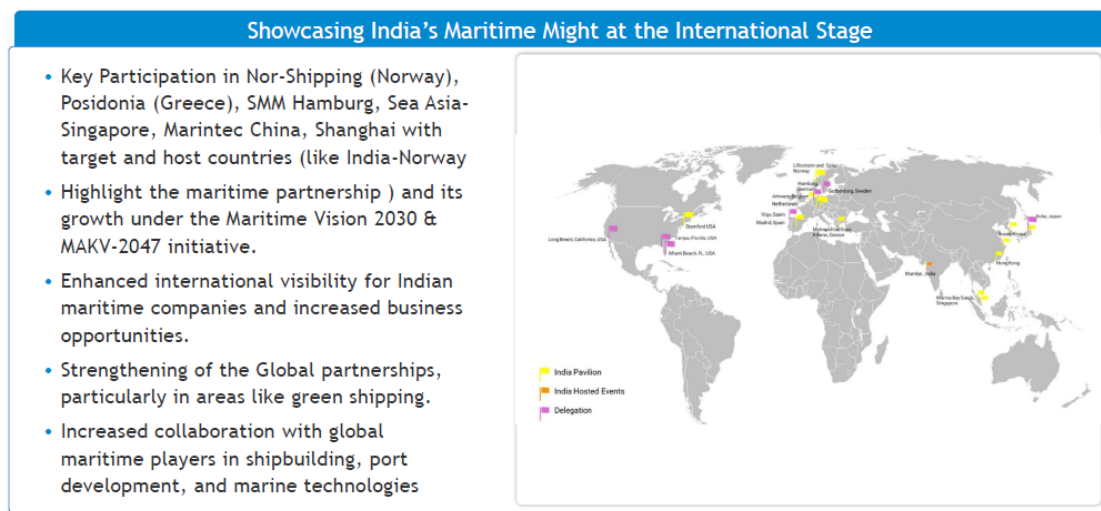
Another significant benefit of the proposed system is the ability to support evidence-based policy formulation. By bringing together technical papers, research studies, stakeholder submissions and deliberative records within a single digital platform, decision makers will have access to a consolidated knowledge base to support preparation of national positions. Such a framework can facilitate informed assessment of emerging regulatory proposals and enable timely identification of matters that may affect India's maritime interests. Enhanced access to technical information and historical records will strengthen the ability of Indian delegations to participate effectively in negotiations and policy discussions at international forums.

The Shadow Committee Portal is also expected to support a more inclusive consultation architecture by creating structured channels for participation from industry, academia, think tanks and other subject matter experts. Maritime governance increasingly involves interdisciplinary issues that extend beyond traditional shipping regulation and require specialised expertise from a broad range of sectors. The proposed framework seeks to leverage this expertise by creating an institutional mechanism through which diverse viewpoints can be considered during policy development. Broader stakeholder participation is expected to produce balanced and well-informed policy positions that reflect both national priorities and practical industry realities.

The initiative forms part of the broader effort to strengthen India's influence within international maritime governance and enhance its ability to contribute to global maritime policy development. By integrating technology, stakeholder engagement and structured knowledge management within a single framework, the Shadow Committee Portal is expected to improve coordination, strengthen policy advocacy and reinforce India's presence in the IMO. The platform will contribute towards creating a more organised, transparent and collaborative approach to international maritime engagement while supporting India's long-term objective of emerging as a leading maritime nation with an influential voice in global maritime affairs.



The India Pavillion



India's participation in major international maritime exhibitions and conferences has emerged as an important strategic instrument for enhancing global visibility of the country's maritime sector and advancing international maritime cooperation. Global maritime events such as Nor-Shipping in Norway, Posidonia in Greece, SMM Hamburg, Sea Asia Singapore and major maritime exhibitions in China provide valuable platforms for showcasing national maritime capabilities, promoting investment opportunities and facilitating engagement with international stakeholders. These events bring together

shipowners, shipbuilders, maritime technology providers, ports, regulators, investors and policy makers from across the world, creating opportunities for collaboration and business development.

The India Pavilion concept has been developed as a dedicated platform for presenting India's growing maritime strengths and transformation initiatives before the international maritime community. Through coordinated participation at leading maritime forums, India is able to showcase developments taking place across shipping, port infrastructure, shipbuilding, maritime services, logistics, skill development and sustainability initiatives. The platform also provides an opportunity to communicate the progress achieved under Maritime India Vision 2030 and Maritime Amrit Kaal Vision 2047, thereby enhancing awareness regarding India's long-term maritime development agenda among global maritime stakeholders.

A key objective of these engagements is to strengthen bilateral and multilateral maritime partnerships with leading maritime nations. International maritime exhibitions provide opportunities for direct interaction between governments, industry representatives and maritime institutions, facilitating discussions on shipping development, maritime investments, technology transfer, green shipping solutions and capacity-building initiatives. Such engagements contribute towards strengthening strategic relationships and creating avenues for cooperation in areas of mutual interest. Enhanced maritime diplomacy through global events also supports India's efforts to position itself as a major maritime nation and trusted international partner.

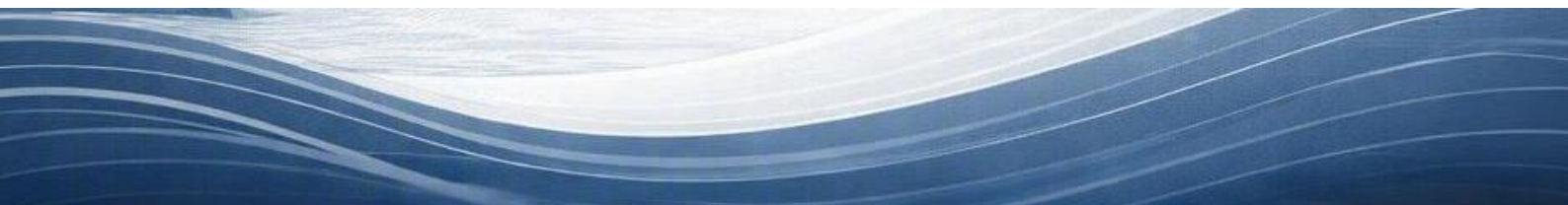
Participation in international events further contributes towards increasing visibility of Indian maritime companies and creating access to new business opportunities. Maritime exhibitions serve as important commercial platforms where Indian firms can showcase products, services and capabilities before a global audience. Greater exposure enables Indian stakeholders to explore international partnerships, attract investments and identify opportunities across emerging sectors such as green shipping, marine technologies, shipbuilding, ship repair and maritime digitalisation. Enhanced market visibility can support expansion of Indian companies into international markets while strengthening their competitiveness within the global maritime economy.

The India Pavilion initiative also supports collaboration with global maritime leaders in areas that are increasingly important for future maritime development. The international shipping industry is undergoing significant transformation driven by decarbonisation, alternative fuels, automation, digital technologies and sustainability requirements. Active engagement with global stakeholders enables India to participate in discussions on emerging technologies, understand evolving industry trends and identify opportunities for adoption of best practices. Such collaboration contributes towards strengthening domestic capabilities while facilitating access to international expertise and innovation.

Green shipping and maritime sustainability represent particularly important areas of cooperation. Global maritime forums provide opportunities for discussions relating to energy transition, low-carbon shipping solutions, alternative fuels and environmental technologies. As India advances its own maritime sustainability agenda, participation in these platforms enables engagement with technology providers, research institutions and international organisations involved in shaping the future of sustainable shipping. The resulting partnerships can contribute towards accelerating the adoption of environmentally responsible maritime practices and supporting national sustainability objectives.

The initiative further supports promotion of India's maritime ecosystem as an integrated destination for shipping, logistics, ports, shipbuilding and maritime services. By presenting a unified national presence through dedicated pavilions and coordinated stakeholder participation, India is able to project a comprehensive image of its maritime capabilities and development potential. Such visibility strengthens investor confidence, attracts international attention towards emerging opportunities and reinforces India's position within global maritime value chains.

The continued expansion of India's presence across leading maritime exhibitions reflects a broader strategy of strengthening international engagement, promoting economic opportunities and increasing India's influence within the global maritime community. Through the India Pavilion initiative, the country seeks not only to highlight its maritime achievements but also to create enduring partnerships that support growth, innovation, sustainability and long-term development of the maritime sector.



13. Green Transition

13.1. Imperative for Maritime Energy Transition

Imperative for Maritime Energy Transition



Maritime transport is central to global trade, supply chains and economic development. At the same time, the sector is increasingly required to address greenhouse gas emissions, improve energy efficiency and prepare for a future in which low and zero-emission operations become commercially and operationally necessary. Maritime energy transition, therefore, is not merely an environmental agenda. It is a strategic requirement for ensuring the long-term resilience, competitiveness and sustainability of the maritime ecosystem.

Shipping has traditionally depended on conventional fossil fuels such as heavy fuel oil, marine gas oil and diesel. While these fuels have supported the growth of global trade, continued dependence creates exposure to volatile fuel prices, supply disruptions, import dependence and future compliance risks. It also places the sector under increasing pressure to reduce its greenhouse gas footprint and align with evolving international expectations on cleaner shipping.

The global maritime sector is moving towards decarbonisation through a combination of regulatory measures, market expectations, technological innovation and financial signals. The 2023 IMO GHG Strategy seeks net-zero GHG emissions from international shipping by or around 2050 and includes interim ambitions for 2030 and 2040. It also envisages increasing uptake of zero and near-zero GHG emission technologies, fuels and energy sources. Discussions on the proposed IMO Net-Zero Framework are continuing, including on a global fuel standard and a GHG-pricing mechanism.

This evolving international environment is likely to influence vessel design, fuel selection, ship operations, chartering decisions, access to finance, port infrastructure and future trade competitiveness. Shipping companies that are unable to adapt may face higher operating costs, reduced market access and greater exposure to regulatory and commercial risks. Conversely, early preparedness can create opportunities for greener fleets, efficient ports, domestic manufacturing, fuel production and new maritime services.

The transition is necessary for five broad reasons.

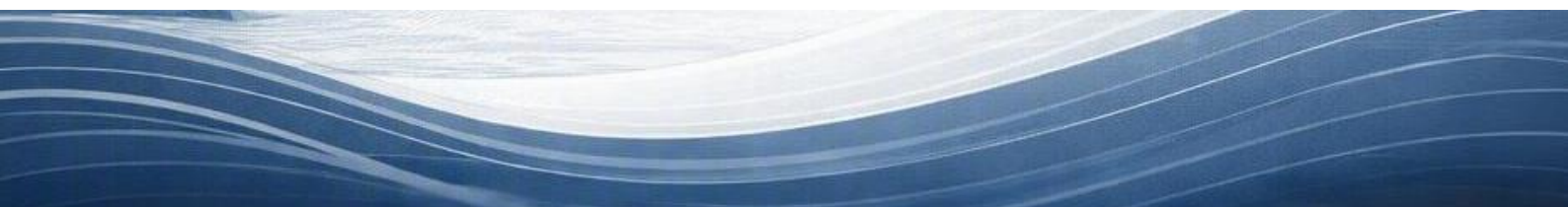
First, it is essential to reduce greenhouse gas emissions from shipping and associated maritime activities. This includes not only emissions from onboard fuel use but also lifecycle emissions associated with fuel production, transportation, storage and use. A lifecycle approach is important to ensure that emissions are genuinely reduced rather than shifted from ships to other parts of the energy system.

Second, maritime energy transition can strengthen energy security. Diversifying fuel options through sustainable biofuels, green methanol, green ammonia, hydrogen, battery-electric systems and other cleaner technologies can reduce dependence on conventional imported fuels. This is particularly relevant for India, where maritime growth, energy security and domestic green-energy capability must progress together.

Third, the transition is necessary to safeguard the long-term competitiveness of Indian shipping. Future competitiveness will increasingly depend on the ability of vessels and ports to meet efficiency standards, access cleaner fuels, comply with carbon-related requirements and respond to changing expectations from cargo owners, charterers, financiers and international supply chains.

Fourth, the transition can support sustainable economic growth. Development of green-fuel ecosystems, bunkering infrastructure, renewable-energy integration, shipbuilding capability, retrofitting capacity, port electrification, digital systems and specialised skills can generate new economic activity and strengthen domestic maritime capability. It can also create opportunities for Indian ports and coastal regions to emerge as green-fuel production, storage, bunkering and maritime-service hubs.

Fifth, maritime energy transition is necessary to enable a progressive shift towards zero and near-zero emission fuels and technologies. The transition will not follow one uniform pathway. Different vessel segments, routes, operating profiles and port conditions will require different solutions. Energy-efficiency measures, operational optimisation, hull and propulsion improvements, wind-assist technologies, shore power, batteries, hybrid systems and multiple alternative fuels will need to be adopted in a phased and practical manner.



The pathway for transition can broadly be understood in three stages. In the immediate term, the focus should be on improving energy efficiency, optimising operations, reducing fuel consumption and preparing vessels and ports for future requirements. In the medium term, greater deployment of alternative fuels, retrofits, green bunkering facilities, shore power and digital optimisation systems will be required. In the long term, the objective is to create a net-zero maritime ecosystem supported by cleaner fuels, efficient ships, green ports, reliable infrastructure, skilled personnel and appropriate safety and regulatory frameworks.

Alternative fuels are an important component of this journey, but they are not a standalone solution. Their successful adoption will depend on availability, affordability, safety, lifecycle emissions, storage and bunkering arrangements, vessel compatibility, engine technology, crew training and international standards. The transition must therefore be supported by coordinated action across shipping, ports, shipbuilding, energy, finance, technology, skill development and regulation.

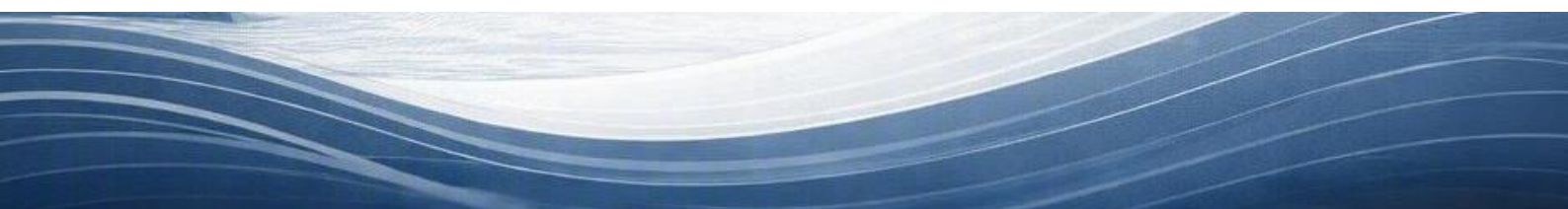
For India, maritime energy transition presents an opportunity to align climate responsibility with national priorities of energy security, Atmanirbhar Bharat, industrial development, port-led growth and Viksit Bharat. It provides a pathway to develop a resilient and future-ready maritime sector that can support trade growth while progressively reducing environmental impact.

The central message is that maritime energy transition should be viewed not as a compliance burden but as a strategic opportunity. A well-planned transition can help decarbonise maritime operations, strengthen energy resilience, improve competitiveness, support innovation and create sustainable economic growth across the maritime value chain.

13.2. India as a Net Green Energy Exporter & Bunkering Destination

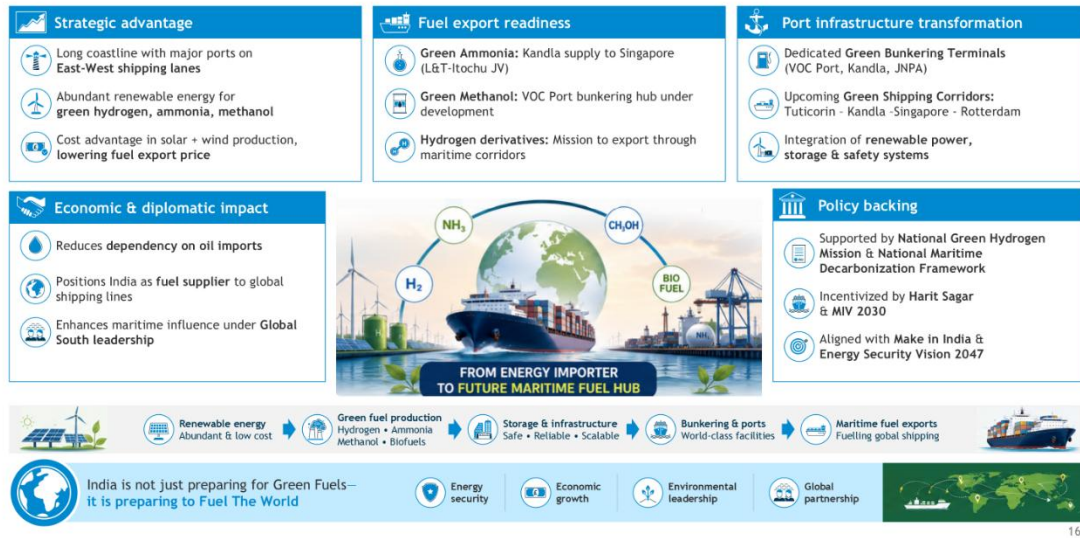
India's positioning as a net green energy exporter and global bunkering destination should be viewed as a long-term strategic vision, rather than a reflection of current energy balances. Historically, India has been a net energy-importing and energy-deficit nation, with high dependence on imported fossil fuels to meet domestic and industrial demand, including for the maritime sector.

The emerging global transition towards low-carbon and zero-carbon fuels presents India with a structural opportunity to reverse this trajectory over the coming decades. By leveraging its renewable energy potential, coastline advantages and expanding port infrastructure, India aims to progressively transition from an energy-deficit economy to a net energy-surplus nation, capable of supplying green energy and green fuels not only for domestic consumption but also for international markets.





India as a Net Green Energy Exporter & Bunkering Destination



163

In the maritime context, this vision translates into India evolving from a fuel-import dependent shipping ecosystem to a producer, exporter and bunkering hub for green maritime fuels, including hydrogen-derived fuels such as green ammonia and green methanol. This shift is envisioned to occur in a phased manner, aligned with the maturation of fuel technologies, scaling of renewable energy capacity and development of safe port-based bunkering infrastructure.

Achieving net energy surplus status is therefore not an immediate outcome but a strategic end-state, underpinned by long-term national initiatives on renewable energy expansion, green hydrogen production, port modernisation and maritime decarbonisation. As these elements converge, India's maritime sector is expected to move from being a passive energy consumer to an active contributor to global green energy supply chains.

This future-oriented vision underpins India's policy approach to green shipping and bunkering and frames the country's ambition to play a system-level role in the global maritime energy transition, while strengthening long-term energy security and economic resilience.

13.3. Green Maritime Corridors

Green Maritime Corridors have emerged internationally as a pragmatic and implementation-oriented mechanism to advance maritime decarbonisation in a structured manner. Rather than attempting immediate sector-wide transformation, green corridors focus on specific routes, vessel segments and port pairs where

coordinated action across the value chain can be demonstrated under real operating conditions.

The corridor approach enables regulators, ports, shipowners, fuel producers and technology providers to collectively address the key barriers to adoption of alternative marine fuels, including fuel availability, pricing, safety, operational reliability and regulatory readiness. By concentrating effort on defined corridors, early investments can be de-risked and lessons generated for wider replication.

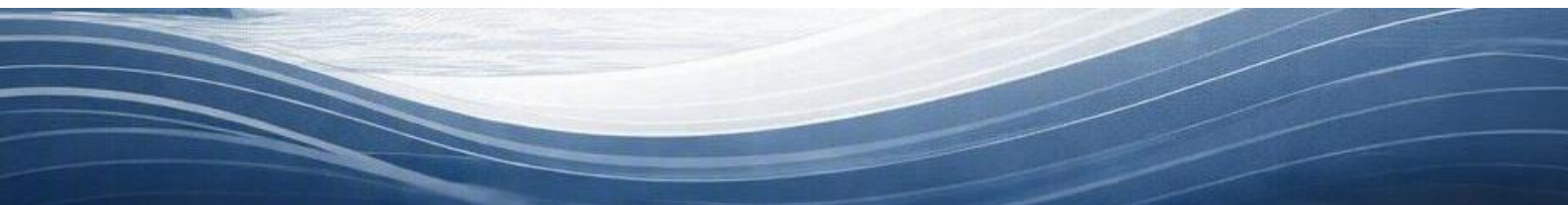
In the Indian context, green maritime corridors form the core implementation pillar of the Green Voyage approach, translating long-term policy ambition on green shipping into route-based, evidence-driven and commercially grounded interventions.

13.4. Study on Potential Demand and Pricing of Alternative Marine Fuels in India

One of the foundational analytical inputs supporting India's Green Voyage strategy is the Study on Potential Demand and Pricing of Alternative Marine Fuels in India, undertaken under the aegis of the International Maritime Organization, in partnership with the Directorate General of Shipping and the Ministry of Ports Shipping and Waterways, with technical support from DNV.

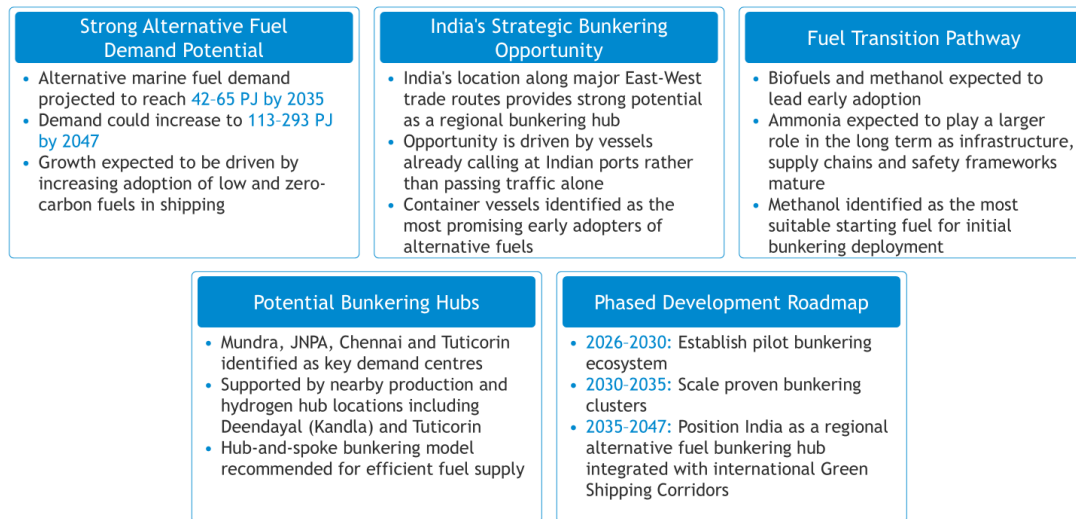
The study evaluates India's prospects of developing into a regional bunkering hub for alternative marine fuels, examining demand drivers, pricing dynamics, operational constraints and competitive positioning. A central and policy-critical conclusion of the study is that:

India's strongest and most realistic bunkering opportunity lies with container vessels already calling at Indian ports for cargo operations or transshipment, rather than with vessels merely passing by along international shipping lanes.





IMO - DNV Study on Potential Demand and Pricing of Alternative Fuels



161

This finding has important strategic implications. The study demonstrates that proximity to shipping lanes alone does not generate bunkering demand. Global shipping lines rarely deviate from established routes unless the bunkering proposition offers clear advantages in delivered fuel cost, operational reliability and turnaround efficiency. As a result, bunkering strategies premised on deviation-based demand are inherently weak.

Instead, the study underscores that cargo-linked demand, particularly from containerised liner services with regular port calls, provides a stable and predictable foundation for early alternative fuel uptake. Transshipment hubs, where vessels already berth for cargo consolidation, offer especially strong potential, as bunkering can be integrated without additional operational disruption.

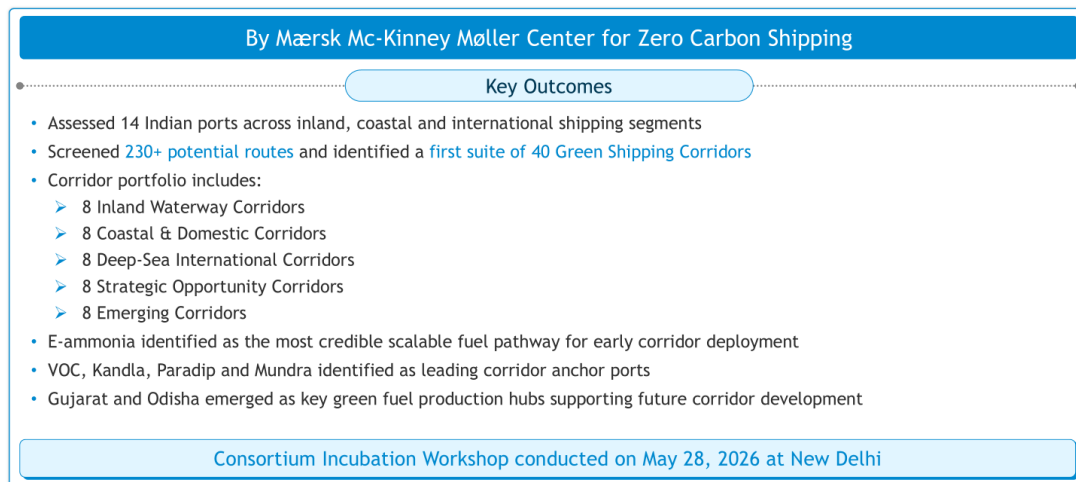
Key insights from the study include:

- Container vessels represent the most viable early adopters due to frequency of port calls and fleet standardisation
- Early demand for alternative fuels is likely to be led by biofuels, given cost and compatibility, with e-methanol and e-ammonia scaling over time
- Bunkering hub development should be selective and concentrated, rather than dispersed across multiple ports
- Policy certainty, targeted incentives and infrastructure readiness are decisive factors for market uptake

The study thus provides a market-grounded demand lens for India's green corridor planning.

13.5. Green Corridor Pre-Feasibility Study under the Indo-Danish Centre of Excellence

India Green Corridors Pre-Feasibility Study



162

The India Green Corridors Pre-Feasibility Study represents an important early initiative under the India–Denmark Green Strategic Partnership to support India’s transition towards a safe, sustainable and future-ready maritime sector.

The broader cooperation is anchored in the Green Strategic Partnership between India and Denmark, established in 2020, which provides a framework for deepening bilateral collaboration on green growth, renewable energy, sustainable development and climate action. Maritime cooperation and green shipping have emerged as key areas within this partnership, reflecting the shared objective of accelerating low-carbon transition in the maritime sector.

In June 2025, during the meeting between the Hon’ble Minister of Ports, Shipping and Waterways, Government of India and the Danish Minister of Industry, Business and Financial Affairs in Copenhagen, both sides reiterated their commitment to maritime cooperation under the India–Denmark framework. The discussions built upon the bilateral Memorandum of Understanding on maritime affairs signed in 2024 and highlighted the need to establish an Indo-Danish Centre of Excellence for Green Shipping in India.

The Centre of Excellence is envisaged as a platform to improve the quality and efficiency of maritime activities while supporting India’s green transition. Its work is aligned with the Maritime Amrit Kaal Vision 2047 and India’s aspiration to emerge as a global hub for safe, sustainable and green maritime operations. Development of Green Shipping Corridors was identified as one of the priority areas through which the Centre of Excellence could contribute to practical and measurable outcomes.

Accordingly, the India Green Corridors Pre-Feasibility Study was initiated as one of the first substantive technical deliverables under this collaboration. The study was undertaken between September 2025 and May 2026 by the Mærsk Mc-Kinney Møller Center for Zero Carbon Shipping, with support from Implement Consulting Group. It was carried out in collaboration with the Ministry of Ports, Shipping and Waterways, Directorate General of Shipping, Indian Ports Association, Danish Energy Agency and Danish Maritime Authority. The project was supported through Danish funding arrangements involving the Danish Maritime Authority, Danish Energy Agency and Ministry of Foreign Affairs of Denmark.

The study moves beyond broad policy intent and seeks to establish an evidence-based basis for identifying corridors that can support early deployment of lower and zero-emission maritime solutions. It assesses green corridors not merely as routes connecting two ports, but as integrated ecosystems involving vessels, fuel supply, renewable-energy availability, port infrastructure, bunkering systems, cargo demand, regulations, safety arrangements and stakeholder commitments.

The assessment was undertaken through a structured methodology developed by the Mærsk Mc-Kinney Møller Center for Zero Carbon Shipping. The methodology covered workstreams relating to alternative fuels, port and bunkering readiness, vessels and cargo, trade routes, regulatory frameworks, just and equitable transition considerations and corridor selection. The Indian institutions supported the process through data provision, port inputs, regulatory perspectives and stakeholder engagement, while the technical analysis and modelling were undertaken by the study consortium.

Key Outcomes

- **14 Indian ports were assessed** across inland waterways, coastal shipping and international trade segments.
- **More than 230 potential routes were screened** to identify a practical portfolio of corridor candidates.
- **A first suite of 40 Green Shipping Corridors** was identified for further prioritisation and maturity.
- The identified corridor portfolio includes:
 - **8 Inland Waterway Corridors**
 - **8 Coastal and Domestic Corridors**
 - **8 Deep-Sea International Corridors**
 - **8 Strategic Opportunity Corridors**
 - **8 Emerging Corridors**

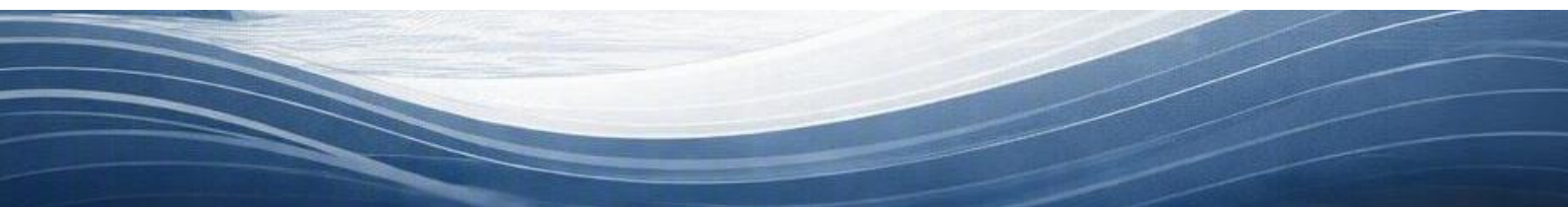
- **E-ammonia was identified as the most credible scalable fuel pathway for early corridor deployment**, especially for larger vessels and long-distance bulk, tanker and energy-related trades.
- **V.O. Chidambaranar Port, Kandla, Paradip and Mundra were identified as leading corridor anchor ports**, based on alternative-fuel readiness, likely fuel availability, strategic location, trade patterns and associated industrial ecosystems.
- **Gujarat and Odisha emerged as key potential green-fuel production hubs** that could support future corridor development, particularly in relation to green hydrogen and green ammonia pathways.
- **A Consortium Incubation Workshop was conducted on 28 May 2026 in New Delhi** to discuss the findings, identify priority stakeholders and facilitate the next stage of corridor maturation.

The categorisation of corridors reflects different levels of readiness. Inland and coastal corridors can provide a practical pathway for early pilots involving harbour craft, tugs, ferries, barges and selected coastal vessels, where distances are shorter, operations are more predictable and fuel or charging arrangements can be managed more easily. These segments may be suitable for electrification, hybridisation, biofuels and other near-term lower-emission solutions.

Deep-sea corridors are more complex and are intended to support larger vessel categories such as tankers, bulk carriers, container vessels and general cargo vessels. These corridors will require greater convergence between fuel production, international partner-port readiness, commercial offtake, vessel availability, bunkering systems, safety standards and regulatory alignment. For such segments, scalable fuels such as e-ammonia and e-methanol are likely to be more relevant than battery-electric solutions.

The study also highlights that fuel transition cannot be approached through a uniform pathway. The suitability of fuels will depend on vessel type, voyage length, cargo profile, fuel availability, storage requirement, engine technology, port infrastructure and safety considerations. While e-ammonia appears to be a strong pathway for early scalable deployment, biofuels, electrification and hybrid systems may remain important for shorter-range and operationally controlled applications.

The identification of Kandla, Mundra, Paradip and V.O. Chidambaranar Port as anchor ports is significant because it indicates that early corridor development may be concentrated around a limited number of regional clusters rather than being distributed evenly across the country. These clusters can combine port infrastructure, renewable-energy potential, industrial demand, green-fuel projects, bunkering potential and shipping activity to create viable early ecosystems.



The study further underlines that port readiness alone will not be sufficient for successful corridor implementation. Green corridors will require coordinated commitments from shipping companies, cargo owners, fuel producers, ports, terminal operators, technology providers, financial institutions, regulators and training institutions. The next phase must therefore focus on detailed feasibility studies, commercial structuring, fuel supply arrangements, vessel deployment plans, safety and regulatory requirements, financing models and stakeholder commitments.

Overall, the India Green Corridors Pre-Feasibility Study provides a structured foundation for India to move from high-level green-shipping ambition towards practical, phased and evidence-led implementation. It supports the larger objective of building a resilient maritime ecosystem that strengthens energy security, develops green industrial capability, improves maritime competitiveness and enables progressive decarbonisation of domestic and international shipping.

13.6. Green Ports

Green Ports : Driving Sustainable Maritime Growth



India's ports form an essential backbone of the national economy and the maritime transport system, underpinning about 95 per cent of the country's trade by volume and almost 68 per cent by value. Backed by a coastline covering more than 7,500 kilometres, the country's port system includes **12 major ports in addition to over 200 non-major ports**, enabling international trade and coastal shipping while supporting inland waterways transport and port-based industrialisation.

Ports are not only gateways for freights, but they are also important logistics and industry hubs that integrate sea transport with rail, road and inland waterways and therefore are at the core of supply chain efficiency and competitive advantage. Port operations are becoming increasingly energy-intensive as India's trade volumes increase and the port infrastructure increases its capability while it makes room for large ships and throughput. Cargo handling, vessel berthing, port craft operations, building services and auxiliary infrastructure all contribute to greenhouse gas emissions, local air pollution, noise and pressure on coastal and marine ecosystems. The impacts are mostly concentrated in and around port regions, which are typically situated neighbouring major urban centres and ecologically sensitive coastal areas

In consequence, **improving the environmental performance of ports** has risen from being a peripheral concern into central necessity for sustainable maritime growth and social acceptance and long-term operational resilience. National climate commitments set out in India, including its goal of becoming **net zero emissions by 2070** and its interim goals based on the Paris Agreement provide an opportunity to implement sector-level strategies that link macro-level targets with real-world action by the sector.

With their long use lifetimes of assets, high energy consumption and prominent position in maritime logistics, ports constitute one of the most viable interfaces for promoting sustainable environmental reductions within the maritime industry.

Therefore, responding to emissions and environmental impacts at ports not only **helps national targets for climate** but also contributes to **improved air quality, resource management efficiency and the resilience of the local coastline's infrastructure**.

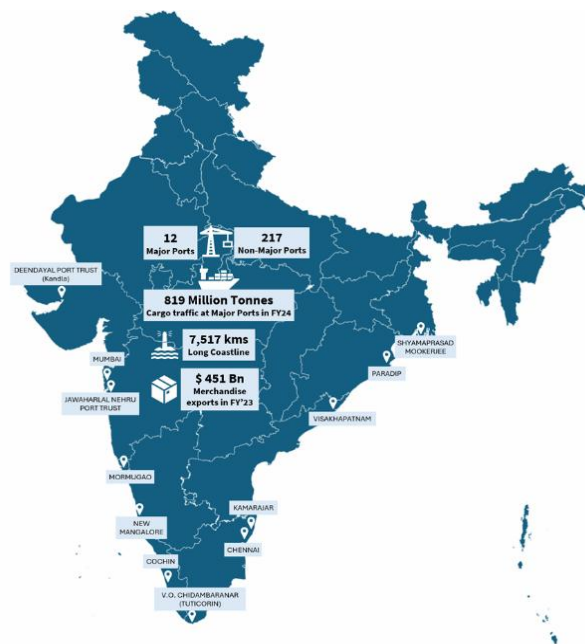


Figure 1 Ports of India

GREEN PORTS IN INDIA

Green ports occupy a crucial facilitating position in India's green shipping and maritime decarbonisation trajectory. Ports therefore can impact emissions outcomes along multiple pathways across maritime value chains, as a set of fixed infrastructure nodes that interact face to face with vessels, fuels, energy systems and logistics infrastructure, directly from the port to ships, fuel sector with the fuel system to logistics network. Because of this, green ports are not just concerned with their own operational footprint, but they also provide the conditions for **cleaner shipping and sustainable maritime operations**.

By Indian policy framework green ports would aim to make the practice of environmentally sustainable operations systematic, infrastructural and governing. Common key areas include emissions reduction of port-controlled assets through electrification and energy optimisation, renewable generation of energy as part of port power solutions, shore-to-ship power systems to minimise ship emissions on board ships and environmental monitoring and management systems.

Simultaneously, ports are also believed to play a pivotal role in facilitating the switch to **alternative and low carbon fuels**, *providing storage, handling and bunkering infrastructure* and holding all these facilities to a high standard of safety and environmental sustainability. Ports also grow to be even more critical determinants of shipping emissions performance. Port infrastructure and services including effective berth allocation, reduced hold-up times, arrival through ports just-in-time system and shore power directly impact vessel fuel consumption and adherence to global indicators like the Carbon Intensity Indicator (CII). Green ports in this space serve as **systemic enablers** that help ship operators fulfil regulatory requirements and operating efficiency requirements while also helping with broader decarbonisation results.

The National Maritime Decarbonization Policy Framework recognises green ports as an essential component of India's maritime transition, supported by complementary instruments such as the **Harit Sagar Green Port Guidelines** (which gives guidance on implementation) and the **Green Port Performance Index (GPPI)**, which provides a systematic framework for measurement and benchmarking of environmental performance.

Together, these instruments create a coherent architecture that connects policy objectives to the **phased implementation and performance-based governance**. By implementing green port practice on an incremental basis with an emphasis on readiness to go green and pilot schemes to widespread and institutionalised application of this approach, Indian ports may become the anchors of port-led decarbonisation.

While the green ports have the capacity to act as systemic enablers of cleaner shipping and maritime decarbonization, translating this role into practice is constrained by a set

of regulatory, infrastructure, technological, financial and coordination challenges. Understanding these constraints is essential for designing phased, targeted interventions that unlock effective and scalable implementation.

The following highlights the key barriers that must be addressed to enable green ports to deliver sustained environmental and operational outcomes



KEY PILLARS OF GREEN PORT

Energy and Emissions

Energy consumption and reduction of emissions is the foundation of Green Port building because ports, located in dense hotspots for electricity, fuel use and GHG, the main sources of power/fuel usage along with GHG emission are highly concentrated ports. Emissions are generated by ships at berth, cargo handling apparatus, vehicles and auxiliary power facilities and ports are important places for intervention to promote decarbonisation.

Green Ports focus on renewable energy uptake and electrification of port equipment, shore power installation and energy-saving measures to mitigate both direct and indirect CO₂ emissions. These interventions are consistent with national climate targets and are also associated with enduring cost efficiencies and operational sustainability

Water and Waste Management

Successful water and waste management is a basic component of Green Ports, addressing effluents, ballast water, stormwater runoff and solid and hazardous waste left after port and shipping operations. Dysregulation of these streams may have the potential to damage marine ecosystems and erode the confidence of port communities, in the ports and marine pollution and pollution remediation by the port community.

Waste in Green Ports is governed along integrated water stewardship principles and circular waste management mechanisms promoting the reduction, reuse, recycling and safe disposal. Such practices promote environmental protection and enhance regulatory compliance and operational efficiency.

Biodiversity and Ecosystem Protection

Ports are frequently situated in natural coastal zones, where human activities and construction can disrupt habitats, fisheries and natural coastal systems. Loss and degradation of biodiversity, which is not only environmentally vulnerable but also leads to potential future operational and regulatory risk for ports

Green Ports includes biodiversity into planning and management and habitat restoration-oriented nature-based environmental solutions-based environment monitoring. This framework integrates port development with long-term challenges for environmental resilience and climate adaptation.

Digitalisation and Operational Efficiency

Digitalisation is a major enabler of Green Ports which helps them to monitor port operations in real time with performance optimization supported by data-driven decision making. Digital tools help ports monitor energy consumption, emissions, shipments flow, environmental impact more efficiently. It increases transparency and the efficiency of production thereby fulfilling the environmental sustainability and competitive goals, strengthening the connection of the two.

Stakeholder Engagement and Governance

Development of Green Port is supported by robust governance mechanisms and the proactive participation of stakeholders, port authorities, terminal operators, shipping lines, regulators, communities and financiers. Good stakeholder participation will facilitate objectives alignment, transparency and shared ownership over sustainability results. Strong governance also enables ports to align sustainability with strategic planning, investment decision-making and performance management thereby enhancing the likelihood of sustainability beyond projects or leadership cycles

KEY FOCUS AREA FOR IMPLEMENTATION

The Green Port Guidelines of the **Harit Sagar** target the sustainable development of the port ecosystem where national Green Port performance standards have been defined. These priorities center around **minimising the emissions** associated with port activity by electrifying plant equipment and vehicles, increasing the use of renewable energy, shore-to-ship power supply to reduce vessel emissions at berth and transitioning port crafts to cleaner propulsion systems aligned with national energy targets. Collectively, these interventions aim to reduce the carbon intensity of port activities, while promoting energy efficiency, operational reliability and environmental performance.

Aside from driving emissions reduction, the Guidelines focus very much on **resource and environmental efficiency** improving water and wastewater management, waste handling and recycling, protection of marine and coastal ecosystems and green cover among port areas to create biodiversity and to operate as natural carbon sink

mechanisms. The main focus areas include an emphasis on energy-efficient buildings, digital optimisation of port operations, promotion of coastal shipping as a low carbon transport mode and good management of the environment with clear performance indicators, audits and incentive structures

Collectively, these focus areas provide a comprehensive and flexible framework for ports to adopt best practices, resilient designs and continuous performance improvement in line with national and global sustainability objectives.

The solutions and opportunity areas contained in this table are drawn upon and aligned with the possible solutions and Key opportunities outlined in the NGSP consultative framework

Solutions	Key Opportunities
Green Corridors	- Requires coordinated efforts among governments, industry bodies and international partners. - India can leverage its bilateral and multilateral relationships to formalize Green Corridors
Just-In-Time Arrival and Port Efficiency	- Standardization of digital solutions and harmonization of port systems will enable seamless operations - Optimizing port design and berthing schedules can reduce congestion and emissions - Digitalization of port operations and intelligent scheduling can improve turnaround times - Linking port efficiency with CII compliance can drive sustainable practices. - National strategy for JIT implementation can ensure uniformity across ports
Shore Power (Cold Ironing)	- Variations in power tariffs and tax structures across states pose challenges - India's lower shore power costs compared to Western markets offer an opportunity - A centralized policy, similar to the EV Charging Policy, can standardize shore power infrastructure - PPPs can support the integration of solar energy and carbon sinks into port infrastructure.
Greener Dredgers & Harbour Crafts	- Current efficiency regulations (e.g., EEXI) do not apply to dredgers and harbour crafts - Gaps in maintenance and energy efficiency training need to be addressed. - Hybrid diesel-electric dredgers can serve as a transitional solution. - Phasing out inefficient harbour crafts through regulatory mandates can support energy transition.
Bunkering Hubs for Alternative Fuels	India can emerge as a major bunkering hub for alternative fuels like hydrogen and ammonia

	• Demand-supply assessment and regional baseline planning are required. • Financial mechanisms such as concessional finance and partial credit guarantees can de-risk investments. • Collaboration across the fuel value chain is crucial for infrastructure development
--	--

Table Solution and Key opportunities in green ports

INTERNATIONAL GREEN PORT BENCHMARKS

International experience shows that early-stage green port programmes succeed when they combine (i) phased delivery, (ii) credible benchmarking and (iii) targeted incentives that reduce first-mover risk. LR's NGSP consultative work already points to the value of aligning national approaches with recognised green port benchmarking schemes (e.g., Eco Ports in Europe and Green Marine in North America), using tiered criteria, periodic verification and public reporting to create transparency and a "race to the top".

A consistent lesson is that incentives and tariff design matter as much as technology. Early OPS/electrification roll-out is often constrained by power pricing, taxes and grid readiness; therefore, national-level measures that harmonise the OPS policy approach and enable PPP delivery models can accelerate adoption and standardisation, while avoiding fragmented port-by-port approaches.

Green corridors are another proven accelerator because they concentrate demand, investment and collaboration across the value chain. Recent regional studies (e.g., UN ESCAP) highlight that corridors face barriers such as limited awareness and infrastructure and stress that digitalisation enables decarbonisation through data-sharing, optimisation and port call synchronisation. In practical terms, tools that support Just-in-Time arrival and port call optimisation, together with IoT/AI-enabled monitoring and "digital twin" approaches, can unlock material efficiency gains and support scalable MRV.

Implication for India: adopt a staged "pilot → scale" pathway anchored in national enablers (standards, tariffs, finance, MRV) while using GPPI/certification to verify progress; the NGSP consultative milestones already envisage early designation of initial green ports with OPS and subsequent corridor scale-up."

13.7. Sustainable Indicators Framework for Indian Ports

As part of India's broader transition towards sustainable maritime development, a structured framework of measurable sustainability indicators is being institutionalized for Indian ports. The objective is not merely to adopt isolated environmental measures, but to establish a coherent system through which port performance can be evaluated, benchmarked and progressively improved.

The proposed framework rests on four interlinked indicators:

1. Green Port Index (GPI)

The Green Port Index serves as a comprehensive evaluation tool to assess the overall environmental performance of ports. It measures parameters such as:

- Carbon footprint and greenhouse gas emissions
- Adoption of alternative fuels
- Energy efficiency measures
- Sustainable logistics practices
- Waste management systems

The intent of GPI is to move beyond project-based interventions and bring sustainability into routine port operations. By quantifying environmental performance across multiple dimensions, ports can identify specific gaps and prioritize targeted improvements. Over time, the index will enable benchmarking across ports and support evidence-based decision-making.

2. Port Readiness Level (PRL)

The Port Readiness Level indicator evaluates the preparedness of ports for the ongoing energy transition and digital transformation.

PRL examines:

- Infrastructure readiness for alternative fuels
- Compliance alignment with evolving international environmental regulations
- Digital systems supporting operational efficiency
- Integration of sustainability into planning and governance

As global shipping moves toward low-carbon fuels and stricter environmental standards, ports must adapt accordingly. PRL provides a structured method to assess whether ports are capable of supporting next-generation vessels and future regulatory requirements. This indicator ensures that ports are not reactive, but forward-prepared.

3. Shore Power Readiness Indicator

Shore power, or cold ironing, is increasingly recognized as a critical intervention to reduce emissions from ships at berth. The Shore Power Readiness Indicator evaluates:

- Availability of onshore power supply infrastructure
- Capacity to integrate renewable energy sources
- Grid stability and connection systems
- Operational protocols for ship–shore interface

Emissions from berthed vessels contribute significantly to local air pollution. By measuring infrastructure readiness and operational capability, this indicator supports phased implementation of shore-to-ship power systems across Indian ports. It also aligns with international decarbonization pathways and improves air quality in port cities.

4. Environmental Ship Index (ESI)

The Environmental Ship Index focuses on incentivizing ship operators to reduce emissions. It evaluates vessels based on emissions performance, including:

- Nitrogen oxides (NO_x)
- Sulphur oxides (SO_x)
- Carbon dioxide (CO₂)

Ports may integrate ESI-based incentives such as differential port dues or priority berthing for higher-rated vessels. This creates a market-based mechanism encouraging cleaner ship operations and aligns port policy with vessel-level environmental performance.

Integrated Impact of the Framework

Individually, each indicator addresses a specific dimension of port sustainability. Collectively, they create a robust governance framework that integrates infrastructure, operations, compliance and incentives.

Institutionalizing these indicators will:

- Enable measurable tracking of environmental performance across Indian ports
- Support structured transition toward low-carbon port operations
- Strengthen India's credibility in global green maritime logistics
- Facilitate participation in international green shipping corridors
- Contribute to long-term net-zero objectives

Rather than relying solely on regulatory mandates, this framework introduces performance measurement and benchmarking into port governance. Over time, it will

support standardization of sustainability practices across both major and non-major ports.

By embedding these indicators within policy and operational systems, India positions its ports not only as trade gateways, but as active enablers of the global maritime energy transition.

13.8. GHG Emission Scopes

Effective decarbonisation of the port sector requires a **clear understanding of emission sources across the port ecosystem**. Ports are complex, multi-actor environments where emissions arise not only from port-owned assets but also from energy consumption and broader logistics activities.

To enable **standardised measurement, reporting and mitigation**, port emissions are classified into **three internationally recognised scopes - Scope 1, Scope 2 and Scope 3**, aligned with global frameworks such as the GHG Protocol.

This classification allows ports to transition from **fragmented emission management to a holistic, system-wide decarbonisation approach**.

Scope 1 – Direct Emissions

Scope 1 emissions refer to **direct greenhouse gas emissions from sources owned or controlled by the port authority or terminal operators**.

Key Sources

- Diesel generators
- Cargo handling equipment (cranes, RTGs, forklifts)
- Dredgers and tugboats
- Port-owned vehicles
- Fuel-based machinery within port premises

Characteristics

- Fully under **operational control of port authorities**
- Most straightforward to **measure, monitor and regulate**
- Typically dependent on fossil fuel consumption

Strategic Importance

- Represents the **starting point for decarbonisation interventions**
- Offers **immediate emission reduction opportunities**

Scope 2 – Indirect Emissions (Electricity Consumption)

Scope 2 emissions arise from **electricity purchased and consumed by port operations but generated externally**, typically from the grid.

Key Sources

- Terminal lighting systems
- Pumping operations
- Reefer container power supply
- Administrative and operational buildings
- Electrified equipment and terminal infrastructure

Characteristics

- Emissions are **indirect but energy-linked**
- Strongly influenced by **grid emission intensity**
- High contribution in regions with **coal-dominated power generation**

Strategic Importance

- Increasing relevance due to **electrification of port operations**
- Critical lever for decarbonisation through **clean energy transition**

Scope 3 – Other Indirect Emissions (Value Chain Emissions)

Scope 3 emissions encompass **all other indirect emissions occurring across the port value chain**, outside direct ownership or control of the port.

Key Sources

- Ships at berth using auxiliary engines
 - Cargo transport via trucks, rail and barges
 - Hinterland logistics operations
 - Waste treatment and disposal
 - Business travel and associated activities
 - Upstream and downstream supply chain emissions
- 

Characteristics

- **Largest and most complex emission category**
- Occurs beyond the physical boundary of the port
- Requires **multi-stakeholder coordination**

Strategic Importance

- Represents the **dominant share of total port-related emissions**
- Central to achieving **deep decarbonisation outcomes**

Integrated Understanding of Port Emissions

The three scopes together provide a **comprehensive view of emissions across the port ecosystem**:

- Scope 1 → Operational emissions within direct control
- Scope 2 → Energy-linked emissions influenced by power systems
- Scope 3 → Value chain emissions requiring collaborative action

This integrated classification enables:

- End-to-end emissions mapping
- Prioritisation of mitigation strategies
- Alignment with international reporting standards

13.9. National Port Sustainability Council (NPSC) – Proposed

India's port sector is entering a phase where sustainability can no longer be treated as a peripheral issue. With more than 200 ports, including 12 major ports and with increasing pressure from global decarbonisation rules, ESG-linked trade expectations and the need for climate-resilient infrastructure, Indian ports require a more structured and measurable approach to sustainability. The concept note therefore proposes the creation of a **National Port Sustainability Council (NPSC)** as a central institutional mechanism to guide, monitor and standardise sustainability efforts across both major and non-major ports.

The note is built around the idea that sustainability at ports must be assessed through a defined set of indicators rather than through isolated projects. For this reason, it brings together frameworks such as **Green Port Indexing (GPI)**, **Green Port Readiness Level /**

Port Readiness Level (GPRL/PRL), Smart Port Shore Power Index (SPSPI), Environmental Ship Indexing (ESI) and an institutionalised GHG emissions inventory.

Need for a National Institutional Mechanism

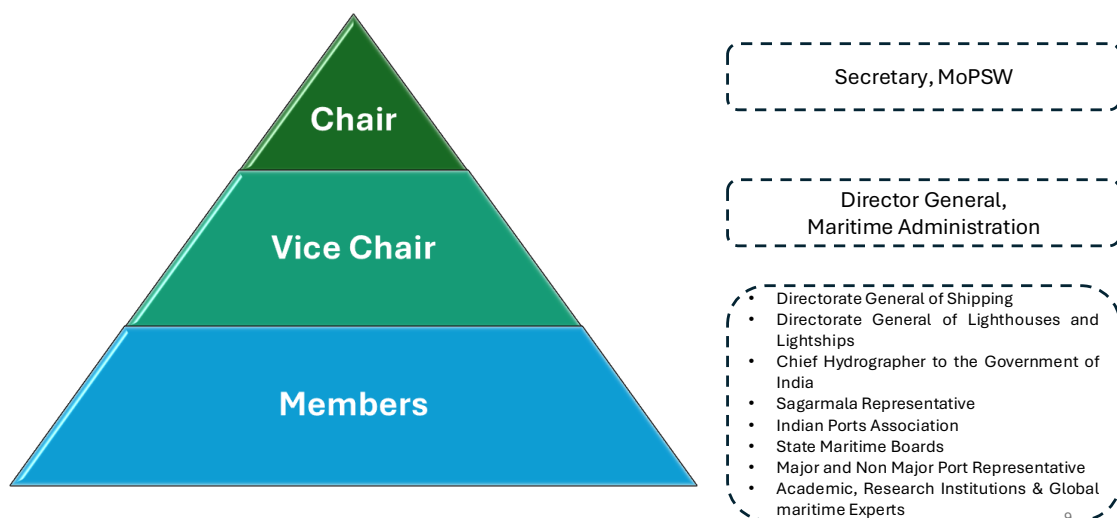
The central argument of the concept note is that India presently has policy intent, individual initiatives and broad sustainability ambitions, but does not yet have a unified national framework that can consistently assess readiness, compare port performance and link sustainability with compliance, investment and global competitiveness. The proposed NPSC is therefore conceived as an apex regulatory and advisory body under the Ministry of Ports, Shipping and Waterways to bring coherence to these efforts.

The note also places this proposal in the context of the expected transition from DG Shipping to the **Directorate General of Maritime Administration (DGMA)** under the forthcoming Merchant Shipping Bill / Maritime Services Bill framework. In the concept note, DGMA is visualised as a broader authority with responsibilities extending beyond vessel and seafarer regulation into port sustainability, alternative fuel readiness, digital governance and environmental compliance.

In practical terms, the NPSC is meant to provide national direction on issues such as emissions monitoring, electrification, alternative fuel readiness, digital port systems, green financing signals and harmonisation with global standards such as the IMO Revised GHG Strategy, EU Fit-for-55 and Maritime Vision 2030.

National Port Sustainability Council – Proposed Role

The NPSC is presented not as a symbolic committee but as a working governance structure that would monitor, evaluate and facilitate the implementation of sustainability and readiness frameworks across Indian ports. Its proposed role includes standard setting, benchmarking, compliance oversight, coordination with central and state-level bodies and support for digital platforms needed for real-time monitoring.



The proposed governing structure is chaired by the Secretary, MoPSW, with the DGMA as Vice-Chairperson. The membership is broad-based and includes the Chief Hydrographer, DGLL, DG Shipping representative, Sagarmala representative, Indian Ports Association, State Maritime Boards, port authorities, private port operators, academic institutions and global maritime experts. This reflects the note's view that port sustainability cannot be managed only through a single regulator and requires operational, technical and policy coordination.

The concept note further proposes specialised technical committees within the NPSC dealing with port safety and navigation, GHG emissions and energy transition, digitalisation and smart ports, sustainable infrastructure and policy and compliance. This is useful because it breaks down sustainability from a broad concept into operational workstreams.

Integration of Navigational Safety and Sustainability

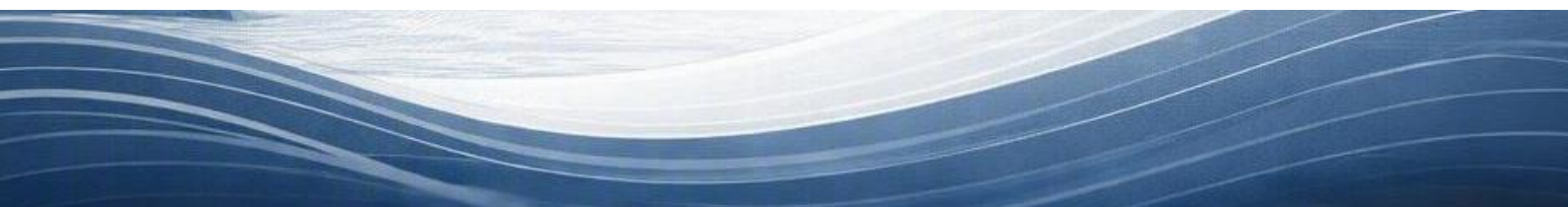
A major point in the note is that sustainability and safety should not be treated as separate verticals. The document therefore links the modernization of the **Navigational Safety at Ports Committee (NSPC)** with the creation of the NPSC. The NSPC, constituted in 1997, has traditionally focused on navigational safety, emergency preparedness, environmental protection and compliance with conventions such as SOLAS, MARPOL and the ISPS Code.

The note argues that port safety today must evolve to include digital systems, emissions considerations, shore power, alternative fuels and climate-related resilience. For that reason, it recommends strategic integration of the NSPC within the broader NPSC framework so that safety, readiness and sustainability are assessed together. The reasons given include holistic port governance, regulatory synergy, better use of resources, stronger crisis preparedness and improvement in India's global competitiveness.

This is one of the stronger ideas in the note because it avoids creating parallel structures for safety on one side and green transition on the other. Instead, it suggests a single institutional architecture where navigation, environment, infrastructure and digital systems are viewed together.

Sustainable Indicators for Indian Ports

The note makes it clear that sustainability must be measurable. It therefore proposes a set of indicators that can be used to assess ports on environmental performance, infrastructure preparedness and operational transition. It specifically highlights GPI, PRL, SPSPi and ESI as the core tools through which Indian ports can be benchmarked and guided.



The need for such indicators is linked to several factors. First, international regulations such as IMO's carbon-related measures and the EU's Fit-for-55 package are creating real commercial pressure on ports and supply chains. Second, India's own port modernisation ambitions under Maritime Vision 2030 require ports to become low-emission and digitally integrated hubs. Third, participation in future green shipping corridors will require ports to demonstrate readiness in a structured and internationally understandable form.

The note also refers to the need for an institutionalised mechanism for port emissions assessment so that green initiatives can actually be tracked and verified rather than only announced. This includes the use of real-time digital emissions monitoring systems and formal carbon accounting tools.

Green Port Indexing (GPI)

The Green Port Index is described as a framework to evaluate the environmental performance of ports in a structured way. The document identifies the main objectives of GPI as benchmarking sustainability performance, encouraging best practices, informing policy, supporting stakeholder engagement and attracting investment into eco-friendly infrastructure.

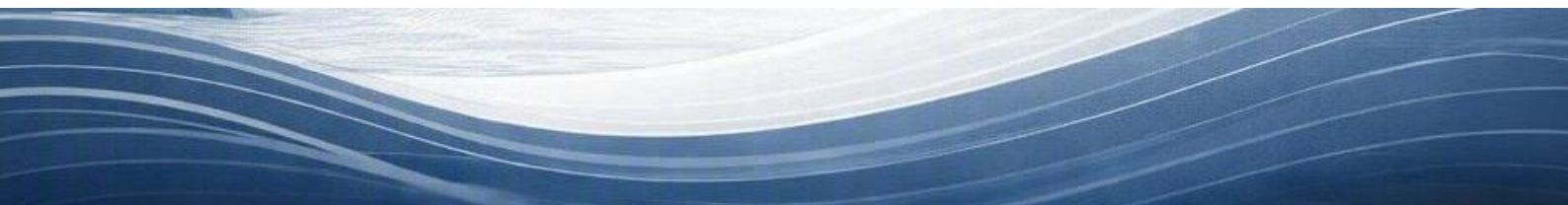
For India, the GPI framework is linked with national environmental regulation as well as Harit Sagar-type environmental indicators. The note groups assessment into management indices, operational indices and condition indices. It also lists pollution-related parameters covering air, water, noise, effluent and waste-related metrics.

The note proposes a multi-tier institutional structure for GPI implementation. At the national level, MoPSW would provide the policy framework. The NPSC would standardise criteria and ensure regulatory alignment. The Indian Ports Association would act as an executing authority, including through annual reporting, digital emissions platforms and pilot implementation at selected ports such as JNPT, Chennai and Visakhapatnam.

The key assessment parameters proposed for Indian ports under GPI include carbon footprint and GHG emissions, renewable energy and electrification, sustainable cargo handling and logistics, waste management and marine pollution control and digitalisation / smart port initiatives.

Green Port Readiness Level (GPRL / PRL)

The note draws on the IAPH's Port Readiness Level approach to assess how prepared ports are for the energy transition, digitalisation and future regulatory requirements. The readiness assessment is built across dimensions such as alternative fuel readiness, shore power integration, digital and smart port systems, regulatory compliance and net-zero infrastructure transition.



The readiness levels range from basic recognition of sustainability needs at lower levels to global sustainability leadership at the highest level, where ports are fully digitalised and effectively carbon-neutral. The note also mentions global examples such as Rotterdam, Singapore, Los Angeles and Hamburg as leading references.

For Indian application, the note proposes a National Port Readiness Framework supported by MoPSW, with the NPSC acting as the regulatory body and IPA as the executing authority. It recommends annual readiness reports, digital dashboards and pilot implementation at ports such as JNPT, Chennai and Deendayal. Assessment dimensions for India include decarbonisation and alternative fuels, digitalisation and smart readiness, regulatory compliance, net-zero infrastructure readiness and sustainable cargo and logistics efficiency.

Smart Port Shore Power Index (SPSPI)

The concept note gives separate importance to shore power through the proposed Smart Port Shore Power Index. This is significant because emissions from berthed ships are increasingly becoming a major focus in global port decarbonisation. The SPSPI is intended to assess port readiness for shore-to-ship power, renewable energy integration, smart grid preparedness, regulatory compliance and economic viability.

The note goes a step further by proposing a certification framework for ships that use shore power at Indian ports. Under this proposal, calibrated metering, auditable data systems, grid-based emission factor calculations and digital access to certificates would allow vessels to demonstrate verified emission reductions. The note also suggests that such certification could support reduced port charges and potential carbon credit eligibility.

Institutionally, the SPSPI framework again follows a multi-tier model: MoPSW for national policy, NPSC for regulatory standards and IPA for dashboards, rankings and capacity building. Pilot ports suggested include JNPT, Chennai and Deendayal.

Environmental Ship Indexing (ESI)

The note includes the Environmental Ship Index as a way to align ship-side environmental performance with port-side incentives. It describes ESI as a voluntary global system developed by IAPH that scores ships on emissions performance, fuel efficiency, shore power compatibility and alternative fuel adoption.

The relevance for India lies in using ESI to support greener shipping practices at Indian ports by linking incentives such as reduced port dues or priority treatment to better-performing vessels. The note also sees ESI as complementary to mandatory IMO measures such as CII, EEXI and SEEMP, thereby allowing ports to use one framework for incentive design while remaining aligned with international regulatory systems.

This is an important idea because it shifts the role of ports from passive infrastructure providers to active participants in shaping cleaner fleet behaviour.

GHG Emissions Inventory

One of the strongest and most practical portions of the note is its emphasis on creating a formal GHG emissions inventory for Indian ports. The document argues that without a structured inventory of energy users and emission sources, it is not possible to understand the baseline, identify hotspots or build cost-effective reduction strategies.

The note recommends a centralised institutional mechanism for emissions monitoring, reporting and mitigation. Suggested elements include emission inventories, air quality monitoring systems, use of emission factors, carbon accounting software, eco-efficiency indicators, ISO 14001-based environmental management systems and third-party audits. It also refers to international best practices such as AI-based monitoring and real-time reporting using IoT and blockchain.

The value of this part of the note is that it moves from a broad sustainability narrative to the actual systems needed for measurement, reporting and verification.

13.10. Harit Sagar – Green Port Guidelines

The “**Harit Sagar**” **Green Port Guidelines**, issued by the Ministry of Ports, Shipping and Waterways in May 2023, provide the broad framework for Major Ports in India to reduce carbon intensity and move towards environmentally sustainable port development and operations. The guidelines were circulated through an Office Memorandum dated 11 May 2023 for further action by all Major Ports.

The document has been positioned as a practical guidance framework for ports to prepare action plans, adopt green technologies, reduce wastage and monitor measurable outcomes over defined timelines. It is also linked to the broader national context of **COP-26 commitments, Panchamrit targets, Maritime India Vision 2030** and India’s long-term objective of reaching **net zero by 2070**. The introductory section of the guidelines clearly states that ports are expected to contribute to de-carbonisation by reducing carbon emissions per ton of cargo handled and by promoting a sustainable ecosystem around port operations.

Vision of the Guidelines

The central vision of the document is to reduce carbon intensity and develop an environment-friendly ecosystem at Major Ports through participation of all stakeholders, including terminal operators, logistics service providers, partner government agencies and shipping lines. The broader intent is to position Major Ports not just as cargo gateways, but as sustainable hubs of economic growth and development. This is to be achieved through optimization of procedures, adoption of green technologies, reduction

of wastages and measurable decarbonisation benchmarks. The vision statement is set out explicitly in the guideline document and is also highlighted visually on the vision page.

Policy Context and Importance

The guidelines derive importance from three connected policy drivers.

First, the maritime sector has a major role in national trade. The guidelines note that the sector accounts for **95 percent of trade by volume and 65 percent by value**, which means that any sustainability transition in ports has a large impact on the economy as a whole. Second, India's climate commitments require a reduction in emission intensity and increased use of non-fossil energy sources by 2030. Third, ports are recognized as critical points where energy use, vessel interface, cargo handling, water use, waste generation and local environmental impacts converge.

The document therefore treats ports as a major lever for achieving environmental goals, rather than only as operational infrastructure. It also makes it clear that the purpose is not limited to carbon accounting alone; the framework covers air, water, waste, noise, ecology, resource efficiency and reporting.

Principles Underlying Harit Sagar

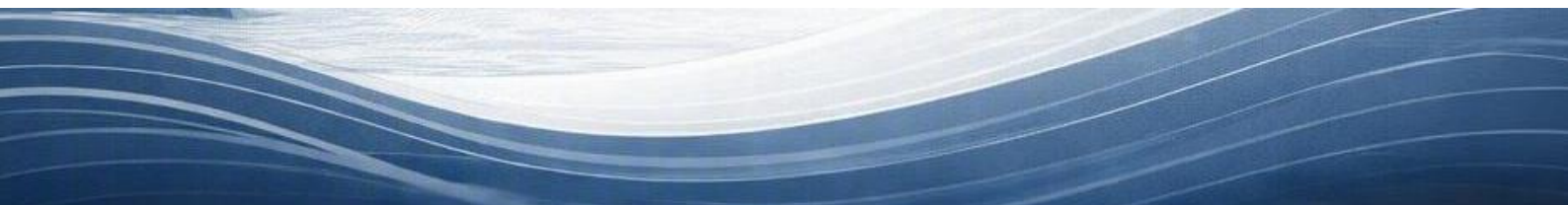
The guidelines are based on a set of broad principles that shape the rest of the document. These include ensuring environmental, economic and social sustainability in port development, adopting environmentally compatible designs, promoting clean and green energy, minimizing carbon and other harmful emissions through the **Eliminate, Reduce and Control (ERC)** approach, minimizing waste through the **5R concept**, conducting appropriate environmental impact assessments and strengthening continuous monitoring and reporting. The document also emphasizes the concept of **“Working with Nature”**, linking port development with ecosystem sensitivity rather than only engineering expansion.

This is important because the guidelines are not drafted as a narrow engineering manual. They are framed as a management and governance instrument that asks ports to integrate sustainability into planning, operation, maintenance and reporting.

Applicability

The guidelines are explicitly applicable to **all Major Ports of India**. At the same time, the message from the Secretary in the front portion of the document indicates that the framework could also be recommended to State Governments and State Maritime Boards for adoption in ports other than Major Ports. This shows that while the legal applicability is limited to Major Ports at present, the document is intended to serve as a broader model for the wider port sector.

Focus Areas for Implementation



The main strength of the Harit Sagar document is that it converts the sustainability agenda into concrete implementation areas.

Green Cover

Ports are required to increase green area cover in order to capture fugitive emissions, attenuate noise and support biodiversity. The target is to increase green belt area to **more than 20 percent by 2030** and **33 percent by 2047** of port area. The document links this not only to visual greening but also to soil moisture retention, erosion control, groundwater recharge and carbon sink creation.

Electrification of Port Equipment and Vehicles

Ports are asked to move progressively towards electrification of vehicles and equipment, targeting **more than 50 percent electrification by 2030** and **more than 90 percent by 2047**. Existing diesel-powered equipment is to be retrofitted or converted in a phased manner and future procurement is expected to favour electric systems or compatibility with greener fuels such as methanol, ethanol, ammonia, hydrogen fuel cell and CNG.

Port Crafts

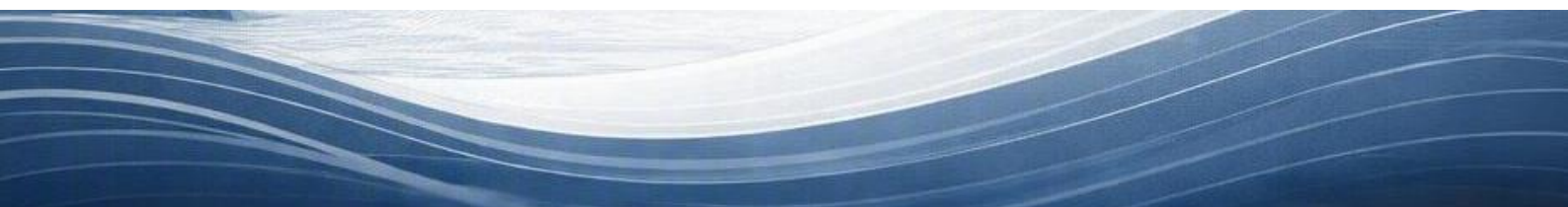
The guidelines extend beyond landside equipment and also cover port crafts such as tugs, pilot boats, mooring boats and survey boats. Ports are expected to prepare action plans for retrofitting these with cleaner propulsion technologies and for creating infrastructure under the National Green Hydrogen Mission. The document specifically states that **green ammonia bunkers and refuelling facilities are to be established at all Major Ports by 2035**.

Renewable Energy

Renewable energy is one of the most explicit targets in the guidelines. Ports are expected to ensure that the share of renewable energy exceeds **60 percent by 2030** and **90 percent by 2047**. The guidelines also provide for **at least one LNG bunkering station by 2030** and adequate EV charging stations in port campuses or nearby areas by 2025. In addition, select ports are expected to support offshore wind energy development. The document specifically mentions V.O. Chidambaranar Port as a pilot port for offshore wind-linked activity.

Shore to Ship Power Supply

All ports are required to develop infrastructure for shore power in a phased manner, beginning with port crafts, then extending to Coast Guard / Navy / small coastal vessels and finally to EXIM vessels. The phased timelines given are **2023, 2024 and 2025** respectively. This is significant because it shows that the guidelines were not only aspirational but provided a sequence for implementation.



Resource Utilisation

The guidelines address water efficiency in a fairly detailed way. Ports are required to increase treatment capacity, use treated water, reduce fresh water consumption per ton of cargo by **more than 20 percent by 2030** and achieve **100 percent recycle and reuse of consumed water**. The document also encourages installation of STPs, rainwater harvesting, desalination plants and even utilisation of condensed water from LNG terminal chilling plants.

Energy-Efficient Equipment and Green Buildings

Ports are directed to use energy-efficient equipment and materials such as LED smart lighting and highly rated appliances, reduce energy consumption per ton of cargo by **more than 20 percent by 2030** and adopt green building concepts for all new buildings. The document also encourages use of digital systems such as Sagar Setu, NLP-Marine, EBS and RFID to improve efficiency and thereby reduce carbon footprint.

Promotion of Coastal Shipping

The guidelines recognise coastal shipping as a cost-effective and energy-efficient alternative mode of transport and ask ports to facilitate it through infrastructure and viable mechanisms. This reflects an important systems-level view: decarbonisation is not only about what happens inside the port boundary, but also about improving cargo movement choices.

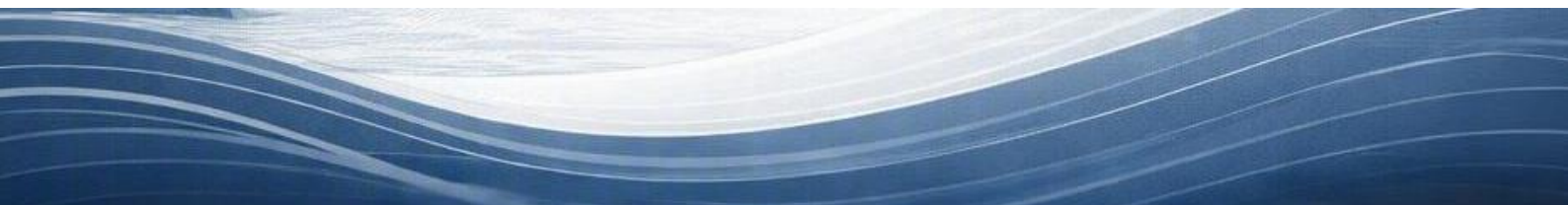
Effluent, Marine Ecosystem and Waste Management

The document includes explicit directions regarding effluent discharge, monitoring of waste from ships under MARPOL, prohibition of wastewater and bilge discharge into port waters, declaration of waste by ships, protection of mangroves and shore ecosystems, oil spill preparedness under NOS-DCP, ballast water management and shore reception facilities. These provisions show that the guidelines treat sustainability as wider than only carbon reduction.

Environmental Management and Incentives

Each port is expected to have approved Environment Management Guidelines, an Environment Management Plan and a dedicated Environment Cell. Independent annual environmental audits are required and the audit reports are to be uploaded on the port website before **30 April every year**. The guidelines also encourage ports to earn carbon credits and introduce green incentives for ships, private craft operators, concessionaires, truck operators and other port users adopting cleaner fuels or shore power-compatible systems. They further direct ports to incorporate green and sustainability aspects into DPRs and PPP projects.

Methodology for Implementation and Compliance



The Harit Sagar document is notable because it does not stop at listing areas of intervention. It also prescribes a method for implementation.

All ports are required to prepare an action plan within **two months** of launch of the guidelines, in reference to the listed Environment Performance Indicators. Ports are expected to establish real-time **Continuous Ambient Air Quality Monitoring Stations (CAAQMS)**, **Continuous Marine Water Quality Monitoring Stations (CMWQMS)** and **Online Continuous Effluent Monitoring Systems (OCEMS)**, all linked to digital dashboards and to the MoPSW server / portal / Sagarmathan dashboard for real-time monitoring and feedback. Different timelines are prescribed depending on the type of port operations.

The guidelines further provide that until these real-time systems are installed, regular reports should be prepared by independent environment auditors and uploaded annually on port websites. In addition, all ports are required to undertake a **baseline study using FY 2022–23 as the base year** within three months, including GHG emissions, carbon footprint and annual emissions of pollutants from all relevant port-related sources such as vessels, harbour crafts, cargo handling equipment and trucks.

This makes the document more implementation-oriented than many broad policy guidelines, because it links targets with baseline data and monitoring architecture.

Environmental Performance Indicators and Targets

The annexures are one of the most useful parts of the document because they convert broad sustainability language into measurable parameters.

Legal Compliance Framework

Annexure-A lists applicable laws relating to air, noise, DG set noise, water, hazardous waste, e-waste, solid waste, biomedical waste, plastic waste, battery waste, construction and demolition waste and environmental clearance. This makes clear that Harit Sagar is not a standalone framework outside the legal system, but is intended to operate in conjunction with existing environmental law and regulatory rules.

Environmental Performance Indicators

Annexure-B lists indicators for air, water, noise and effluent. These include parameters such as SO₂, NO₂, PM₁₀, PM_{2.5}, ozone, lead, ammonia, benzene, arsenic, mercury, dissolved oxygen, BOD, COD, turbidity, salinity, noise levels and effluent discharge parameters. Annexure-C provides a reporting format for waste management across hazardous waste, e-waste, solid waste, plastic waste, battery waste, construction and demolition waste and biomedical waste.

Sustainability Targets

Annexure-D sets out specific sustainability targets. These include:

- Renewable energy share at ports: **more than 60 percent by 2030** and **more than 90 percent by 2047**
- Electrified port equipment / vehicles: **more than 50 percent by 2030** and **more than 90 percent by 2047**
- Area under green belt: **more than 20 percent by 2030** and **more than 33 percent by 2047**
- Reduction in CO₂ emission per ton of cargo: **more than 30 percent by 2030** and **more than 70 percent by 2047**
- Reduction in GHG emissions in coastal / EXIM vessels: **more than 10 percent by 2030** and **more than 50 percent by 2047**
- Reduction in fresh water consumption per ton of cargo: **more than 20 percent by 2030**
- Recycle and reuse of consumed water: **more than 100 percent by 2030**
- Reduction in energy consumption per ton of cargo: **more than 20 percent by 2030**
- One LNG bunkering station: **by 2030**
- Green hydrogen / ammonia bunkering and refuelling facilities: **by 2035**
- Adequate number of EV charging stations: **by 2025**.

These annexed targets are perhaps the most important operational takeaway from the document because they provide benchmarks that ports can actually monitor and report.

Reporting, Review and Recognition

The guidelines also stress reporting and communication. Ports are encouraged to adopt the **Green Reporting Initiative (GRI)** as a global standard for communicating accountability with regard to impacts on environment, economy and people. The Ministry also reserves the power to interpret, clarify and relax provisions in public interest and may amend the guidelines from time to time.

An important provision is that the Ministry will recognize and award the **best three green performing ports of the year** based on evaluation criteria. This gives the guidelines a performance-based character rather than merely a compliance-based one.

13.11. Green Tug Transition Program (GTTP)

Harbour tugs play a critical role in port operations, particularly in berthing, unberthing and ship-assist functions. However, these vessels are typically powered by diesel engines and operate continuously within port limits, making them a concentrated source of greenhouse gas (GHG) emissions as well as local air pollutants such as NO_x, SO_x and particulate matter.

With increasing emphasis on maritime decarbonisation under national and global commitments, port-based emissions have emerged as a priority area for intervention. In this context, the Government of India has introduced the **Green Tug Transition Program (GTTP)** as a focused initiative to transition harbour tug fleets towards cleaner and low-emission alternatives.

The program forms part of the broader sustainability agenda under maritime sector reforms and aligns with national frameworks such as Maritime India Vision 2030 and Maritime Amrit Kaal Vision 2047.

The GTTP is designed to facilitate the phased replacement of conventional diesel-powered harbour tugs with environmentally sustainable alternatives using zero-emission or low-emission technologies.

The program envisages a structured transition pathway, supported by standardized design specifications, phased implementation and institutional oversight.

As per the official launch, Phase 1 of the program will be implemented from **October 2024 to December 2027**, with an estimated investment of approximately **INR 1000 crore** for development and deployment of green tugs .

Implementation Framework

Phase 1 (2024–2027)

The initial phase focuses on early adoption and demonstration across select major ports. The following four ports have been identified:

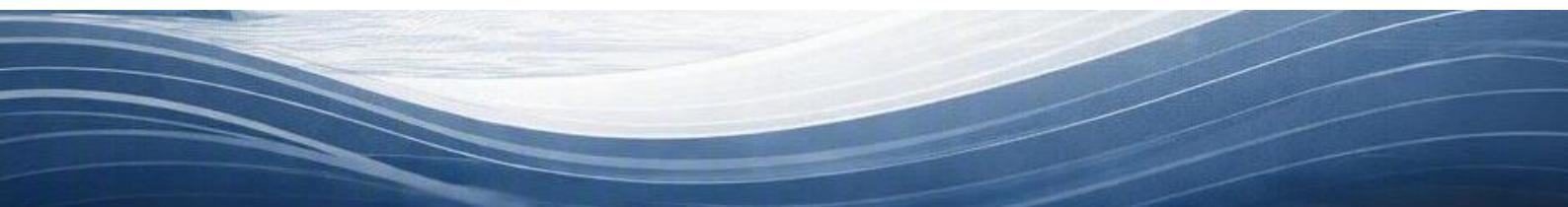
- Jawaharlal Nehru Port Authority (JNPA)
- Deendayal Port Authority (DPA)
- Paradip Port Authority
- V.O. Chidambaranar Port Authority

Each port is expected to procure or charter a minimum of two green tugs, based on standardized designs developed by the **Standing Specification Committee (SSC)** .

The first set of tugs will primarily be **battery-electric**, with provision for adoption of other emerging propulsion technologies such as hybrid systems, methanol and green hydrogen as technology maturity improves.

Technology Approach

The GTTP adopts a **technology-neutral but future-ready approach**, enabling ports to adopt suitable propulsion systems based on operational requirements and infrastructure readiness.



Key technology pathways include:

- Battery-electric propulsion for short-duration harbour operations
- Hybrid propulsion combining battery and fuel-based systems
- Alternative fuels such as methanol and green hydrogen
- Provision for retrofitting and modular upgrades as technologies evolve

This approach ensures flexibility while maintaining alignment with long-term decarbonisation objectives.

Standardization and Compliance

A key feature of the GTTP is the development of **Approved Standard Tug Designs and Specifications (ASTDS)** to ensure:

- Uniformity in design and performance benchmarks
- Safety and operational reliability
- Ease of procurement and scalability
- Alignment with environmental performance standards

Further, it has been envisaged that:

- By **2033**, all new tugs built for Indian ports will be required to comply with GTTP standards
- By **2040**, all tugs operating in major ports are targeted to transition to green alternatives

Strategic Alignment

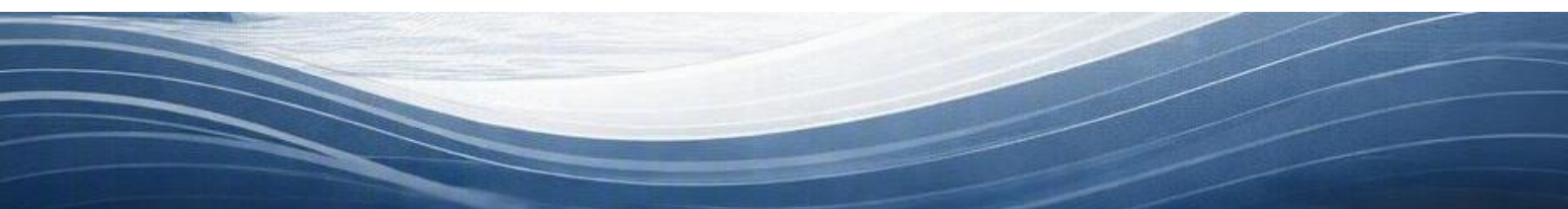
The GTTP is closely aligned with national maritime and climate objectives:

Maritime India Vision 2030 (MIV 2030)

- Target of **30% reduction in carbon emissions per ton of cargo**
- Increased adoption of renewable energy across ports

Maritime Amrit Kaal Vision 2047

- Long-term decarbonisation of port operations
- Reduction in emissions from port-owned vessels



The transition of harbour tugs represents a **high-impact, low-complexity intervention**, as these vessels operate within controlled port environments and are well-suited for electrification and alternative fuels.

Industrial and Economic Impact

The GTTP is also positioned as an industrial development initiative:

- All tugs under the program are to be constructed in Indian shipyards under the **Make in India** initiative
- Expected to generate demand in shipbuilding, design and marine engineering sectors
- Creation of employment across manufacturing and ancillary industries
- Development of domestic capabilities in green vessel technologies

Environmental Significance

The transition to green tugs is expected to deliver measurable environmental benefits:

- Reduction in direct (Scope 1) emissions from port-owned vessels
- Improvement in air quality in port cities
- Contribution towards national GHG reduction commitments
- Demonstration effect for wider adoption of green technologies in maritime sector

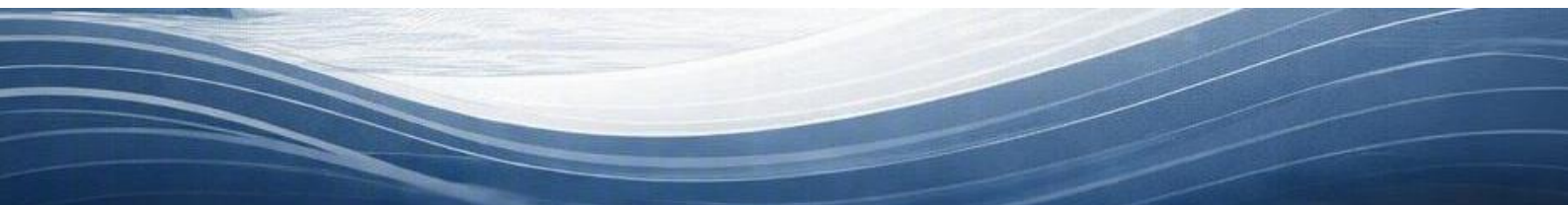
Given the high utilisation rates of harbour tugs, even limited fleet replacement can result in **disproportionately high emission reductions**.

Key Challenges and Considerations

While the program is well structured, certain implementation challenges need to be addressed:

- High upfront capital cost of green technologies
- Charging or fuel infrastructure readiness at ports
- Technology maturity, particularly for hydrogen-based systems
- Operational reliability and lifecycle performance
- Need for capacity building among port operators and crew

Addressing these will be critical for scaling beyond the initial phase.



13.12. Sagar Aankalan - National Benchmarking Guidelines for Mapping Logistics Performance of Indian Ports

India's ports are critical nodes in the national logistics network, connecting maritime trade with road, rail, inland waterways, industrial clusters and hinterland markets. Port competitiveness depends not only on installed capacity and cargo volumes but also on the speed, reliability and efficiency with which vessels and cargo are handled.

To establish a uniform national framework for assessing these aspects, the Ministry of Ports, Shipping and Waterways issued the **“Sagar Aankalan – National Benchmarking Guidelines for Mapping Logistics Performance of Indian Ports”** in February 2024. The Guidelines provide a standard methodology for evaluating and comparing the logistics performance of Indian ports through the **Logistics Port Performance Index (LPPI)**.

The framework is aligned with the **PM Gati Shakti National Master Plan** and the **National Logistics Policy**, which emphasise integrated logistics planning, improved productivity and competitive service delivery. It seeks to move port-performance assessment beyond individual statistics by combining operational efficiency, cargo productivity, user experience and renewable-energy utilisation within a common benchmarking framework.

Objectives and Applicability

Sagar Aankalan has three principal objectives:

- assessing the logistics performance of Indian ports through operational performance-based inter-port comparison;
- improving the efficiency, competitiveness and overall performance of ports; and
- aligning national evaluation and assessment procedures with globally recognised norms, standards and definitions.

The Guidelines apply to all Indian ports, including major and non-major ports, notified under the Indian Ports Act, 1908, as referred to in the document. Ports are assessed under two categories:

1. **Bulk Cargo**, including dry and liquid bulk; and
2. **Container Cargo**.

The assessment is to be conducted annually in April for the preceding financial year. The separate categorisation recognises that bulk and container ports have different operational characteristics. Container-port assessment therefore includes container dwell time as an additional indicator, while bulk-port assessment places comparatively greater weight on vessel turnaround time.

Logistics Port Performance Index

The LPPI is a composite index derived through a multi-criteria evaluation methodology using both quantitative operational data and qualitative stakeholder feedback.

It assesses port performance across the following broad dimensions:

- cargo throughput;
- vessel and berth efficiency;
- cargo evacuation efficiency;
- quality of services provided to users; and
- share of renewable energy in total energy consumption.

The index does not rank ports solely on the basis of cargo handled. A port handling high cargo volumes may still perform poorly in vessel turnaround, berth productivity or customer satisfaction. Conversely, a smaller port may demonstrate efficient operations and significant year-on-year improvement. The LPPI seeks to capture these differences through weighted indicators.

Key Performance Indicators

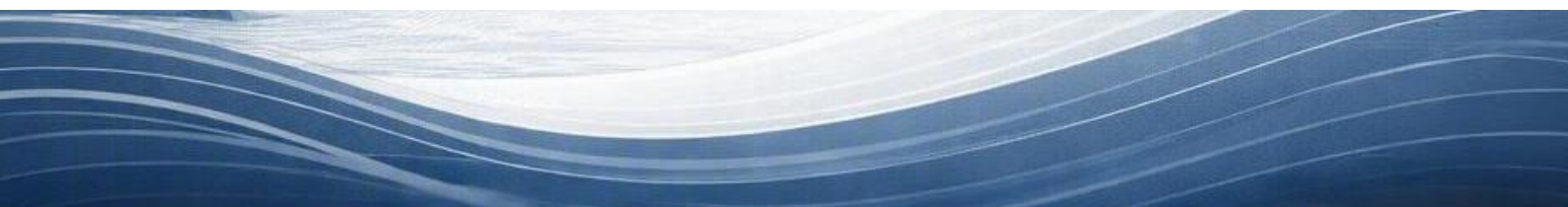
Customer Satisfaction

Customer Satisfaction carries a weightage of **20 per cent** in both the bulk and container categories, making it one of the two highest-weighted indicators.

It is evaluated through a survey of port users, shipping lines, exporters, importers, logistics service providers, industry representatives, regulatory bodies and other stakeholders. Responses are rated on a scale of 1 to 5, ranging from Poor to Excellent.

The survey covers:

- logistics tracking and punctuality;
- quality-price ratio;
- communication and professional conduct of staff;
- safety and security of cargo handling;
- quality of services and technical support;
- after-sales service;
- reliability of operations and management;
- accuracy of invoices and documentation;



- port infrastructure, including berths, yards, warehouses and hinterland connectivity; and
- digital infrastructure.

The indicator ensures that performance assessment includes service reliability, stakeholder experience and institutional responsiveness, rather than relying only on physical operational data.

Cargo Handled

Cargo Handled carries a weightage of **20 per cent** in both categories. It comprises the aggregate cargo loaded, unloaded and transshipped during the financial year.

It represents the scale of port activity but is balanced by efficiency and service-quality indicators so that larger cargo volumes alone do not determine the final ranking.

Idle Time at Berth

Idle Time at Berth is the total idle time spent by cargo vessels at berth, expressed as a percentage of the total time spent at berth. It carries a weightage of **10 per cent** in both categories.

Idle time represents periods during which a vessel occupies a berth but productive cargo operations are not taking place. It is treated as a negative-impact indicator, meaning that a lower value represents better performance.

Average Turnaround Time

Average Turnaround Time represents the total period spent by a vessel at the port from arrival at the reporting station to departure for its onward journey. It includes pre-berthing delay, cargo-operation time and idle time. Certain delays arising from litigation, fire, repair, dry-docking or dismantling-related decisions may be deducted.

It carries a weightage of:

- **15 per cent** for Bulk Cargo Ports; and
- **7 per cent** for Container Ports.

A lower turnaround time reflects more efficient vessel movement and port operations.

Average Pre-Berthing Waiting Time

Average Pre-Berthing Waiting Time is the period from a vessel's arrival at the anchorage or reporting station until it is berthed at an operational berth.

It carries a weightage of **10 per cent** in both categories and is treated as a negative-impact indicator. Lower waiting time indicates better berth planning, vessel scheduling and marine-service coordination.

Average Ship Berth-Day Output

Average Ship Berth-Day Output is calculated by dividing the aggregate cargo handled by the total number of berth-days spent by cargo ships during the financial year.

It measures berth productivity and carries a weightage of **15 per cent** in both categories. A higher output indicates more efficient use of berth time, cargo-handling equipment and terminal resources.

Average Container Dwell Time

Average Container Dwell Time applies only to the Container Cargo Category and carries a weightage of **8 per cent**.

For imports, it is the time spent by a container inside the port before it is gated out. For exports, it is the time spent inside the port before being loaded onto a vessel. The Guidelines prescribe a calculation combining the respective shares and dwell times of import and export containers.

A lower dwell time supports faster cargo movement, reduced congestion and better utilisation of storage and terminal infrastructure.

Share of Renewable Energy

Share of Renewable Energy carries a weightage of **10 per cent** in both categories. It is calculated as the ratio of renewable-energy consumption to total energy consumption.

The calculation must include energy consumed at terminals and berths operated through PPP or captive arrangements. This ensures that the indicator captures the wider operational energy footprint of the port and not only consumption directly controlled by the port authority.

A higher renewable-energy share contributes positively to the LPPI score.

KPI Weightage Structure

KPI	Bulk Cargo	Container Cargo	Impact
Customer Satisfaction	20%	20%	Positive
Cargo Handled	20%	20%	Positive
Idle Time at Berth	10%	10%	Negative
Average Turnaround Time	15%	7%	Negative
Average Container Dwell Time	—	8%	Negative
Average Pre-Berthing Waiting Time	10%	10%	Negative
Average Ship Berth-Day Output	15%	15%	Positive

Share of Renewable Energy	10%	10%	Positive
---------------------------	-----	-----	----------

Positive-impact indicators are those where a higher value represents better performance. Negative-impact indicators are those where a lower value represents better performance.

Absolute Performance and Incremental Improvement

A significant feature of Sagar Aankalan is that most operational KPIs are evaluated on the basis of both present performance and improvement over time.

For all indicators other than Customer Satisfaction and Share of Renewable Energy:

- 50 per cent of the respective KPI weight applies to absolute performance; and
- 50 per cent applies to year-on-year incremental improvement.

This approach prevents the assessment from favouring only ports with historically large capacity or traffic. It recognises ports that achieve measurable improvements in turnaround time, waiting time, berth productivity, cargo handling and other operational parameters.

Customer Satisfaction and Share of Renewable Energy are assessed entirely on absolute performance.

Evaluation Methodology

The LPPI is derived through a seven-step multi-criteria evaluation process.

First, an evaluation matrix is created in which ports constitute the alternatives and the applicable KPIs constitute the criteria.

Second, the performance values are normalised between 0 and 1. Normalisation is necessary because the KPIs are measured in different units, such as tonnes, TEUs, hours, percentages and survey ratings.

Third, each normalised value is multiplied by its prescribed weight to create a weighted decision matrix.

Fourth, the best and worst performance values are identified for each KPI. For a positive-impact indicator, the highest value generally represents the best alternative. For a negative-impact indicator, the lowest value represents the best alternative.

Fifth, the Euclidean distance of each port from the best and worst alternatives is calculated.

Sixth, an evaluation score is generated based on the port's relative proximity to the best-performing alternative and its distance from the worst-performing alternative.

Finally, ports are ranked in descending order according to their scores within the applicable Bulk Cargo or Container Cargo category.

Strategic Significance

Sagar Aankalan creates a common performance language for Indian ports. It shifts the focus from reporting isolated statistics towards an integrated assessment of logistics performance.

The framework can support:

- identification of operational bottlenecks;
- reduction of vessel waiting and turnaround time;
- improvement in berth productivity;
- reduction in container dwell time;
- better utilisation of existing port infrastructure;
- stronger customer service and digital systems;
- greater transparency and comparability of performance; and
- increased adoption of renewable energy.

The year-on-year improvement component encourages continuous performance enhancement, while the Customer Satisfaction indicator ensures that the experience of port users remains central to the assessment.

Sustainability Dimension

Sagar Aankalan is primarily a logistics and operational benchmarking framework. Its principal focus is on vessel efficiency, cargo movement, berth productivity and service quality.

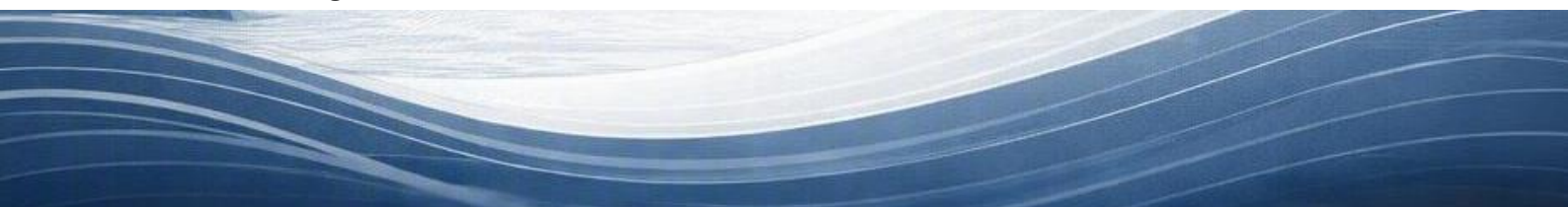
The inclusion of Share of Renewable Energy introduces a sustainability dimension. However, the present Guidelines do not separately assess greenhouse gas emissions, air quality, water quality, waste management, shore power, alternative-fuel readiness or carbon intensity.

Accordingly, Sagar Aankalan should not be treated as a comprehensive green-port rating or environmental certification framework. It is a logistics performance index that incorporates renewable-energy utilisation as one of its indicators.

Implementation Considerations

Effective implementation requires ports to maintain reliable and consistent data on:

- cargo handled;



- vessel arrival, berthing and departure times;
- berth occupancy and idle time;
- berth-day output;
- container dwell time;
- total and renewable-energy consumption; and
- consumption at PPP and captive terminals.

Ports must also conduct the Customer Satisfaction Survey using a consistent stakeholder base and rating methodology.

The Guidelines establish the broad methodology but do not provide detailed provisions regarding independent data verification, minimum survey sample size, treatment of missing data or assessment of ports handling both bulk and container cargo. Such issues may require further clarification or implementation instructions from MoPSW.

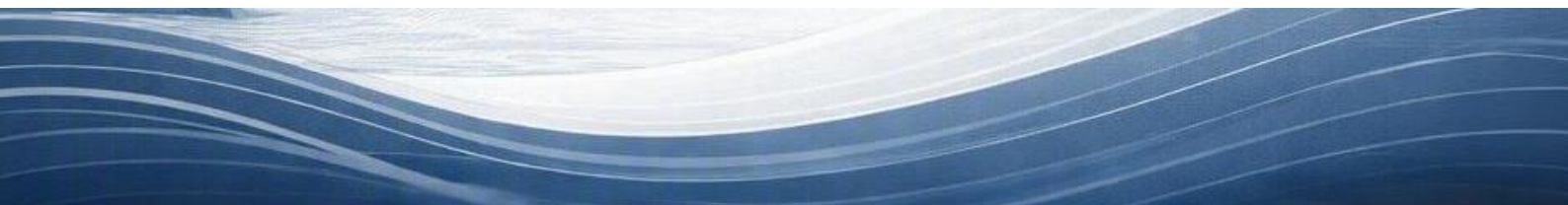
The Guidelines provide for periodic review based on feedback and learning from the national benchmarking exercise. MoPSW also retains the power to interpret and clarify any ambiguity within the overall framework and spirit of the Guidelines.

Conclusion

Sagar Aankalan establishes a uniform, data-driven national framework for benchmarking the logistics performance of Indian ports through the Logistics Port Performance Index.

It combines cargo throughput, vessel efficiency, berth productivity, container evacuation, customer satisfaction and renewable-energy consumption within a weighted multi-criteria assessment. Its key strength lies in balancing absolute performance with year-on-year improvement, thereby recognising both established high-performing ports and ports demonstrating measurable progress.

Properly implemented, Sagar Aankalan can serve not merely as a ranking exercise but as a management and policy tool for identifying performance gaps, improving port operations, reducing logistics delays and strengthening the overall competitiveness of India's maritime logistics ecosystem.



13.13. Integrated Vessel Traffic Management System (iVTMS)

The Integrated Vessel Traffic Management System (iVTMS) has been implemented in accordance with Chapter V of the International Convention for the Safety of Life at Sea (SOLAS), which deals with safety of navigation. The system aligns with relevant IMO guidelines and circulars governing vessel traffic services and navigational safety standards.

The primary objective of iVTMS is to ensure standardized vessel traffic monitoring in high-density maritime areas, port approaches and sensitive coastal zones. By institutionalising real-time surveillance and control mechanisms, the system strengthens India's compliance posture under international maritime safety obligations.

The regulatory basis of iVTMS ensures that its deployment is not discretionary or project-based, but anchored within an established global maritime safety framework.

Coverage and Deployment

iVTMS has been implemented across all Major Ports in India, creating a uniform navigational safety architecture across the country's principal maritime gateways.

In addition, the Directorate General of Lighthouses and Lightships (DGLL) operates iVTMS in the Gulf of Kutch region, one of India's most sensitive and high-density maritime corridors. This region handles significant volumes of crude oil traffic and large tankers, requiring enhanced surveillance and traffic coordination.

The system therefore provides integrated monitoring in both port-specific and broader coastal maritime zones. This layered deployment enhances oversight in congested approaches, narrow channels and environmentally sensitive areas.

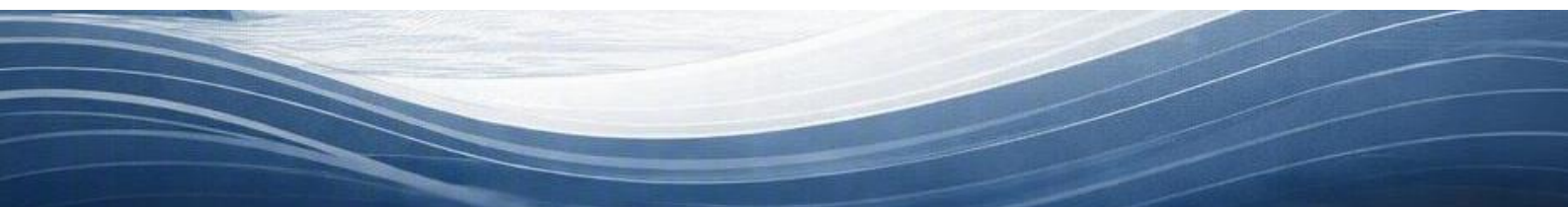
System Architecture and Technical Integration

iVTMS is a centrally integrated command-and-control platform developed by IIT Madras through the National Technology Centre for Ports, Waterways and Coasts (NTCPWC).

The system integrates multiple real-time data sources, including:

- Automatic Identification System (AIS)
- Radar surveillance
- VHF communication channels
- Meteorological and oceanographic inputs
- CCTV-based visual monitoring

These inputs are consolidated into a unified operational dashboard, enabling maritime authorities to maintain real-time situational awareness.



The integration of navigational, meteorological and communication systems into a single interface significantly reduces response time during abnormal situations and improves traffic sequencing efficiency.

Operational Significance

The operational value of iVTMS extends beyond passive vessel tracking.

It enables:

- Collision avoidance through proactive traffic regulation
- Structured channel traffic management in constrained waterways
- Coordinated emergency response in case of mechanical failure, grounding or collision
- Optimised vessel sequencing to reduce waiting time
- Congestion management in port approaches

By providing predictive and real-time visibility of vessel movements, iVTMS reduces uncertainty in navigation and enhances overall maritime safety.

Environmental Governance Dimension

While iVTMS is primarily a navigational safety system, its environmental implications are equally significant.

First, optimized vessel sequencing reduces unnecessary anchorage time. Prolonged anchorage leads to continuous operation of auxiliary engines, resulting in avoidable emissions. By enabling Just-in-Time (JIT) arrival practices, iVTMS contributes indirectly to emission reduction.

Second, traffic regulation supports speed optimization. Controlled speed adjustments during approach reduce fuel consumption and associated GHG emissions.

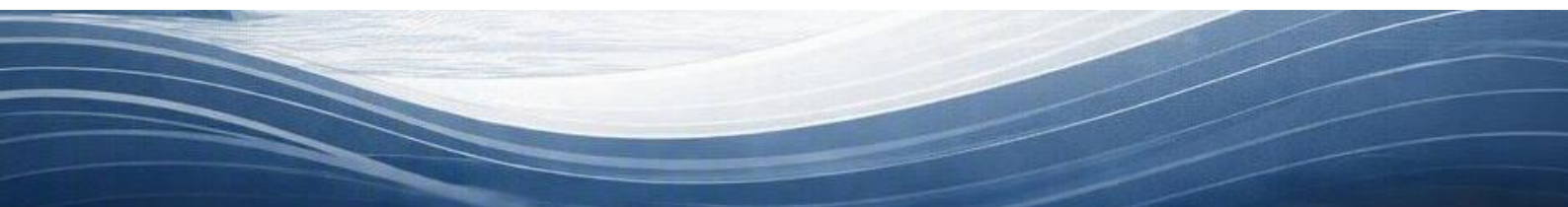
Third, in the event of maritime incidents such as oil spills or collisions, real-time surveillance supports rapid response coordination, thereby limiting environmental damage.

In this manner, iVTMS serves as both a safety and environmental governance tool.

Strategic Importance for India

India's maritime traffic density is increasing, with rising cargo volumes, crude imports and containerized trade. As port capacity expands, navigational complexity correspondingly increases.

iVTMS provides the digital backbone required to manage this complexity. It enhances India's credibility as a safe maritime destination and aligns with global best practices in vessel traffic services.



Furthermore, integration of iVTMS with future digital initiatives such as digital twins, Just-in-Time arrival systems and port community platforms can create a seamless operational ecosystem.

In the long term, iVTMS strengthens three core pillars:

- Navigational Safety
- Operational Efficiency
- Environmental Responsiveness

It therefore represents a foundational infrastructure element in India's broader maritime modernization strategy.

13.14. Just-in-Time Arrival and Digital Twin for Ports

Just-in-Time (JIT) Vessel Arrival – Eliminating Anchorage Inefficiencies

One of the persistent inefficiencies in port operations globally is excessive anchorage waiting. Vessels often arrive at port approaches ahead of berth availability and remain at anchor with auxiliary engines running, leading to avoidable fuel consumption, congestion and emissions.

The Just-in-Time (JIT) arrival framework seeks to address this structural inefficiency by synchronizing vessel speed with real-time berth readiness.

Objective

The core objective of JIT is to align vessel arrival with confirmed berth availability so that ships can reduce speed during voyage and avoid idle waiting at anchorage.

Operational Principle

Instead of vessels rushing to port and waiting, dynamic scheduling information is shared in advance. Based on real-time berth status, crane availability, pilotage inputs and channel conditions, vessels adjust speed to arrive precisely when required.

Benefits

- Reduced fuel consumption at sea through speed optimization
- Lower congestion in port approaches
- Improved berth utilization
- Elimination or reduction of emissions from idling vessels at anchorage

Speed optimization has an immediate impact on carbon dioxide emissions. Even modest reductions in sailing speed can produce measurable emission savings due to the non-linear relationship between speed and fuel consumption.

JIT is therefore not merely an operational improvement — it is a decarbonization intervention embedded in voyage planning.

Digital Twin Architecture for Ports

JIT cannot function effectively without an integrated digital data environment. This is where the Digital Twin concept becomes foundational.

A Digital Twin of a port is a dynamic virtual representation of the physical port ecosystem, continuously updated through automated real-time data exchange.

Integrated Operational Data Layer

For a Digital Twin to function effectively, it must integrate multiple real-time inputs:

- AIS vessel tracking data
- Weather and oceanographic conditions
- Berth occupancy status
- Terminal equipment data including cranes and yard operations
- Pilotage and tug scheduling inputs
- Hinterland connectivity visibility (rail and truck flows)

The system must enable bi-directional real-time data exchange between physical infrastructure and digital platforms. It is not merely a visualization tool but a decision-support architecture.

Capabilities of a Port Digital Twin

When fully functional, a Digital Twin can enable:

- Simulation of berth allocation scenarios
- Crane and yard scheduling optimization
- Congestion prediction in yard and gate operations
- Emission modelling under different traffic scenarios
- Scenario testing for weather disruptions, peak traffic or operational delays

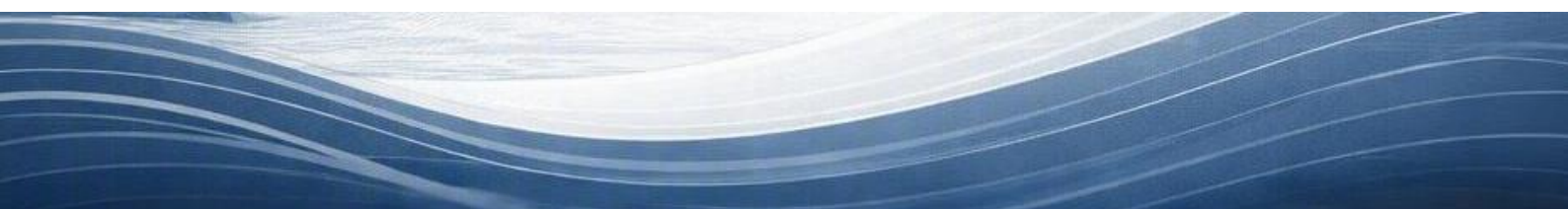
This shifts port management from reactive intervention to predictive planning.

Governance Implication

A well-designed Digital Twin supports:

- Situational awareness
- Intelligent decision support
- Multi-stakeholder coordination across port authority, terminal operators, pilots and shipping lines

It creates a unified operational picture, reducing information asymmetry between stakeholders.



13.15. Digital Twin Pilot – VOCPA Tuticorin

The Digital Twin initiative at VO Chidambaranar Port Authority (VOCPA), Tuticorin represents India's first structured implementation of this next-generation port management architecture.

The project was executed in record time and commissioned within six months at an approximate cost of ₹24.62 crore. It was executed by IPRCL and inaugurated by the Hon'ble Minister of Ports, Shipping and Waterways on 23 February 2026.



Key Features of the VOCPA Digital Twin

1. Complete 3D Port Visualization

The entire port ecosystem is rendered in real-time 3D format through an interactive visualization platform. This enables immersive and intuitive operational monitoring across berths, yards and channel approaches.

This visualization capability is not cosmetic; it enhances comprehension of spatial relationships between vessel movements, equipment positions and yard occupancy.

2. Integrated CCTV Surveillance (~400 Cameras)

Nearly 400 CCTV cameras across the port are mapped to their exact physical coordinates within the digital environment. This allows location-specific monitoring and centralised oversight of activities.

Operators can transition from a macro port view to micro-level surveillance instantly.

3. VTMS Integration – Real-Time Vessel Intelligence

The Vessel Traffic Management System is fully integrated with the digital twin. Vessel movement details, cargo status and navigational information are accessible through a single operational interface.

This integration strengthens navigational oversight and supports synchronized berth planning.

4. Integrated Weather Monitoring

Live weather systems are embedded within the platform, enabling proactive monitoring of rainfall, cyclonic activity and atmospheric disturbances.

This capability supports early-warning based decision-making and improves resilience against extreme weather events.

Strategic Significance of the VOCPA Pilot

The VOCPA Digital Twin is not an isolated technology demonstration. It establishes a proof-of-concept for:

- JIT-enabled berth synchronization
- Data-driven emission reduction
- Predictive congestion management
- Integrated maritime safety and environmental governance

By linking vessel traffic intelligence, equipment data and weather inputs into a unified platform, the pilot demonstrates how digital infrastructure can directly support operational efficiency and decarbonisation objectives.

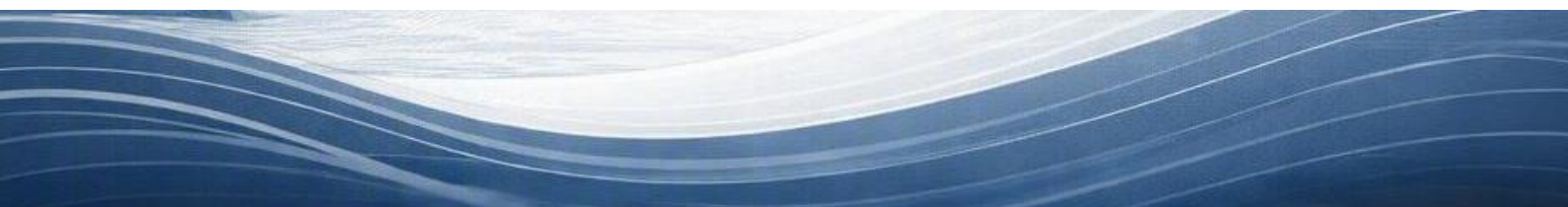
The next logical step would involve scaling such platforms across major ports, integrating them with JIT frameworks and aligning them with Green Port Index parameters.

13.16. Shore-to-Ship Power (SPS) – Decarbonising Emissions at Berth

Shore-to-Ship Power (SPS), also referred to as cold ironing or Onshore Power Supply (OPS), involves supplying electricity from the shore grid to a vessel while it is berthed at port. During this period, the ship's auxiliary engines and diesel generators are switched off, thereby eliminating onboard fuel combustion for hoteling loads.

Under conventional operations, even when ships are stationary at berth, auxiliary engines continue to run to support lighting, ventilation, refrigeration, cargo operations and other onboard systems. These engines consume marine fuel and emit carbon dioxide (CO₂), nitrogen oxides (NO_x), sulphur oxides (SO_x) and particulate matter (PM), contributing to localized air pollution within port areas.

SPS replaces this combustion-based generation with shore-based electricity, significantly reducing emissions at berth.



Environmental and Regulatory Significance

The introduction of SPS directly addresses one of the most visible sources of port-area emissions — emissions from berthed vessels.

Its environmental impact includes:

- Reduction in CO₂ emissions during hoteling period
- Elimination of NO_x and SO_x emissions at berth
- Significant reduction in particulate matter in port zones
- Improvement in ambient air quality in port-adjacent urban areas

From a regulatory standpoint, SPS contributes to:

- Compliance alignment with IMO's Carbon Intensity Indicator (CII) framework
- Support to GHG reduction commitments
- Strengthening of Green Port Index parameters
- Enhancement of ESG metrics for Indian ports

As global shipping transitions toward decarbonisation, ports that provide SPS infrastructure become more attractive to environmentally compliant ship operators.

Strategic Importance for Indian Ports

For India, SPS has three distinct strategic implications:

First, it improves local air quality. Many Indian ports are located near dense urban populations. Reduction of emissions at berth has direct public health benefits.

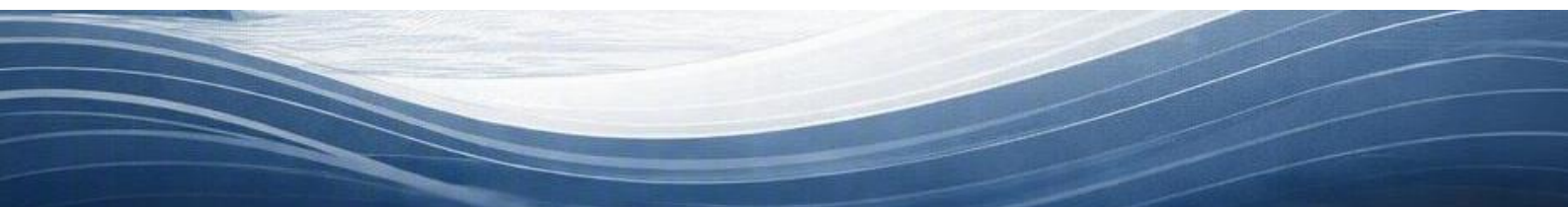
Second, it strengthens India's positioning in green shipping corridors. Several international green corridor initiatives now incorporate shore power as a baseline infrastructure requirement.

Third, it enhances competitiveness. As shipping lines increasingly report Scope 1 and Scope 3 emissions, availability of SPS allows vessel operators to reduce emissions during port calls, improving their sustainability performance.

SPS therefore shifts ports from being passive infrastructure providers to active contributors in maritime decarbonisation.

Implementation Status in Indian Ports

- **Kamarajar Port** has implemented 500 kW, 400V, 50–60 Hz SPS systems at Coal Berths 1 and 2.
- **VO Chidambaranar Port** has installed 305 kW, 400V, 60 Hz systems at VOC Berths 2 and 3.



- **Jawaharlal Nehru Port Authority (JNPA)** has deployed SPS for tug operations and has planned full-scale deployment across all terminals with an estimated 45 MVA capacity and projected investment of approximately INR 600 crore.
- **Paradip Port** has recently commissioned SPS facilities and delivered full load power to vessels at CB1 berth.

These early deployments indicate proof-of-concept and operational viability. However, large-scale adoption across cargo terminals will require capacity augmentation, grid integration and financial structuring.

Technical and Infrastructure Considerations

Implementation of SPS requires careful technical planning:

- Grid capacity and substation upgrades
- Frequency compatibility (50/60 Hz considerations)
- High-voltage connection systems for large container and cruise vessels
- Cable management systems and automated connection interfaces
- Safety interlocks and harmonised standards for ship–shore interface

Vessels must also be SPS-ready, meaning onboard electrical systems must be configured for shore connection. Therefore, adoption requires coordination between ports, ship operators and classification societies.

Financial Structuring and Investment Models

SPS infrastructure involves significant capital expenditure, especially for high-capacity berths. To scale deployment, diversified financing models may be required.

Possible approaches include:

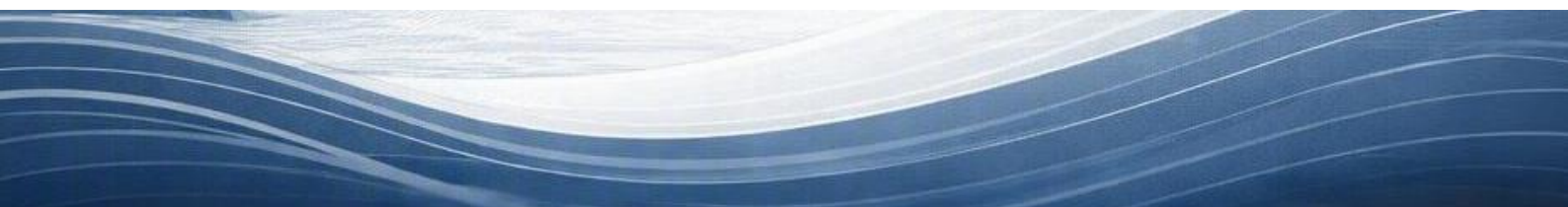
- **Blended finance models**, combining government support, multilateral development banks and private investment.
- **Green or blue bonds**, specifically earmarked for shore power and decarbonisation infrastructure.
- **Public–Private Partnership (PPP) models**, where terminal operators co-invest in SPS infrastructure.

Given the long asset life and public-good environmental benefits, concessional finance mechanisms may improve viability.

Challenges and Way Forward

While SPS offers clear environmental benefits, certain practical challenges remain:

- High upfront capital costs



- Tariff competitiveness versus onboard fuel generation
- Standardisation across vessel categories
- Grid stability and renewable energy integration

To address these challenges, a phased expansion approach may be adopted:

1. Prioritisation of high-traffic container and cruise terminals.
2. Integration with renewable energy sources to maximize decarbonisation benefit.
3. Development of uniform national technical standards.
4. Incentivization mechanisms for vessels that utilise SPS.

Long-term viability will depend on coordinated policy support, tariff rationalisation and integration within broader port decarbonisation strategies.

13.17. Swachh Sagar Portal

The Swachh Sagar Portal is India's unified digital platform for maritime environmental compliance, developed to support clean seas, transparent reporting and decarbonisation efforts. It consolidates all pollution control and sustainability mandates under a single national system, enabling ships, ports and regulatory authorities to operate within a structured, real-time governance framework. Each module within the portal addresses a specific environmental obligation under MARPOL and IMO conventions, ensuring data integrity, traceability and enforcement consistency.

Port Reception Facility (PRF) Module

The Port Reception Facility module establishes a structured digital system for vessels to declare ship-generated waste prior to port arrival. It links ships with authorised waste collection vendors and enables real-time approval, tracking and disposal coordination, reducing delays and eliminating informal handling. By digitally recording every waste transaction, it ensures full transparency under MARPOL Annex V and prevents sea dumping. This module supports State Maritime Boards, Port Authorities and Pollution Control Boards in monitoring compliance, while creating auditable records for IMO and port State control inspections.

Fuel Consumption Reporting

This module captures fuel consumption data for all vessels required to report under DGS regulations, including those below the IMO's global Data Collection System threshold of 5,000 GT. It enables national compliance with MARPOL Annex VI carbon intensity and energy efficiency requirements. All operational fuel data, type, quantity, voyage consumption, is digitally lodged, enabling India to build a national emissions database.

This data will support policy development for future MBM mechanisms and ensure readiness for IMO's Net-Zero Framework implementation.

Single Use Plastics (SUP) Module

The Single Use Plastics module operationalises DGS Order No. 05 of 2019 by mandating ships to submit a Ship Execution Plan (SEP) identifying plastic items onboard, their phase-out measures and disposal methods. It enables tracking of plastic usage, recycling and substitution with sustainable alternatives. By capturing ship-level data, this module enforces India's national ban on certain plastic categories and contributes to IMO's Action Plan on Marine Litter. It shifts plastic control from advisory to mandatory digital reporting, enhancing accountability.

e-BDN & Bunker Supplier Information System

This module creates a national registry of licensed bunker suppliers and mandates issuance of electronic Bunker Delivery Notes (e-BDN) for every fuel transaction. Each e-BDN is time-stamped, digitally signed and serialised, preventing manipulation or use of unregistered suppliers. It improves traceability of marine fuels and helps detect off-spec or adulterated bunkers. By integrating supplier verification and fuel documentation, the portal strengthens maritime fuel governance and directly supports enforcement of fuel quality standards under MARPOL Annex VI.

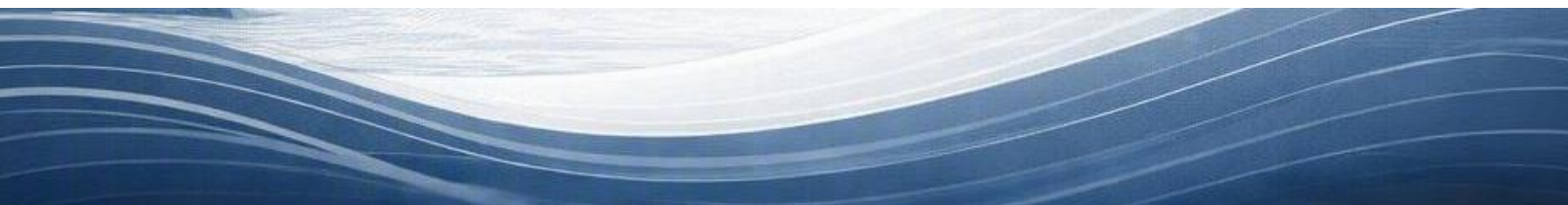
Ballast Water Reporting Module (BWM Convention Alignment)

The Ballast Water module requires all ships, Indian and Foreign Flagged, to electronically report ballast operations upon every arrival and departure. It captures data on ballast uptake, exchange, treatment and discharge, enabling continuous monitoring in line with IMO's experience-building phase. This allows authorities to assess invasive species risk, treatment plant functionality and compliance behaviour. By linking with GISIS reporting, it elevates India's oversight role under the Ballast Water Management Convention and prepares ports for future biological discharge standards.

Together, these five modules establish India's first end-to-end maritime environmental registry, shifting compliance from manual declarations to auditable, technology-driven oversight. By integrating reporting on waste, fuel, plastics, bunkers and ballast water, the portal strengthens India's role in global maritime regulation and positions the country to lead international initiatives on green shipping corridors, blue economy and marine pollution control. Swachh Sagar is not just a compliance tool, but a strategic instrument for India's transition to a cleaner, future-ready maritime ecosystem.

13.18. Just Transition in Maritime

Putting People at the Core of Decarbonisation



The global maritime sector is undergoing a structural transformation driven by decarbonisation commitments, alternative fuel adoption and digitalisation. However, decarbonisation is not merely a technological or fuel transition — it represents a workforce transition.

For maritime economies such as India, this dimension assumes critical importance. With approximately 3.23 lakh Indian seafarers as of 2025 — accounting for nearly 12% of the global maritime workforce — India plays a pivotal role in shaping the human dimension of maritime transition.

A green transition that does not account for employment continuity, skills upgrading and safety risks would create structural imbalances. Therefore, the principle of a Just Transition seeks to ensure that environmental progress does not come at the cost of workforce vulnerability.

Workforce Implications of Fuel Transition

The shift toward alternative marine fuels such as green ammonia, hydrogen, methanol and other low-flashpoint fuels introduces new technical and operational complexities.

These fuels:

- Present distinct toxicity and flammability risks
- Require modified onboard storage and handling systems
- Demand new emergency response protocols
- Necessitate revised competency standards

This implies that decarbonisation will require new competencies across engineering, deck operations, safety management and port handling systems.

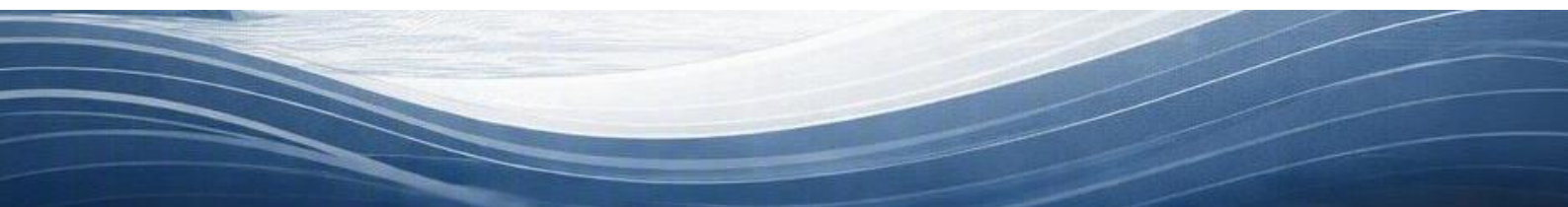
A structured upskilling strategy is therefore essential to ensure that the maritime workforce transitions alongside technological change.

Skills and Training Ecosystem

A Just Transition framework must prioritize large-scale capacity building.

Key areas include:

- Structured upskilling for handling green fuels
- Modernization of STCW-aligned training modules
- Investment in simulator-based training for ammonia, hydrogen and hybrid propulsion systems
- Upgradation of maritime training infrastructure



India's maritime training institutions must progressively integrate green fuel modules into curricula. This is not a short-term training exercise but a phased institutional transformation.

The emphasis must be on competency-based certification aligned with emerging IMO standards and future regulatory frameworks.

Safety and Standards

Alternative fuels introduce unfamiliar safety risks. For example:

- Ammonia exposure risks
- Hydrogen storage complexities
- Low flashpoint fuel handling hazards

A Just Transition requires a safety-first approach.

This includes:

- Strengthening onboard safety protocols
- Revising emergency preparedness standards
- Aligning operational practices with evolving IMO IGF Code provisions
- Ensuring compliance with the Maritime Labour Convention (MLC 2006) and international labour norms

Safety cannot be compromised in pursuit of decarbonisation targets. Technological adoption must be matched by risk mitigation frameworks.

Equity and Inclusion

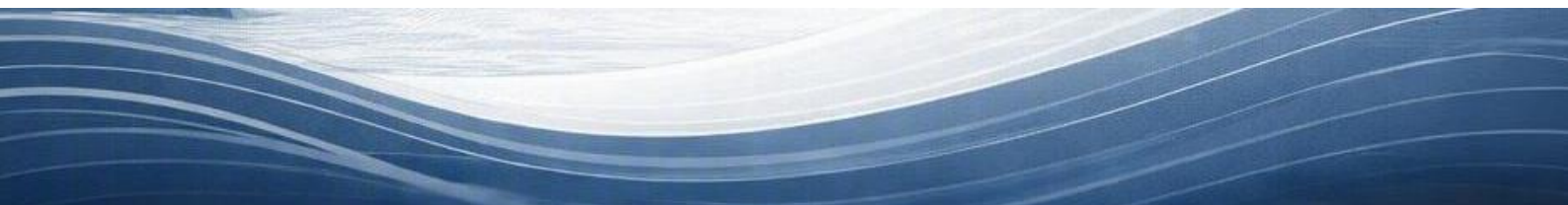
The maritime workforce is globally distributed, with developing nations supplying a significant share of seafarers. Without coordinated support, the transition to green fuels risks widening global skills gaps.

A Just Transition approach must therefore:

- Avoid marginalization of seafarers from developing maritime nations
- Promote equal access to new training pathways
- Encourage gender inclusion and diversity within maritime professions
- Support global knowledge-sharing mechanisms

India, as a leading supplier of maritime manpower, has both an opportunity and responsibility to advocate for inclusive transition pathways.

Policy Direction for India



India's maritime decarbonisation roadmap must embed workforce considerations within broader sustainability initiatives.

Key policy directions may include:

1. Integration of green fuel competencies within national maritime training frameworks.
2. Structured collaboration between DGS, training institutes and industry stakeholders.
3. Development of standardized certification pathways for alternative fuel operations.
4. Incorporation of Just Transition principles within National Maritime Decarbonization Policy Framework frameworks.

The objective should be to ensure that environmental ambition is matched with human resilience.

13.19. IMO Led Projects

The International Maritime Organization (IMO), in collaboration with global partners, is leading several flagship initiatives aimed at addressing key environmental challenges in the maritime sector. These initiatives are designed to support developing countries through **capacity building, policy support, technology adoption and implementation frameworks**, ensuring a coordinated global response to sustainability challenges.

Among these, **GloLitter Partnerships, GreenVoyage2050 and GloNoise Partnership** represent critical interventions addressing marine pollution, greenhouse gas emissions and underwater noise respectively.

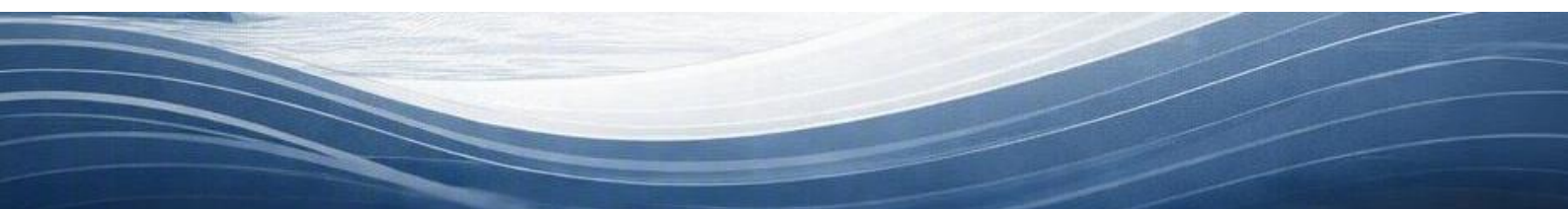
GloLitter Partnerships - Tackling Marine Plastic Litter

The **GloLitter Partnerships Project** is a global initiative focused on the prevention and reduction of marine plastic litter originating from sea-based sources, particularly from shipping and fisheries sectors.

The project is jointly implemented by the **International Maritime Organization (IMO)** and the **Food and Agriculture Organization (FAO)** and primarily supports developing countries, including Small Island Developing States (SIDS) and Least Developed Countries (LDCs), in strengthening their regulatory and institutional frameworks.

The initiative operates under the broader **OceanLitter Programme**, which serves as a platform for coordinated action against marine litter.

The GloLitter project has a wide global footprint, with **30 participating countries across five regions**, including both Lead Partner Countries and Partner Countries, enabling cross-regional knowledge exchange and implementation of best practices.



Key areas of intervention include:

- Development of National Action Plans (NAPs) for marine litter management
- Strengthening legal, policy and institutional frameworks
- Enhancing Port State Control (PSC) capacity for enforcement of MARPOL Annex V
- Promoting public-private partnerships for waste management solutions
- Supporting capacity building and training programmes

The project has achieved significant progress, with multiple countries, including India, developing **National Action Plans (NAPs)** and strengthening enforcement and compliance mechanisms.

Building on the GloLitter framework, the **RegLitter Project** has been launched as a regional initiative focused on Asia, aimed at advancing implementation at both national and regional levels.

RegLitter includes **seven participating countries** — India, Indonesia, Philippines, Sri Lanka, Thailand, Timor-Leste and Viet Nam — and focuses on strengthening regional cooperation, policy alignment and institutional capacity for tackling marine plastic litter.

A key milestone under RegLitter was the **Regional Task Force (RTF) Workshop held in Kochi, India, from 8–12 December 2025**, where participating countries collaborated to:

- Review progress on national and regional actions
- Share best practices and national experiences
- Strengthen cooperation on research and policy frameworks
- Build capacity for implementation of MARPOL Annex V and related instruments

The workshop also included targeted training programmes, including **Port State Control (PSC) training on ship-generated waste management**, enhancing enforcement capabilities at the operational level.

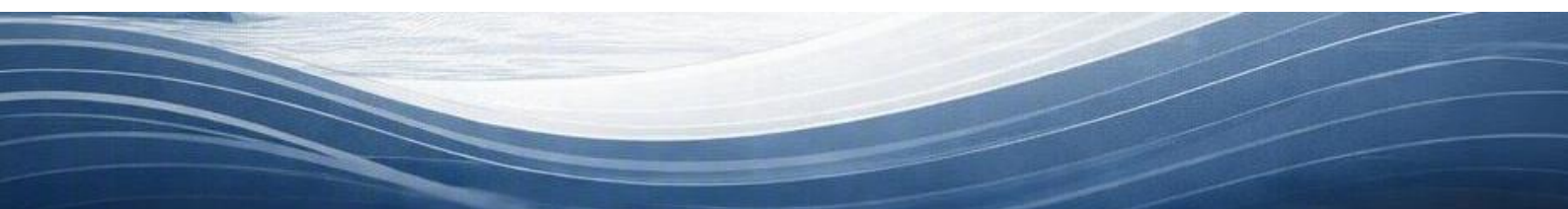
Overall, GloLitter, along with RegLitter, plays a crucial role in addressing plastic pollution at source, promoting regional cooperation and contributing to cleaner oceans and sustainable maritime operations.

GreenVoyage2050 - Advancing Maritime Decarbonisation

GreenVoyage2050 is IMO's flagship programme supporting developing countries in reducing **greenhouse gas (GHG) emissions from shipping**, aligned with the **IMO 2023 GHG Strategy**.

The programme is being implemented in two phases:

- **Phase 1 (2019–2023):** Focused on developing **policy frameworks, regulatory readiness and pilot project identification**



- **Phase 2 (2024–2030):** Focused on **scaling implementation**, including pilot projects, technology demonstrations and financing mechanisms

The initiative provides comprehensive support to partner countries across multiple areas:

- Development of **national policies and regulatory frameworks**
- Identification and execution of **pilot projects and green corridor initiatives**
- Promotion of **energy efficiency technologies and alternative fuels**
- Facilitation of **access to finance for green maritime technologies**

GreenVoyage2050 acts as a central pillar in IMO's broader GHG reduction efforts, ensuring that developing countries are able to actively participate in the transition towards **low and zero carbon shipping**.

The programme is supported by multiple donor countries including Norway, Denmark, Finland, France, Germany and the Netherlands, highlighting strong international commitment towards maritime decarbonisation.

GloNoise Partnership - Addressing Underwater Radiated Noise

The **GloNoise Partnership** focuses on mitigating the impacts of **underwater radiated noise (URN)** from shipping on marine ecosystems.

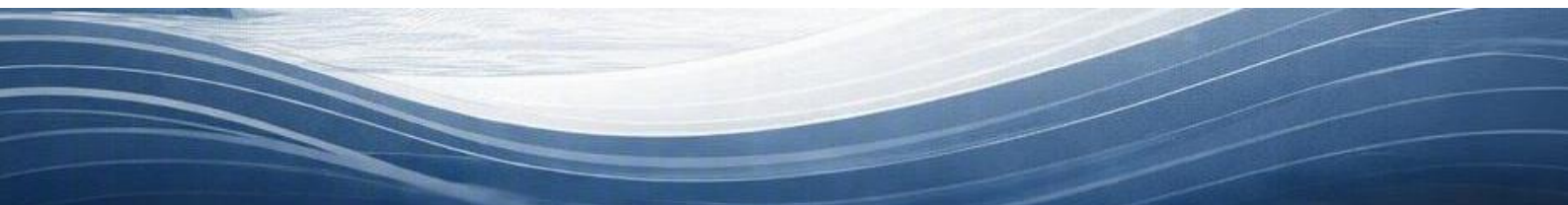
Led by IMO in collaboration with **UNDP and GEF**, the project supports the implementation of the **IMO Revised Guidelines for the Reduction of Underwater Noise (MEPC.1/Circ.906/Rev.1)**.

The initiative includes:

- **Nine beneficiary countries**, comprising:
 - **Six Lead Pilot Countries:** Argentina, Chile, Costa Rica, India, South Africa and Trinidad and Tobago
 - **Three Twinning Partner Countries:** Georgia, Madagascar and Malaysia

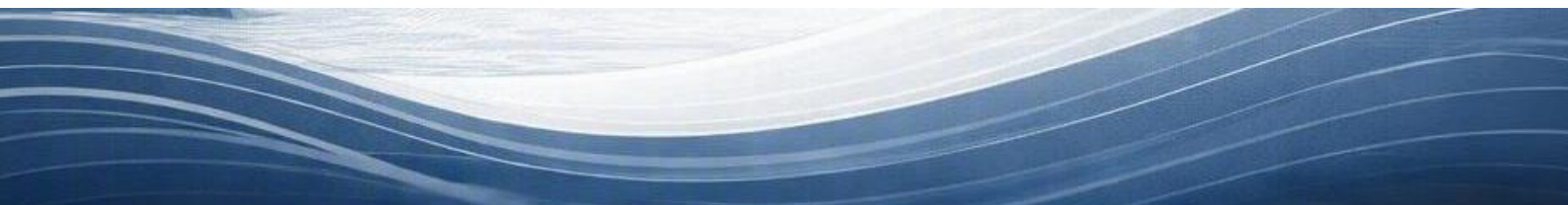
Key focus areas include:

- **Capacity building and technical training**
- Development of **data and evidence for policy formulation**
- Creation of tools such as the **URN Toolkit (RAINDROP)**
- Support for **national-level implementation of IMO guidelines**



The project aims to reduce underwater noise and its ecological impacts, particularly on marine species that rely on sound for communication, navigation and survival.

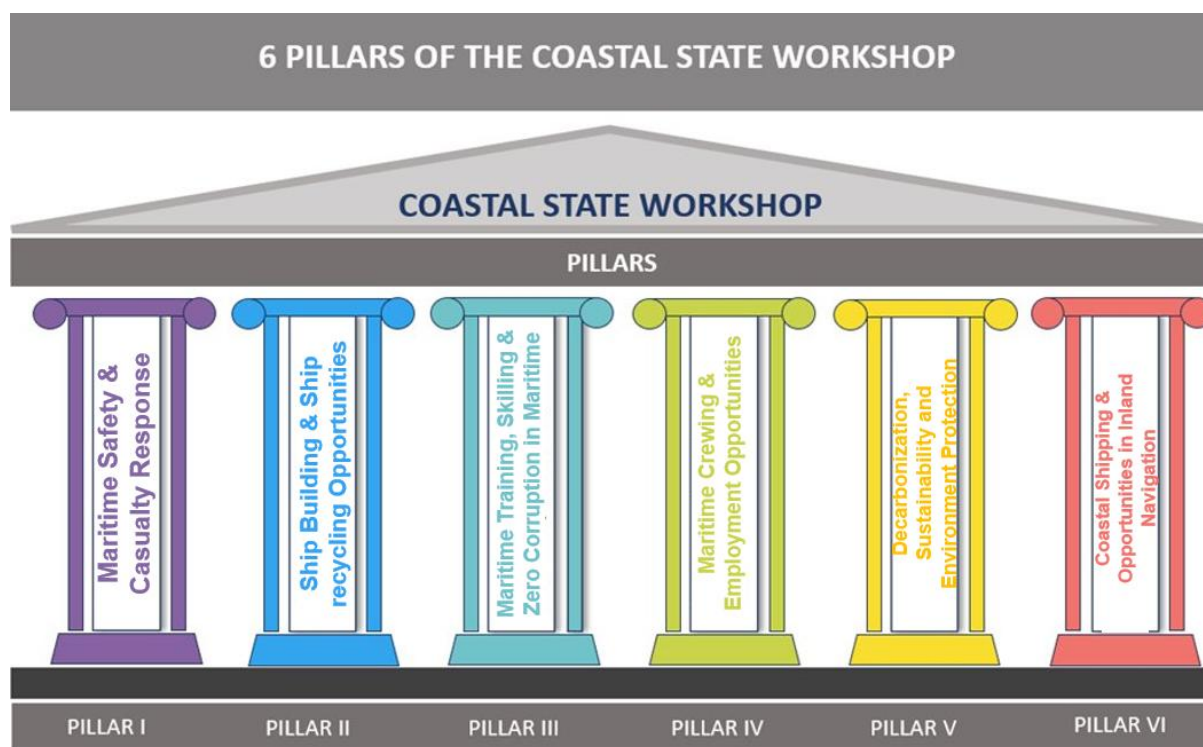
India, as a **Lead Pilot Country**, is actively contributing to global efforts through workshops, stakeholder engagement and capacity building initiatives, reinforcing its role in sustainable maritime governance.



14. Coastal State Workshops

The Directorate General of Maritime Administration (DGMA) has initiated the Coastal State Workshop programme as a strategic platform to strengthen Centre-State collaboration in the maritime sector and to promote coordinated development of India's coastal ecosystem. Recognising that several maritime initiatives require active participation and support from State Governments, the workshops are designed to facilitate structured engagement between the Central Government, State administrations, industry stakeholders, and maritime institutions. The initiative seeks to create a common forum for discussion, knowledge sharing, and collaborative problem-solving on issues impacting coastal shipping, maritime infrastructure, skills development, and maritime governance.

The workshops are aligned with the broader national objective of enhancing maritime competitiveness and realizing the vision of a sustainable and integrated maritime sector. Through focused deliberations, the workshops aim to address state-specific challenges while ensuring alignment with national maritime priorities and programmes. The platform enables stakeholders to identify opportunities for maritime growth, discuss policy and regulatory interventions, and develop actionable strategies for accelerating maritime development across coastal states.



A key objective of the Coastal State Workshops is to promote stakeholder coordination and foster a collaborative approach towards the development of the maritime sector. The workshops provide an opportunity for State Governments to engage directly with the Directorate General of Shipping and other relevant stakeholders on matters relating to maritime safety, coastal shipping, shipbuilding, skill development, environmental

sustainability, and inland and coastal navigation. These deliberations facilitate informed decision-making and support the formulation of targeted interventions suited to the unique requirements of each state.

The discussion framework of the workshops is structured around six core pillars that collectively address critical dimensions of maritime development:

Pillar I: Maritime Safety and Casualty Response focuses on strengthening maritime safety standards, enhancing preparedness and response mechanisms, and improving coordination for accident investigation and emergency management.

Pillar II: Shipbuilding and Ship Repairing Opportunities aims to explore avenues for strengthening the domestic shipbuilding and ship repair ecosystem, encouraging investment, and promoting indigenous maritime capabilities.

Pillar III: Maritime Training, Skilling and Career Opportunities seeks to enhance the availability and quality of maritime education and training, create greater awareness regarding maritime careers, and develop a skilled workforce to meet future industry requirements.

Pillar IV: Maritime Crewing and Employment Opportunities addresses workforce deployment, seafarer welfare, employment generation, and the creation of pathways for greater participation of Indian maritime professionals in domestic and global shipping markets.

Pillar V: Decarbonization, Sustainability and Environmental Protection focuses on advancing green shipping practices, encouraging adoption of environmentally sustainable technologies, and supporting national and international commitments towards maritime decarbonization.

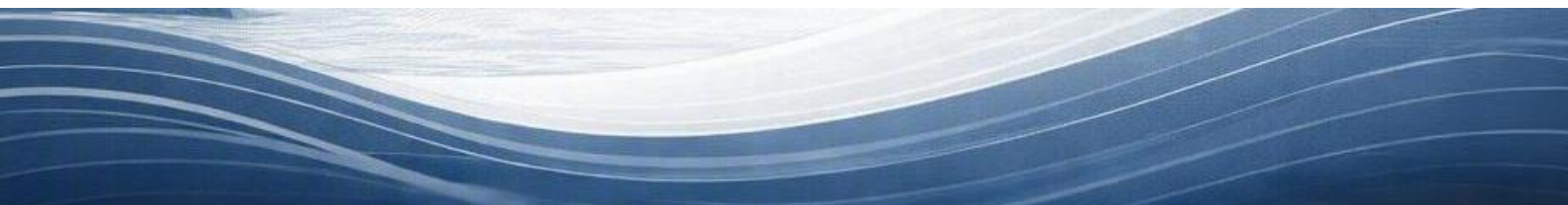
Pillar VI: Coastal Shipping and Opportunities in Inland Navigation aims to promote modal shift towards water-based transport, enhance the utilization of coastal shipping and inland waterways, and identify opportunities for improving logistics efficiency and reducing transportation costs.

The first Physical Coastal State Workshop was successfully conducted in Goa in March 2026. The workshop served as an effective platform for Centre-State consultations and facilitated constructive discussions on maritime priorities, sectoral challenges, and opportunities for collaborative action. The engagement demonstrated the value of structured stakeholder dialogue in addressing region-specific issues while contributing to national maritime development goals.

Building on the successful outcomes of the Goa workshop, the Directorate General of Shipping has planned a series of subsequent workshops across other coastal states. Upcoming workshops are proposed to be conducted in **Gujarat, Tamil Nadu, Andhra Pradesh, and Kerala**, with each workshop focusing on state-specific maritime priorities and development opportunities. Through these engagements, DGS aims to establish a

sustained mechanism for stakeholder interaction, facilitate policy implementation at the state level, and accelerate the growth of India's maritime sector in a coordinated and inclusive manner.

The Coastal State Workshop initiative is expected to significantly contribute to strengthening maritime governance, enhancing regional participation in maritime development, and fostering a collaborative ecosystem that supports economic growth, employment generation, sustainability, and improved connectivity along India's coastline. Through continued engagement with coastal states, the initiative will play an important role in advancing the national maritime agenda and unlocking the full potential of India's maritime economy.



15. Coastal Cargo Promotion Scheme

The Coastal Cargo Promotion Scheme (CCPS) has been introduced as a dedicated policy intervention under the Union Budget 2026-27 to promote a modal shift of freight transportation from road and rail to coastal shipping. The scheme has been conceptualized in recognition of the significant untapped potential of India's extensive coastline and waterways network, and the need to develop a more cost-effective, sustainable, and efficient logistics ecosystem. By incentivizing incremental cargo movement through coastal shipping, the scheme seeks to strengthen maritime transport as a key component of the national logistics framework and contribute towards achieving long-term economic and environmental objectives.

The formulation of the scheme is driven by several structural challenges that currently constrain the growth of coastal shipping in India. Despite possessing a vast coastline and significant maritime infrastructure, coastal shipping continues to account for a relatively small share of the national freight movement. High logistics costs as a percentage of GDP, underutilization of available coastal berth capacity, limited private sector investment in coastal vessels, and tariff and taxation asymmetries across transport modes have collectively affected the competitiveness of coastal shipping. Additionally, increasing emphasis on sustainable transportation and the transition towards low-emission logistics solutions has highlighted the need for targeted measures to encourage greater adoption of water-based transport. In this context, the establishment of a structured incentive mechanism is considered essential to improve the commercial viability and attractiveness of coastal shipping for both cargo owners and vessel operators.

The primary objective of the Coastal Cargo Promotion Scheme is to increase the modal share of coastal cargo in India's overall freight transportation system. The scheme seeks to facilitate a gradual transition of suitable cargo from road and rail networks to coastal waterways, thereby reducing transportation costs and improving supply chain efficiency. By supporting incremental cargo movement through coastal routes, the scheme aims to strengthen the role of coastal shipping as a reliable and competitive logistics alternative.

The scheme is also expected to promote the growth of domestic shipping and shipbuilding by creating sustained demand for coastal transportation services. Increased cargo volumes are likely to encourage investment in coastal fleets, support capacity expansion, and contribute to the development of indigenous maritime capabilities. This, in turn, will generate employment opportunities across various segments of the maritime sector and strengthen the overall maritime ecosystem.

A key focus area of the scheme is the promotion of environmentally sustainable transportation solutions. Coastal shipping offers significant advantages in terms of fuel



efficiency and lower emissions compared to road transport. By facilitating a shift towards water-based transport, the scheme is expected to contribute to reduced carbon emissions, lower fuel consumption, and a more sustainable logistics sector. The initiative is therefore aligned with broader national and international commitments towards environmental sustainability and green growth.

The scheme further seeks to strengthen multimodal integration by enhancing connectivity between ports, inland waterways, and other modes of transportation. Improved integration across logistics networks will facilitate seamless cargo movement, reduce bottlenecks, and support the development of a more efficient freight transportation system. Through coordinated development of maritime and inland transport infrastructure, the scheme aims to position water-based transport as a central pillar of India's logistics strategy.

The Coastal Cargo Promotion Scheme has been designed with ambitious long-term objectives. It seeks to accelerate the modal shift of freight movement from road and rail to coastal waterways and contribute towards increasing the modal share of water-based transport from approximately 6 percent to 12 percent by 2047. Achievement of this target is expected to generate multiple economic and environmental benefits, including lower logistics costs, reduced greenhouse gas emissions, enhanced fuel efficiency, and improved competitiveness of Indian industry.

The scheme also aligns with the broader vision of *Viksit Bharat 2047* and the objective of building an *Atmanirbhar Bharat*. By strengthening domestic shipping capabilities, promoting indigenous shipbuilding, improving logistics efficiency, and fostering sustainable transport solutions, the CCPS is expected to play a significant role in supporting India's long-term economic development and maritime growth agenda. Through a targeted, performance-linked incentive framework, the scheme seeks to unlock the full potential of coastal shipping and establish it as a key driver of efficient, resilient, and sustainable freight transportation in the country.

15.1. Overview

The Coastal Cargo Promotion Scheme (CCPS) is a performance-linked incentive programme designed to promote incremental cargo movement through coastal shipping. The scheme seeks to encourage greater utilization of India's coastal transport network by providing targeted incentives to key stakeholders involved in the coastal logistics value chain, including Cargo Owners, Coastal Vessel Operators, and Multimodal Transport Operators (MTOs).

The proposed scheme is envisaged for a period of ten years and includes a mid-term review after the completion of five years or upon conclusion of the 16th Finance Commission cycle, subject to budgetary allocations and policy considerations. Through a structured incentive mechanism, the scheme aims to improve the commercial

attractiveness of coastal shipping and facilitate a sustained modal shift from road and rail transport.

15.2. Incentive Structure

The CCPS adopts a multi-stakeholder approach by extending incentives to different participants in the cargo transportation ecosystem. The incentive framework has been designed to reward incremental cargo movement and encourage operational efficiencies, fleet modernization, and expansion of coastal shipping services.

The scheme comprises three distinct incentive packages, each tailored to a specific beneficiary category.

Package A: Incentives for Coastal Vessel Operators

Beneficiary

Coastal Vessel Operators

Incentive Type

Per Voyage Incentive

Incentive Components

Package A is intended to support coastal vessel operators by incentivizing additional cargo movement through coastal routes. The incentive structure includes:

- A base incentive for transportation of incremental cargo above the established baseline cargo volume.
- Additional incentives for operations undertaken by Indian-flag vessels, thereby promoting domestic shipping capacity and enhancing self-reliance in maritime transportation.
- Additional incentives for green vessels to encourage environmentally sustainable shipping practices and support decarbonization objectives.
- Additional incentives for the movement of new commodities, development of new Origin-Destination (OD) pairs, or a combination thereof, thereby expanding the scope and geographical reach of coastal cargo operations.

Expected Outcomes

The package is expected to stimulate investment in coastal vessel operations, improve fleet utilization, encourage deployment of environmentally sustainable vessels, and facilitate the development of new coastal trade routes.

Package B: Incentives for Cargo Owners



Beneficiary

Cargo Owners

Incentive Type

Annual Incentive

Incentive Components

Under Package B, eligible cargo owners will receive incentives based on incremental cargo movement through coastal shipping over and above a pre-determined baseline. The annual incentive structure is intended to encourage cargo owners to progressively shift suitable cargo from road and rail to coastal transport.

Expected Outcomes

The package seeks to create sustained demand for coastal shipping services by encouraging large cargo-generating industries and businesses to adopt coastal transportation as an integral component of their logistics strategy. Increased participation by cargo owners is expected to drive long-term growth in coastal cargo volumes.

Package C: Incentives for Multimodal Transport Operators**Beneficiary**

Multimodal Transport Operators (MTOs)

Incentive Type

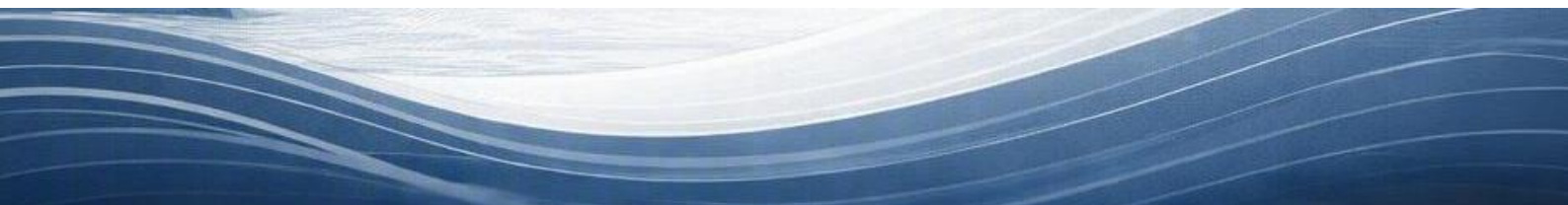
Per Voyage Incentive

Incentive Components

Package C provides incentives to Multimodal Transport Operators for facilitating incremental cargo movement through integrated logistics solutions involving coastal shipping. Incentives are linked to the transportation of cargo volumes exceeding established baseline levels.

Expected Outcomes

The package is expected to strengthen multimodal logistics integration and promote seamless cargo movement across ports, waterways, road, and rail networks. Greater participation of MTOs will facilitate efficient end-to-end logistics solutions and enhance the competitiveness of coastal shipping.



15.3. Key Features of the Incentive Framework

The proposed incentive framework incorporates several strategic features designed to maximize cargo mobilization and enhance the effectiveness of scheme implementation:

- Incentives are linked to **incremental cargo movement**, ensuring that support is directed towards generating additional coastal traffic.
- The framework encourages the use of **Indian-flag vessels**, thereby contributing to the growth of the domestic shipping sector.
- Dedicated incentives for **green vessels** promote sustainable maritime transport and support national decarbonization goals.
- Additional support for **new commodities and new Origin-Destination pairs** encourages market expansion and diversification of cargo streams.
- The inclusion of **Multimodal Transport Operators** promotes integrated logistics solutions and strengthens multimodal connectivity.

15.4. Expected Impact of the Coastal Cargo Promotion Scheme

Vision for Modal Shift

The Coastal Cargo Promotion Scheme (CCPS) is designed to accelerate the transition of freight movement towards coastal and inland water transport and support the long-term objective of doubling the modal share of waterborne freight transport in India from approximately **6% at present to 12% by 2047**. This target seeks to bring India's freight transport profile closer to global benchmarks observed in leading maritime economies.

International Context

Currently, coastal and inland waterways account for approximately 6% of India's freight movement, which is significantly lower than comparable maritime nations such as Australia (17%), China (24%), and Japan (34%). The scheme aims to bridge this gap by creating sustained economic incentives for stakeholders to adopt coastal shipping as a preferred mode of transport.

Key Outcomes

Increase in Modal Share

The scheme is expected to drive higher utilization of coastal and inland waterways by encouraging the movement of suitable cargo away from road and rail networks. This will contribute towards a gradual increase in the share of water-based transport within the national logistics system.

Development of New Cargo Streams and Routes

By incentivizing incremental cargo movement, new commodities and Origin-Destination (OD) pairs, the scheme is expected to stimulate the development of previously underutilized coastal routes. This will support diversification of cargo traffic and expansion of coastal logistics networks.

Improved Service Reliability

Performance-linked incentives are expected to encourage vessel operators to maintain regular and reliable services. Greater schedule reliability will enhance confidence among cargo owners and facilitate long-term adoption of coastal shipping.

Environmental Benefits

The modal shift from road and rail to waterways is expected to reduce fuel consumption, lower carbon emissions, and decrease highway congestion. Increased use of coastal shipping will therefore contribute to India's sustainability and decarbonization objectives while promoting greener freight transportation.

15.5. Incentive Design of the Coastal Cargo Promotion Scheme

The Coastal Cargo Promotion Scheme (CCPS) adopts a targeted, performance-linked incentive framework that rewards only incremental cargo movement through coastal shipping. Incentives are provided only when cargo volumes exceed an approved baseline, ensuring that financial support directly contributes to additional freight movement rather than subsidizing existing traffic.

To create impact across the entire logistics value chain, incentives are distributed among three key stakeholders: Coastal Vessel Operators, Cargo Owners, and Multimodal Transport Operators (MTOs).

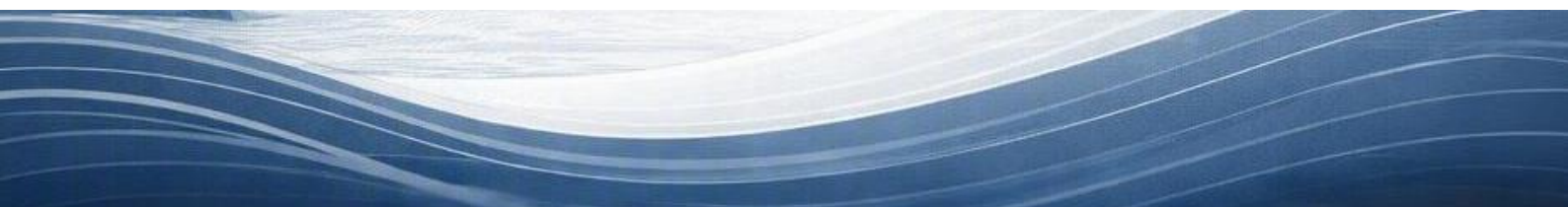
Key Features of the Incentive Framework

Incremental Cargo-Based Incentives

The scheme supports only cargo volumes transported above a predefined baseline. This approach ensures that incentives are linked to genuine modal shift and the creation of new coastal cargo traffic.

Incentive Cap

Financial assistance is capped at **up to 25% of the coastal voyage cost**, thereby maintaining fiscal prudence while improving the commercial viability of coastal transportation.



Multi-Stakeholder Approach

The incentive structure has been designed to address both supply-side and demand-side barriers by incentivizing three distinct stakeholder groups involved in cargo transportation.

Incentives for Coastal Vessel Operators

Purpose

This component provides supply-side support to coastal vessel operators, enabling them to introduce new services and operate on emerging or low-volume routes with reduced commercial risk.

Incentive Mechanism

Incentives are provided on a **per-voyage basis** once the operator's cargo movement exceeds the approved baseline level.

Expected Benefits

The incentive is expected to encourage higher vessel utilization, expansion of coastal services, and development of new trade routes, thereby strengthening coastal shipping capacity.

Incentives for Cargo Owners

Purpose

This component encourages cargo-generating industries and businesses to shift freight from road and rail to coastal shipping.

Incentive Mechanism

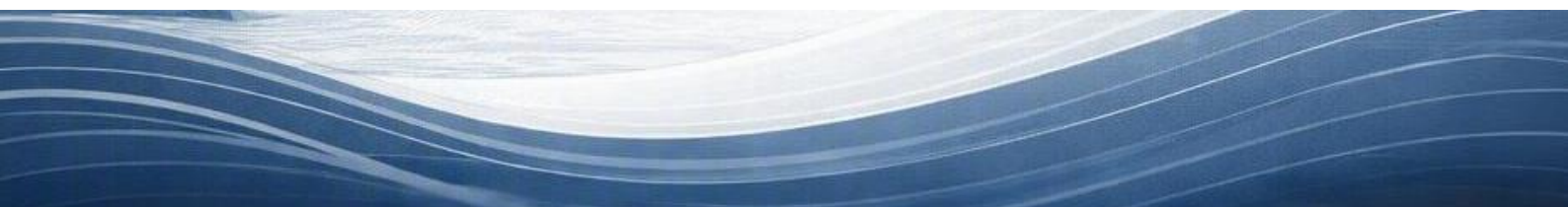
Eligible cargo owners receive annual incentives based on incremental coastal cargo movement beyond their established baseline.

Expected Benefits

The incentive is expected to stimulate demand for coastal transportation and facilitate sustained modal shift among major cargo owners.

Incentives for Multimodal Transport Operators

Purpose



Multimodal Transport Operators play a critical role in aggregating cargo from multiple shippers and integrating different transport modes into a seamless logistics chain.

Incentive Mechanism

MTOs receive incentives for facilitating incremental cargo movement through multimodal logistics solutions involving coastal shipping.

Expected Benefits

The incentive is expected to improve cargo aggregation, strengthen multimodal connectivity, and enhance the accessibility of coastal shipping for smaller cargo consignments.

15.6. Incentive Mechanism under the Coastal Cargo Promotion Scheme

Package A: Incentives for Coastal Vessel Operators

Objective

Package A has been designed to strengthen the supply side of the coastal shipping ecosystem by incentivizing Coastal Vessel Operators to deploy vessels on new and existing coastal routes and undertake additional cargo movement beyond an approved baseline level.

Baseline Determination

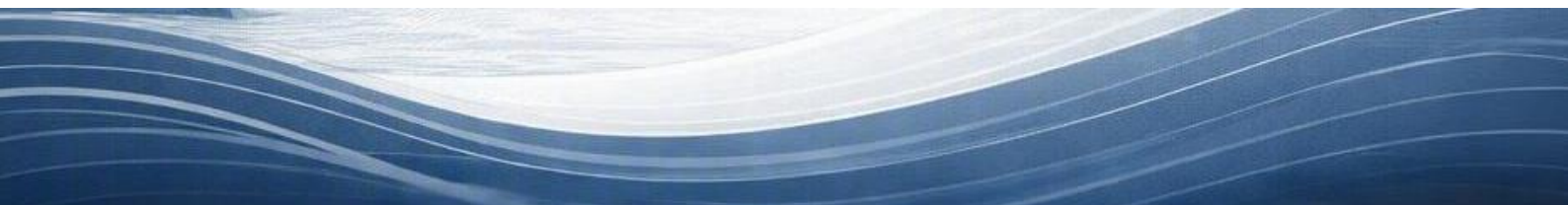
To participate in the scheme, vessel operators are required to register a Service Plan specifying the commodities proposed to be transported, cargo categories, Origin-Destination (OD) pairs, and projected cargo volumes. Based on these declarations, a baseline cargo volume and cargo movement benchmark is established by the administering authority.

Incentive Eligibility

Incentives become payable only after the operator exceeds both the approved baseline cargo volume and baseline cargo movement for the scheme year. This ensures that financial assistance is directed solely towards incremental cargo movement and genuine modal shift.

Incentive Structure

Once the baseline threshold is crossed, operators become eligible for a per-voyage incentive linked to the additional tonne-kilometres transported through coastal shipping. To support broader policy objectives, the incentive framework includes additional premiums for:



- Deployment of **Indian-flag vessels** (+10%).
- Use of **environmentally compliant or green vessels** (+5%).
- Introduction of **new commodities, new OD pairs, or new coastal trade routes** (+10%).

Expected Impact

The package is expected to reduce commercial risks associated with operating on emerging coastal routes, improve vessel utilization, encourage investment in domestic tonnage, and support the long-term expansion of India's coastal shipping network.

Package B: Incentives for Cargo Owners

Objective

Package B seeks to address demand-side challenges by encouraging cargo-owning industries and businesses to shift freight from road and rail towards coastal shipping.

Registration and Baseline

Participating cargo owners are required to submit a Coastal Cargo Declaration identifying the commodities to be transported and the proposed OD pairs before the commencement of the scheme year. Based on this information, an annual baseline cargo movement is established.

Incentive Eligibility

The incentive applies only to tonne-kilometres transported above the approved baseline level. Existing coastal cargo movement is excluded, ensuring that the scheme rewards only incremental volumes resulting from modal shift.

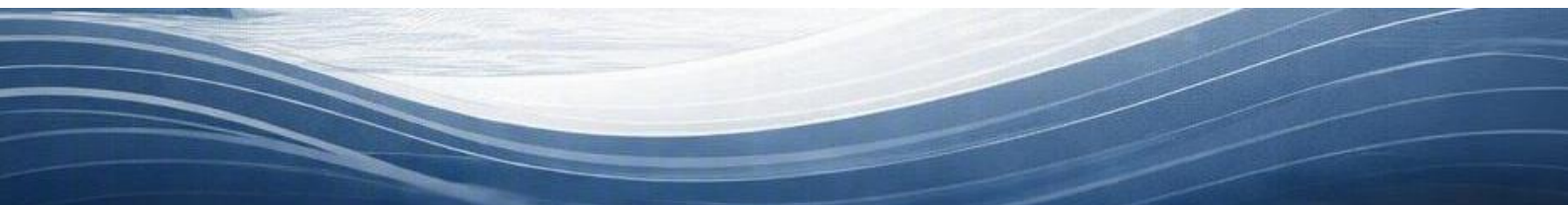
Payment Mechanism

Unlike the voyage-based incentives applicable to Vessel Operators and MTOs, incentives for Cargo Owners are calculated and settled annually based on cumulative performance achieved during the year.

Commodity-Based Incentive Rates

The scheme proposes differentiated rates across commodities and distance slabs to reflect varying transportation economics and encourage movement of key bulk and industrial cargoes. Commodities such as coal, steel, containers and other major cargo streams have been identified as important categories for modal shift under the programme.

Expected Impact



The package is expected to create sustained demand for coastal transportation, enhance utilization of coastal services, and support the transition towards a more balanced and cost-efficient freight transport system.

Package C: Incentives for Multimodal Transport Operators (MTOs)

Objective

Package C recognizes the critical role played by Multimodal Transport Operators in integrating different transport modes and aggregating fragmented cargo volumes that may otherwise be insufficient to support coastal services.

Rationale

A significant proportion of cargo generated by individual shippers is often too small to independently justify dedicated coastal transportation. As a result, viable cargo volumes frequently fail to reach the coastal shipping network. MTOs address this challenge by consolidating cargo from multiple shippers and integrating port, road, rail, and coastal transport services.

Incentive Mechanism

Under the scheme, MTOs receive incentives linked to incremental cargo movement above their approved baseline. The incentive is paid on a per-voyage basis and is designed to support logistics integration and cargo aggregation activities.

Expected Impact

The package is expected to improve the accessibility of coastal shipping for smaller cargo owners, strengthen multimodal connectivity, increase vessel load factors, and create a more efficient logistics ecosystem.

Integrated Design of the Three Incentive Packages

Complementary Stakeholder Support

The Coastal Cargo Promotion Scheme has been designed to address all major components of the freight transportation value chain through three complementary incentive packages.

- **Package A** supports vessel operators and addresses supply-side constraints.
- **Package B** supports cargo owners and stimulates demand-side participation.
- **Package C** supports cargo aggregation and multimodal logistics integration.

Reinforcing Modal Shift

The three packages have been structured to reinforce one another rather than operate in isolation. A single cargo movement may simultaneously generate benefits for the vessel

operator transporting the cargo, the cargo owner shifting freight to the coastal mode, and the MTO facilitating aggregation and logistics integration. This creates aligned incentives across the ecosystem and maximizes the likelihood of sustained modal shift.

Incentive Rates and Additional Benefits

Base Incentive Rates

The scheme proposes commodity-specific incentive rates for all three categories of beneficiaries. In general, Package A offers higher base incentives in recognition of the operational risks and capital intensity associated with vessel deployment.

Performance-Based Enhancements

Additional premiums have been incorporated under Package A to support national maritime priorities, including:

- Promotion of Indian-flag shipping.
- Adoption of greener and more energy-efficient vessels.
- Development of new coastal cargo routes and services.

Policy Significance

By linking incentives to operational performance and strategic objectives, the framework promotes both increased cargo movement and long-term strengthening of domestic maritime capabilities.

15.7. Institutional Framework and Implementation Mechanism

Governance Structure

The Ministry of Ports, Shipping and Waterways (MoPSW) will serve as the approving authority and provide overall policy supervision for the scheme. A dedicated CCPS Committee will support implementation through recommendations relating to eligible routes, commodities, incentive rates and other operational matters.

Role of DGMA

The Directorate General of Maritime Affairs (DGMA) will function as the nodal implementation agency responsible for scheme administration, beneficiary registration, claim processing, monitoring, and performance evaluation.

Process Flow

Implementation of the scheme will follow a digital process involving:

1. Registration of beneficiaries.
2. Submission of claims through NDCS/Maritime Single Window 2.0.

3. Verification of cargo movement using port records and operational data.
4. Approval and release of incentive payments.

The digital architecture is expected to ensure transparency, accountability, and timely disbursement of incentives.

Projected Outcomes and Economic Impact

Financial Outlay

The Coastal Cargo Promotion Scheme is proposed with an estimated cumulative expenditure of approximately **₹10,081 crore over a period of ten years**, subject to budgetary approvals and periodic review.

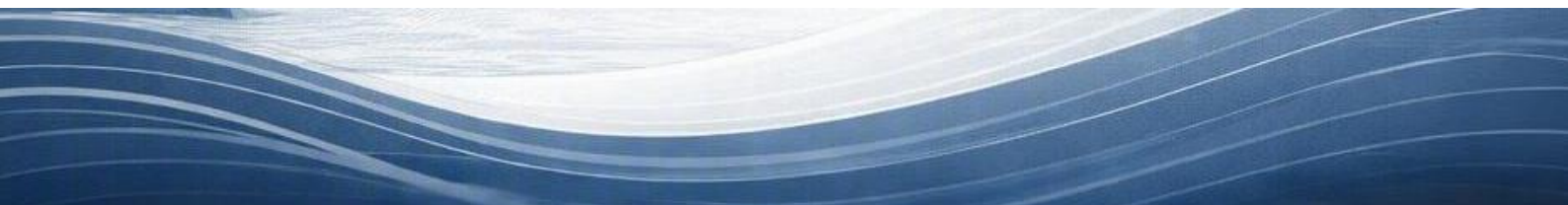
Anticipated Benefits

Implementation of the scheme is expected to generate significant economic, environmental, and employment benefits, including:

- Increase in coastal cargo throughput from current levels to approximately **1,000-1,100 MMT by FY 2037**.
- Creation of **around 1.6 lakh jobs** across the maritime and logistics value chain.
- Avoidance of approximately **16 million tonnes of CO₂ emissions** over the implementation period.
- Reduction of nearly **6 million truck trips**, thereby lowering road congestion and associated logistics costs.

Long-Term Strategic Impact

By simultaneously supporting cargo generation, vessel deployment, and logistics integration, CCPS is expected to play a transformative role in India's freight transportation landscape. The scheme is designed to support the national objective of doubling the share of coastal and inland waterways in freight movement, strengthen domestic maritime capabilities, and contribute towards the vision of **Viksit Bharat 2047**.



16. Offshore and Way Ahead

16.1. Development of Indian Offshore Competency Standards

Development of Indian Offshore Competency Standards



Current Gap	Proposed Outcome
Limited India-specific offshore competency, inspection and certification regime, reliance on voluntary global frameworks and operator practice.	A nationally auditable offshore safety regime aligned with OPITO but enforceable through Indian standards.
Global Benchmarks	
- Existing international Courses: BOSIET, FOET, HUET, OIM. - OCIMF: OVID, SIRE 2.0 etc for offshore vessel/tanker assurance and management-system review. - IMCA: DP guidance, diving and marine operations competency frameworks.	
Key Recommendation	
- India's offshore workforce predominantly follows international competency and assurance standards. Developing equivalent Indian standards aligned with global best practices and embedded within the OISD regulatory framework would strengthen competency assurance while addressing India's operational and regulatory requirements. - Develop an OISD-led national offshore competency and certification framework aligned with internationally recognised standards to ensure global equivalence, regulatory consistency, and improved workforce competency.	
<i>DGMA signed an MoU with Engineers India Limited (EIL) for the development and adoption of India-specific offshore standards and technical frameworks for the offshore energy sector.</i>	

30

India's offshore energy sector is entering a phase of significant expansion, driven by increasing investments in offshore oil and gas exploration, offshore infrastructure development, renewable energy projects, deep-water operations, and the growing strategic importance of maritime resources. The sector supports a wide range of specialized activities including offshore drilling, production operations, subsea engineering, diving operations, dynamic positioning, marine logistics, platform maintenance, emergency response, and offshore construction. These activities involve complex operational environments where safety, technical competence, and regulatory compliance are critical to ensuring safe and efficient operations.

At present, the competency requirements for personnel engaged in offshore operations in India are largely based on internationally recognized standards and training programmes established by organizations such as the Offshore Petroleum Industry Training Organization (OPITO), International Marine Contractors Association (IMCA), and Oil Companies International Marine Forum (OCIMF). Courses such as Basic Offshore Safety Induction and Emergency Training (BOSIET), Further Offshore Emergency Training (FOET), Helicopter Underwater Escape Training (HUET), and Offshore Installation Manager (OIM) certification are widely accepted across the global offshore industry and are utilized by Indian operators and offshore personnel.

While these international standards provide a robust framework for offshore competency assurance, India presently lacks a comprehensive and nationally auditable offshore

competency, inspection, and certification regime specifically tailored to its own operational, regulatory, geographical, and environmental requirements. As a result, the offshore sector relies heavily on external certification frameworks and company-specific competency management systems, leading to variations in implementation and limited regulatory oversight of workforce competency assurance at the national level.

With India's growing offshore footprint, increasing indigenous offshore capabilities, and emphasis on self-reliance under the vision of *Atmanirbhar Bharat*, there is a need to establish a structured competency framework that aligns with global best practices while addressing Indian operational realities. Such a framework would provide standardization in training, assessment, certification, and competency verification across the offshore workforce, thereby enhancing safety performance, workforce mobility, quality assurance, and regulatory consistency.

Global offshore jurisdictions have demonstrated the effectiveness of competency-based regulatory systems that integrate training standards, competency assessments, verification mechanisms, and periodic auditing processes. International bodies such as IMCA, OCIMF, and OPITO have developed mature systems covering marine operations, dynamic positioning, marine assurance, diving activities, emergency preparedness, and offshore personnel competency management. These frameworks have become industry benchmarks and offer valuable guidance for developing an Indian equivalent model.

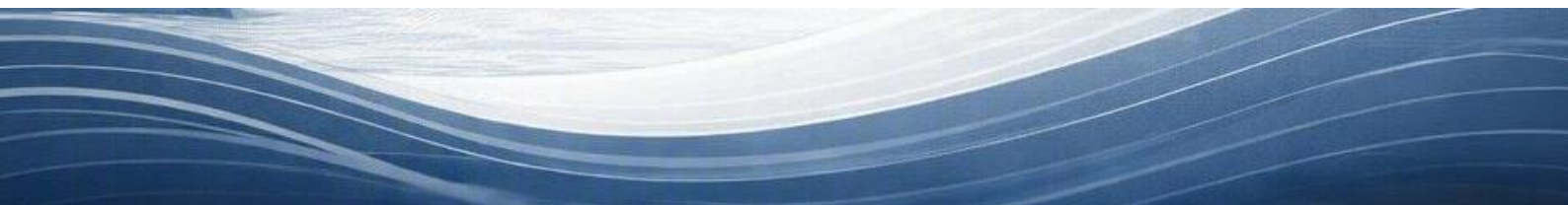
Recognizing this requirement, it is proposed to develop an **OISD-led National Offshore Competency and Certification Framework** that is aligned with internationally recognized standards while remaining enforceable under Indian regulations and industry practices. The proposed framework would establish India-specific competency standards, qualification requirements, training modules, assessment methodologies, certification processes, and auditing mechanisms for personnel employed across offshore operations.

The initiative aims to create a nationally recognized offshore competency ecosystem that ensures workforce competence, strengthens safety assurance, promotes regulatory consistency, supports industry growth, and enables international equivalence of Indian certifications. The framework will facilitate enhanced confidence among offshore operators, regulators, insurers, and international stakeholders while contributing to the development of a highly skilled and globally competitive offshore workforce.

In furtherance of this objective, **the Directorate General of Maritime Affairs (DGMA) has signed a Memorandum of Understanding (MoU) with Engineers India Limited (EIL) for the development and adoption of India-specific offshore standards and**

technical frameworks for the offshore energy sector. The collaboration seeks to establish a robust institutional foundation for developing competency standards, inspection protocols, certification systems, and technical guidelines that will support the long-term growth, safety, and sustainability of India's offshore industry.

The development of Indian Offshore Competency Standards therefore represents a strategic step towards establishing a globally aligned, nationally enforceable, and future-ready offshore safety and competency regime that strengthens India's position as a leading maritime and offshore nation.



17. Ship Recycling

17.1. Ship Recycling



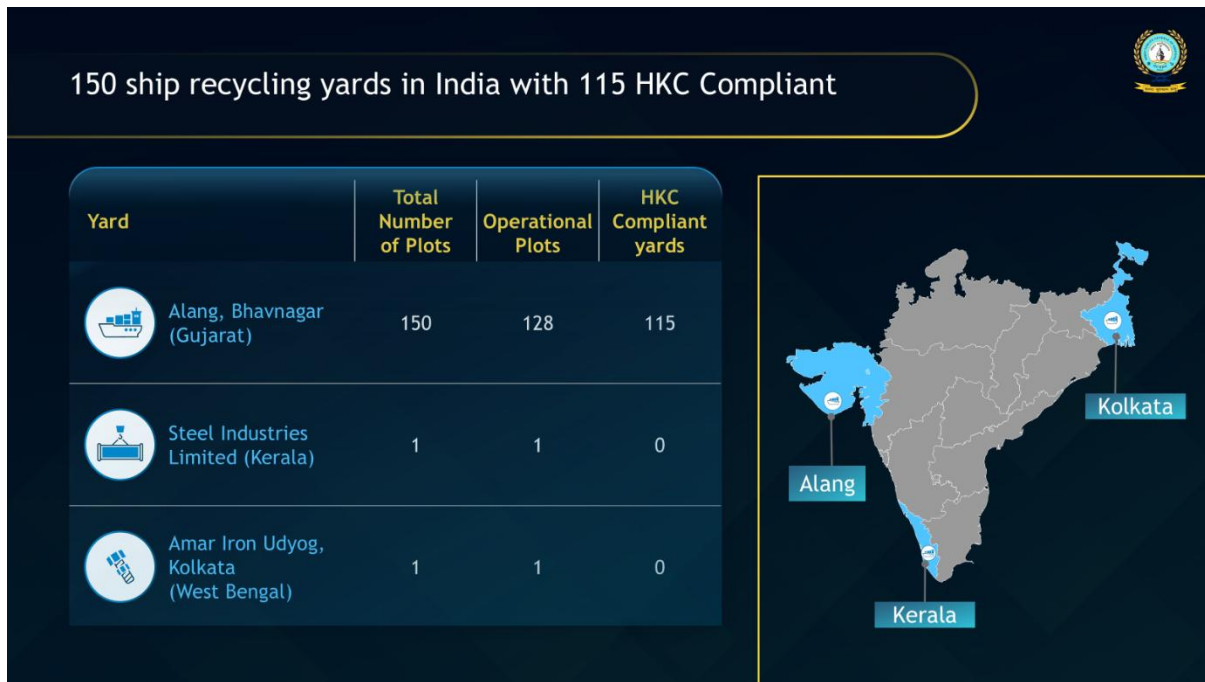
Ship recycling forms the terminal stage of a vessel's operational life and has historically been treated as a downstream industrial activity. However, in the present regulatory and sustainability environment, it has evolved into a strategically important maritime segment with implications for industrial policy, environmental governance and international compliance.

Ships typically operate for 25 to 30 years. At the end of this lifecycle, dismantling must be carried out in a manner that ensures safe handling of hazardous materials, recovery of recyclable components and minimal environmental impact. A modern ocean-going vessel contains large quantities of high-grade steel along with non-ferrous metals, machinery, electrical systems and reusable equipment. When dismantled under controlled conditions, a significant proportion of this material re-enters the industrial supply chain.

The global regulatory framework governing this activity changed materially with the entry into force of the Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships on 26 June 2025 .

Post-HKC, ship recycling is no longer a loosely regulated industrial activity; it is now a structured compliance-based system requiring lifecycle documentation, certification and facility authorisation.

India has aligned its domestic legal framework accordingly through the Recycling of Ships Act, 2019 and related Rules, positioning itself as an early mover in the post-HKC regime.



India's Leadership

India today occupies a central position in global ship recycling. The Alang–Sosiya ship recycling cluster in Bhavnagar, Gujarat is the largest such cluster in the world .

Current status of the Alang cluster:

- 150 total plots
- 128 operational plots
- 115 HKC compliant yards

The fact that 115 yards are HKC compliant is significant. It reflects not only infrastructure upgradation but a conscious regulatory transition over the past decade. No other recycling nation currently has over 100 HKC compliant facilities concentrated in a single cluster .

In volume terms, India handles approximately 30–35% of global ship recycling tonnage annually

At the national level, the sector supplies around 20–25% of India's ferrous scrap requirement. Given India's steel production expansion targets, this contribution is strategically relevant.

The sector provides direct employment to more than 15,000 workers and sustains a broader ecosystem involving logistics operators, re-rolling mills, scrap traders and ancillary service providers .

India's leadership is therefore based on scale, regulatory alignment and economic integration.

Strategic Importance

Ship recycling intersects with India's priorities in steel production, maritime manufacturing and sustainability commitments.

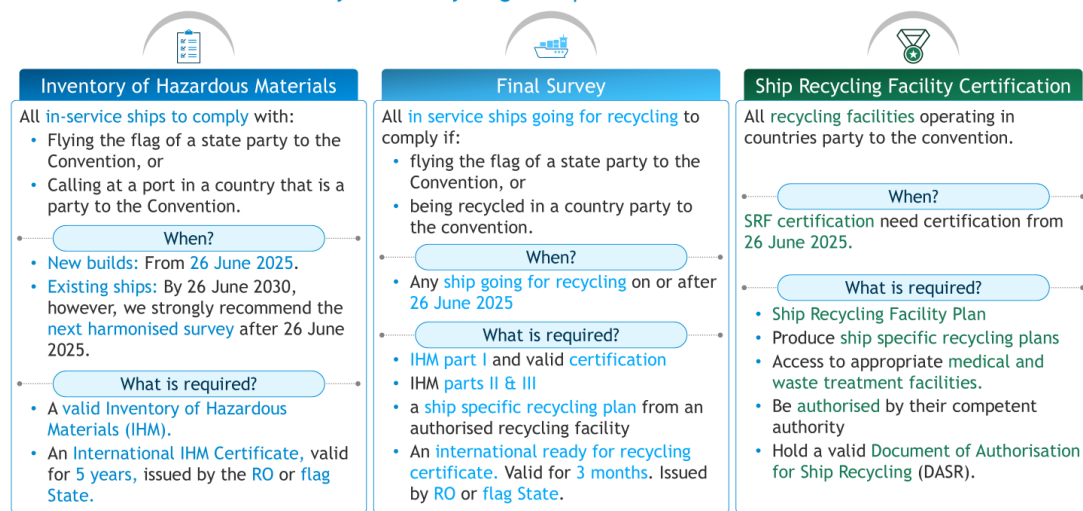
First, it strengthens domestic scrap availability. Scrap-based steel production is less energy intensive compared to primary steelmaking and reduces dependence on iron ore extraction and coal usage. In the context of decarbonisation and resource efficiency, this is important.

Second, it supports maritime industrial integration. The introduction of the Ship Recycling Credit Note under SBFA 2.0 has created a policy linkage between dismantling and new shipbuilding . This ensures that economic value generated from recycling remains within the domestic maritime ecosystem.

Third, post-HKC, shipowners assess recycling destinations on compliance credentials. India's compliance depth strengthens its credibility and reduces the risk of business diversion to alternative jurisdictions.

17.2. Hong Kong Convention (HKC)

Hong Kong International Convention For the safe and environmentally sound recycling of ships



184

The Hong Kong Convention establishes binding obligations for both ships and recycling facilities.

For ships:

- New ships are required to comply from 26 June 2025.
- Existing ships must comply by 26 June 2030 .

Ships proceeding for recycling after 26 June 2025 must carry:

- A valid Inventory of Hazardous Materials (IHM).
- Updated IHM Parts II and III.
- A ship-specific Recycling Plan.
- An International Ready for Recycling Certificate (valid for three months) .

For recycling facilities:

- An approved Ship Recycling Facility Plan is mandatory.
- Authorisation by the competent authority is required.
- A valid Document of Authorisation for Ship Recycling (DASR) must be held .

India's Recycling of Ships Act, 2019 operationalises these requirements domestically, ensuring harmonisation between international obligations and national enforcement.

Compliance and Risk

In the current regime, compliance gaps carry both regulatory and commercial consequences.

Improper handling of hazardous materials such as asbestos, PCBs, oils or sludge can result in environmental contamination and worker safety incidents. Documentation deficiencies in IHM or recycling plans can undermine international confidence.

Reputational risk is particularly relevant in the post-HKC environment, where shipowners and flag administrations are expected to exercise due diligence in selecting recycling destinations.

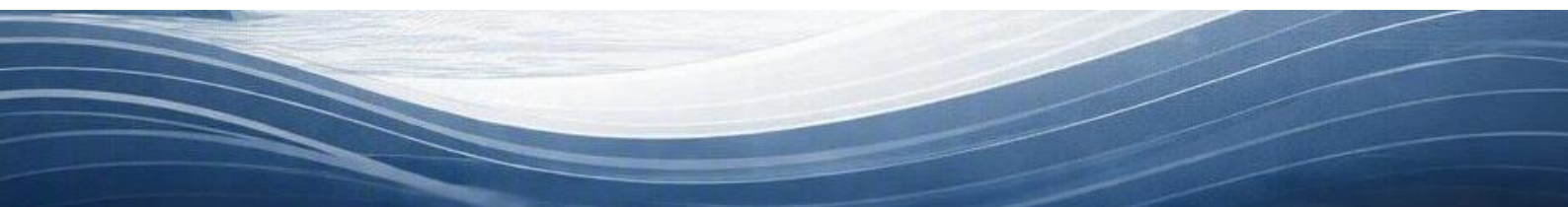
India's approach has therefore emphasised:

- Yard infrastructure upgradation.
- Adoption of internationally recognised management systems.
- Structured inspection and oversight.
- Progressive digitalisation of compliance processes.

The objective is to institutionalise compliance rather than rely solely on periodic enforcement.

Inventory of Hazardous Materials (IHM)

The IHM framework is central to safe and environmentally sound recycling.



The IHM consists of three parts:

- Part I – Hazardous materials present in ship structure and equipment.
- Part II – Operational wastes.
- Part III – Stores.

Ships must maintain a valid IHM certificate, generally with a five-year validity . Prior to recycling, Parts II and III must be completed and verified.

The IHM enables:

- Identification of hazardous substances.
- Planning of removal and segregation.
- Safe disposal pathways.
- Worker safety during dismantling.

In practical terms, effective IHM governance reduces uncertainty at the yard stage and supports structured dismantling.

17.3. ISO Standards for Ship Recycling



A significant number of Indian recycling facilities operate under ISO-based management systems , including:

- ISO 9001 – Quality Management.
- ISO 14001 – Environmental Management.
- ISO 30000 – Ship Recycling Management.
- ISO 45001 – Occupational Health and Safety.

These systems formalise documentation control, environmental monitoring, safety audits and corrective action mechanisms. ISO certification strengthens process discipline and enhances international credibility.

Ferrous Scrap Development Fund (FSDF)

The Ferrous Scrap Development Fund supports systemic improvements in the recycling ecosystem

The Fund is utilised for:

- Yard infrastructure improvements.
- Effluent treatment and hazardous waste management systems.
- Worker housing and welfare facilities.
- Skill development and training initiatives.
- Research and consultancy inputs.

The objective is to ensure that compliance and safety improvements are capital-backed and sustainable.

17.4. Green Steel

- “Green Steel” is defined by its CO₂ emission intensity — less than 2.2 tonnes CO₂ emission per tonne of finished steel (tfs).
- Greenness is expressed as a percentage reduction below the threshold of 2.2 tonnes CO₂ emission per tonne of finished steel
- The certification done via NISST (National Institute of Secondary Steel Technology) under the Bureau of Energy Efficiency (BEE) Measurement, Reporting and Verification (MRV) methodology.

Star Rating System

- Five-Star: < 1.6 tCO₂e/tfs ★★★★★
- Four-Star: 1.6 – 2.0 tCO₂e/tfs ★★★★
- Three-Star: 2.0 – 2.2 tCO₂e/tfs ★★★
- > 2.2 tCO₂e/tfs → Not eligible for green rating
(Threshold reviewed every 3 years)



Green Steel is defined as steel with emission intensity below 2.2 tonnes of CO₂ per tonne of finished steel

Scrap-based steel production significantly reduces resource consumption. For every tonne of scrap steel used:

- 1,370 kg of iron ore is conserved.
- 780 kg of coal is saved.
- 270 kg of limestone is saved

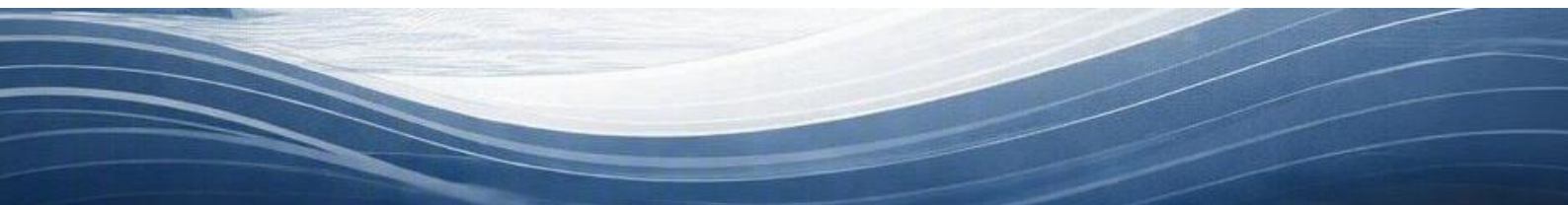
Ship recycling therefore directly contributes to resource conservation and emissions reduction objectives.

Circular Economy Linkage

India's ship recycling model now reflects a structured circular framework:

- Ships are dismantled in HKC-compliant yards.
- Scrap is channelled into domestic steel production.
- The Credit Note incentivises new vessel construction in India.
- Fleet renewal supports technological modernisation.
- FSDF reinvests in safety and infrastructure.
- Digital governance improves transparency and oversight.

The emphasis going forward will be on maintaining documentation integrity, strengthening digital systems and ensuring that worker safety and environmental safeguards remain embedded in operations.



18. Security

18.1. BoPS and ISPS Effective Implementation:

Maritime security has emerged as a critical national priority in view of evolving geopolitical tensions, growing maritime trade dependence, increasing cyber threats, and the strategic importance of India's ports and shipping sector. India handles more than 95% of its trade by volume and approximately 70% by value through maritime transport, making the security of ports, port facilities, ships, offshore installations, and associated maritime infrastructure essential for national economic security and supply chain resilience. Recent disruptions in key maritime regions such as the Red Sea, Gulf of Aden, Persian Gulf, and Black Sea have further highlighted the need for robust security governance, risk-based threat monitoring, and coordinated incident response mechanisms.

The International Ship and Port Facility Security (ISPS) Code, adopted under the International Convention for the Safety of Life at Sea (SOLAS), provides the global framework for safeguarding ships and port facilities against security threats. India has implemented the ISPS Code through the Merchant Shipping Act and associated regulations, requiring designated ports and ships to undertake security assessments, prepare security plans, maintain trained security personnel, conduct drills and exercises, and comply with prescribed security levels. While the existing framework has enabled substantial compliance across Indian ports and vessels, the increasing complexity of modern maritime threats necessitates stronger institutional oversight, standardized implementation, enhanced intelligence sharing, and continuous monitoring of compliance.

India's maritime security environment today extends beyond conventional physical threats and includes cyber-attacks on port infrastructure, disruption of critical logistics chains, smuggling, terrorism, piracy, illegal trafficking, threats to offshore energy installations, and vulnerabilities arising from interconnected port information systems. Addressing these challenges requires an integrated national framework capable of coordinating multiple stakeholders, including the Directorate General of Maritime Affairs (DGMA), Indian Navy, Indian Coast Guard, CISE, Customs, Port Authorities, State Maritime Boards, intelligence agencies, law enforcement organizations, and shipping companies.

In this context, the establishment of the **Bureau of Port Security (BoPS)** is envisaged as a dedicated institutional mechanism to strengthen and streamline the implementation of the ISPS Code across the country. BoPS can serve as the national security regulator and oversight authority responsible for ensuring uniform, measurable, and timely implementation of maritime security requirements across ports, port facilities, ships, offshore installations, and other critical maritime assets. The Bureau would provide a centralized framework for policy formulation, regulatory supervision, security audits, risk assessments, intelligence coordination, capacity building, and incident management.

A key role of BoPS would be to enhance regulatory oversight by issuing directions, monitoring implementation of Port Facility Security Plans (PFSPs), Ship Security Plans (SSPs), and Recognized Security Organization (RSO) activities, while supporting stronger enforcement provisions under the Merchant Shipping Act. Simultaneously, the Bureau would promote a risk-based security approach by classifying maritime assets according to vulnerability, strategic importance, cargo profile, geographical location, and prevailing threat conditions, thereby enabling more effective application of Maritime Security (MARSEC) Levels.

The proposed framework also emphasizes information fusion and intelligence sharing through timely collection, analysis, dissemination, and exchange of security-related information, including cyber security threats, port IT vulnerabilities, suspicious maritime activities, and emerging regional security developments. Such a mechanism would facilitate informed decision-making and rapid response during security incidents, casualties, and emergencies affecting maritime trade and critical infrastructure.

Further, BoPS would play a significant role in enhancing security preparedness through regular audits, inspections, compliance reviews, drills, exercises, training programmes for Port Facility Security Officers (PFSOs), Ship Security Officers (SSOs), and Company Security Officers (CSOs), along with robust incident reporting and corrective action tracking systems. This would help foster a culture of continuous improvement and security awareness across the maritime sector.

The establishment of BoPS is expected to result in greater uniformity in ISPS compliance across Indian ports and ships, faster response to security and casualty incidents, improved maritime domain awareness, stronger cyber resilience, and enhanced coordination among all maritime security stakeholders. Through a dedicated institutional framework, India will be better positioned to safeguard its maritime interests, protect critical trade infrastructure, strengthen national security, and ensure the safe and efficient functioning of the maritime sector in an increasingly complex global security environment.

18.2. Functions of BoPS:

Functions of Bureau of Port Security as per the rules



In accordance with International Conventions (**Safety of Life at Sea & International Ship and Port Security Code**) BOPS shall perform the following functions

- i. Regulatory and oversight responsibilities for security measures that protect port facilities and ships, ships stores, persons, cargo, cargo transport units within port limits, including anchorages from the risks of a security incident
- ii. Approval of Port Facility Security Assessment (PFSA) and Port Facility Security Plan (PFSP), security audit of port facilities, issuance of certificates of port facilities and review of PFSA and PFSP
- iii. Monitor, supervise and review the implementation of port facility security and vessel/port interface measures provided under the Merchant Shipping (Ships and Port Facility Security) Rules, 2026 by Port Facility Security Officers;
- iv. Collect, analyse and disseminate security related information, alerts and risk assessments to relevant authorities and agencies;
- v. Coordinate with the Central Government, State Governments, Administration, Port Authorities, Maritime Law Enforcement Agencies and other stakeholders for implementation of security measures as provided under the ISPS Code read with the Merchant Shipping (Ships and Port Facility Security) Rules, 2026;
- vi. Regulate the private security agencies engaged for port facilities and vessel/port interface security services;

29

In accordance with International Conventions (**Safety of Life at Sea & International Ship and Port Security Code**) BOPS shall perform the following functions

- i.Regulatory and oversight responsibilities for security measures that protect port facilities and ships, ships stores, persons, cargo, cargo transport units within port limits, including anchorages from the risks of a security incident
- ii.Approval of Port Facility Security Assessment (PFSA) and Port Facility Security Plan (PFSP), security audit of port facilities, issuance of certificates of port facilities and review of PFSA and PFSP
- iii.Monitor, supervise and review the implementation of port facility security and vessel/port interface measures provided under the Merchant Shipping (Ships and Port Facility Security) Rules, 2026 by Port Facility Security Officers;
- iv.Collect, analyse and disseminate security related information, alerts and risk assessments to relevant authorities and agencies;
- v.Coordinate with the Central Government, State Governments, Administration, Port Authorities, Maritime Law Enforcement Agencies and other stakeholders for implementation of security measures as provided under the ISPS Code read with the Merchant Shipping (Ships and Port Facility Security) Rules, 2026;
- vi.Regulate the private security agencies engaged for port facilities and vessel/port interface security services;

18.1. Indian Maritime Compliance Code (IMCC)

A single national framework across Health, Safety and Casualty response, Security and Disaster Management, and Environment Compliance (HSSEC)

The Directorate General of Maritime Administration is developing the Indian Maritime Compliance Code, envisaged as a comprehensive national framework spanning the full HSSEC domain. The Code responds to a compliance landscape that is at present distributed across multiple statutes and instruments, dated in parts, and administered through processes that operate in isolation from one another. Its purpose is to consolidate that landscape into a single, modern and digitally administered framework, and in doing so to move the sector towards an incident free maritime ecosystem.

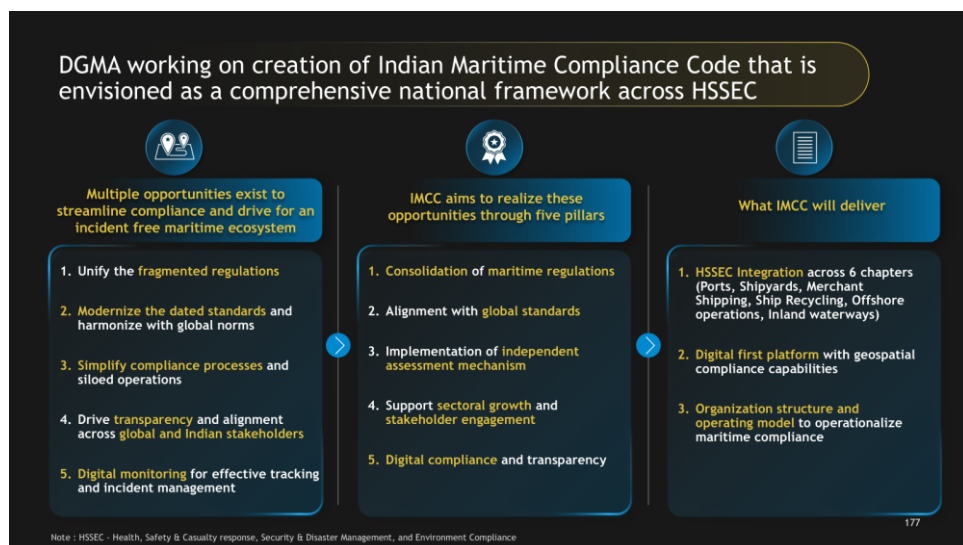


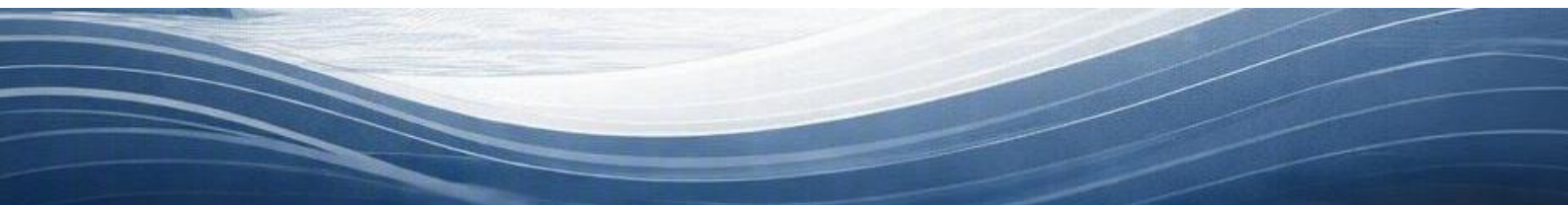
Exhibit 1: The Indian Maritime Compliance Code - opportunity, pillars and deliverables

The opportunity. India's maritime sector has grown rapidly, and its regulatory framework now has the chance to grow with it. Several specialised authorities, including DG Shipping, the Port Authorities, State Maritime Boards, the Ministry of Environment, Customs and the Coast Guard, each bring deep expertise to different parts of the sector. The Code's opportunity is to bring that expertise together into one coordinated framework, so that the sector's strong foundations translate into a single, unified standard recognised globally.

The five pillars. The five pillars work together to turn the Code from a document into a functioning system. Consolidation brings the sector's regulations into one framework, and alignment with global standards keeps that framework current with international practice. An independent assessment mechanism, like the standalone model already trusted in aviation and rail, gives the sector a transparent, credible way to demonstrate its performance. Alongside this, the Code supports sectoral growth and stakeholder engagement and establishes digital compliance and transparency so that progress is visible and verifiable at every stage.

What the Code will deliver. The digital platform is built to work alongside the systems India already has in place, such as OCEMS and PARIVESH for environmental data, IOCIS for vessel safety, and Shram Suvidha for labour compliance, extending their reach rather than duplicating them. Alongside this, a dedicated organisation and operating model will give the framework a clear institutional home, so that DGMA, the State Maritime Boards and the sector-specific bodies work together in a defined, lasting structure rather than on an ad hoc basis.

The Code consolidates what is fragmented, modernises what is dated, and makes verifiable what is presently asserted. It is the regulatory foundation on which the wider maritime programme ultimately depends.



19. Concluding Remarks

Over the course of this address, a clear picture has emerged of a maritime sector undergoing one of the most significant transformations in its history. What is unfolding today is not a series of isolated policy initiatives, but a coordinated effort to reposition India's maritime sector as a strategic pillar of national economic growth, trade competitiveness, energy security, and global influence. Guided by the objectives of Maritime India Vision 2030 and Maritime Amrit Kaal Vision 2047, the Directorate General of Shipping—transitioning into the Directorate General of Maritime Administration (DGMA)—has undertaken reforms across multiple dimensions of the maritime ecosystem.

These reforms can be viewed through four interconnected pillars: strengthening safety and welfare, modernising institutions and digital systems, enhancing economic competitiveness, and elevating India's global maritime standing. Together, these initiatives are laying the foundation for a safer, more efficient, technologically advanced and globally competitive maritime sector.

19.1. Safety, Welfare and the Human Element

At the centre of India's maritime transformation remains the seafarer. The maritime industry is ultimately powered by people, and therefore the safety, welfare and professional development of maritime personnel have been accorded the highest priority. The launch of initiatives such as Suraksha Sarvapratham reflects a renewed commitment towards strengthening maritime safety culture, reducing accidents and ensuring compliance with international best practices.

The establishment of the Global Safety Portal marks a major step towards creating a centralized, data-driven framework for safety reporting, incident monitoring and regulatory oversight. Simultaneously, investments in Seafarers Welfare Board and Training (SWBAT) infrastructure seek to strengthen welfare support systems available to Indian seafarers and their families.

Equally important has been the effort to reform crewing, certification and training systems. Through stricter oversight, enhanced transparency and a zero-tolerance approach towards non-compliance, India is working to ensure that its maritime workforce remains globally respected and internationally competitive. These initiatives reinforce India's position as one of the world's leading suppliers of skilled maritime manpower.

19.2. Institutional and Digital Modernisation

A second pillar of transformation has been the modernization of maritime governance and administration. The transition from DGS to DGMA represents more than a change in nomenclature; it signifies the evolution of maritime regulation towards a more integrated, technology-enabled and future-ready institutional framework.

Digitalisation has become a key enabler of this transformation. Platforms such as E-Samudra and E-Navik are streamlining regulatory processes, reducing administrative burden, improving transparency and enhancing service delivery to maritime

stakeholders. Digital certification, online approvals, integrated databases and automated workflows are significantly improving the ease of doing business within the maritime sector.

The adoption of geospatial technologies, digital monitoring tools and video-based safety platforms further strengthens maritime governance capabilities. Together, these initiatives are creating a modern regulatory ecosystem capable of supporting the growing complexity of India's maritime sector while improving efficiency and stakeholder experience.

19.3. Economic Competitiveness and Maritime Growth

The third pillar focuses on strengthening India's maritime competitiveness and supporting the country's broader economic aspirations. As India's trade volumes continue to expand, the maritime sector must evolve from being merely a transport facilitator to becoming a catalyst for economic growth and industrial development.

Several policy initiatives discussed throughout this address directly contribute to this objective. The Coastal Cargo Promotion Scheme seeks to shift cargo movement from road and rail to coastal shipping, reducing logistics costs, lowering emissions and improving overall transport efficiency. Simultaneously, reforms aimed at increasing Indian-controlled tonnage are intended to strengthen India's strategic control over maritime trade while supporting domestic shipping enterprises.

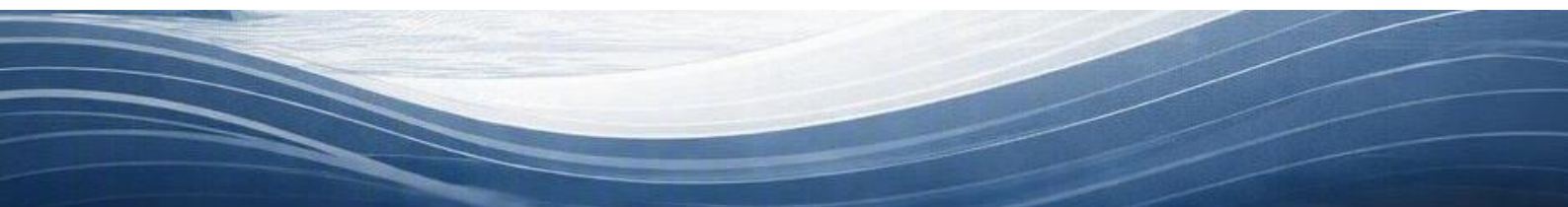
The government's renewed focus on shipbuilding, ship repair and maritime manufacturing represents another significant opportunity. Through initiatives such as the Shipbuilding Financial Assistance Scheme, Shipbuilding Development Scheme and container manufacturing promotion efforts, India is seeking to build a stronger domestic maritime industrial base. The emphasis on indigenisation of shipbuilding equipment and components further supports the broader vision of Atmanirbhar Bharat while reducing dependence on imported maritime technologies.

In the offshore sector, the adoption of internationally benchmarked competency standards, including alignment with OPITO and OVID frameworks, is helping create a skilled workforce capable of supporting India's growing offshore energy ambitions. These initiatives collectively enhance the competitiveness of Indian maritime services while creating new opportunities for investment, employment and industrial growth.

19.4. Global Standing, Sustainability and Strategic Resilience

The final pillar of transformation concerns India's growing role within the global maritime community. India's engagement with international maritime institutions has expanded significantly, reflected through leadership positions within the International Maritime Organization (IMO), the establishment of the C.P. Srivastava Chair at the World Maritime University and the growing visibility of the India Pavilion at major global maritime forums.

At the same time, sustainability has emerged as a central theme of India's maritime strategy. The National Maritime Decarbonisation Policy Framework provides a roadmap for reducing emissions across shipping, ports and maritime logistics while supporting the transition towards cleaner fuels, greener technologies and sustainable operations.



India's leadership in ship recycling, supported by implementation of the Hong Kong International Convention, further demonstrates its commitment to responsible and environmentally sound maritime practices.

The events of 2026 have also underscored the importance of resilience. Disruptions across the Red Sea, Gulf of Aden, Persian Gulf and Black Sea highlighted the vulnerability of global supply chains to geopolitical instability. India's ability to maintain energy supplies, diversify sourcing arrangements and adapt maritime trade routes demonstrated the growing resilience of its maritime ecosystem. These experiences reinforce the importance of diversification, maritime security and strategic preparedness in an increasingly uncertain global environment.

19.5. Charting the Way Ahead

While significant progress has been achieved, the journey towards Maritime India Vision 2030 and Maritime Amrit Kaal Vision 2047 will require continued collaboration among governments, industry stakeholders, international partners and maritime institutions. One of the most ambitious objectives remains the increase of coastal and inland water transport modal share from approximately 6% today to 12% in the coming decades. Achieving this target will require coordinated action across multiple sectors and jurisdictions.

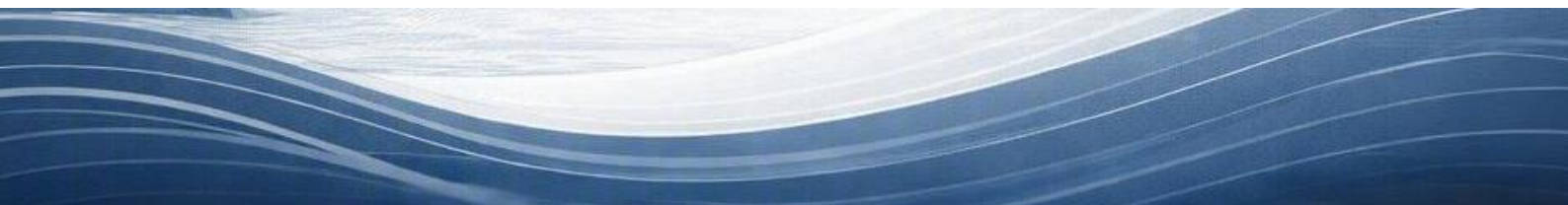
For international partners, India's maritime transformation presents significant opportunities for collaboration in areas such as technology transfer, training, sustainability, digitalisation and maritime governance. Engagement through the IMO, the World Maritime University and other international platforms will remain critical to strengthening global partnerships and advancing shared maritime objectives.

For industry and investors, the opportunities are equally substantial. Growth in shipbuilding, ship repair, offshore services, green shipping, coastal logistics, maritime digitalisation and indigenous manufacturing creates a favourable environment for long-term investment. Active participation in shipbuilding indigenisation initiatives, competency development programmes and coastal cargo promotion efforts will be essential in unlocking these opportunities.

For states and maritime institutions, the Coastal State Workshops represent an important mechanism for strengthening Centre-State collaboration. Ports, coastal infrastructure, skilling initiatives, logistics planning and maritime industrial development all require close coordination between national and state governments. Building on these engagements will help create a more integrated and cohesive maritime development framework.

19.6. Conclusion

India's maritime sector stands at a defining moment. The reforms discussed throughout this address reflect a clear and ambitious vision: to create a maritime ecosystem that is safe, efficient, digitally enabled, globally competitive and environmentally sustainable. The progress achieved thus far demonstrates what can be accomplished through coordinated policy action, institutional commitment and stakeholder collaboration.



The next phase of this journey will require continued partnership across governments, industry, academia, international organizations and maritime professionals. With sustained commitment and collective effort, India is well positioned to emerge as one of the world's leading maritime nations, contributing not only to national prosperity but also to the broader advancement of the global maritime community. As we move forward, continued engagement, collaboration and innovation will remain essential to realizing this shared vision.

