Workshop Overview

Title: Stakeholders Workshop – Mumbai
Theme: *Stepping Stone Towards a Safe and Sustainable Ocean Economy in India*
Date & Venue: 03 November 2025 | Institute of Marine Engineers India (IMEI), Mumbai
Organizers:

- United Nations Global Compact (India)
- Lloyd's Register Foundation
- Ocean Centres

Supported by **Directorate General of Shipping (MoPSW, Govt. of India)** and other maritime bodies

Objective:
To bring together key stakeholders from government, maritime industry, and international organizations to deliberate on enhancing maritime safety, sustainability, and green transition of ports in India.
The event is divided into three main segments :

Inaugural Session
Panel 1: Safety and Sustainability in Indian Shipping
Panel 2: Green Ports Transition in India
followed by a summing-up session.

Expected Participants :

Name	Designation	Organisation	Remark / Role in Event
Mr. Ratnesh Jha	Executive Director	United Nations Global Compact India	Welcome Address & Closing Remarks
Ms. Dagmara Karbowska	Senior Programme Manager	Lloyd's Register Foundation	Special Address
Dr. Ravi Raj Atrey	Country Lead	Ocean Centres India	Presentation on Ocean Centres
Mr. Rajeev Nayyer	Former President	Institute of Marine Engineers India (IMEI)	Special Address
Mr. Anil Devli	Chief Executive Officer	Indian National Shipowners Association (INSA)	Special Address
Mr. Shyam Jagannathan, IAS	Director General	Directorate General of Shipping, MoPSW, Govt. of India	Keynote Address
Mr. Kaushik Kumar Seal	President	Institute of Marine Engineers India (IMEI)	Moderator – Panel 1

Capt. Harinder Singh	Nautical Surveyor & DDG (Tech.)	Directorate General of Shipping, Govt. of India	Panellist – Panel 1
Capt. Shiv Halbe	Chief Executive Officer	Maritime Association of Shipowners, Shipmanagers and Agents (MASSA)	Panellist – Panel 1
Capt. Ram Iyer	Senior Vice President	Seahorse Ship Agency	Panellist – Panel 1
Ms. Saleha Shaikh	Founder President	Women in Maritime Association India (WIMAI)	Panellist – Panel 1
Mr. Chirag Bahri	International Operations Manager	International Seafarers' Welfare and Assistance Network (ISWAN)	Panellist – Panel 1
Mr. Anil Kumar	Principal Surveyor & Area Business Development Manager	Lloyd's Register	Panellist – Panel 1
Mr. Satish Kamath	Dy. Chief Surveyor-cum-Sr. DDG	Directorate General of Shipping, Govt. of India	Moderator – Panel 2
Capt. Vikas Vij	Chairman & Managing Director	I-Marine Infratech (India) Pvt. Ltd.	Panellist – Panel 2
Ms. Kalpana Desai	Ex-Treasurer; Ex-Board Member	Transport & Dockworkers Union; Mumbai Port Authority	Panellist – Panel 2
Ms. Shashi Kala Agarwal	Senior Counsellor	Confederation of Indian Industry (CII)	Panellist – Panel 2
Mr. Ambrish Bansal	SVP & Global Head – Management Consulting & ESG Advisory	Lloyd's Register Maritime & Offshore India LLP	Panellist – Panel 2
Mr. N. M. Prusty	Director	Centre for Development & Disaster Management Support Service (CDMASS)	Panellist – Panel 2

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"A very good morning to everyone present here."

It is a privilege to represent the **Directorate General of Shipping**, Ministry of Ports, Shipping and Waterways, at this **UN Ocean Centre Workshop**.

India's maritime sector today stands at a crucial juncture, where **economic growth and environmental stewardship** must go hand in hand. Our oceans are not just trade highways but vital ecosystems that sustain livelihoods, biodiversity, and global climate balance.

This presentation, titled *"Stepping Stone towards a Safe and Sustainable Ocean Economy in India,"* highlights the multi-dimensional efforts being undertaken by the Directorate General of Shipping to promote:
Safety and sustainability across the maritime value chain,
Cleaner and greener shipping practices, and
Capacity building for coastal and offshore stakeholders.

Through progressive initiatives, from **green shipping and alternative fuels** to **fisheries safety, waste reduction, and decarbonization,** India is aligning its national maritime agenda with global frameworks such as **MARPOL, the IMO Initial GHG Strategy, and the Sustainable Development Goals (SDGs 13, 14, and 17).**

"The journey toward a sustainable ocean economy begins with collaboration — between nations, industries, and institutions. Today's workshop is one such collective step forward."

Directorate General of Shipping

India's Maritime Regulator

- **Established:** *3 September 1949* as an attached office under Ministry of Commerce; now functions under the **Ministry of Ports, Shipping & Waterways (MoPSW)**.
- **Mandate:** Formulates and enforces **shipping policies and legislations** in India.
- **Global Role:** Serves as India's **Maritime Administration**, representing the country at the **IMO** and other international maritime forums.
- **Presence:** Headquarters in **Mumbai**, supported by 14 **Mercantile Marine Departments (MMDs)** PAN India.

Key Wings & Branches :

- Engineering
- Nautical
- Naval Architecture
- Coastal Shipping
- Crew
- Shipping Development
- Administration
- Training

Core Functions :

- ⚖️ **Policy & Regulation :** Formulates shipping policy, enforces national & international legislations.
- 🚢 **Ship Safety :** Surveys, inspections, and certification of vessels.
- 👨‍✈️ **Seafarers** Training, competency certification, and welfare.
- 🌍 **Environment & Green Shipping :** Implements MARPOL, promotes decarbonisation & alternate fuels.
- 🛠️ **Ship Recycling :** Regulates and monitors yards, ensures HKC compliance.
- 🤝 **International Engagement :** Represents India at IMO & global maritime forums.

Directorate General of Shipping
(India's Maritime Regulator)

"Good morning distinguished delegates, colleagues, and members of the United Nations Ocean Centre."

Allow me to briefly introduce the **Directorate General of Shipping**, the apex maritime regulatory authority of India.

Established in **1949**, the Directorate has evolved over the decades from a small office under the Ministry of Commerce into a full-fledged maritime administration under the **Ministry of Ports, Shipping and Waterways**. It continues to serve as the central institution responsible for **formulating, implementing, and enforcing national and international shipping policies and legislation** in India.

Our mandate is broad and holistic — covering every dimension of India's maritime domain. We are responsible for **ship safety**, **seafarer training and welfare**, **environmental protection**, and the **promotion of green and sustainable shipping practices**. At the same time, we ensure compliance with conventions of the **International Maritime Organization (IMO)** and other global instruments.

From our **headquarters in Mumbai**, we operate through a network of **14 Mercantile Marine Departments** strategically located across the country — from Kandla and Kochi to Kolkata, Chennai, and Port Blair. These MMDs act as our field arms for inspections, surveys, certification, and maritime governance, ensuring that the standards we uphold in New Delhi and Mumbai are implemented uniformly across all Indian ports and coasts.

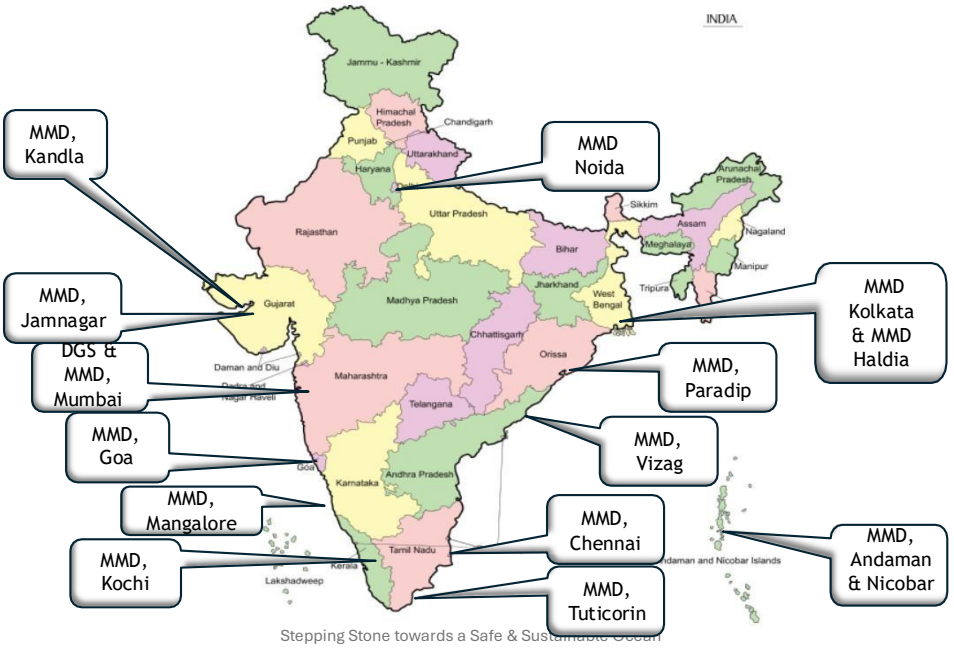
The Directorate's work is organized across key functional wings and branches - **Engineering, Nautical, Naval Architecture, Crew, Administration, Coastal Shipping, and Training**. Together, these verticals form the operational backbone of India's maritime ecosystem.

Our **core functions** reflect both our regulatory mandate and developmental vision:
We **formulate and enforce policy**, keeping pace with global maritime law.
We ensure **ship safety** through surveys, inspections, and certification.
We oversee **seafarers' training, competency, and welfare**, enabling India to remain one of the top seafarer-supplying nations in the world.
We are driving the **green shipping transition**, implementing MARPOL and promoting alternate fuels and decarbonization.
We also regulate **ship recycling**, with India leading globally in Hong Kong Convention–compliant yards.
And finally, we play a pivotal role in **international engagement**, representing India at the **IMO** and multiple global maritime forums.

In essence, the Directorate General of Shipping stands at the confluence of **policy, regulation, sustainability, and international cooperation** — ensuring that India's maritime growth remains both safe and sustainable, aligned with the **UN Sustainable Development Goals** and the vision of a **Viksit Bharat by 2047**.

"We are not just regulators; we are enablers of India's maritime future."

Mercantile Marine Departments



Mercantile Marine Departments

"This map illustrates the national footprint of the Directorate General of Shipping through its network of Mercantile Marine Departments, or MMDs."

The Directorate operates through **14 Mercantile Marine Departments** strategically located along India's vast coastline and inland regions. These offices act as the **operational arms** of the Directorate, ensuring that all statutory functions related to **safety, certification, inspection, training, and compliance** are executed efficiently and uniformly across the country.

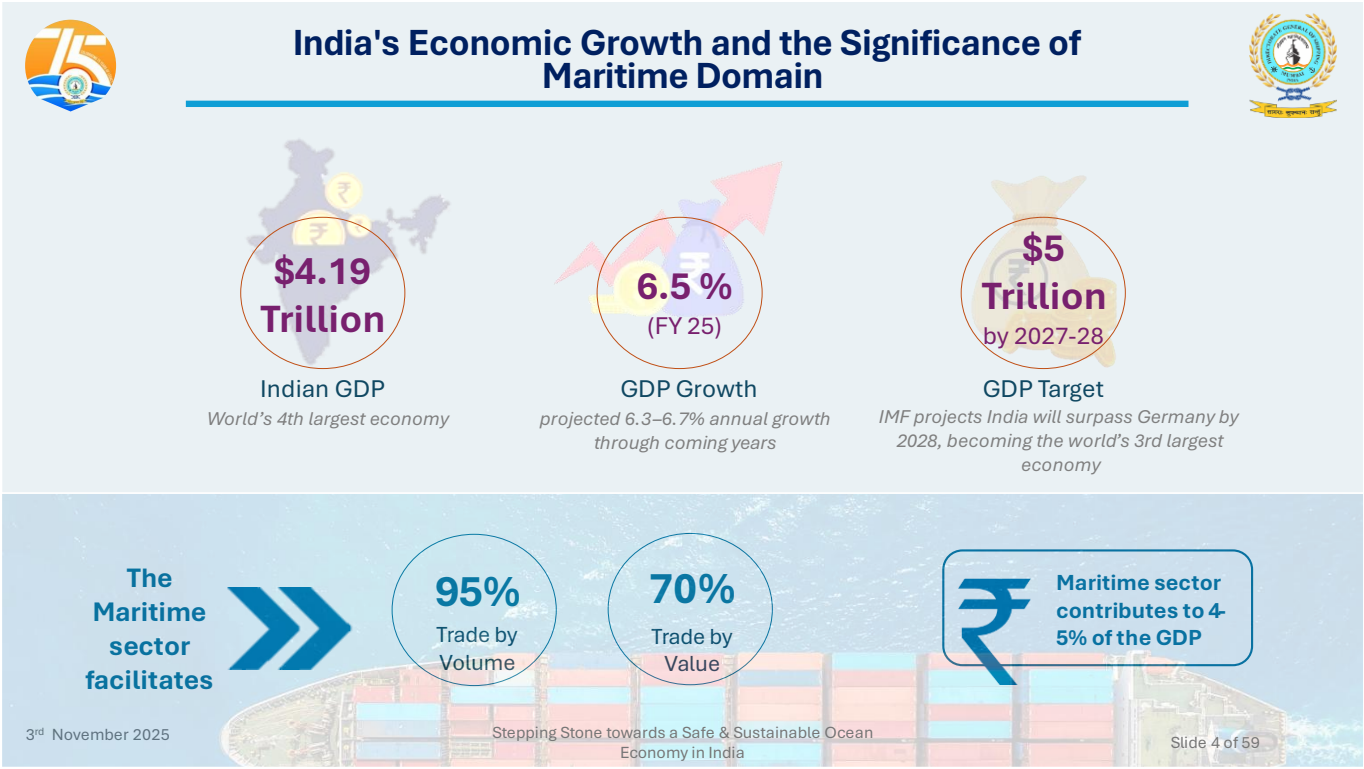
From **Kandla and Jamnagar in the west**, to **Kolkata, Haldia, and Paradip in the east**, and from **Tuticorin and Kochi in the south** to **Noida in the north**, each MMD serves as a crucial link in India's maritime administration framework. The presence of an MMD in the **Andaman and Nicobar Islands** also ensures regulatory coverage of India's strategic island territories.

Each of these departments is headed by a **Principal Officer**, supported by technical and administrative staff from diverse disciplines—engineering, nautical, and naval architecture—working in close coordination with the Directorate in Mumbai.

Their role is not merely administrative but also regulatory and service-oriented. They conduct **surveys of Indian and foreign ships**, issue **certificates of competency to seafarers**, carry out **port State and flag State inspections**, and ensure the **implementation of international maritime conventions** such as SOLAS, MARPOL, and STCW at the regional level.

Together, this network ensures **nationwide maritime governance**, providing accessibility and uniformity in the enforcement of shipping laws and safety standards, irrespective of where a vessel or seafarer is located in India.

"In short, these MMDs form the backbone of our field operations — ensuring that every port and coastal state in India remains connected to the Directorate's regulatory framework, and that the standards we uphold internationally are implemented locally with equal rigour."

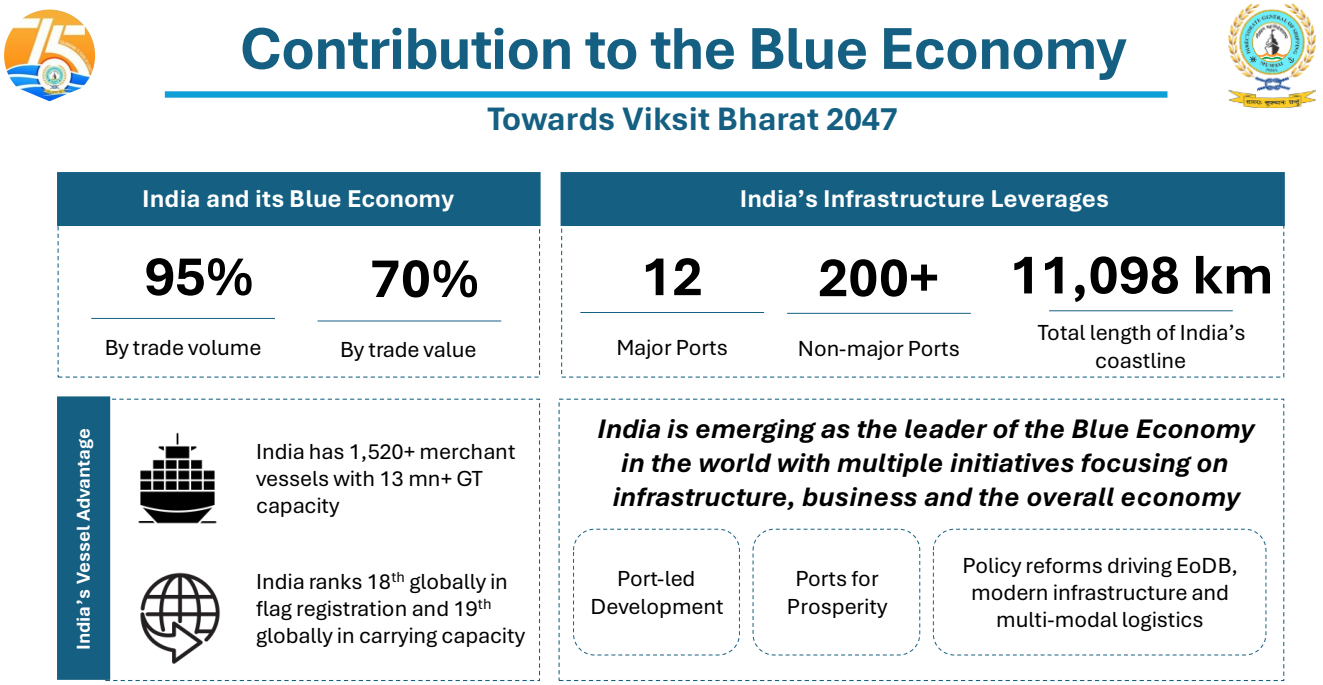


India's Economic Growth and the Significance of Maritime Domain

India today stands as the **world's fourth largest economy** with a GDP of **USD 4.1G trillion**, recording a growth rate of **6.5% in FY 2025**. With a projected growth trajectory of **6.3 - 6.7% annually**, the nation is firmly on course to achieve the **USD 5 trillion milestone by 2027 - 28**. The International Monetary Fund projects that by 2028, India will surpass Germany to emerge as the **world's third largest economy**, underscoring its growing global economic stature.

The maritime sector has been a critical enabler of this economic rise, **facilitating nearly G5% of India's trade by volume and 70% by value**. Beyond trade, the sector directly contributes **4–5% to the national GDP**, making it not only a backbone of India's commerce but also a strategic lever for sustained growth.

The synergy between economic expansion and maritime activity highlights a fundamental truth, India's economic ambitions are deeply intertwined with its maritime strength. As the country advances towards its vision for **Viksit Bharat @ 2047**, the maritime domain will continue to serve as the lifeline of trade, connectivity and strategic resilience.



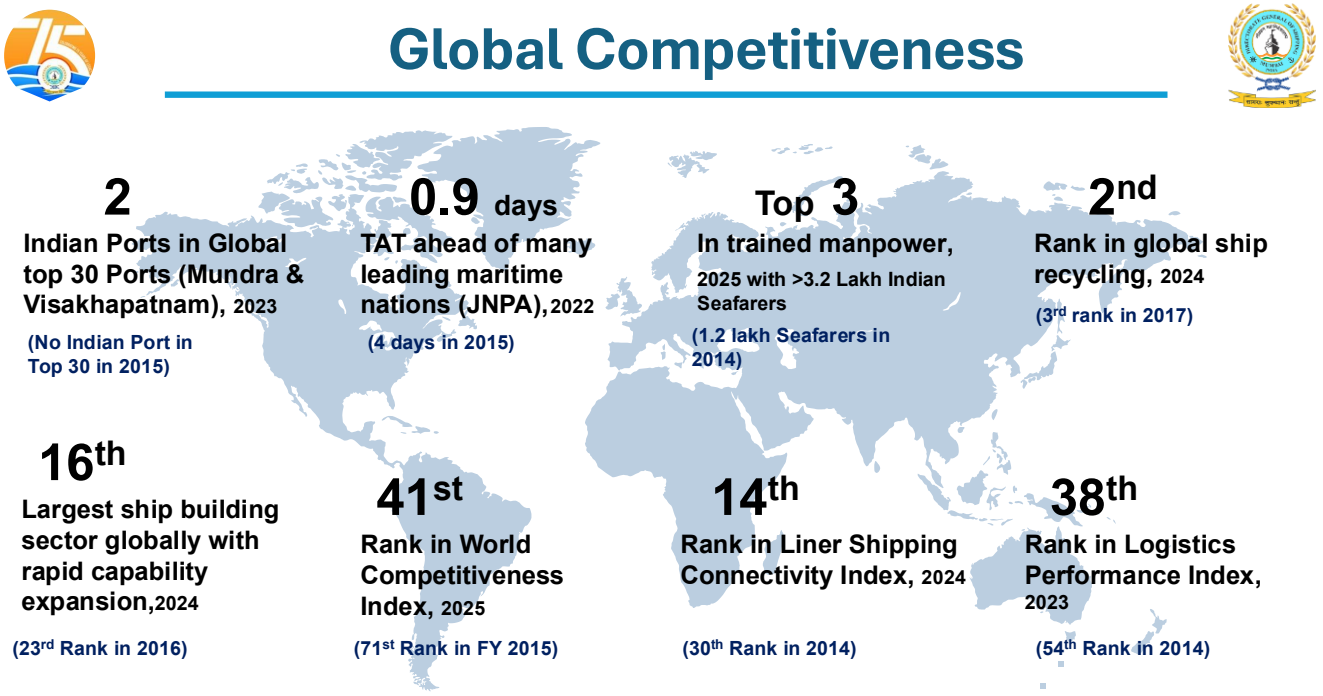
Contribution of the Blue Economy

The Blue Economy lies at the heart of India's economic and strategic rise, accounting for **G5% of trade by volume and 70% by value**. With **12 major ports, 200+ non-major ports, and an extensive coastline of 11,0G8 km**, India possesses one of the largest maritime infrastructures in the world, giving it a natural advantage in connecting markets and enabling prosperity.

India's fleet strength has also grown steadily, with **1,520+ merchant vessels aggregating over 13 million GT capacity**. On the global stage, India now ranks **18th in flag registration and 1Gth in carrying capacity**, underscoring its expanding role in global shipping while contributing significantly to supply chain resilience.

The Government has positioned the Blue Economy as a **pillar of Viksit Bharat 2047**, with a strong emphasis on **port-led development, multimodal logistics, and ease of doing business reforms**. Initiatives under Sagarmala, Harit Sagar, and Maritime India Vision 2030 have transformed ports into hubs of efficiency, green practices, and integrated logistics.

Thus, India's Blue Economy is not just about scale, but about direction, moving towards sustainability, competitiveness, and strategic influence. As the world transitions towards cleaner and more resilient maritime operations, India's leadership in the Blue Economy offers a model of how infrastructure, business, and policy can be aligned to deliver long-term growth and global impact.



Global Competitiveness

India's maritime sector has undergone a significant transformation in global rankings, reflecting improvements in efficiency, manpower, recycling, and overall competitiveness. From ports and logistics to shipbuilding and seafarer supply, India today stands as a pivotal player in global maritime trade.

Ports in Global Top 30: In 2015, no Indian port featured among the world's leading container hubs. By 2023, **Mundra and Visakhapatnam** have both entered the **global top 30 ports**, a testament to capacity expansion, operational efficiency, and international connectivity.

Turnaround Time (TAT): Vessel turnaround time at **JNPA improved from 4 days in 2015 to just 0.G days in 2022**, placing India ahead of many advanced maritime nations and showcasing the results of digitalization and port modernization.

Trained Manpower: With more than **3.2 lakh Indian seafarers in 2025**, up from 1.2 lakh in 2014, India ranks in the **global top 3 for maritime manpower**. This includes a growing strength of women seafarers, reinforcing India's role as the **second-largest supplier of trained seafarers worldwide**.

Global Ship Recycling: India has strengthened its global leadership in ship recycling, moving from **3rd rank in 2017 to 2nd rank in 2024**. With over 115 Hong Kong Convention–compliant yards at Alang, India's recycling practices now directly contribute to safe and sustainable global tonnage disposal.

Shipbuilding Sector: India's shipbuilding industry has advanced from **23rd globally in 2016 to 16th in 2024**, backed by financing reforms, capacity expansion, and the recent ₹69,725 crore package aimed at building a globally competitive ecosystem.

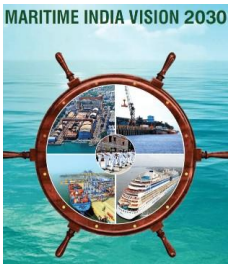
World Competitiveness Index: India's steady economic reforms and maritime sector efficiencies have elevated its position from **71st in FY 2015 to 41st in 2025**, signalling stronger global competitiveness across infrastructure, logistics, and trade facilitation.

Liner Shipping Connectivity Index: India's connectivity to global trade routes has improved dramatically, climbing from **30th in 2014 to 14th in 2024**, driven by expanded port capacity, greater container handling efficiency, and integration into global liner networks.

Logistics Performance Index: On the **World Bank LPI**, India has risen from **54th in 2014 to 38th in 2023**, particularly excelling in vessel turnaround and port efficiency. This improvement enhances India's role in global supply chains and strengthens its credibility as a logistics hub.

Taken together, these eight indicators highlight a decade of **policy-driven transformation and operational improvements**. India has shifted from being a lagging participant to an emerging global maritime leader — building resilience, strengthening competitiveness, and aligning with its vision of becoming a top maritime nation by **Viksit Bharat 2047**.

India's Vision for the Maritime Sector



Maritime India Vision (MIV) 2030

- Position India Globally in the Top 10 Shipbuilding, repair nations
- Production Targets: Increase from current 30k GT to 500k+ GT annually by 2030
- Investment: INR 20,000+ Crores
- Employment Generation: 1,00,000+ additional jobs (direct and indirect)

Maritime Amrit Kaal Vision 2047

- Advanced phase targeting Top5 global position in shipbuilding and maintaining 1 position in ship recycling
- 69% Indian-Built Ships Share (up from current 5%)
- 300+ Strategic Initiatives across 11 key maritime areas
- Financial Assistance: 20-30% assistance for green vessels (including retrofitting)

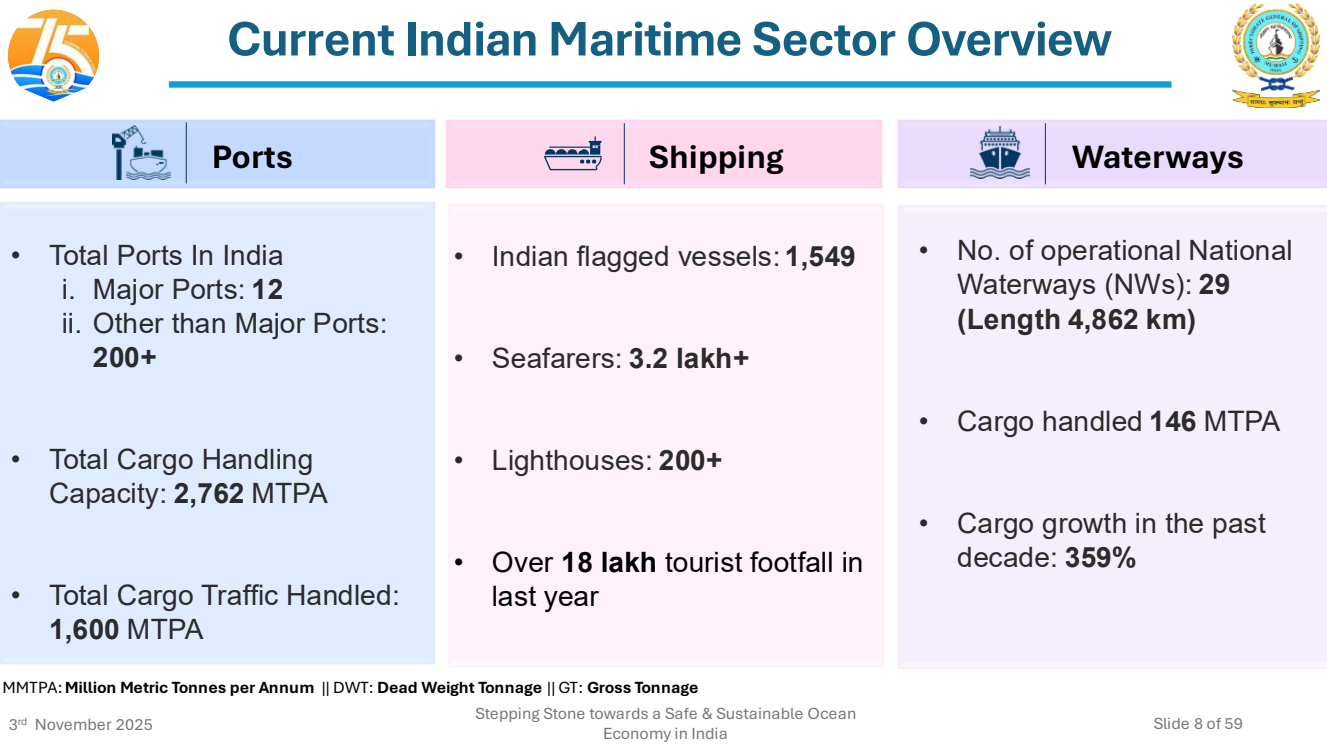
India's Vision for the Maritime Sector

India's maritime strategy is anchored in two long-term frameworks - **Maritime India Vision 2030 (MIV 2030)** and **Maritime Amrit Kaal Vision 2047 (MAKV 2047),** which together chart a pathway for transforming India into a global maritime power.

Maritime India Vision 2030 sets a 10-year blueprint aimed at positioning India among the world's **top 10 shipbuilding and repair nations**. It seeks to raise production from the current **30,000 GT to over 500,000 GT annually by 2030**, supported by an investment of **₹20,000+ crore**. The vision also targets the creation of over **1,00,000 new jobs** (direct and indirect) while strengthening domestic repair, recycling, and logistics ecosystems.

Looking further ahead, **Maritime Amrit Kaal Vision 2047** is an advanced phase of India's maritime ambitions, aligned with the country's goal of becoming a developed economy by 2047. It aspires to secure a **top 5 global position in shipbuilding** while maintaining India's leadership in **ship recycling**. With more than **300 strategic initiatives spanning 11 key areas**, MAKV 2047 envisions raising the share of Indian-built ships from **5% to nearly 6G%**, backed by **20–30% financial assistance for green vessels and retrofitting**.

These visions are not limited to infrastructure growth but also focus on **sustainability, innovation, and global integration**. By 2047, India's maritime sector is expected to be a major contributor to GDP growth, employment generation, and global supply chain resilience. Together, MIV 2030 and MAKV 2047 reaffirm India's commitment to becoming a **leading Blue Economy**, driven by green growth, digitalization and strategic partnerships.



Current Indian Maritime Sector Overview

"Before delving into policy and sustainability aspects, it is important to understand the scale and scope of India's maritime sector today."

India's maritime ecosystem is among the largest and most diverse in the world, encompassing **ports, shipping and inland waterways**, each playing a crucial role in supporting the country's trade, connectivity, and economic growth.

Let's begin with **Ports**.
India operates **12 major ports** and over **200 non-major or minor ports** spread across its extensive coastline. Together, these ports have a combined **cargo handling capacity of 2,762 million tonnes per annum**, handling around **1,600 million tonnes of cargo** last year. This capacity expansion reflects India's consistent focus on modernisation, digitalisation, and port-led industrial growth under the Sagarmala and Harit Sagar initiatives.

Moving to **Shipping** - the core of our maritime identity.
India today has over **1,500 Indian-flagged vessels**, supporting domestic and international trade. More importantly, India is one of the **largest contributors of seafarers** to the global maritime workforce, with **over 3.2 lakh trained professionals** serving across international fleets. Our network of **200+ lighthouses** ensures navigational safety along the coasts, while maritime tourism — a growing area, recorded **over 18 lakh visitors** in the past year, highlighting the sector's expanding socio-economic reach.

Lastly, **Waterways** - the most efficient and eco-friendly mode of transport.
India has **2G operational National Waterways**, covering approximately **4,862 kilometres**, handling **146 million tonnes of cargo annually**. What's remarkable is that in the last decade alone, inland waterway cargo traffic has **grown by nearly 360%**, reflecting a strong modal shift toward greener logistics and reduced carbon emissions.

Together, these three pillars, **Ports, Shipping, and Waterways** form the foundation of India's maritime strength. They support **G5% of India's trade by volume** and nearly **70% by value**, directly contributing to around **4–5% of the national GDP**.

"This integrated growth across our maritime ecosystem is what positions India to lead the next phase of the global Blue Economy — one that is competitive, sustainable, and inclusive."

Synergy Between DGS and UN Ocean Centre

How DGS is Connected:

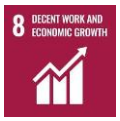
- India's apex maritime regulator, implementing **IMO conventions** and **National shipping policy.**
- Direct role in **safety, seafarers, environment, and sustainable shipping**
- Key driver of India's maritime vision – **MIV 2030, MAKV 2047, Viksit Bharat 2047**.

Why Partnership Matters:

- **Knowledge Exchange:** Bridges global UN expertise with India's field experience (MMDs).
- **Capacity Building:** Strengthens skills of officers in shipping ports, fisheries, aquaculture.
- **Policy Alignment:** Connects India's initiatives (NGSP, Harit Sagar, OPS, Ship Recycling) with **UN SDG goals**.
- **Global Visibility:** Enhances India's role in ocean governance and **Blue Economy & Green Economy transition**.

Relevant UN SDGs :

- **SDG 14 – Life Below Water** (sustainable use of oceans).
- **SDG 13 – Climate Action** (decarbonisation & green shipping).
- **SDG 8 – Decent Work & Economic Growth** (seafarer welfare, just transition, circular economy).
- **SDG 12 – Responsible Consumption & Production** (ship recycling, marine plastics).



Synergy Between DGS and UN Ocean Centre

"This slide captures the core connection between the Directorate General of Shipping and the United Nations Ocean Centre — a partnership that is both natural and strategic."

The **Directorate General of Shipping**, as India's **apex maritime regulator**, is the principal authority responsible for implementing **IMO conventions**, enforcing **national shipping legislation**, and driving **maritime sustainability policies** across the country.

Our mandate extends well beyond regulation. It includes **safety of ships**, **welfare of seafarers**, and the promotion of **environmentally responsible and sustainable shipping**.
We are also a key driver of India's broader maritime vision, through initiatives under **Maritime India Vision 2030**, **Maritime Amrit Kaal Vision 2047**, and the overarching national objective of **Viksit Bharat 2047**.

Now, this partnership with the **UN Ocean Centre** is especially relevant because it helps bridge global expertise with India's vast on-ground implementation capacity. The Directorate's nationwide field presence, through **14 Mercantile Marine Departments** and extensive stakeholder networks, makes it a natural partner in the practical realization of UN-led ocean sustainability initiatives.

There are four pillars that make this collaboration meaningful:

Knowledge Exchange: It allows us to combine UN's global frameworks and analytical depth with India's local field experience, technical insights, and regulatory infrastructure.
Capacity Building: It helps strengthen the skills of officers and professionals in areas such as **shipping, port operations, fisheries, and aquaculture,** thereby nurturing a workforce aligned with global maritime sustainability standards.
Policy Alignment: It ensures that India's flagship initiatives, including the upcoming **National Green Shipping**

Policy, **Harit Sagar Guidelines**, **Onshore Power Supply projects** and **Ship Recycling frameworks** are aligned with **UN Sustainable Development Goals**.
Global Visibility: Through such collaborations, India's efforts gain international recognition, enhancing our leadership role in the transition toward a **Blue Economy** and a **Green Economy**.

This partnership directly contributes to several **UN SDGs** :
SDG 14 (Life Below Water) through the sustainable use and conservation of ocean resources;
SDG 13 (Climate Action) by advancing maritime decarbonization and green fuel transitions;
SDG 8 (Decent Work and Economic Growth) through seafarer welfare, just transition, and circular economy models; and
SDG 12 (Responsible Consumption and Production) through ship recycling and marine waste reduction.

"In essence, the DGS–UN Ocean Centre partnership exemplifies the spirit of global cooperation — combining India's maritime experience with the UN's knowledge ecosystem to drive collective progress towards safer, greener, and more inclusive oceans."

Blue Economy

Growth with Sustainability

- Sustainable use of ocean resources for economic growth, improved livelihoods, and jobs while preserving the marine ecosystem.
- Balances economic development, environmental sustainability, and social inclusion.
- Recognized as a key pillar under MAKV2047 and MIV 2030.

Key Focus Areas :

- Fisheries & Aquaculture
- Maritime Transport & Ports
- Livelihood Generation
- Tourism & Coastal Development
- Marine Renewable Energy
- Shipbuilding & Recycling
- Marine Biotechnology & Research

Impact :

- Economic diversification with inclusive growth for coastal communities.
- Strengthened ecosystem resilience & biodiversity protection.
- Positioning India as a global maritime hub in sustainable trade and logistics.

India's Vision :

- Target to be a **leading Blue Economy nation by 2047**.
- Enhance ocean-based GDP contribution while ensuring **net-zero pathways**.
- Integrate **Harit Sagar Guidelines** for green port practices.
- Promote **regional cooperation** (IORA, BIMSTEC, ASEAN, IMO initiatives).

Blue Economy – Growth with Sustainability

"The Blue Economy represents the bridge between ocean health and human prosperity, and for India, it is both a developmental priority and a moral responsibility."

At its core, the **Blue Economy** refers to the **sustainable use of ocean resources** for economic growth, job creation, and improved livelihoods, while preserving the marine ecosystem. It recognizes that the ocean is not merely a resource, but a shared global heritage that demands balance between **economic development**, **environmental stewardship** and **social inclusion**.

Under India's strategic maritime frameworks, the **Maritime Amrit Kaal Vision 2047** and the **Maritime India Vision 2030,** the Blue Economy has been recognized as a **key pillar of long-term national growth**. These visions aim to align ocean-based industries with the goals of sustainability, decarbonization, and community development.

The approach is holistic, encompassing **the key focus areas**:
Fisheries and Aquaculture, ensuring food security and livelihood resilience; **Maritime Transport and Ports**, the backbone of India's trade and logistics; **Tourism and Coastal Development**, enhancing economic opportunities while protecting fragile ecosystems;
Marine Renewable Energy, including offshore wind and tidal energy;
Shipbuilding and Recycling, integrating circular economy principles; and
Marine Biotechnology and Research, promoting innovation and sustainable resource use.

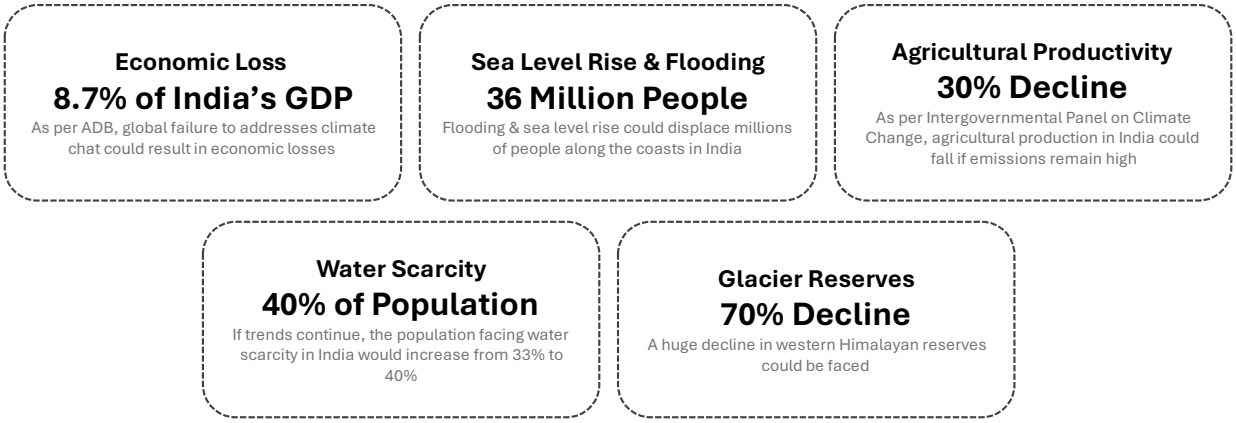
Our **vision** is clear ie. to make India a **leading Blue Economy nation by 2047**. This means increasing the **ocean-based contribution to GDP** while following a **net-zero growth trajectory**.
We are integrating the **Harit Sagar Guidelines** to ensure green and resilient port operations, and actively

promoting **regional cooperation** through platforms like **IORA, BIMSTEC, ASEAN, and IMO-led initiatives**.

The **impact** of this transition is multidimensional:
It drives **economic diversification** and creates **inclusive growth** opportunities for coastal communities;
It strengthens **ecosystem resilience and biodiversity protection**; and
It positions India as a **global maritime hub** for sustainable trade, logistics, and innovation.

"In essence, the Blue Economy embodies our collective resolve — to use the oceans responsibly, to grow equitably, and to leave behind seas that are cleaner, safer, and more productive for future generations."

Impacts of Climate Change



Impacts of Climate Change

"When the coastlines retreat, so does the confidence of a maritime nation."

Climate change is no longer a future threat. it is a lived reality for India. As one of the world's most climate-vulnerable nations, India faces multidimensional risks that directly affect its economy, coastal communities, food security, water systems, and maritime infrastructure.

Economic Impact

The Asian Development Bank (ADB) estimates that unchecked climate change could reduce India's GDP by up to **8.7% by 2100**. Extreme weather events, disruption of supply chains, damage to coastal port assets, and loss of productivity will place immense pressure on national development goals.

Sea Level Rise & Coastal Displacement

Over **36 million Indians** are at risk of displacement due to sea-level rise and coastal flooding, particularly in low-lying states such as West Bengal, Odisha, Tamil Nadu, and Gujarat. India's 7,500 km coastline and major ports are increasingly exposed to storm surges and saline water intrusion, threatening maritime trade and livelihoods.

Agricultural Productivity Decline

The **IPCC projects a 30% decline** in India's agricultural output if high-emission trends persist. Heat stress, erratic monsoons, and shifting rainfall patterns endanger food security and rural incomes, further intensifying migration pressure on coastal and urban zones.

Water Stress

Today, one-third of India's population faces water scarcity. By 2050, this number could rise to **40%**, as Himalayan ice melt, reduced river flows, and rising evaporation diminish freshwater availability. Climate-linked water stress will

aggravate interstate river disputes and strain urban water systems.

Glacier Loss & Himalayan Risk

The Western Himalayan glaciers may witness up to a **70% decline**, jeopardizing perennial river systems such as the Ganga, Brahmaputra, and Indus. This impacts drinking water, irrigation, hydropower, and ecological stability, directly affecting India's long-term maritime and riverine logistics.

UNFCCC Framework

Purpose: *Stabilize greenhouse gas (GHG) concentrations in the atmosphere to prevent dangerous anthropogenic interference with the climate system*

Key Principles:
•Common but differentiated responsibilities (CBDR)
•Precautionary principle
•Sustainable development integration

Present-Day Evolution:
•Over **197 Parties** ratified, including India
•Serves as the **umbrella framework** for subsequent agreements: Kyoto Protocol (1997), Paris Agreement (2015)
•Ongoing initiatives: Nationally Determined Contributions (NDCs), climate finance mechanisms, capacity building, technology transfer

UNFCCC Framework

The **United Nations Framework Convention on Climate Change (UNFCCC)**, adopted at the Earth Summit in 1992, serves as the foundational global treaty to address climate change. Its core mission is to stabilize greenhouse gas concentrations to prevent dangerous human interference with the climate system.

Core Principles of UNFCCC

Common But Differentiated Responsibilities (CBDR):
Recognizes that all countries share the responsibility to combat climate change, but developed nations must lead due to their historical emissions and greater capabilities.

Precautionary Principle:
Calls for preventive action against climate risks, even when full scientific certainty is lacking — prioritizing protection over delay.
Sustainable Development Integration:
Climate action must align with development goals, ensuring that economic growth, poverty eradication, and environmental protection proceed together.

Evolution Under the UNFCCC Umbrella

The UNFCCC acts as an umbrella legal framework, under which major climate agreements have been established:

Kyoto Protocol (1GG7):
Introduced legally binding emission reduction targets for developed countries.

Paris Agreement (2015):

Shifted to a universal pledge system, requiring all 197 Parties, including India, to submit **Nationally Determined Contributions (NDCs)**.

Ongoing Work Streams:

Climate finance (Green Climate Fund)
Technology transfer C capacity building
Global Stocktake C mitigation adaptation balance

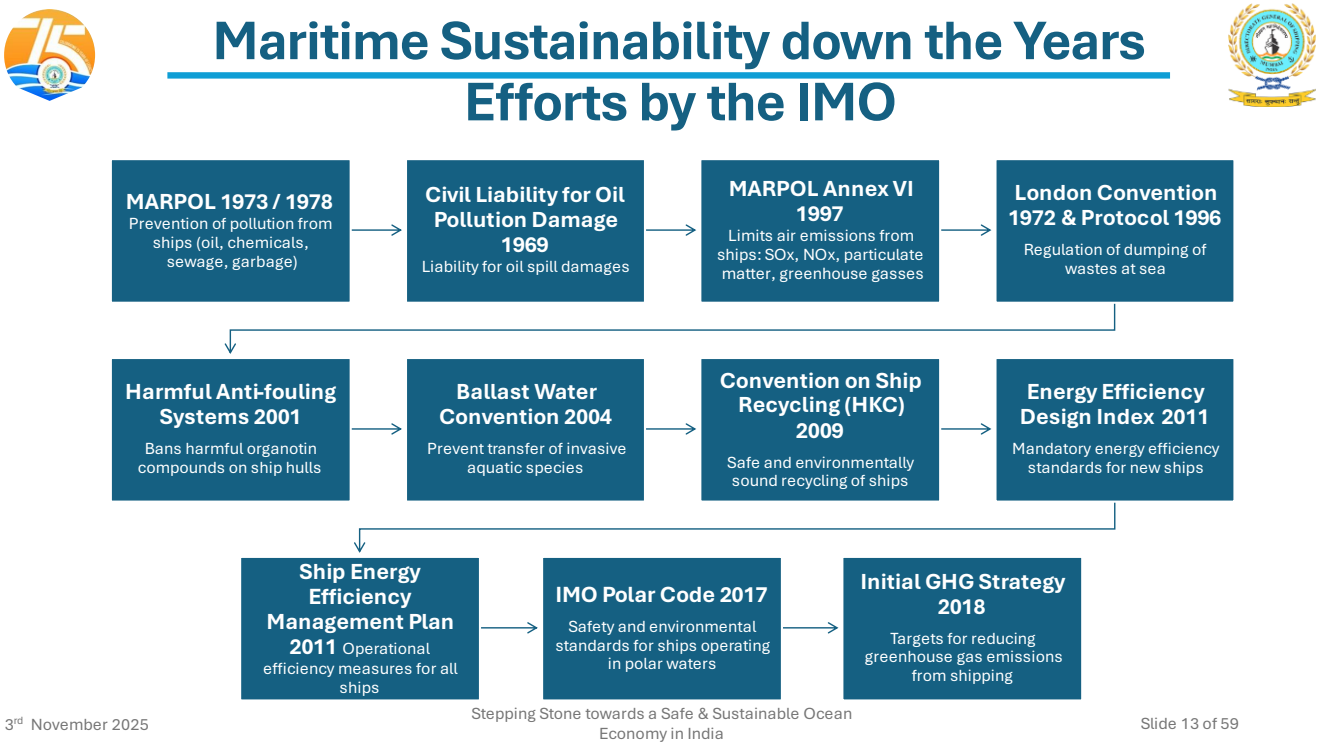
India's Role and Commitments

India has actively shaped the narrative of **climate justice**, asserting that development must not be compromised. Through its NDCs, India has committed to:
45% reduction in emissions intensity of GDP by 2030
50% installed power from non-fossil fuel sources
Net Zero by 2070 commitment announced at COP26

India continues to uphold **climate equity** and the right to growth for developing nations.

Relevance to Maritime Sector

UNFCCC principles, especially CBDR, now influence negotiations at the **International Maritime Organization (IMO),** where India advocates that developing countries should have fair transition timelines and access to green fuel technologies.



Maritime Sustainability down the Years Efforts by the IMO

The journey of maritime sustainability under the International Maritime Organization (IMO) reflects a progressive evolution, from controlling visible marine pollution to addressing invisible emissions and ultimately steering global shipping toward decarbonization. Each milestone represents a deliberate expansion of responsibility: from oil spills, to toxic chemicals, invasive species, ship recycling, operational efficiency, and today, climate change.

Foundation Years : collectively established that oceans are not dumping grounds. Neither for waste, nor unregulated emissions. IMO's role evolved from navigational safety to environmental stewardship.

MARPOL 1G73/78 laid the very foundation of maritime environmental regulation. It sought to prevent the discharge of harmful substances — oil, chemicals, sewage, garbage — and established pollution control as a core shipping obligation.

The Civil Liability Convention (1G6G) introduced legal and financial accountability for oil pollution damage, marking a critical shift from mere prevention to compensation for environmental harm.

MARPOL Annex VI (1GG7) extended IMO's mandate into the **air pollution domain**, setting limits on sulphur oxides (SOx), nitrogen oxides (NOx), and particulate matter from ships, and laying early groundwork for greenhouse gas control.

The London Convention (1G72) and London Protocol (1GG6) regulated **dumping of wastes at sea**, using a 'reverse list' approach that bans dumping unless explicitly allowed. Later, the Protocol expanded to address new risks like **Carbon Capture and Storage (CCS)** and **marine geoengineering**.

Targeted Ecological Protections - From Sea Life to End-of-Life : IMO transitioned from land-sea protection to tackling environmental harm *across the life cycle of a ship,* covering design, operation and dismantling. **Anti-Fouling Systems Convention (2001)** prohibited harmful organotin compounds like TBT from ship hulls due to their toxic impact on marine life, forcing the industry to shift to environmentally safe coatings.

Ballast Water Management Convention (2004) addressed one of the most silent global threats — transportation of invasive aquatic species. It introduced the D-1 and D-2 discharge standards and mandated onboard treatment systems.

Hong Kong Convention (200G) brought sustainability full circle by ensuring that ships are safely and responsibly recycled at the end of their operational life, requiring inventoried hazardous materials and certified recycling yards.

Energy Efficiency Design Index (EEDI) – 2011 became the first global legally binding climate standard on any industrial sector, requiring all *newbuild* ships to meet minimum energy efficiency performance.

Operational G Climate Governance - The Decarbonisation Era : The environmental journey moved from cleanup and containment, to efficiency and accountability, to systemic decarbonisation. IMO is today the only UN agency with a sector-wide Net Zero transition underway.

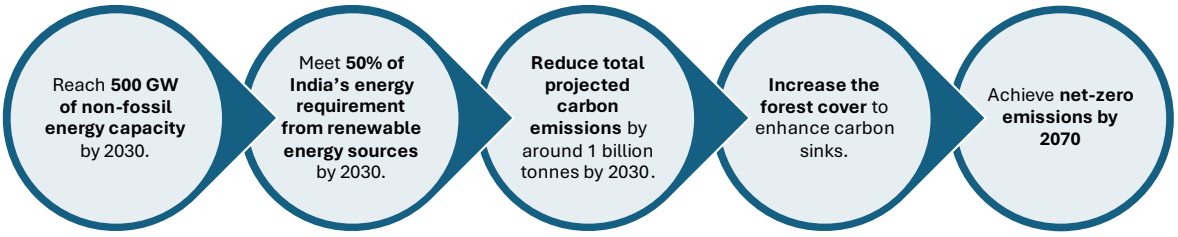
Ship Energy Efficiency Management Plan (SEEMP) 2011 introduced operational controls, making every voyage accountable through better planning, speed management, and performance monitoring.

IMO Polar Code (2017) expanded IMO's jurisdiction to ecologically fragile polar regions, setting stringent ship safety and environmental protection norms in newly accessible waters due to ice melt.

Initial IMO GHG Strategy (2018) marked a historic turning point calling for at least **50% reduction in total GHG emissions** from international shipping by 2050, on a pathway to **zero**. This strategy paved the way for ongoing development of the **IMO Net Zero Framework**, including measures such as GFI (fuel intensity limits), CII (carbon intensity indicator), and GHG pricing mechanisms.

India's Panchamrit Action Plan

The Panchamrit action plan is a five-fold strategy proposed by India to address climate change.



India's Panchamrit Action Plan at COP-26

India's announcement of the *"Panchamrit"* at COP-26 in Glasgow marked a defining moment in global climate negotiations, positioning the country not as a reluctant participant, but as a proactive leader among developing nations.
Rooted in the principles of *equity, climate justice,* and *Common but Differentiated Responsibilities (CBDR-RC),* the Panchamrit provides a strategic, five-fold blueprint for India's long-term transition towards a low-carbon economy.

The first commitment is to achieve **500 GW of non-fossil energy capacity by 2030**, demonstrating India's intent to become one of the world's largest renewable power generators. Parallelly, India pledged that **50% of its total energy requirements will come from renewable sources** by 2030, signalling a structural shift away from coal dependency. These targets align with major domestic initiatives such as the National Solar Mission, Green Hydrogen Mission, and large-scale offshore wind development.

In quantitative terms, India has committed to **reducing projected carbon emissions by 1 billion tonnes by 2030**, indicating a measurable contribution towards the global carbon budget. This is reinforced by a pledge to **reduce the carbon intensity of its GDP by 45% from 2005 levels**, reflecting a focus on economic efficiency rather than absolute caps, essential for a developing economy still pursuing growth and poverty eradication.

The long-term anchor of Panchamrit is the goal of reaching **net-zero emissions by 2070,** a timeline that balances developmental imperatives with climate responsibility. India has argued at COP forums that developed nations must reach net-zero well before 2050, as they have historically consumed a disproportionate share of the global carbon budget.

Beyond mitigation, India used the Panchamrit platform to highlight systemic concerns faced by developing countries. India firmly reiterated that **climate finance and technology transfer must be tracked as seriously as**

emissions reductions, calling for accountability on the USD 100 billion annual pledge by developed countries. The concept of **LIFE – Lifestyle for Environment** was introduced as a behavioural movement, encouraging mindful consumption and sustainable living as a collective global responsibility.

Through Panchamrit, India has effectively linked climate action with climate justice, committing to ambitious goals while demanding an equitable global framework that neither penalises development nor ignores historical responsibility. The international response to Panchamrit has been largely positive, with multiple nations acknowledging India's pragmatic yet visionary approach.

Green Shipping – The Big Picture

- Shipping is the **backbone of global trade** – carrying 80% of goods worldwide.
- Shipping contributes to ~3% of global CO_2 emissions.
- Green Shipping = *making ships, ports, and supply chains cleaner, smarter, and future-ready.*
- It's not just about compliance — it's about **staying competitive in a low-carbon economy.**
- **Vision & Commitments:**
  - Aligned with *Maritime India Vision 2030 & Maritime Amrit Kal Vision 2047*.
  - Supports IMO's **Net Zero 2050** ambition.
  - Anchored in India's **Panchamrit Pledge** – 500 GW non-fossil capacity by 2030, Net Zero by 2070.

"The future of shipping is green — by necessity, not by choice."

Green Shipping – The Big Picture

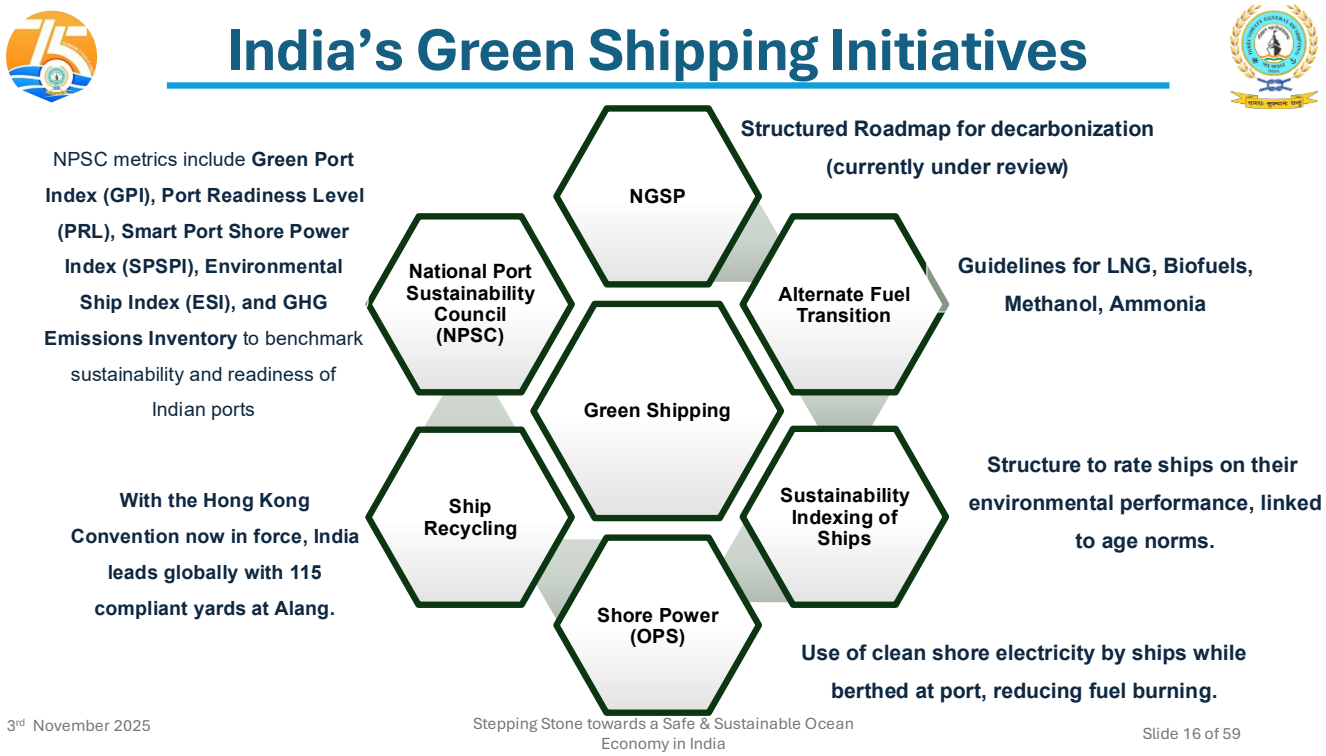
Shipping is the backbone of world trade, carrying nearly **80% of global goods**. But it is also responsible for **~3% of global CO_2 emissions**, making decarbonisation one of the most pressing challenges of our time.

Green Shipping is not just about compliance, it is about transforming **ships, ports, and supply chains into cleaner, smarter, and future-ready systems**. In a low-carbon economy, sustainability is synonymous with competitiveness, and the maritime sector cannot afford to lag behind.

India's approach aligns ambition with action:

Maritime India Vision 2030 and **Maritime Amrit Kaal Vision 2047** embed sustainability into long-term growth strategies.
India supports the **IMO's Net Zero 2050** ambition, strengthening its role as a responsible maritime nation.
Through the **Panchamrit Pledge**, India has committed to 500 GW of non-fossil capacity by 2030 and Net Zero by 2070, anchoring maritime decarbonisation within the national clean energy agenda.

The **future of shipping is green by necessity, not by choice.** Green shipping is not a burden but an opportunity: to reduce costs, attract green finance, and ensure India remains at the forefront of global maritime competitiveness.



India's Green Shipping Initiatives

India's maritime decarbonization roadmap is evolving from isolated compliance measures into an integrated national strategy under the broader vision of *"Samudra Shuddhih, Rāṣṭrasya Vriddhih."* This transformation is being driven by coordinated initiatives that target vessels, ports, fuel ecosystems, and regulatory governance.

At the institutional level, the formation of the **National Port Sustainability Council (NPSC)** reflects a shift toward performance-based benchmarking in port operations. The council employs indicators such as the *Green Port Index (GPI), Port Readiness Level (PRL), Environmental Ship Index (ESI)* and *GHG Emissions Inventory*, ensuring Indian ports are globally aligned on sustainability, electrification, and green infrastructure standards.

A central pillar of green transition is the **National Green Shipping Plan (NGSP)**, which provides a structured roadmap for decarbonisation of both ports and ships. The plan not only sets targets for reducing port emissions but also outlines future bunkering corridors for alternative fuels such as LNG, biofuels, methanol, and green ammonia. These fuels are being introduced through detailed guidelines to support a phased shift from transitional to zero-carbon fuels.

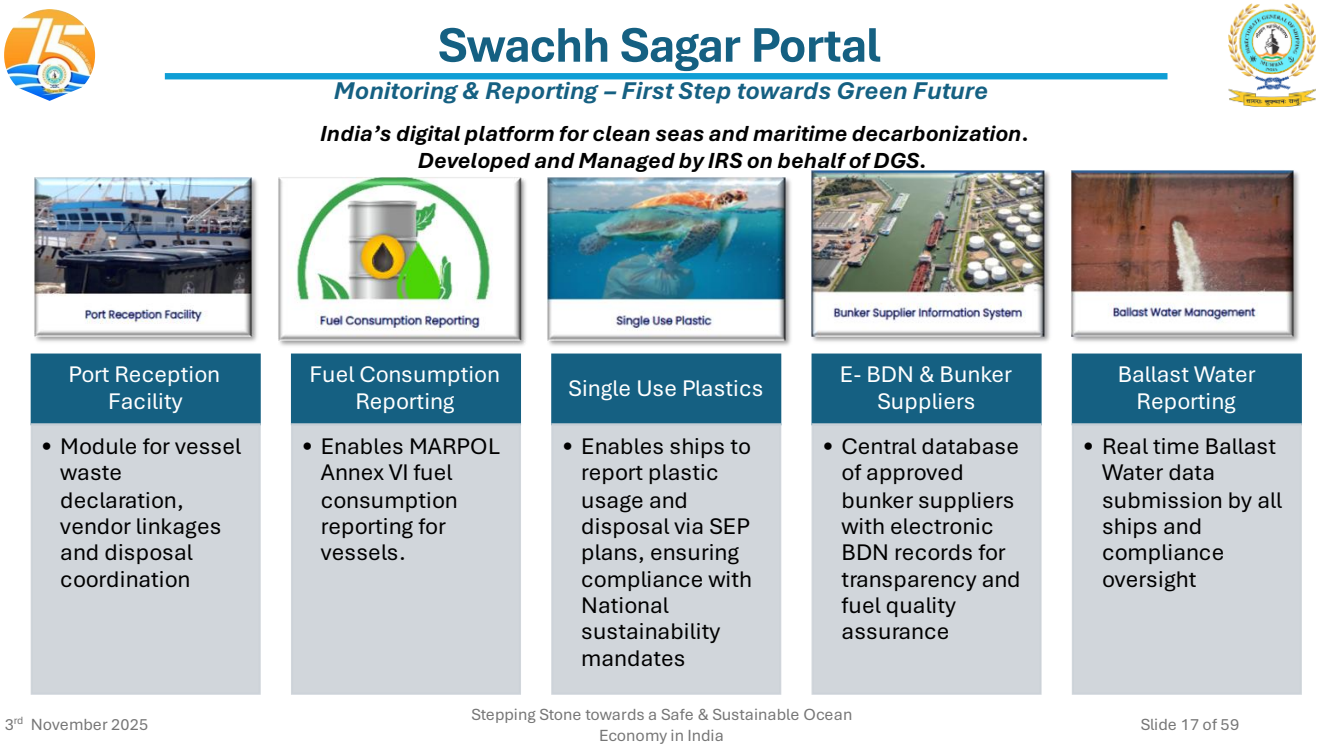
On the vessel front, **Sustainability Indexing of Ships (SIS)** is being introduced to rate ships based on environmental performance, integrating parameters such as fuel type, age, emissions, and onboard energy efficiency. This index will be directly linked to regulatory incentives and port access policies, encouraging shipowners to modernise fleets and retire obsolete, high-emission tonnage.

Shore Power (Onshore Power Supply - OPS) forms another critical component, aimed at eliminating auxiliary engine use while ships are docked. By supplying clean electricity directly at berth, OPS significantly reduces particulate emissions, sulphur oxides, and carbon output in port cities. Pilot installations at major

ports such as VOC and JNPA are now being expanded to create OPS- enabled green corridors.

Ship recycling also contributes to India's green leadership. With the Hong Kong Convention now in force, India leads the world with over **115 HKC-compliant recycling yards at Alang**, integrating environmentally safe dismantling practices and hazardous waste management. This positions India as a responsible global hub in the circular economy for ships.

Together, these initiatives illustrate India's transition from a compliance-driven maritime nation to a climate-responsible maritime power. By integrating policy (NGSP), infrastructure (OPS), market readiness (alt-fuels), and regulatory reform (SIS, NPSC), India is preparing not only to meet IMO's 2050 targets but to set new benchmarks for green maritime leadership.



Swachh Sagar Portal

Monitoring & Reporting – First Step towards Green Future

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.

National Green Shipping Policy

Maritime Vision for a Green Future

The NGSP is India's strategic response to the global decarbonization mandate, a policy blueprint designed to secure maritime growth while transitioning towards clean energy, sustainable ships and climate-resilient ports.

Key Transition Pillars:

- Green Ships
- Green Ports
- Green Fuels
- Green Recycling
- Green Financing & Collaborations

Strategic Intent

To position India as a **global hub for green shipping and future fuels**, enabling industry to move from regulatory compliance to global competitiveness and leadership.

Draft NGSP Document under Review

The National Green Shipping Policy (NGSP) is India's comprehensive roadmap to align the maritime sector with global decarbonization goals while ensuring economic growth and competitiveness. As highlighted in the consultative document (2025), NGSP is not just an environmental initiative, but a strategic shift to position India as a global hub for **green shipping, green fuels, green ports, and maritime innovation**. It builds on international mandates such as the IMO's 2023 GHG Strategy and domestic commitments announced under COP-26 *Panchamrit*.

The policy integrates sustainability across the maritime value chain, focusing on low-emission vessel technologies, alternative fuel infrastructure, regulatory reform, and green financing mechanisms. It also aligns with major national frameworks – **Maritime India Vision 2030, Amrit Kaal Vision 2047, Sagarmala and Harit Sagar guidelines** – creating a unified and future-ready maritime strategy.

Key Transition Pillars

Green Ships:

Promotion of energy-efficient vessel designs, retrofits, zero-emission propulsion, and mandatory green certification. NGSP envisions India becoming a shipbuilding and retrofit hub for low-carbon vessels.

Green Ports:

Port decarbonization through shore power (OPS), electrified equipment, green corridors, emission monitoring, and renewable integration (solar, wind, hydrogen bunkering).

Green Fuels:

Adoption of biofuels, LNG, methanol, hydrogen and ammonia under a phased fuel transition plan. The policy promotes domestic fuel production and bunkering hubs to make India a **future fuel supply nation**.

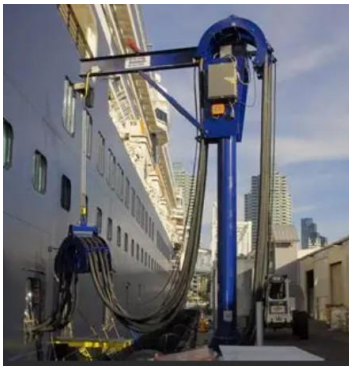
Green Recycling:
Modernization of Alang and other ship recycling yards under HKC-compliant practices, with circular economy principles, hazardous waste control, and global recycling leadership.

Green Finance & Collaboration:
Creation of national green maritime funds, tax incentives, ESG-linked financing, PPP models, and international partnerships to support innovation and equitable transition.

Strategic Intent
The core objective of NGSP is to **shift India from regulatory compliance to global leadership** in green shipping. By integrating technology, sustainability, and economy, India seeks to become a maritime nation that exports *solutions, not emissions*. The policy emphasizes a just and equitable transition, ensuring inclusion of industry, labour, MSMEs, and coastal communities.

Shore to Ship

What is Shore Power?
Electricity supplied from the shore to berthed ships, allowing engines to be switched off and eliminating fuel combustion while docked.



Why It Matters
- Cuts **CO_2, NOx, SOx and Particulate Matter** emissions in port zones
- Improves **Air Quality and ESG scores** for Indian ports
- Supports compliance with **IMO CII, GHG & Green Port Index**

Implementation Status in Indian Ports
- **Kamarajar Port** - 500 kW, 400V, 50-60 Hz in Coal Berth 1 & 2
- **VO Chidambaranar Port** - 305 kW, 400V 60Hz in VOC Berth 2 & 3
- **Jawaharlal Nehru Port Authority** - SPS used for Tugs. SPS for all terminals planned (45MVA; INR 600 crore expected)

Possible Financing options

Blended finance → *govt + MDBs + private capital.*

Green/blue bonds → *specifically earmarked for OPS infra.*

PPP models → *private players co-invest in OPS roll-out.*

Shore-to-Ship Power (OPS)

Shore-to-Ship Power (Onshore Power Supply – OPS), commonly referred to as *cold ironing*, enables vessels to switch off their diesel auxiliary engines and draw electricity directly from port infrastructure while berthed. This significantly reduces emissions of **CO_2, NO_x, SO_x and Particulate Matter**, addressing one of the most concentrated sources of pollution in port cities.

OPS is central to India's maritime decarbonisation strategy under *Harit Sagar*, supporting compliance with IMO's CII and aligning with national climate commitments under the Panchamrit and Net Zero 2070 vision. Beyond emissions reduction, OPS improves **ESG scores, port sustainability ratings**, and promotes health benefits for coastal communities.

Implementation Progress in Indian Ports

Kamarajar Port (Ennore) – 2024 Commissioning

Commissioned OPS facility in **November 2024**, at a cost of **₹20.5 crore**.
Capacity: **500 kW, 400V, 50–60 Hz**, serving **Coal Berths 1 & 2**
Developed under **Harit Sagar Guidelines**, promoting green port practices.
KPL is actively encouraging vessels to retrofit and connect, supported by trials and coordination with Paradip Port for a **Green Shipping Corridor (Paradip–Ennore)**.

VO Chidambaranar Port (Tuticorin)

OPS installed at **Berths 2 & 3** (305 kW units), supporting auxiliary load supply and positioning VOC as a green maritime pilot port.

Jawaharlal Nehru Port Authority (JNPA)

Currently uses OPS for port tugs.
₹600 crore, 45 MVA national terminal OPS plan under formulation to become India's largest cold ironing hub.

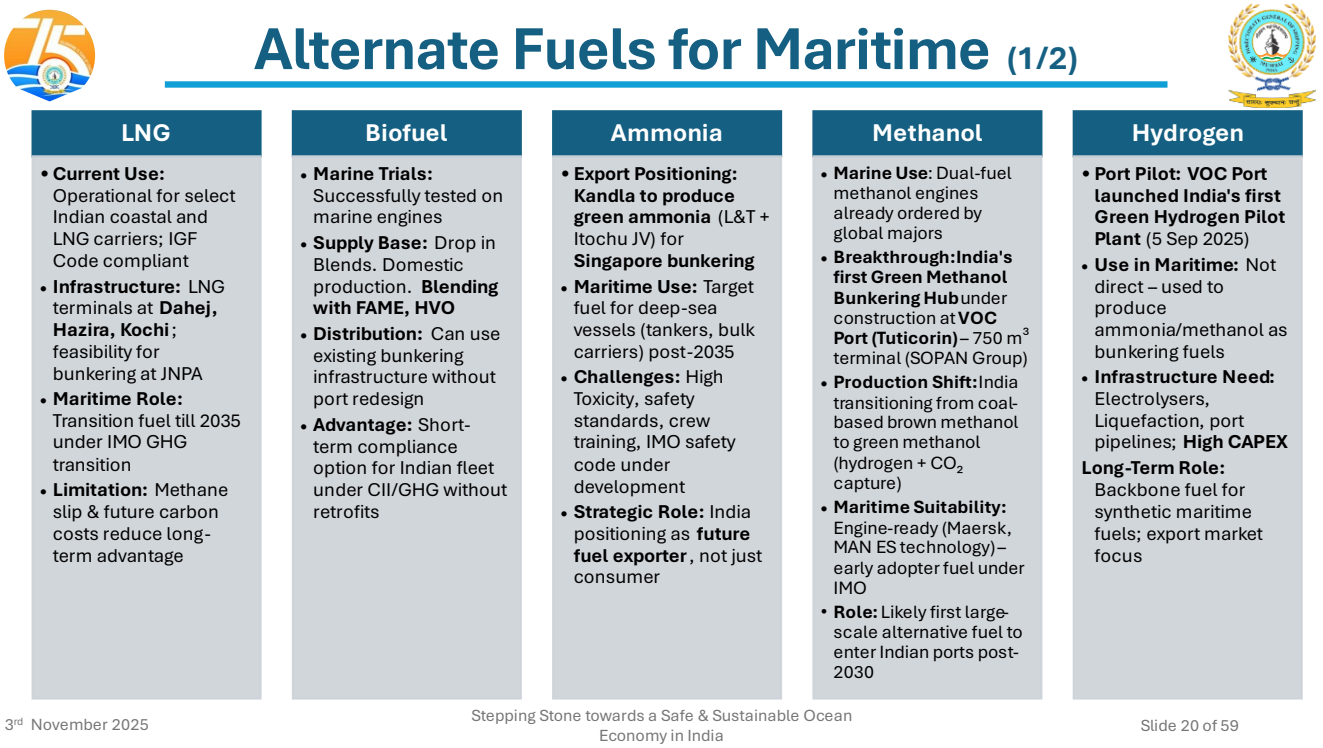
Challenges & Opportunities

While ships are currently hesitant due to retrofitting and administrative costs, OPS offers long-term operational benefits:

- Reduced fuel consumption and engine wear
- Lower carbon intensity scores (CII/GHG Index compliance)
- Eligibility for global green incentives and carbon credits

Financing the Transition

- **Blended Finance** – Government + MDBs + private capital
- **Green/Blue Bonds** – Infrastructure-specific debt mechanisms
- **PPP Models** – Terminal operators & energy companies co-investing



Alternate Fuels for Maritime

India's maritime fuel transition will not be "one fuel for all," but a **sequenced multi-fuel pathway** that matches IMO's Net-Zero Framework and the Green Fuel Intensity (GFI) curve. Near-term compliance will lean on drop-in **biofuels** and limited **LNG**; the first scalable alternative expected in Indian ports is **green methanol**; **ammonia** follows for deep-sea ships post-2035; and **green hydrogen** underpins methanol/ammonia production and long-term export play. The strategy links three levers: (i) **domestic fuel manufacture**, (ii) **bunkering hubs & safety codes**, and (iii) **demand signals** created by IMO pricing (RUs) and India's NGSP/Harit Sagar policies.

1) LNG - Transitional Fuel

Current role : Deployed on select Indian coastal/LNG carriers; compliant under IGF Code.

Infrastructure : Import/LNG terminals at **Dahej, Hazira, Kochi**; feasibility for marine bunkering studied at **Kochi & JNPA**.

Why transitional : LNG reduces CO_2 but faces **methane-slip.**

Methane slip is the escape of unburned methane gas into the atmosphere, typically from engines running on natural gas, where incomplete combustion occurs. This phenomenon is a significant concern because methane is a potent greenhouse gas, with a much higher global warming potential than carbon dioxide over the short term. It can occur in a wide range of applications, including marine engines, stationary engines, and across the entire natural gas supply chain

2) Biofuels - Immediate, Drop-in Compliance

Technical fit : Blends (B20–B100) run on existing marine engines; trials by **Indian Navy & fleet operators** demonstrate operational feasibility.

Supply base : Domestic streams from **ethanol, biodiesel, HVO , FAME** under the National Biofuel Policy; strongest near-term pathway to lower well-to-wake GHG without retrofits.

Ports : Minimal infrastructure change. can use current bunkering networks with sustainability certification.

Role : Near-term CII/GFI relief for Indian fleets; ideal for tugs, OSVs, coastal and inland segments while

methanol/ammonia scale up.

3) Methanol

Breakthrough project : India's first Green Methanol Bunkering & Refuelling Hub is **under construction at VOC Port, Tuticorin - 750 m³ terminal (SOPAN Group)**. This is the country's first dedicated maritime methanol node and a key plank of the **Coastal Green Shipping Corridor (Kandla–Tuticorin)**.

Why methanol first : Dual-fuel engines are commercially available (MAN ES, widely ordered by global liners), handling is simpler than ammonia/hydrogen, and safety codes are mature.

Production shift : India must pivot from **coal-based "brown" methanol** to **green methanol** (renewable H_2 + captured CO_2). VOC's **port-based green hydrogen pilot** is a feeder step.

Role & Timing : Likely the **first large-scale alternative marine fuel** to appear regularly in Indian ports **post-2030**, enabling ships to meet tightening GFI thresholds at competitive abatement cost.

4) Ammonia (Green Ammonia)

Strategic positioning : Kandla is being developed by **L&T Energy GreenTech with ITOCHU** to produce **green ammonia (~300 KTPA)** with **offtake for bunkering in Singapore**. ITOCHU is also developing a **5,000 m³ ammonia bunkering vessel (2027) ,** evidence of real demand creation in the region.

Maritime use : Target fuel for deep-sea tankers/bulkers **post-2035**, once IMO's dedicated **safety code** and crew-training standards are finalised.

Challenges : High toxicity handling, new port safety zones, emergency response, and specialised storage/transfer systems.

India's role : Strong **export economics** (renewables + electrolyser scale). India can be a **fuel supplier to Asian bunkering hubs** while gradually enabling domestic corridors.

5) Hydrogen (Green H_2)

Port pilot : VOC Port commissioned **India's first port-based Green Hydrogen pilot (10 Nm³/hr)** on **5 Sep 2025**; foundation stone also laid for the **750 m³ methanol facility**.

Maritime : Direct shipboard hydrogen (LH_2 at −253 °C or high-pressure gas) is niche in the near term; the **primary role is upstream**, as feedstock for **green methanol and green ammonia**.

Infrastructure : Electrolysers, renewable power, desalination, compression/liquefaction and pipelines. H**igh CAPEX** but central to India's export ambition under the **National Green Hydrogen Mission**.

Role : Backbone energy for synthetic maritime fuels; supports India's positioning as a **net green energy exporter**.

Cross-cutting Enablers India Must Move On

Standards & Safety : Fast-track Indian codes (storage, transfer, firefighting, crew competence) harmonised with IMO/IGF; publish methanol and ammonia bunkering SOPs for pilot ports.

Fuel Certification : Well-to-wake sustainability verification to claim **GFI reductions** and generate **Surplus Units (SU)** under the IMO scheme.

Finance : Use **green/blue bonds**, viability-gap/interest subvention, and **PPP** to de-risk first terminals; align with **NGSP** and **Harit Sagar** incentives.

Domestic Manufacture : Anchor **H_2, CO_2 capture, and e-fuel plants** near high-renewables clusters and port industrial estates to reduce delivered fuel cost.

Early-Mover Demand : Government-linked charters (PSU cargoes, coastal programs) to specify **biofuel/methanol blends** from FY26–27 to seed predictable offtake.

How This Meets IMO GFI Trajectory

2028–2030: Biofuels and limited LNG provide immediate GFI relief; pilots for methanol bunkering (VOC) mature.
2030–2035: Methanol scales in Indian ports; India begins **green ammonia exports**; OPS and efficiency measures cut berth emissions.
Post-2035: Ammonia fuels deep-sea segments; hydrogen-based derivatives dominate; India emerges as a **regional bunker/export hub** for future fuels.

Alternate Fuels for Maritime (2/2)

Shipping today contributes around **3% of global CO_2 emissions**. The IMO has locked in a target of **net-zero by 2050** → which means fuels like HFO and MDO are on their way out.

For India, the next 25 years are about **switching the fuel mix**:

Fuel	Demand in 2030	Demand in 2050
Hydrogen	**0.026 MT**	**0.3 MT**
Ammonia	**0.025 MT**	**4.4 MT**
Methanol	**0.037 MT**	**0.272 MT**
LNG	**0.66 MT**	**0.3 MT** (to be replaced by bio/e-LNG).

India can produce these fuels cheaper than almost anyone.
Green Hydrogen cost by 2030:
India $1.5–2.0/kg.
Middle East: $2.0–2.5/kg.
Europe/East Asia: $3.0–6.0/kg.
This is the base case for India becoming **the lowest-cost Global hub for Green Maritime Fuels and an Energy Surplus Nation.**

Nuclear – Long Term Option

- **Current Readiness :** No commercial maritime Nuclear vessel. Only Indian Navy operates Nuclear vessels.
- **No policy framework** yet for nuclear fuel for maritime.
- **Strategic Potential :** Ultra long endurance fuel, zero CO2 emission
- **Financial : Very High CAPEX** Estimate **$700-900 million per vessel (3x cost of LNG vessel)**
- **No IMO civilian Nuclear code** (under development)

Green Fuel Transition

The maritime sector, responsible for **nearly 3 percent of global CO_2 emissions**, is entering a decisive phase of energy transition to align with the IMO's Net Zero 2050 ambition. This transition demands a structured exit from conventional fuels such as HFO and MDO, and an accelerated shift towards a diversified portfolio of green fuels.

For India, the coming 25 years represent a carefully sequenced fuel substitution strategy. By 2030, LNG is expected to dominate with an estimated demand of **0.66 MT**, before gradually transitioning to bio/e-LNG. Simultaneously, emerging fuels such as hydrogen, ammonia and methanol will scale significantly, with **hydrogen rising from 0.026 MT to 0.3 MT**, and **ammonia from 0.025 MT to 4.4 MT by 2050** , reflecting both global decarbonization trends and domestic industrial capability.

India's strategic advantage lies in fuel economics. By 2030, **green hydrogen production costs in India are projected at $1.5–2.0/kg**, far below Europe and East Asia. This cost leadership positions India to become a global hub for green maritime fuels, enabling both domestic fleet transition and export opportunities.

Looking further ahead, nuclear marine propulsion is emerging as a potential long-term option for deep-sea and high-endurance operations. With unmatched energy density and zero operational emissions, nuclear could complement the green fuel mix for specific vessel categories — subject to future international regulatory frameworks on safety, liability and waste management.

Therefore, India's fuel transition is not only a compliance response but a strategic opportunity — to secure energy autonomy, build green shipping supply chains and lead the global maritime decarbonisation

narrative.

Nuclear Propulsion - Long-Term Strategic Prospect for India

Nuclear propulsion remains a long-term, exploratory option for maritime decarbonisation, with *no commercial nuclear vessels currently operating under the Indian flag*. India's only experience with nuclear-powered ships lies within the defence sector, through the Indian Navy's nuclear submarines (INS Arihant class), which demonstrates indigenous capability in naval nuclear engineering. However, there is **no existing policy or regulatory framework** under DG Shipping or MoPSW for the civilian use of nuclear fuel at sea. While nuclear propulsion offers unmatched strategic potential- **ultra-long endurance and near-zero CO_2 emissions** without the need for refuelling. it comes with significant barriers. The **capital expenditure is extremely high**, estimated at **USD 700–900 million per vessel**, almost *three times the cost of LNG-powered ships*, making commercial viability a major concern. Additionally, **IMO has not yet finalised a civilian nuclear safety code**, with guidelines for Small Modular Reactors (SMRs) still under development. For India, nuclear remains a speculative option beyond 2040, contingent upon global regulatory consensus, public acceptance, liability legislation, and strong international safeguards.

India as a Net Green Energy Exporter & Bunkering Destination

From energy importer to future maritime fuel hub

Strategic Advantage
- Long coastline with major ports on **East–West shipping lanes**
- Abundant renewable energy for **green hydrogen, ammonia, methanol**
- Cost advantage in **solar + wind production**, lowering fuel export price

Fuel Export Readiness
- **Green Ammonia :** Kandla supply to Singapore (L&T–Itochu JV)
- **Green Methanol :** VOC Port bunkering hub under development
- **Hydrogen Derivatives :** Mission to export through maritime corridors

Port Infrastructure Transformation
- Dedicated **Green Bunkering Terminals** (VOC Port, Kandla, JNPA)
- Upcoming **Green Shipping Corridors**: Tuticorin – Kandla – Singapore – Rotterdam
- Integration of **renewable power, storage & safety systems**

Economic & Diplomatic Impact
- Reduces dependency on oil imports
- Positions India as **fuel supplier to global shipping lines**
- Enhances maritime influence under **Global South leadership**

Policy Backing
- Supported by **National Green Hydrogen Mission & NGSP**
- Incentivized by **Harit Sagar & MIV 2030**
- Aligned with **Make in India & Energy Security Vision 2047**

India is not just preparing for Green Fuels — it is preparing to Fuel The World.

India as a Net Green Energy Exporter & Bunkering Destination

India is at the crossroads of a major strategic shift, from being one of the world's largest **importers of fossil fuels** to emerging as a **future global supplier of green maritime fuels** such as **green ammonia, green methanol, and hydrogen derivatives**. This transition is not isolated; it is rooted in domestic policy reforms, renewable energy leadership, and a geopolitical push for *energy independence by 2047* and *Net Zero by 2070*.

1. Strategic Maritime Advantage

With its extensive coastline and central position on **major East–West shipping corridors**, India is geographically primed to become a bunkering and refueling hub for global shipping. India has one of the world's largest solar and wind power expansion programmes, which provides a **cost advantage in producing green fuels**, making exports competitive.

2. Fuel Export Capacity in Motion

India is already laying the groundwork for maritime fuel exports:

Green Ammonia (Export-Oriented Production)

At **Kandla**, a JV between **L&T and Itochu (Japan)** is setting up a large-scale green ammonia plant (~300 KTPA), with committed offtake to Singapore's bunkering market.

Green Methanol (First Bunkering Hub in India)

At **VOC Port, Tuticorin**, construction of a **750 m³ green methanol bunkering terminal** is underway (SOPAN Group). This is India's first dedicated alternative fuel facility for shipping.

Hydrogen Derivatives for Maritime Corridors

Under the **National Green Hydrogen Mission**, India targets **5 MMT green hydrogen** by 2030, largely to convert into **exportable derivatives** (ammonia/methanol) through maritime corridors like **Kandla–Singapore**, **Tuticorin–Rotterdam**, etc.

3. Port Infrastructure Transformation

Ports are evolving from cargo hubs to **energy export platforms**:

Dedicated **green fuel terminals** at **VOC Port, Kandla, JNPA**

Coastal **Green Shipping Corridors** being piloted (Tuticorin–Kandla–Singapore–Rotterdam)

Integration of **renewable power, desalination, safety systems**, and bunkering pipelines into port estates under **Harit Sagar Guidelines** and **NGSP**

4. Economic & Diplomatic Impact

India's leadership in green fuel exports has a threefold strategic impact:

Reduces dependence on crude oil imports (currently 85% import-driven energy market)

Positions India as a fuel supplier to global shipping lines transitioning under IMO Net-Zero framework

Strengthens India's diplomatic role as a provider of clean energy to the **Global South**, reinforcing leadership at forums such as OPEC, G20, and COP

5. Strong Policy Backing

Backed by **National Green Hydrogen Mission** and **Draft National Green Shipping Policy (NGSP)**

Incentives via **Harit Sagar**, **Maritime India Vision 2030**, and **Make in India–Energy Security 2047**

PIB statements (July 2025, OPEC Summit):

"India will not only be energy independent by 2047, but will also fuel the world with green energy exports."

Conclusion

India is not simply decarbonizing its ports and ships, it is **building a green energy export economy** around its maritime sector. With methanol bunkering, ammonia export hubs, and hydrogen corridors already initiated, India is setting the stage to become the **refuelling station of a net-zero maritime world.**

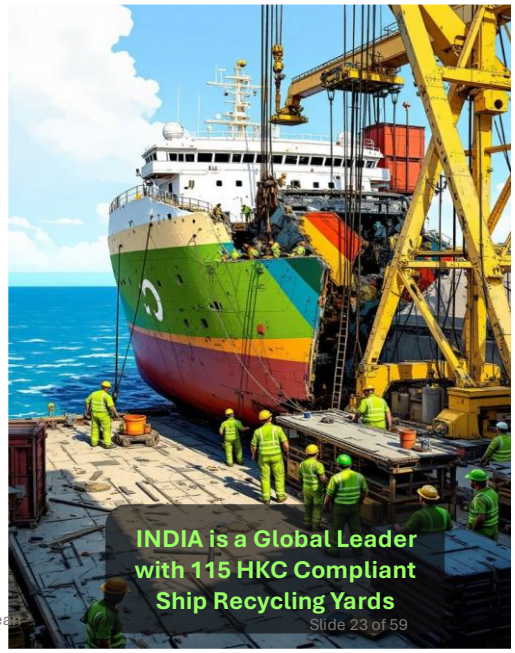
India is not just preparing for Green Fuels…… It is preparing to Fuel the World.

Ship Recycling

- Process of dismantling end-of-life ships to recover **steel and other valuable materials**.
- India is a **global leader**, with Alang–Sosiya in Gujarat being the **world's largest ship recycling cluster**.
- Governed internationally by the **Hong Kong Convention (HKC)**, which came into force on **26 June 2025**.
- Integral to the **circular economy**, reducing the demand for virgin raw materials.

India's Role & Importance

- Handles **30% - 35% of global ship recycling tonnage** annually.
- Provides **20 - 25% of India's ferrous scrap requirement**, reducing dependence on imports.
- India is the **only country with 100+ HKC Compliant Recycling Yards. [115 HKC Compliant Yards at Alang]**
- Supplies input material for the **Green Steel ecosystem**, boosting India's low-carbon transition.
- Generates **direct employment for 15000+ workers** and **indirect livelihood opportunities** for thousands more in logistics, scrap processing, and allied services.
- Strengthens India's position in **global maritime sustainability.**



Ship Recycling – India's Global Leadership

Ship recycling is not just an industry - it is a **strategic pillar of India's maritime economy** and the global circular economy. The process dismantles end-of-life ships to recover steel and other valuable materials, reducing the demand for virgin raw inputs while cutting costs and emissions.

India today stands as the **global leader in ship recycling**, with the Alang–Sosiya cluster in Gujarat being the world's largest ship recycling facility. The entry into force of the **Hong Kong Convention (HKC) on 26 June 2025** has further elevated India's role, as it is the **only nation with more than 100 HKC-compliant yards (115 facilities)**.

This sector contributes significantly to India's industrial ecosystem by:
Handling **30–35% of global ship recycling tonnage annually**, consolidating India's leadership.
Meeting **20–25% of India's ferrous scrap demand**, reducing import dependency and saving valuable forex.
Feeding the **Green Steel ecosystem**, providing low-carbon inputs that align with India's net-zero ambitions.

The impact is equally socio-economic. Ship recycling directly employs **15,000+ workers**, while creating indirect livelihood opportunities for thousands more in logistics, scrap processing, and allied services. The industry has become a driver of **inclusive growth**, while embedding high safety and environmental standards under HKC compliance.

By anchoring itself as the hub of HKC-compliant recycling, India not only ensures **sustainable resource recovery** but also strengthens its position as a **global leader in maritime sustainability**.

Ship Recycling Portal

An upcoming unified national digital platform under DGS to implement the Hong Kong Convention (HKC) and Recycling of Ships Act (2019), ensuring real-time, transparent and accountable governance of India's ship recycling ecosystem.

Importance of Portal

- **Transparency** : Digitally traceable inspections, certifications & audits
- **Accountability** : Role-based actions with time-stamped compliance trails
- **Real-time Monitoring** : Central oversight by DGS & State Authorities
- **Global Credibility** : Auditable records for IMO, foreign Flag States & shipowners
- **Stakeholder Integration** : Connects DGS, GMB, ROs, yards, service suppliers

Core Functional Modules

- Yard Registration & Licensing
- **Inventory of Hazardous Materials Inventory**
- **RRC Certification Registry**
- SRP Submission & Approval
- **Inspection, Audit & ISO Compliance Tracking (ISO 9001, 14001, 30000, 45001)**
- Incident & Non-Conformity Reporting
- Worker Training & Competency Records
- GISIS / IMO Reporting Integration

ISO 9001
Quality Management System (QMS)

ISO 14001
Environmental Management System (EMS)

ISO 30000
Ship Recycling Management System (RSMS)

ISO 45001
Occupational Health & Safety Management System (OHSMS)

Ship Recycling Portal

The Ship Recycling Portal is being developed as India's national digital command platform for implementing the Hong Kong Convention (HKC) and the Recycling of Ships Act, 2019. Its purpose is to centralize every regulatory, safety and environmental function into a unified digital architecture, replacing fragmented documentation and manual oversight with real-time, auditable governance. Post-HKC entry into force, digital traceability will be essential to retaining India's leadership in global ship recycling.

The portal will enable complete life-cycle governance, from yard registration and licensing to issuance of Ready-for-Recycling Certificates (RRC), monitoring of hazardous materials and oversight of ISO-certified processes. Role-based access and time-stamped actions will ensure accountability by DGS, Gujarat Maritime Board and State Pollution Control Boards. Integration with GISIS and IMO reporting systems will provide global credibility by ensuring transparent access for foreign Flag States, classification societies and shipowners.

Beyond compliance, the portal institutionalises digital monitoring of inspections, surveillance logs, incident reporting and corrective actions. Worker training records, safety drills, waste disposal data and non-conformity reports will be digitally stored, building a permanent regulatory archive. This transition marks a strategic shift from physical inspection dependency to data-driven environmental governance, positioning India as the first digitally governed ship recycling nation under HKC.

ISO Standards

To operationalise HKC requirements, Indian recycling yards are adopting a comprehensive ISO framework that strengthens transparency, worker safety and environmental stewardship.

ISO 9001 – Quality Management System

Ensures procedural discipline, documentation integrity and continuous improvement across recycling operations. It is the baseline for demonstrating reliability to international shipowners.

ISO 14001 – Environmental Management System
Addresses pollution prevention, hazardous waste handling and resource control. It demonstrates alignment with global expectations for safe dismantling and coastal environmental protection.

ISO 30000 – Ship Recycling Management System
The core ISO standard specific to ship recycling under HKC. It governs implementation of IHM, Safe-for-Hot-Work certifications, containment of toxic substances and controlled dismantling protocols.

ISO 45001 – Occupational Health & Safety Management System
Protects workers through structured risk assessment, PPE enforcement, emergency response planning and health surveillance. It elevates human safety to audit-ready international standards.

Collectively, these ISO certifications move Indian yards from compliance demonstration to institutional credibility, assuring shipowners, classification societies and global regulators that end-of-life vessels are dismantled with full environmental and human safety assurance.

Green Steel

- "Green Steel" is defined by its CO_2 emission intensity — less than 2.2 tonnes CO_2 emission per tonne of finished steel (tfs).
- Greenness is expressed as a percentage reduction below the threshold of 2.2 2.2 tonnes CO_2 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 tCO_2e/tfs ★★★★★
- Four-Star: 1.6 – 2.0 tCO_2e/tfs ★★★★
- Three-Star: 2.0 – 2.2 tCO_2e/tfs ★★★
- > 2.2 tCO_2e/tfs → Not eligible for green rating
  (Threshold reviewed every 3 years)

Green Steel : Driving Low-Carbon Industrial Transition

Steel is the backbone of infrastructure and shipbuilding, but it is also one of the most carbon-intensive industries. The concept of **"Green Steel"** aims to transform this challenge into an opportunity by reducing the **CO_2 emission intensity below 2.2 tonnes of CO_2 per tonne of finished steel (tfs)**.

Greenness is measured as the percentage reduction in emissions below this threshold. Certification is carried out by the **National Institute of Secondary Steel Technology (NISST)** under the **Bureau of Energy Efficiency (BEE)**, using global-standard **Measurement, Reporting and Verification (MRV) methodologies**.

A **star rating system** makes this framework transparent and globally competitive:
Five-Star: < 1.6 tCO_2e/tfs
Four-Star: 1.6 – 2.0 tCO_2e/tfs
Three-Star: 2.0 – 2.2 tCO_2e/tfs
Above 2.2 tCO_2e/tfs: Not eligible for green certification

The threshold will be reviewed every three years, ensuring constant ambition in line with climate goals.
Green Steel is not just about lowering emissions,it is about **embedding recycling, renewable energy, hydrogen and energy efficiency** into steel production, linking ship recycling and scrap recovery directly with India's **circular economy vision**. This makes India's maritime sector a critical contributor to the **Green Steel ecosystem**, reinforcing both industrial competitiveness and sustainability.

Emissions Covered :
Scope 1 : Direct emissions from steel making
Scope 2 : Indirect emissions from purchased electricity
Scope 3 : Agglomeration, pellet making, coke making, beneficiation, raw materials

Green Ports

Driving Sustainable Maritime Growth

Concept of Green Ports
- Ports designed & operated with minimal environmental impact.
- Integration of clean energy, efficiency, and circular economy practices.

Key Initiatives in India
- Harit Sagar Guidelines (2023): National framework for green port development.
- Proposed National Port Sustainability Code (NPSC): Metrics for emissions, energy, waste, and community impact.
- Onshore Power Supply (OPS): Cut ship emissions at berth by connecting to shore electricity.
- Waste & Plastics Management: Port reception facilities for MARPOL Annex V compliance.

Benefits
- Reduces GHG emissions & pollution.
- Improves air quality in port cities.
- Promotes India's Blue Economy & Green Economy transition.
- Aligns with IMO decarbonization goals & India's Viksit Bharat 2047 vision.

Green Ports – Driving Sustainable Maritime Growth

"Ports are the beating hearts of global trade, but they are also significant contributors to emissions. The idea of 'Green Ports' is to transform these engines of growth into anchors of sustainability."

The **concept of Green Ports** focuses on designing and operating ports with **minimal environmental impact**. This means integrating **clean energy**, **resource efficiency**, and **circular economy practices** into every aspect of port planning, operation, and logistics.

India has already taken pioneering steps in this direction through several flagship initiatives.
The **Harit Sagar Guidelines**, launched in 2023, provide a **national framework** for green port development, setting out principles for clean energy adoption, pollution control, waste management, and biodiversity protection.

Building upon this, the **National Port Sustainability Council (NPSC) , envisaged**, will establish measurable **metrics for emissions, energy use, waste, and community impact**, ensuring that environmental performance becomes a benchmark for all Indian ports.

The next major enabler is **Onshore Power Supply (OPS)**, which allows ships at berth to connect directly to the grid and switch off their auxiliary engines. This single intervention can drastically reduce **CO_2, NOx, and SOx emissions** in port zones, improving air quality and public health in surrounding cities.

Complementing this, the Directorate is driving **Waste and Plastics Management** under **MARPOL Annex V compliance**, ensuring that port reception facilities can handle ship-generated waste and prevent marine pollution.

Together, these efforts yield tangible benefits:
Reduction in greenhouse gas emissions and pollution,
Improved air quality in port-adjacent areas, and

A major boost to India's **Blue and Green Economy transition**.

Importantly, these initiatives are fully aligned with **IMO's decarbonization goals** and India's long-term national vision , **Viksit Bharat 2047**.

"In essence, Green Ports are not just an environmental necessity — they are the next competitive advantage for India's maritime sector. They signal that economic growth and ecological responsibility can, and must, advance together."

Sustainable Indicators for Indian Ports

Green Port Index (GPI)

Evaluates ports based on carbon footprint, alternative fuels adoption, energy efficiency, sustainable logistics, and waste management practices.

Port Readiness Level (PRL)

Assesses ports' preparedness for energy transition, digitalization, and compliance with global environmental regulations.

Shore Power Readiness Indicator (SPRI)

Measures infrastructure for cold ironing and renewable energy integration to reduce emissions from berthed ships.

Environmental Ship Index (ESI)

Incentivizes ship operators to reduce emissions through a rating system that evaluates NOx, SOx, and CO_2 emissions.

These indicators create a robust framework to measure and enhance the environmental performance of Indian ports. By institutionalizing them, India positions itself as a global frontrunner in green maritime logistics & unlocks access to international green shipping corridors and drive long-term net-zero ambitions.

Sustainable Indicators for Indian Ports

To translate the sustainability vision into measurable action, a structured set of indicators has been developed to evaluate and benchmark the environmental and operational performance of Indian ports.

*The first is the **Green Port Index**, which assesses ports on their overall carbon footprint, energy efficiency, use of alternative fuels, and adoption of sustainable logistics and waste management practices. This index provides a clear picture of how each port contributes to reducing emissions and improving environmental stewardship.*

*The **Port Readiness Level**, or PRL, measures how prepared ports are for the transition to cleaner energy systems and digital operations. It evaluates their compliance with global environmental standards and their readiness to adopt emerging technologies.*

*The third parameter is the **Shore Power Readiness Indicator**, which reflects the extent to which ports are equipped with shore-to-ship power infrastructure. This is a crucial enabler in reducing emissions from berthed ships, allowing vessels to draw renewable electricity instead of using onboard auxiliary engines.*

*Finally, the **Environmental Ship Index** encourages ship operators to voluntarily reduce emissions by adopting cleaner fuels and technologies. It introduces a transparent rating system that accounts for NOx, SOx, and CO_2 performance, rewarding environmentally responsible operations.*

Collectively, these four indicators form a comprehensive framework for driving measurable sustainability across the Indian port ecosystem. By institutionalising these benchmarks, India is positioning its ports as global frontrunners in green logistics and opening pathways for participation in international green shipping corridors under its long-term Net Zero vision.

GHG Emission Scope at Ports

Scope 1 : Direct Emissions

- From port owned/controlled sources
- Diesel generators, cranes, dredgers, tugs, vehicles, fuel machinery

Scope 2 : Indirect Emissions (Purchased Electricity)

- Power consumed but generated elsewhere (state grid)
- Lighting, pumps, reefer containers, terminal operations
- Coal-based power grid

Scope 3 : Other Indirect Emissions (Value Chain)

- Ships at berth using auxiliary engines
- Trucks, trains, barges transporting cargo
- Business travel, investments, waste treatment

GHG Emission Scope at Ports

"To address decarbonization effectively, it is essential that we first understand where emissions actually come from within the port ecosystem."

The **Greenhouse Gas (GHG) emission inventory** at ports is categorized under three internationally recognized scopes - **Scope 1, Scope 2 and Scope 3,** as per global reporting standards.

Scope 1 – Direct Emissions:
These are emissions that originate from **port-owned or controlled sources**.
They include **diesel generators, cranes, dredgers, tugs, vehicles, and other fuel-based machinery** operating within the port premises.
Essentially, these are emissions under the port authority's **direct operational control**, and therefore, the easiest to measure, monitor, and manage.

Scope 2 – Indirect Emissions:
These arise from the **purchase of electricity** that is generated elsewhere, typically from the **state grid**.
Although the port does not produce these emissions directly, they are linked to the **energy consumed for lighting, pumping systems, refrigerated containers, and terminal operations**.
In countries where grid power is largely **coal-based**, Scope 2 emissions form a substantial part of the port's total carbon footprint — highlighting the importance of shifting towards **renewable energy and solar-based supply** for port operations.

Scope 3 – Other Indirect Emissions (Value Chain):
These are the most complex and far-reaching.
They include emissions from **ships at berth using auxiliary engines**, **trucks, trains, and barges transporting**

cargo, as well as **business travel, waste treatment, and upstream investments** associated with port operations. Though these emissions occur outside the direct boundary of the port, they represent the **largest share of overall carbon impact** — making stakeholder coordination and value-chain partnerships crucial for achieving real decarbonisation.

"Recognizing these three scopes allows ports to move from a fragmented to a holistic approach — one where emissions are mapped, mitigated, and monitored across the entire logistics chain."

Green Tug Transition Program

To replace/retrofit conventional diesel-powered tugs with *green tugs* powered by **alternative fuels** (like LNG, methanol, hydrogen, or hybrid-electric systems).

- At least **50% of all tugs in major ports to be green tugs by 2030**.
- 100% transition by 2047

Current Status

~ 400 + tugs are operating in Indian Waters (Coastal & Offshore Tugs)
~ 45% of tugs are 20 + years
~ 20% of tugs are 30 + years

Problem

Older tugs generate higher emissions and operate with lower efficiency compared to modern green tugs.

Opportunity and Way Forward

- Replacing / retrofitting old fleet
- Deployment of hybrid & green-fuel powered tugs
- Incentivize adoption of LNG, Methanol, Hydrogen & Electric tugs

Green Tug Transition Program

"Tugs are among the most vital assets in port operations, yet they also remain some of the most carbon-intensive. The Green Tug Transition Program represents India's commitment to make even these workhorses of the harbour cleaner, smarter, and future-ready."

Today, more than **400 tugs** operate in Indian waters, serving both coastal and offshore operations. However, nearly **45% of these tugs are over 20 years old**, and about **one-fifth are more than 30 years old**.

These older vessels operate with **lower fuel efficiency**, higher maintenance costs, and significantly **higher emissions**, especially of carbon dioxide, nitrogen oxides, and particulate matter.

Recognizing this challenge, the **Ministry of Ports, Shipping and Waterways** under the **Harit Sagar Guidelines (2023)** has mandated a phased transition towards **green and low-emission port crafts**.

The goal is ambitious yet achievable :
To ensure that **at least 50% of all tugs operating in major ports are green tugs by 2030**, and
To achieve a **100% transition by 2047**.

Under these guidelines, all ports are required to **retrofit or replace existing diesel-powered tugs** with vessels powered by **alternative fuels** such as **LNG, methanol, hydrogen, or hybrid-electric propulsion systems**.

These clean-energy conversions align with India's **National Green Hydrogen Mission** and the targets for port decarbonization set under **Maritime Amrit Kaal Vision 2047**.

The **opportunity** here is multifold:
Retrofitting the old fleet not only cuts emissions but also extends vessel life and reduces operational costs.

Deploying hybrid and fuel-flexible tugs creates resilience in fuel sourcing and operational efficiency.
And most importantly, it opens pathways to **incentivize early adopters,** by offering tariff rebates or priority berthing for cleaner vessels, as recommended in the Harit Sagar framework

.

In the long term, India's ports are expected to develop the **infrastructure for bunkering and refuelling of green fuels**, including **green hydrogen and ammonia**, by 2035. This will enable a seamless green transition not only for tugs but for all port craft and coastal vessels.

"In essence, the Green Tug Transition Program is more than a fleet upgrade. It is a statement of intent. It signals that India's ports will lead by example, proving that sustainability and operational efficiency can move together, powered by innovation and responsibility."

East - West Coastal Ports

India has major coastal ports on both East and West coasts essential for offshore hydrocarbon logistics and transportation. These ports play a vital role in India's offshore oil exploration, crude oil imports, and LNG terminal operations. India hosts 12 major ports and around 200 minor ports.

West Coast Ports

such as Kandla, Mumbai, Jawaharlal Nehru Port (Nhava Sheva), Mormugao, New Mangalore, and Kochi support offshore oil and gas supply chains.

East Coast Ports

Include Chennai, Tuticorin, Ennore, Visakhapatnam, Paradip, Haldia, Kolkata, and Port Blair, facilitating imports and exports for hydrocarbon industries.

74 ports

ISPS compliant, overseen by DG Shipping and proposed Bureau of Port Security (BoPS) for centralized security audit and risk management

East–West Coastal Ports

"India's maritime strength lies not only in its scale but also in its strategic geography, with two vibrant coastlines forming the backbone of our ocean economy."

India is uniquely positioned with **major ports along both the East and West coasts**, each playing a complementary role in supporting the nation's trade, energy logistics, and offshore industries. Collectively, India operates **12 major ports** and over **200 non-major ports**, connecting the country's hinterland to global shipping routes and energy corridors.

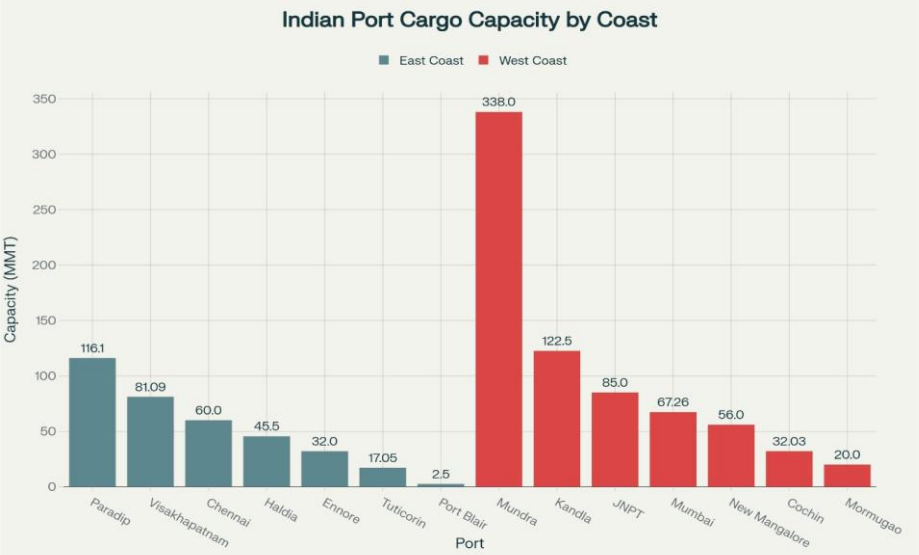
Starting with the **West Coast**, ports such as **Kandla, Mumbai, Jawaharlal Nehru Port (Nhava Sheva), Mormugao, New Mangalore, and Kochi** handle a substantial share of **crude oil, LNG, and offshore hydrocarbon logistics**. These ports are crucial nodes in India's **energy import and refining network**, and many are being developed as **multi-fuel energy hubs** under the **Harit Sagar and Maritime Amrit Kaal Vision 2047** frameworks.

On the **East Coast**, ports including **Chennai, Ennore, Tuticorin, Visakhapatnam, Paradip, Haldia, Kolkata, and Port Blair** serve as gateways for **bulk exports**, **hydrocarbon industries**, and **offshore exploration** in the Bay of Bengal. They are also central to India's **Act East policy**, connecting with Southeast Asian markets through BIMSTEC and ASEAN maritime corridors.

Altogether, India's major and minor ports across both coasts play a decisive role in ensuring **supply chain continuity for offshore energy, coastal shipping, and LNG terminal operations**.

A total of 74 ports in India are ISPS-compliant, overseen by the **Directorate General of Shipping**, ensuring adherence to international port and ship security standards. Plans are also underway for establishing a **centralised Bureau of Port Security (BoPS)** to strengthen **security audits, risk management, and cyber-security systems**, fully aligned with international frameworks and IMO guidelines.

"Through balanced development of both coastlines, west for hydrocarbons and energy logistics, and east for trade and connectivity — India is creating a resilient and sustainable coastal ecosystem, essential for a secure and thriving Blue Economy."



Cargo Handling Capacity of Major Indian Ports by Coast

"This chart illustrates the comparative cargo handling capacity across India's major ports, clearly reflecting both our scale and regional strengths."

India's **major ports together handle over 1,600 million metric tonnes (MMT) of cargo annually**, with a total installed capacity exceeding **2,700 MMT per year**. What's evident here is the **balance and complementarity** between the East and West coasts — each playing distinct yet interlinked roles in India's maritime economy.

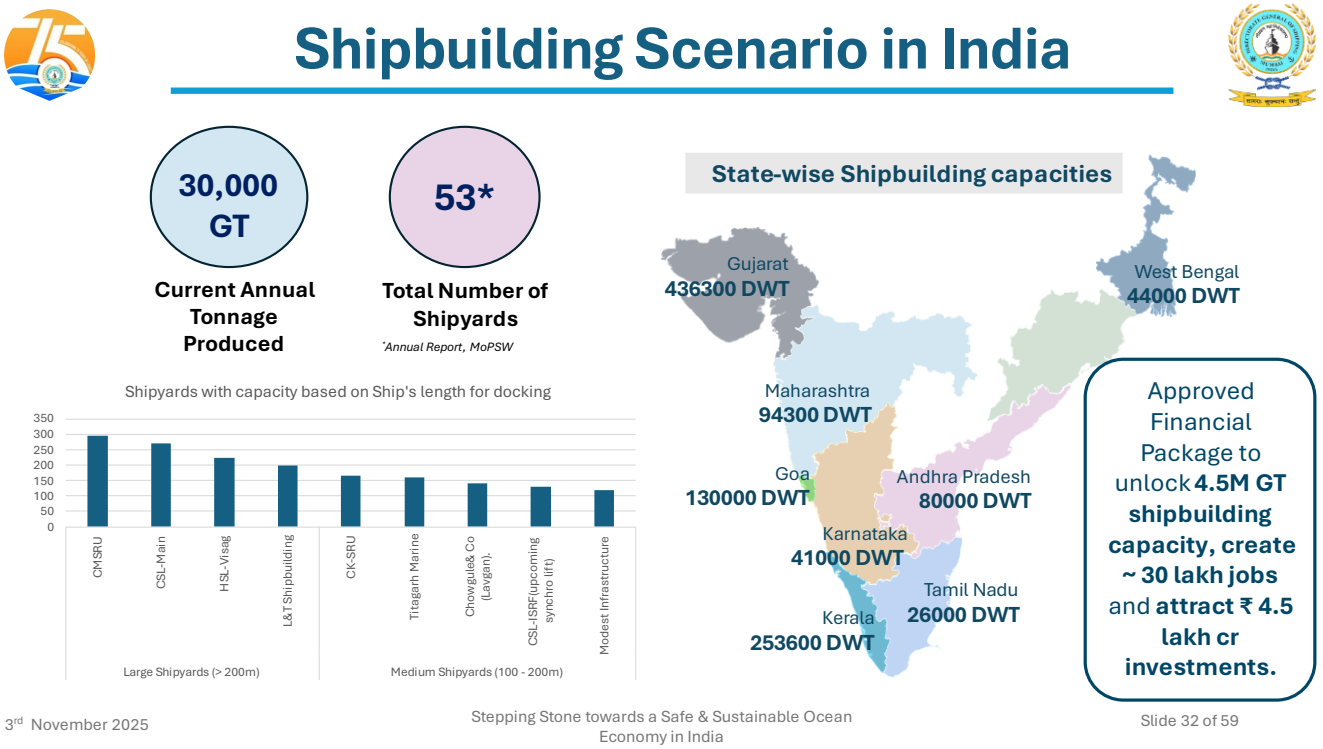
On the **East Coast**, ports like **Paradip (116 MMT)**, **Visakhapatnam (81 MMT)**, and **Chennai (60 MMT)** are among the largest, serving as primary gateways for **coal, iron ore, fertilizers, and coastal bulk cargo**. These ports also anchor India's trade with **ASEAN and East Asian economies**, reinforcing the country's "**Act East**" trade corridors.

On the **West Coast**, we see some of the **highest capacities and throughput levels,** particularly **Mundra Port** with **338 MMT**, followed by **Kandla (122.5 MMT)**, **JNPT (85 MMT)**, and **Mumbai Port (67 MMT)**. These ports dominate in **crude oil imports, containerized trade, and energy logistics**, forming the lifeline for India's **hydrocarbon and refinery supply chains**.

Together, these figures highlight that the **West Coast currently handles a larger share of India's maritime traffic**, owing to higher industrial density and export-linked infrastructure. However, with ongoing capacity expansions and modernization under **Sagarmala**, **Harit Sagar**, and the **National Port Sustainability Code (NPSC)**, the East Coast is rapidly catching up — particularly in the green and multi-fuel terminal segment.

What's also important to note is that ports like **Tuticorin, Ennore, and Cochin** are increasingly diversifying into **clean energy logistics**, including **LNG, hydrogen, and offshore wind components**, which aligns directly with India's **Maritime Amrit Kaal Vision 2047**.

"So, while the West Coast continues to drive India's trade and energy imports, the East Coast is emerging as the new frontier for green growth, coastal connectivity, and international integration."



Shipbuilding Scenario in India

India's shipbuilding sector is at a **nascent but strategically critical stage**. Despite having a long coastline and 53 shipyards (as per MoPSW Annual Report), the country currently produces only **30,000 GT annually**, which is a small fraction compared to global leaders like China, South Korea, and Japan.

State-wise Capacities

Gujarat leads the sector with **436,300 DWT**, thanks to strong industrial clusters and its coastal industrial base.

Kerala (253,600 DWT) and **Goa (130,000 DWT)** follow, with a mix of public and private yards catering to both defence and commercial orders.

Other contributors include **Maharashtra (94,300 DWT)**, **Andhra Pradesh (80,000 DWT)**, **West Bengal (44,000 DWT)**, **Karnataka (41,000 DWT)**, and **Tamil Nadu (26,000 DWT)**.

This distribution highlights both the **geographic spread of capacity** and the under-utilisation of existing infrastructure.

Yard Capacities & Capabilities

India has a handful of large shipyards capable of handling vessels >200m in length — such as **Cochin Shipyard Limited (CSL), Hindustan Shipyard Ltd. (HSL), L&T Shipbuilding, and Central/State-run units like CMSRU and CKSRU**.

Medium shipyards like **Timblo, Chowgule, Titagarh Marine, CSL's smaller yards** and others handle repair, retrofits, and mid-sized vessels.

However, compared to international peers, India suffers from **low productivity, high financing costs, and limited scale economies**.

Policy & Investment Push

The Government has approved a **financial package to unlock 4.5 million GT of shipbuilding capacity**, with the potential to:

Generate **~30 lakh direct and indirect jobs**,

Attract **₹4.5 lakh crore in investments**,

Enable India to become a **competitive global player** while reducing dependence on foreign-built ships.

Strategic Importance

Shipbuilding is not just an industrial sector, it is a **strategic enabler**:

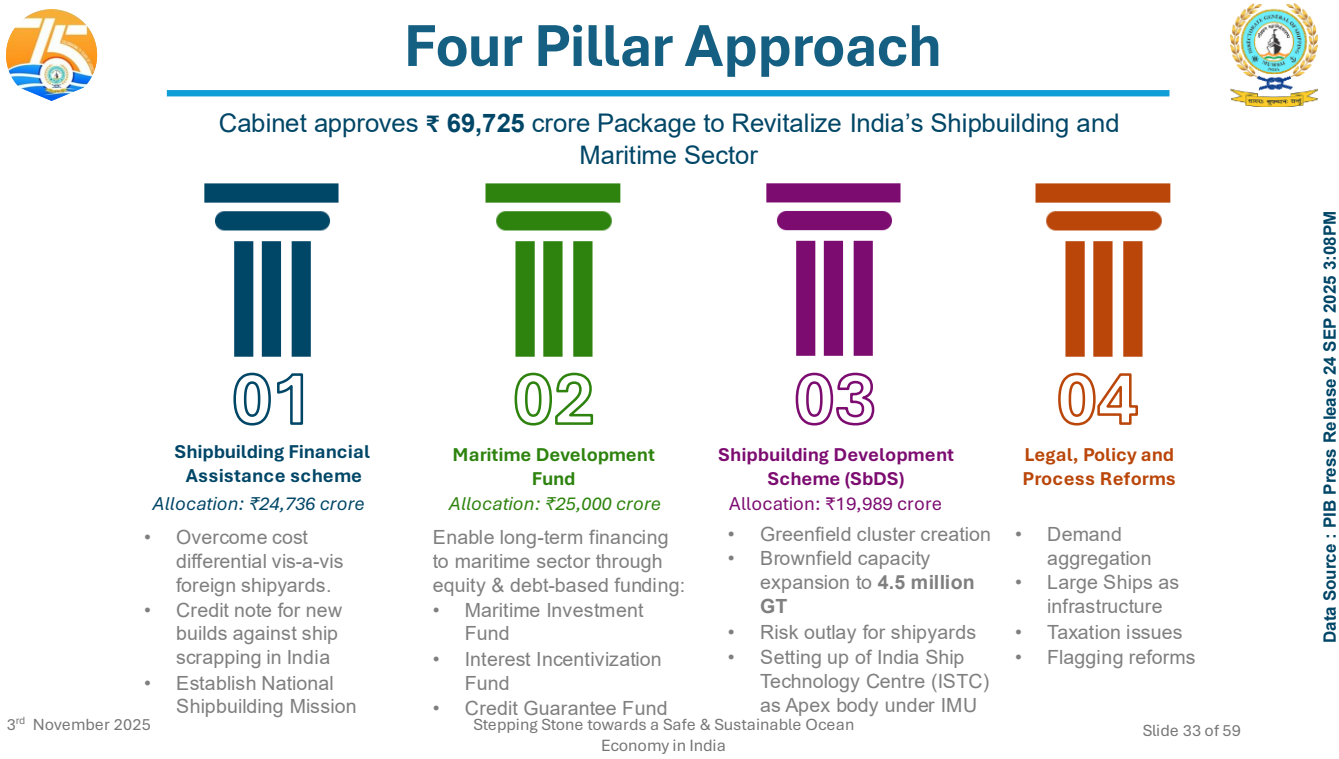
Strengthens national security by ensuring **domestic capacity for defence and merchant fleets**.

Boosts **exports of vessels and green technology** in the long run.

Creates linkages with allied industries — **steel, engineering, design, marine electronics**, and services.

Positions India to capture a share of the **$70 billion global shipbuilding market**.

India's shipbuilding potential is large but untapped. With policy support, financing reforms, and capacity unlocking, the sector can shift from a marginal 30,000 GT output today to millions of GT tomorrow, creating jobs, saving forex, and boosting strategic autonomy.



Four Pillar Approach

The Government of India has approved a **₹69,725 crore revitalization package** for the shipbuilding and maritime sector. This approach rests on **four strategic pillars**, each addressing a critical gap in India's maritime ecosystem- finance, infrastructure, capacity building, and regulatory reform.

Pillar 1: Shipbuilding Financial Assistance Scheme (₹24,736 crore)
Designed to **bridge the cost differential** between Indian and foreign shipyards, ensuring domestic yards remain competitive.
Provides **credit notes** for new shipbuilding linked to ship recycling in India, integrating sustainability with incentives.
Includes the establishment of a **National Shipbuilding Mission** to provide long-term policy continuity.

Pillar 2: Maritime Development Fund (₹25,000 crore)
Aims to enable **long-term, low-cost financing** for the maritime sector via equity and debt funding.
Includes sub-funds such as:
Maritime Investment Fund – to channel capital into greenfield projects.
Interest Incentivization Fund – to reduce borrowing costs for shipyards.
Credit Guarantee Fund – to reduce lender risk and unlock financing for vessel owners and builders.

Pillar 3: Shipbuilding Development Scheme (SbDS) (₹19,989 crore)
Focused on **capacity expansion and technology development**:
Establishment of **greenfield shipbuilding clusters**.

Brownfield expansion to raise capacity to **4.5 million GT**.
Risk outlay provision to protect shipyards from financial exposure.
Setting up the **India Ship Technology Centre (ISTC)** under IMU as an apex R&D and training body for advanced shipbuilding technologies.

Pillar 4: Legal, Policy, and Process Reforms
Demand aggregation across PSU, defence, and private shipping to secure consistent order books for Indian shipyards.
Recognition of **large ships as infrastructure**, unlocking easier access to long-term credit and incentives.
Addressing **taxation anomalies** and simplifying GST/customs regimes for shipbuilders.
Flagging reforms to incentivize Indian ownership of ships and reduce outflow of foreign exchange.

The four-pillar approach provides a **holistic framework** for India's shipbuilding revival. With financing support, capacity expansion, institutional R&D, and regulatory reforms, the package seeks to transform India into a **globally competitive shipbuilding hub**, aligned with Maritime India Vision 2030 and Maritime Amrit Kaal Vision 2047.

Ship Recycling Credit Note

- Introduced under **Ship Building Financial Assistance Scheme 2.0 (SBFA 2.0)**
- Incentivizes ship owners to **recycle in India** and **build new ships in Indian shipyards**

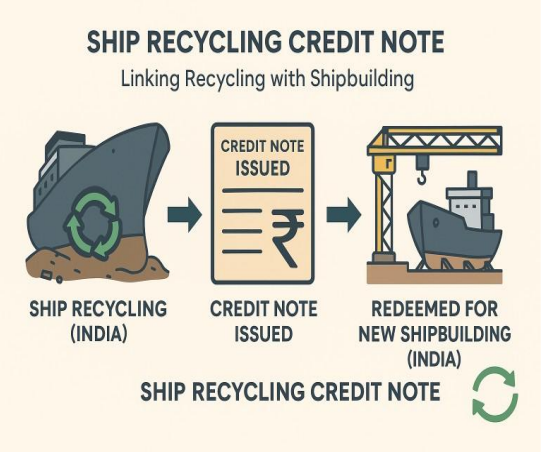
Allocation of : ₹ 4,001 crore
(under SBFA)

How It Works

- When a vessel is recycled in a certified Indian yard, the ship owner receives a **Credit Note for 40% of scrap value.**
- The Credit Note remains valid until the owner builds a new vessel/ ship in an Indian shipyard
- Redeemed as **financial assistance/ subsidy** under SBFA 2.0

Expected Benefits

- Encourages **safe and HKC compliant ship recycling** in India
- Provides direct **business boost for Indian shipyards**
- Attracts **new players** to India's ship recycling and shipbuilding ecosystem
- Strengthens India's **circular economy** : recycling feeds into new shipbuilding
- Positions India as a leader in **Green and Sustainable Maritime Growth**



Ship Recycling Credit Note

The **Ship Recycling Credit Note (SRCN)** is one of the most innovative financial instruments introduced under the **Shipbuilding Financial Assistance Scheme 2.0 (SBFA 2.0)** with an allocation of **₹4,001 crore**. It directly links India's ship recycling strength with the growth of its shipbuilding industry.

How It Works

When a vessel is dismantled in a **certified Indian ship recycling yard**, the shipowner is issued a **Credit Note worth 40% of the vessel's scrap value**.
This Credit Note remains valid until the shipowner invests in building a **new vessel in an Indian shipyard**.
The note is then **redeemed as financial assistance/subsidy** under SBFA 2.0, lowering the effective cost of new builds in India.

Expected Benefits

Boosts HKC-compliant recycling: Encourages safe, environmentally sound, and **Hong Kong Convention (HKC) aligned ship recycling** practices.
Strengthens shipbuilding: Directly channels recycling activity into **new orders for Indian shipyards**, ensuring business continuity.
Expands ecosystem participation: Incentivizes **new players**—both domestic and foreign—to engage with India's recycling and shipbuilding ecosystem.
Promotes circular economy: Scrap steel and materials from recycling feed into the production of new ships, cutting raw material dependence.
Sustainability leadership: Positions India as a **global leader in green and sustainable maritime growth**, combining recycling, green steel, and shipbuilding.

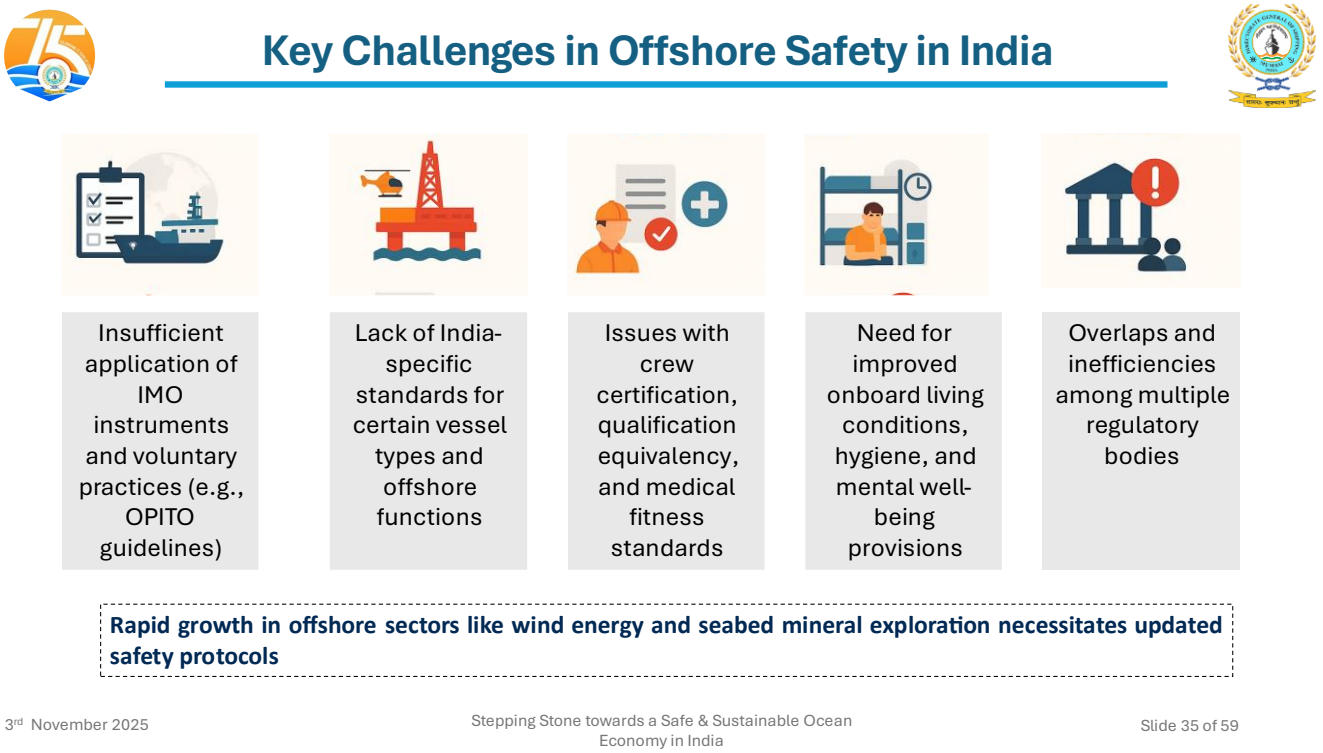
Strategic Importance

SRCN acts as a **bridge policy**, ensuring that India's dominance in recycling (30–35% of global share) translates into a **thriving shipbuilding industry**.

It enhances India's image as the **only country with over 100 HKC-compliant yards** while simultaneously supporting its ambition to become a **shipbuilding hub**.

By tying together **scrap recovery, circular economy, and green shipbuilding**, it creates a **self-sustaining maritime growth cycle**.

The Ship Recycling Credit Note is a **game-changer**, as it uniquely integrates recycling with new construction, creating a **virtuous cycle of sustainability, industrial growth, and employment**.



Key Challenges in Offshore Safety in India

"India's offshore footprint is expanding rapidly—from hydrocarbons to offshore wind and seabed resources. That growth must be matched with a safety framework that is modern, harmonised and enforced consistently."

1) Patchy application of IMO instruments & voluntary best practices

On many offshore units and support vessels, ISM/SOLAS/MARPOL compliance is uneven, especially for **non-SOLAS craft** and **special purpose vessels** supporting offshore projects.

Best-practice frameworks (e.g., **OPITO** for workforce safety, emergency response and helicopter ops) aren't uniformly embedded in contracts or audits.

2) India-specific standards gaps for certain vessel types & functions

Grey areas persist for **construction/support craft, DP vessels, accommodation barges, jack-ups/MODUs, cable-lay, and geotechnical survey vessels**.

Interface with port rules and coastal regulation often leaves SIMOPS (simultaneous operations) under-specified. **Message:** publish a **cross-walk code** that localises IMO/ILO/OPITO/Class requirements for Indian conditions (environment, met-ocean, cyclone, monsoon).

3) Crew certification, equivalency & medical standards

Inconsistent recognition of **specialist competencies** (DP, rigger/lifting, H2S awareness, banksman, helideck team, confined-space & hot-work).

Medical fitness: variation in **offshore-specific medicals**, fatigue management, and **mental-wellbeing** protocols for long hitches.

Message: a **national competency matrix** for offshore roles with mutual recognition, minimum refresher cycles, and **offshore-specific medical standard** aligned to MLC/ILO.

4) Living conditions, hygiene & wellbeing on board
Older units fall short on **accommodation standards, potable water, HVAC, hygiene, recreation and connectivity**, impacting safety culture and retention.
Message: enforce **minimum habitability standards** for all offshore units operating in Indian waters; link to **permit-to-work** and contract scorecards.

5) Fragmented oversight & overlaps
Multiple bodies (DGS, MoPNG/OISD, DGH, Coast Guard, Flag/ROs, state maritime boards) create **gaps at the interfaces**: design approvals, SIMOPS, EER (evacuation, escape & rescue), and post-incident learning.
Message: operationalise a **single coordination window** (ODAG-style) with **shared audits, unified checklists**, and a **common incident taxonomy** to pool lessons learned.

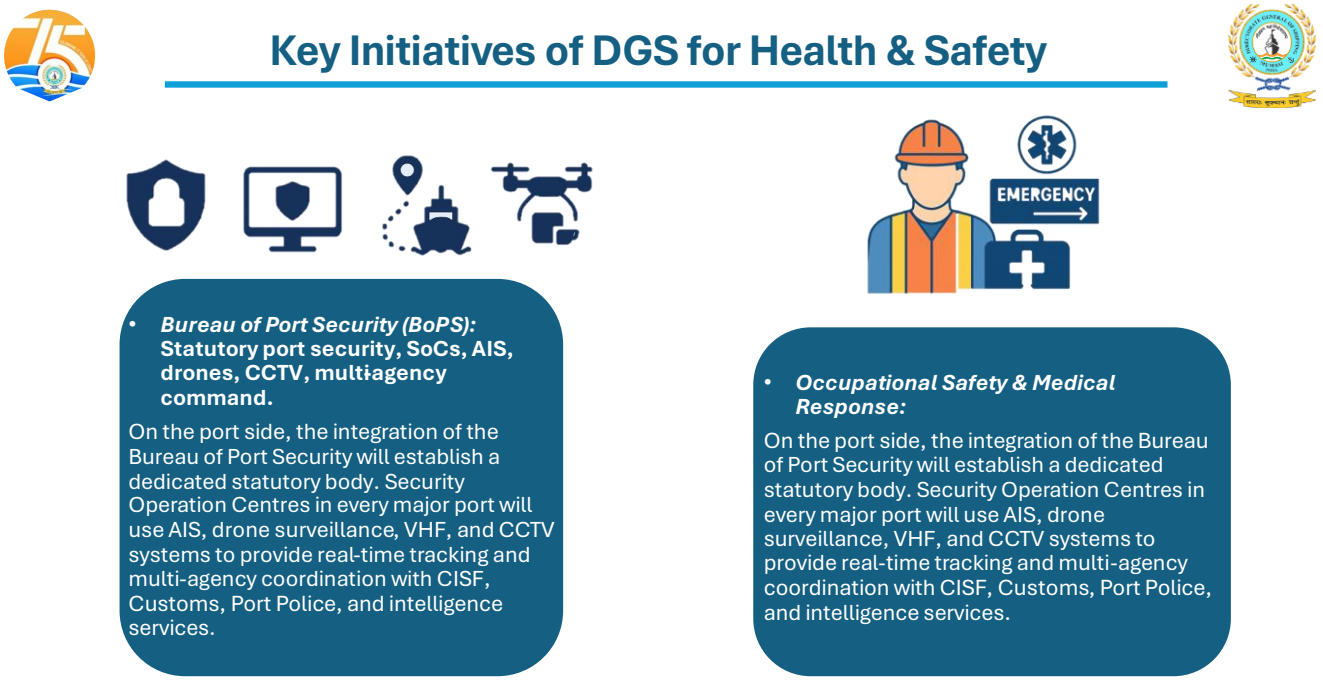
6) SIMOPS & high-risk task control (Explicit Addition)
Lifting operations, hot work, confined space entry, diving, ROV, bunkering, and **helicopter operations** need stronger **permit-to-work** discipline and **toolbox talk** culture during multi-contractor campaigns.
Message: mandate **SIMOPS plans** and **Golden Rules**; require **independent lifting & DP assurance** on critical jobs.

7) Emergency preparedness & pollution response
Alignment with **NOS-DCP** for oil spills, mass-casualty medevac, cyclone/hurricane plans and **SAR with Coast Guard** is uneven in exercises and equipment pre-positioning.
Message: drill calendar with joint exercises; publish **time-to-respond KPIs** by basin.

8) Cyber-physical security of offshore assets
Increasing automation/DP/OT systems raise **cyber risk** to safety-critical functions.
Message: adopt **OT-cyber baselines** (access control, patching, logging, incident drills) as part of statutory audits.

9) Data, near-miss reporting & transparency
Under-reporting of **near misses** dulls learning loops; incident data isn't always comparable across agencies.
Message: create a **national offshore safety dashboard** (anonymised) with **leading indicators** (training currency, PTW quality, SIMOPS audits, medevac readiness) in addition to lagging indicators.

"Our objective is simple: one risk standard, applied everywhere—regardless of flag, function or contractor. That is how we protect lives, protect the ocean, and protect India's energy transition."



Key Initiatives of DGS for Health & Safety

"Safety and security form the foundation of a resilient maritime ecosystem. The Directorate has therefore prioritized two critical interventions, port security and occupational health, to safeguard both infrastructure and personnel."

The first initiative is the **Bureau of Port Security**, or **BoPS**. This will be a **statutory body under the Directorate General of Shipping**, designed to ensure a **unified national framework for port security**.

The Bureau will establish **Security Operation Centres** in every major port, integrating multiple systems — **Automatic Identification System (AIS)**, **VHF**, **drone surveillance**, **CCTV networks**, and **multi-agency command platforms**. These centres will enable **real-time vessel and cargo tracking**, early warning, and coordinated responses across **CISF, Customs, Port Police, and intelligence services**.

BoPS will also serve as the **nodal authority for ISPS compliance** and will oversee **standard operating procedures (SoCs)** for port security audits, risk assessments, and emergency drills. In the long term, it will evolve into an integrated **national maritime safety and security grid**, aligning with the objectives of the **Maritime Amrit Kaal Vision 2047**.

The second pillar is **Occupational Safety and Medical Response**.
This focuses on strengthening **health and emergency preparedness** across ports and maritime establishments. Every major port is being directed to establish a **24x7 medical emergency response system**, supported by **trained first responders, telemedicine facilities, and tie-ups with nearby hospitals**. These systems will ensure immediate assistance for incidents such as **fire, toxic exposure, falls, or mechanical injuries**, particularly in high-risk port and shipyard zones.

The Directorate is also working on integrating **occupational safety data,** including incident reports, training coverage, and near-miss analytics, into a centralised dashboard for better **monitoring and prevention**.

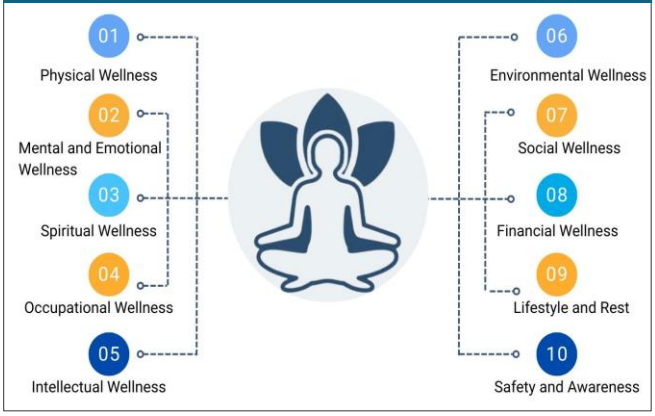
"Together, these initiatives, BoPS and the Occupational Safety Framework, represent a paradigm shift from reactive to proactive safety. They will allow India's ports to not only meet global standards but set new ones in maritime security, resilience, and worker welfare."

Seafarers may face multiple challenges in coping with the challenges of life at sea. Hence, the Sagar Mein Yog initiative has been taken to cater to the complete wellness of seafarers.

About Sagar Mein Yog

- *A flagship initiative by the DGS, India, aimed at promoting physical and mental well-being among seafarers through yoga and mindfulness practices.*
- *Programme seeks to provide complete wellness at Sea/Shore*
- *LMS training program modules have been prepared and would be launched*
- *In the second phase, the SMY training through the LMS to be made mandatory for all serving seafarers.*

10 components of Sagar Mein Yog



Sagar Mein Yog

"Behind every vessel that sails safely across our oceans stands a seafarer, an individual who spends months away from home, facing isolation, stress, and unpredictable working conditions. The 'Sagar Mein Yog' initiative was conceived to care for that individual, to bring balance, wellness, and mindfulness to life at sea."

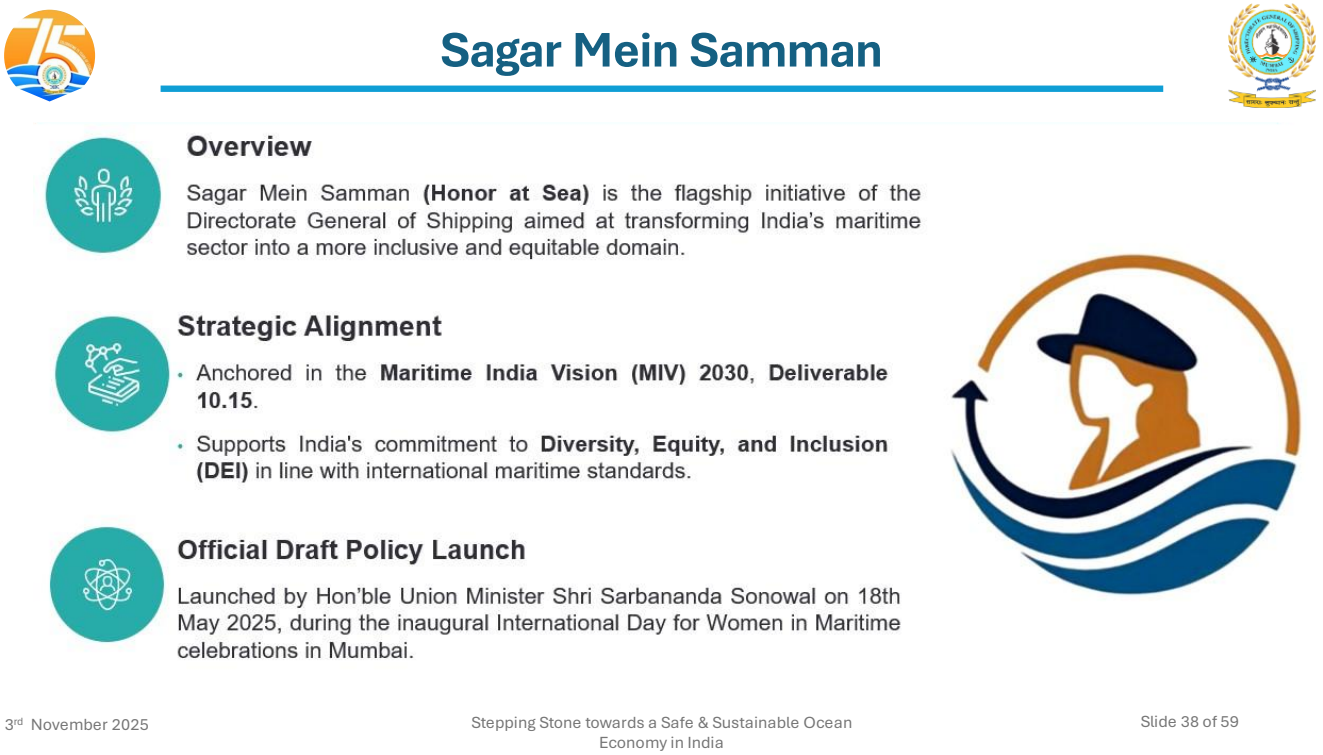
The **Sagar Mein Yog (SMY)** programme is a **flagship initiative of the Directorate General of Shipping**, dedicated to promoting the **physical, mental, and emotional well-being of Indian seafarers**. It recognizes that the challenges faced at sea are not only technical but also human, long working hours, isolation, fatigue, and anxiety often take a toll on the body and mind.

Through yoga, meditation, and mindfulness practices, **Sagar Mein Yog** seeks to nurture **holistic wellness** , addressing both physical health and mental resilience. It is designed to support seafarers at all stages of their service, whether **onboard a ship or stationed ashore**.

The programme is structured around **ten key dimensions of wellness**:
Physical wellness, through guided routines for flexibility and strength;
Mental and emotional wellness, promoting mindfulness and stress management;
Spiritual wellness, focusing on inner peace and stability;
Occupational and intellectual wellness, improving focus and awareness;
Environmental and social wellness, encouraging harmony and teamwork at sea;
Financial wellness, ensuring stability and security; and
Lifestyle, rest, and safety awareness, which complete the holistic approach.
To make this accessible to all, the Directorate has developed dedicated **Learning Management System (LMS) training modules**. These are being rolled out as part of the **national e-learning framework for**

seafarers, and in the next phase, participation in the SMY course will be **mandatory for all serving Indian seafarers**.

“Sagar Mein Yog is not just a programme — it’s a promise. A promise that as India strengthens its maritime capability, it will also safeguard the mind, body, and spirit of those who keep our seas moving.”



Sagar Mein Samman

"If Sagar Mein Yog focuses on the wellness of the individual, Sagar Mein Samman focuses on the dignity of the profession. It represents the human side of maritime reform — respect, equality, and opportunity for all who serve at sea."

Sagar Mein Samman, or *"Honor at Sea,"* is a **flagship inclusivity initiative** of the Directorate General of Shipping. It aims to **transform India's maritime sector into a more equitable, diverse, and inclusive domain,** one where every seafarer, regardless of gender or background, is treated with respect, safety, and equal opportunity.

This initiative is **anchored within the Maritime India Vision 2030**, under **Deliverable 10.15**, which calls for enhancing *diversity, equity, and inclusion* across the maritime workforce.
The policy is fully aligned with international frameworks, particularly the IMO's and ILO's evolving focus on **DEI (Diversity, Equity, and Inclusion)** in shipping and port operations.

Under **Sagar Mein Samman**, DGS envisions the creation of an ecosystem that:
Ensures **safe and respectful working environments** onboard ships;
Promotes **gender diversity and leadership opportunities for women**;
Encourages **inclusive recruitment and training frameworks**; and
Establishes **mechanisms to address harassment, discrimination, or bias** in the maritime workplace.

The **draft policy** was officially launched by **Hon'ble Union Minister Shri Sarbananda Sonowal** on **18th May 2025**, coinciding with the **International Day for Women in Maritime**, during a special event held in Mumbai.

The launch marked a symbolic and practical milestone — showcasing India's commitment to embedding inclusion not as an aspiration, but as a statutory principle in its maritime governance.

“Through Sagar Mein Samman, India sends a clear message — that the strength of our maritime community lies not only in ships and ports, but in the people who serve them, with dignity, equality, and honor.”

Regulatory & Institutional Initiatives 2025

"The year 2025 marks a pivotal phase in India's maritime governance — one defined by modernization, accountability, and safety. Several landmark legislative and institutional reforms are now reshaping the framework of how India governs its seas."

Let me begin with the **Merchant Shipping Bill, 2025**.
This Bill, enacted in August 2025, represents the **first major overhaul of India's maritime law in over six decades**.
It replaces outdated provisions, simplifies compliance, and brings India's maritime governance fully **in line with IMO conventions and global best practices**.
The Bill also emphasizes **digital certification, environmental responsibility, and accountability in ship management**, ensuring that India remains a credible and progressive flag administration.

Parallel to this, the **Indian Ports Act, 2025** is being rolled out.
This Act aims to **streamline port governance**, strengthen oversight mechanisms, and **embed sustainability and safety standards** into the operations of both major and non-major ports.
It introduces **uniform compliance mechanisms** for environmental protection, port security, and worker safety — ensuring every port operates with transparency and responsibility.
Together, these two legislative reforms lay the foundation for **an integrated, modern maritime legal architecture**.

Another milestone is the establishment of **NAVIC Cell 2** and the launch of the **India Maritime Compliance Manual (IMCM)**.
These initiatives serve as the backbone of a **national compliance ecosystem**, covering safety, security, environmental protection, and disaster response.
They enable real-time coordination between the **Directorate General of Shipping, Coast Guard, Navy, and port authorities**, ensuring that compliance is not just reactive but predictive and technology-driven.

Finally, the Directorate has piloted the **ISO 45001 Occupational Health & Safety Standards** across several ports and shipyards.
This initiative aims to institutionalize **safe working practices and hazard prevention** across India's maritime workplaces. The certification will become **mandatory for all shipyards and port facilities by end-2025**, aligning national operations with **international occupational safety benchmarks**.

"These initiatives together mark a decisive shift — from regulation to reform, from compliance to culture, and from fragmented oversight to integrated maritime governance. The result is a safer, smarter, and globally aligned maritime India."

- **Purpose**: Consolidates Indian shipping law, repealing the MS Act 1958 and Coastal Vessel 1838 Act.
- **Global Alignment**: Compliance with IMO conventions and international treaties.
- **Applicability**: Covers all Indian-registered vessels, including offshore; applies to foreign vessels in Indian waters.
- **Regulatory Strengthening**: Expands powers of DG Shipping & Government to regulate operations and protect national interests.
- **Continuity**: Existing registrations, licenses, and certificates remain valid until replaced.
- **Safety & Welfare**: Stronger provisions on abandonment, repatriation, and seafarer welfare.
- **National Interest**: Promotes Indian shipping growth, efficient mercantile marine, and offshore energy logistics.

Offshore Relevance of MS Act 2025:

- **Applicability**: Covers offshore supply ships, drill ships, floating platforms, and construction vessels registered in India or operating in Indian waters.
- **Safety & Certification**: Offshore vessels must meet updated safety, manning, and survey norms aligned with SOLAS, MARPOL, Load Line and other IMO conventions.
- **Seafarer Welfare**: Stronger safeguards on abandonment, repatriation, and welfare for offshore crews.
- **Jurisdiction**: Strengthens India's flag state control and port/coastal state jurisdiction over offshore and EEZ operations.
- **Energy Integration**: Provides legal support for offshore hydrocarbons, LNG, and renewable projects such as offshore wind.

MS Act 2025 (Offshore Relevance)

"The Merchant Shipping Act 2025 is not just a legislative update — it is a complete modernization of India's maritime legal architecture. It reflects India's commitment to safe, sustainable, and globally aligned maritime governance."

The **Merchant Shipping Act 2025** consolidates and modernizes Indian shipping law by repealing outdated legislations such as the **Merchant Shipping Act of 1958** and the **Coastal Vessels Act of 1838**. This reform brings all aspects of Indian shipping, from ship registration to manning, certification, and welfare — under one **comprehensive and internationally harmonized framework**.
A key aspect of this new Act is its **direct relevance to the offshore sector**.

For the first time, offshore supply ships, drill ships, floating platforms, and construction vessels operating in Indian waters are formally covered within the national regulatory framework. This ensures that **safety, manning, and survey standards** for offshore vessels are fully aligned with **IMO conventions** such as SOLAS, MARPOL, and the Load Line Convention.
The Act also enhances **flag state control** and **port/coastal state jurisdiction**, strengthening India's oversight of offshore and EEZ operations.

By expanding the powers of the Directorate General of Shipping, it ensures **regulatory continuity and swift enforcement**, particularly in areas concerning crew certification, vessel survey, and environmental compliance.

Another important dimension is **seafarer welfare**. The Act introduces stronger provisions for **crew protection**, including mechanisms for **abandonment and repatriation**, and ensures that offshore workers enjoy the same welfare and safety protections as mainstream seafarers. It reinforces India's commitment to the **Maritime Labour Convention (MLC)** principles.

From an economic standpoint, the Act supports **India's energy and offshore ambitions**. It provides **legal clarity and institutional backing** for activities involving **offshore hydrocarbons, LNG bunkering, and renewable energy projects such as offshore wind farms**, helping India diversify its energy mix while maintaining maritime safety and environmental integrity.

"In essence, the Merchant Shipping Act 2025 redefines maritime governance — making it adaptive to new technologies, responsive to the offshore energy transition, and anchored firmly in global best practices."

Occupational Safety and Health (OSH)

- A multidisciplinary field concerned with the **safety, health, and welfare of people at work**.
- Ensuring safe working conditions, preventing workplace accidents, injuries, and illnesses.
- Protecting workers **physical, mental, and social well-being** in all occupations.

Workplace Safety –
Preventing accidents, hazards, and unsafe conditions.

Occupational Health
monitoring health risks like chemicals, noise, stress, ergonomics.

Compliance & Standards
Following national laws and international guidelines (ILO conventions, ISO 45001)

Training & Awareness
safety drills, use of protective equipment, hazard reporting.

Welfare Measures
Ensuring first aid, rest breaks, proper working hours, and mental health support.

Occupational Safety and Health (OSH)

"Safety is not just a compliance requirement — it is a culture, a value system that protects lives and sustains productivity across every port, shipyard, and offshore operation."

Occupational Safety and Health, or **OSH**, represents a multidisciplinary framework that safeguards the **physical, mental, and social well-being** of workers across all maritime domains. It encompasses every aspect of workplace protection, from preventing accidents and exposure to harmful substances, to ensuring proper working hours, welfare amenities, and psychological support.

At its core, OSH rests on **five interconnected pillars**:

Workplace Safety – This covers proactive hazard identification, accident prevention, and ensuring that work environments meet established safety design and operation standards. The focus is on eliminating unsafe practices through inspection, supervision, and a culture of vigilance.

Occupational Health – Beyond safety, health management plays an equal role. It involves **monitoring risks from noise, vibration, chemicals, ergonomics, and stress**, ensuring workers' long-term health is not compromised by their work environment.

Compliance and Standards – India's maritime OSH framework is now being **aligned with ILO conventions** and **ISO 45001**, which emphasize structured risk management, emergency preparedness, and continuous improvement. This alignment ensures that ports and shipyards adopt uniform health and safety benchmarks comparable to global standards.

Training and Awareness – The most effective safeguard is an informed workforce. Regular **safety drills, use of personal protective equipment (PPE), and reporting mechanisms** empower workers to identify and mitigate risks themselves, turning compliance into habit.

Welfare Measures – Finally, OSH extends to **rest periods, nutrition, mental health support, and family well-being** — particularly critical for seafarers and port workers exposed to prolonged stress or isolation.

In the maritime sector, these elements are being institutionalized through the **ISO 45001 certification program**, recently piloted across major ports and shipyards under the Directorate General of Shipping.

This initiative not only strengthens accountability but also positions India as a leader in **workforce safety and welfare in the global maritime domain**.

"Through OSH, India is setting a precedent — that economic growth and worker welfare are not competing goals, but parallel priorities. Safe workers build resilient nations."

OSH in Shipping and Maritime Context

Importance of OSH in Maritime

Seafarers face **hazardous working and living conditions**: confined spaces, heavy machinery, extreme weather, long hours, and isolation.

Ensures **compliance** with international conventions like:

- **ILO** – **Maritime Labour Convention (MLC, 2006)** – covers health, safety, and welfare
- **STCW** – **STCW Convention** – training and watchkeeping requirements that indirectly support safety.
- **SOLAS** – **SOLAS** (Safety of Life at Sea) – mandatory safety standards

OSH in Shipping and Maritime Context

- **Onboard Safety Drills**
- **Prevention of occupational hazards**
- **Seafarers' mental well-being**
- **Compliance with ILO Maritime Labour Convention (MLC, 2006)**
- **Use of PPE**
- **Medical care and telemedical support**
- **Safe cargo and machinery operations**

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OSH in Shipping and Maritime Context

"The maritime sector presents one of the most challenging work environments in the world — one that demands not just skill and discipline, but also resilience and protection."

Occupational Safety and Health (OSH) in the maritime context carries unique complexities because of the very nature of seafaring.
Seafarers often operate in **hazardous and isolated conditions**, dealing with confined spaces, heavy machinery, extreme weather, and long shifts away from home.
This combination of **physical strain and psychological isolation** makes the industry particularly vulnerable to accidents, fatigue, and mental health concerns.
Recognizing these challenges, OSH in the maritime domain is **anchored in international conventions and mandatory frameworks** that together ensure holistic protection of maritime workers.

The **Maritime Labour Convention (MLC, 2006)**, adopted by the International Labour Organization, is the cornerstone.
It covers **health, safety, and welfare** — ensuring decent working and living conditions, onboard accommodation standards, medical care, and social protection for seafarers.
India's full compliance with the MLC demonstrates our commitment to maintaining international parity in seafarer welfare.

Complementing this, the **STCW Convention** (Standards of Training, Certification and Watchkeeping) defines the **training and competency benchmarks** that underpin safety.
It ensures that all seafarers are adequately trained for emergency response, equipment handling, and fatigue management — which indirectly but powerfully support workplace safety.

Then comes **SOLAS — the Safety of Life at Sea Convention**, one of the oldest and most fundamental IMO instruments.
SOLAS mandates safety drills, fire control systems, lifesaving appliances, and emergency preparedness as core operational requirements — saving countless lives every year.

In practical application, India's OSH framework translates these conventions into **daily operational safety measures**:
Regular **onboard safety drills** and hazard prevention protocols.
Provision of **PPE and safety signage** across shipboard and port operations.
Telemedical assistance and onboard medical care for emergencies.
Proactive emphasis on **mental well-being**, addressing stress and isolation through training, peer support, and initiatives like *Sagar Mein Yog*.
And finally, **safe cargo and machinery operations**, aligned with the ISM Code and MARPOL safety management systems.

"When we talk about maritime safety, it is not just about ships and cargo — it is about people. A safe and cared-for seafarer ensures a safe ship, a compliant company, and a stronger maritime nation."

Need for OSH in Maritime Sector (1/2)

May 2025: *MSC Elsa III, containing hazardous chemicals, capsized off the shore of Kochi*

July 2024: *Major Fire erupted on a merchant ship MV Maersk Frankfurt off the Karnataka coast*

- High-risk working environment: long voyages, harsh weather, hazardous cargo
- Physical & mental health challenges for seafarers
- Recent incidents highlight need for stronger safety standards
- Essential for environmental protection & emergency preparedness
- Ensures dignity, welfare, and productivity of India's 2.5+ lakh seafarers

Need for OSH in Maritime Sector (1/2)

"Every maritime accident is not just a loss of cargo or infrastructure — it's a reminder of the human cost that underscores why safety cannot be optional in our sector."

The **maritime sector is inherently high-risk.** A domain where nature, machinery, and human endurance intersect every single day.
Seafarers routinely work in extreme conditions: **long voyages**, **harsh weather**, and **exposure to hazardous cargo**. Confined environments, fatigue, and physical isolation make their work among the most demanding in any industry.

This reality has been reinforced by **recent maritime incidents**, including:
The *MSC Elsa III* incident in **May 2025**, which capsized off Kochi carrying hazardous chemicals, highlighting the scale of environmental and safety challenges that can arise from one vessel casualty.
The *Maersk Frankfurt* fire off the **Karnataka coast in July 2024**, a reminder that even modern ships are vulnerable to onboard emergencies — particularly those involving flammable or chemical cargo.

Such cases are not isolated; they reflect **systemic vulnerabilities** in operational safety, emergency response readiness, and crew fatigue management.
They underline the need for a **robust Occupational Safety and Health framework** tailored specifically for maritime and offshore conditions.

OSH in this context is not limited to compliance — it is a **strategic necessity**.
It directly supports:
Environmental protection, by minimizing the likelihood and impact of marine pollution incidents.
Emergency preparedness, ensuring ports and ships can respond swiftly and effectively to crises.
Crew welfare and productivity, by ensuring that India's **2.5+ lakh seafarers** work with dignity, safety, and access to mental health and medical support systems.

The message is clear: **a safe seafarer is the foundation of a safe ship, and a safe ship sustains global trade**. India's leadership in implementing stronger OSH mechanisms — from port operations to offshore installations — will be key to preventing recurrence and strengthening our maritime resilience.

"Every step we take in OSH today protects not just our people and coasts, but also the credibility of India's maritime commitment to the world."

Need for OSH in Maritime Sector (2/2)

Maritime Incidents			Casualties in 2024	
153	186	21.6%	83	61
In 2023	In 2024	Increase in incidents	Deaths	Injuries

Most incidents involved vessels flagged in Marshall Islands, Panama, and India where **Indian flagged vessels** see a **decline in fire/explosion** cases from **7 (2023) to 1 (2024)**

Absence of Single Institution for Safety Oversight

Need for OSH in Maritime Sector (2/2)

"The numbers before us are not just statistics — they represent incidents that could have been prevented through stronger safety oversight, better preparedness, and coordinated institutional action."

The data presents a **clear and concerning trend**. India recorded **186 maritime incidents in 2024**, marking a **21.6% increase** compared to **153 cases in 2023**. While such figures mirror a global rise in marine traffic and operational intensity, they also underscore **the gaps in proactive safety management** — particularly in areas of occupational health, training, and emergency response.

In terms of casualties, **83 lives were lost** and **61 injuries** reported across international and coastal operations in 2024. These are not abstract figures — each represents a seafarer, a family, a community affected.

They emphasize why **Occupational Safety and Health (OSH)** must move from being a compliance topic to an operational priority across every vessel and port.
Interestingly, despite this global rise, **Indian-flagged vessels have shown measurable improvement**.

Fire and explosion cases, for instance, **declined from 7 in 2023 to just 1 in 2024**, demonstrating the impact of enhanced inspections, improved crew training, and the introduction of preventive maintenance frameworks. This positive shift validates the direction of India's maritime administration under the Directorate General of Shipping — where safety culture is being institutionalized through both regulatory and behavioral reform.

However, the data also brings out a structural weakness ie the **absence of a single, dedicated institution for safety oversight**.
Currently, multiple agencies handle aspects of port, offshore, and crew safety, leading to overlaps and inefficiencies.

A unified framework or **National Maritime Safety Authority** could bridge these gaps — ensuring standardized audits, centralized incident tracking, and faster policy response.

"As India's fleet grows and our maritime footprint expands, safety must remain non-negotiable. The vision ahead is clear — zero preventable incidents, a protected workforce, and an accountable institutional framework."

Port-wise Distribution of Marine Incidents

2019-2024

Key Insights:

- Deendayal Port Authority recorded the highest incidents: 28
- Followed by Chennai (19), Cochin (18), and Visakhapatnam (15)
- These four ports account for nearly 74% of all incidents
- Ports like Tuticorin (2) and Jawaharlal Nehru (1) have minimal incidents
- Incidents correlate strongly with vessel traffic density and cargo handling complexity

Impact of Marine Incidents

- Endanger human lives
- Disrupt trade and operational efficiency
- Undermine India's global maritime competitiveness

Table: Marine Incidents Registered at Ports (2019-2024)

Port	Total Incidents
Deendayal Port Authority	28
Chennai Port Authority	19
Cochin Port Authority	18
Visakhapatnam Port Authority	15
Paradip Port Authority	10
New Mangalore Port Authority	8
Murmugao Port Authority	4
Kolkata Port Authority	3
Tuticorin Port Authority	2
Jawaharlal Nehru Port Authority	1

Port-wise Distribution of Marine Incidents (2019–2024)

"When we analyze safety performance across India's ports, we begin to see clear correlations — between operational scale, cargo complexity, and the frequency of marine incidents."

This data covers a **five-year period from 2019 to 2024**, tracking incident reports submitted by port authorities across India.
At the top of the list is the **Deendayal Port Authority (Kandla)**, which recorded **28 marine incidents**, the highest in the country.

It is followed by **Chennai (19)**, **Cochin (18)**, and **Visakhapatnam (15)** — together accounting for nearly **three-fourths of all recorded incidents**.
These are high-traffic, multi-cargo ports that handle bulk chemicals, petroleum products, and containerized trade — categories inherently prone to operational risk.

By contrast, ports such as **Tuticorin (2)** and **Jawaharlal Nehru Port Authority (1)** show **minimal incident frequency**, largely due to more standardized container operations, advanced traffic systems, and better-established safety management frameworks.

This pattern indicates a strong **correlation between vessel density, cargo handling complexity, and incident likelihood**.

Ports with diverse cargo profiles — particularly hazardous or bulk cargo — require **enhanced monitoring mechanisms**, **stricter compliance audits**, and **continuous safety drills**.

From an operational standpoint, these incidents have **three direct impacts**:
They **endanger human lives** — especially seafarers, pilots, and port workers.
They **disrupt trade flow**, causing downtime, insurance escalations, and congestion.
They **undermine India's global competitiveness**, particularly when benchmarking port reliability against major regional hubs like Singapore or Rotterdam.

"The path forward is clear — our major ports must evolve from reactive incident reporting to proactive risk management. Integrating predictive analytics, training programs, and unified oversight under DGS can help India transition to a zero-incident maritime ecosystem."

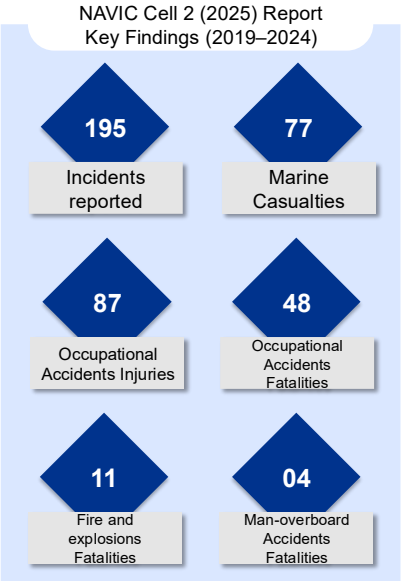
Incident Analysis Highlights & KPIs

Total fatalities (2019-2024): 48 deaths, 20 injuries reported in port and sea incidents

Incident locations: Berth/Jetties (31), port roads (29), navigation channels (14)

Safety KPIs under IMCM: accident frequency rate, compliance rate, emergency response time, training completion

Digital platforms like E-Samudra, Digital Twin and Sagarmanthan Dashboard deployed for real-time monitoring and data-driven risk mitigation



Incident Analysis Highlights & KPIs

"Behind every statistic here lies an operational story, one that helps us understand where interventions are needed, and where our systems are already beginning to respond effectively."

This slide presents an overview of incident trends compiled through **NAVIC Cell 2's 2025 report**, covering the period **2019 to 2024**.
During this timeframe, India recorded **195 maritime incidents**, of which **77 were classified as marine casualties**. Out of these, **48 fatalities and 20 serious injuries** occurred across both port and sea operations — with the highest concentration at **berths, jetties, and port access roads**.
These locations alone account for nearly **60% of all reported accidents**, underscoring the risk associated with high-density cargo and berthing activities.

Even **navigation channels**, though less frequent in incident count, remain sensitive zones due to congestion, dredging, and pilotage challenges.
The data also reveals a gradual but consistent improvement in **response and reporting discipline** — something achieved through the **Integrated Maritime Compliance Manual (IMCM)** framework.

Under the IMCM, DGS has instituted measurable **Safety KPIs**, including:
Accident frequency rate,
Compliance rate of port and vessel audits,
Emergency response time, and
Training completion rate for safety personnel.

These indicators are critical for tracking how effectively safety culture is being institutionalized across ports and shipping lines.

Importantly, DGS has also integrated **digital monitoring platforms** such as **E-Samudra**, **Digital Twin models**, and the **Sagarmanthān Dashboard**.
These tools enable **real-time data collection**, predictive alerts, and **data-driven risk mitigation**, helping authorities intervene before incidents escalate.

The NAVIC Cell findings show encouraging progress —
Occupational injuries: 87
Occupational fatalities: 48
Fire and explosion fatalities: 11
Man-overboard fatalities: 4

While these numbers still indicate areas of concern, they also reflect a **maturing reporting culture** and a **foundation for evidence-based policy**.

"The objective now is not only to reduce incidents but to build foresight — anticipating risk through digital intelligence, training, and unified governance under DGS."

Safety First

'Suraksha Sarvapratham'

DGS is focused on promoting safety on vessels and is set to launch a campaign called the Suraksha Sarvpratham, ensuring that the seafarers are able to discharge their duties in a risk-free manner.

To reduce accidents and minimize risks aboard ships.	Detailed documentation of incidents that occur at sea and during port operations.	Systematic recording and analysis of incidents will help identify patterns, understand root causes, and implement preventative strategies.	Instill a culture of safety among seafarers.
Web-based learning management systems for training.	Free online courses will be developed.	To create a safer working environment for seafarers by reducing the frequency and severity of accidents at sea and in ports.	Comprehensive incident documentation, strict adherence to safety protocols, and innovative AI-based safety videos--- to establish Safety Culture

Safety First – Suraksha Sarvpratham

"Safety is not a procedure; it is a mindset. The Directorate General of Shipping is embedding this mindset across the maritime sector through the Suraksha Sarvpratham campaign — safety, above all else."

This national safety initiative reflects DGS's long-term commitment to **zero-incident maritime operations**. The campaign, titled **Suraksha Sarvpratham**, focuses on creating a **proactive and preventive safety culture** among seafarers and port professionals alike.

The objective is :
To reduce accidents and minimize risks aboard ships, by moving from incident response to risk anticipation.
To institutionalize a continuous learning ecosystem, using web-based training and AI-enabled awareness tools.
To strengthen the safety reporting and documentation process, so that every incident, however small, contributes to systemic improvement.

Every accident is now to be **systematically recorded and analysed**. Not only to determine cause, but to identify recurring patterns and areas for early intervention. These insights will feed into **preventive strategies**, emergency preparedness plans, and the upcoming **Maritime Safety Information System**.

On the human-capital side, **free online safety courses** and **LMS-based training modules** are being developed to ensure accessibility for all ranks of seafarers. This includes visual learning aids, case-based lessons, and **AI-based safety videos** — practical, interactive, and available on-demand.

The larger aim is to **instil safety as a professional value**, rather than as a compliance requirement. When every officer, rating, or pilot treats safety as integral to their duty, we move closer to a self-sustaining safety culture across ships and ports.

"Through Suraksha Sarvpratham, India's maritime workforce will lead by example — demonstrating that growth and safety are not trade-offs, but partners in progress."

Offshore Oil & Gas Development and Safety Framework in India

India's offshore oil and gas ecosystem is supported by a multi-tiered institutional framework that ensures safe, efficient, and sustainable operations across exploration, production, and workforce training.

1. Safety and Competency Standards (OPITO):

OPITO serves as the global benchmark for offshore workforce training and safety certification.

India hosts OPITO-approved centers like Suraksha Marine, WOISO, and iMost Academy, offering over 25 internationally recognized safety courses such as BOSIET, HUET, and FOET.

Standardized training enhances emergency preparedness, hazard management, and offshore operational safety.

2. Strategic Coordination (ODAG):

The Offshore Defence Advisory Group (ODAG) acts as the strategic interface between offshore hydrocarbon operations, maritime logistics, and national defence.

It coordinates with DGS for regulatory compliance, crew welfare, and environmental oversight while supporting port operations and offshore supply chains.

ODAG also promotes international certifications and capacity building for India's maritime workforce.

3. Technical Oversight (OISD):

The Oil Industry Safety Directorate (OISD), under MoPNG, sets and monitors over 120 safety standards for upstream, midstream, and downstream operations.

It conducts audits, accident investigations, and compliance inspections for onshore and offshore installations.

OISD advances safety culture and continuous improvement through policy guidelines and stakeholder collaboration.

4. Exploration and Resource Governance (DGH):

The Directorate General of Hydrocarbons (DGH) is the nodal agency for upstream oil and gas exploration and production policies.

Oversees offshore exploration programs, reservoir management, and data-driven resource evaluation across Indian sedimentary basins.

DGH facilitates technology collaborations, contract management, and the implementation of schemes such as NELP, HELP, and OALP.

Offshore Oil & Gas Development and Safety Framework in India

"India's offshore ecosystem stands at the intersection of energy, environment, and safety. As we expand our offshore footprint, the need for a cohesive safety and competency framework becomes critical."

India's offshore oil and gas domain operates through a **multi-tiered institutional structure** with each agency playing a defined but interconnected role across exploration, production, logistics, and workforce safety.

Let's look at these four pillars briefly:

1. Safety and Competency Standards (OPITO):

OPITO serves as the **global benchmark** for offshore workforce training and certification.
India is home to several **OPITO-accredited training centres**, including **Suraksha Marine**, **WOISO**, and **iMost Academy**, offering more than **25 internationally recognised safety courses** such as **BOSIET**, **HUET**, and **FOET**.
These programs ensure **emergency preparedness, hazard awareness, and operational discipline** in offshore environments — aligning Indian workforce competency with global standards.

2. Strategic Coordination (ODAG):

The **Offshore Defence Advisory Group (ODAG)** functions as the **strategic bridge** between offshore energy operations, maritime logistics, and national defence.
It coordinates closely with the **Directorate General of Shipping** to strengthen regulatory compliance, crew welfare, and environmental safety.
ODAG also supports **international certification programs** and capacity-building initiatives to prepare Indian seafarers and offshore workers for complex, cross-domain operations.

3. Technical Oversight (OISD):

The **Oil Industry Safety Directorate (OISD)**, under the **Ministry of Petroleum and Natural Gas**, formulates and enforces over **120 safety standards** for upstream, midstream, and downstream operations.

OISD conducts **safety audits, accident investigations, and compliance inspections** across both onshore and offshore installations.
It is also leading efforts in **policy harmonisation**, ensuring that safety culture and continuous improvement become integral to India's hydrocarbon governance.

4. Exploration and Resource Governance (DGH):
The **Directorate General of Hydrocarbons (DGH)** serves as the **nodal authority** for upstream oil and gas policy — overseeing exploration programs, reservoir management, and resource mapping across India's sedimentary basins. DGH plays a key role in enabling **technology transfer**, managing contracts under **NELP, HELP, and OALP**, and ensuring environmental safeguards during offshore drilling and production activities.

Collectively, these four institutions ensure that India's offshore operations are **safe, efficient, and globally aligned**. However, as offshore activity diversifies into **LNG bunkering, offshore wind, and seabed mineral exploration**, a stronger **inter-agency coordination mechanism** — under the leadership of the **Directorate General of Shipping** — will be crucial for unified safety oversight.

"The vision is to establish India not just as a major offshore player, but as a model of sustainable and safe offshore governance — where energy growth and environmental responsibility advance together."

Coastal Shipping

Coastal shipping is the movement of goods and passengers along a country's coast using sea routes, offering a cost-effective and eco-friendly alternative to road and rail transport.

India's Potential

- 11098 km coastline & 14,000 km navigable waterways.
- Underutilised compared to road & rail.

Trends & Growth

- Coastal cargo in 2023–24: **187.22 million tonnes** (+1.97%).
- Major commodities: POL, crude, containers, iron ore.
- Paradip & Deendayal Ports lead in volumes.

Coastal Shipping Reforms

- **Coastal Shipping Bill, 2025**: modern legal framework, aligned with global cabotage standards.
- Targets **230 million tonnes by 2030**.
- National Coastal & Inland Shipping Strategic Plan + National Database for Coastal Shipping.
- Supports **Atmanirbhar Bharat & Viksit Bharat 2047** vision.

Benefits of Maritime Shipping

- **Most Carbon-Efficient Mode**
  - Shipping has the lowest CO_2 emissions per tonne-km compared to road, rail, and air.
- **Reduced Pollution & Congestion**
  - Shifting freight from trucks/trains to ships cuts urban air pollution.
  - Less congestion on highways and rail networks.
- **Green Logistics**
  - Supports low-carbon supply chains and climate commitments.
  - Essential for achieving India's net-zero & IMO 2050 targets.
- **Large-Scale Impact**
  - Moving bulk cargo by sea reduces fossil fuel consumption.
  - Coastal shipping = key enabler of Blue Economy + Green Economy transition.

Coastal Shipping

"Coastal shipping represents one of India's greatest untapped logistics assets — a cleaner, cheaper, and more efficient alternative to road and rail transport."

India's coastline spans **over 11,000 kilometres**, complemented by nearly **14,000 kilometres of navigable waterways**. Despite this vast potential, coastal shipping remains **underutilised** compared to land-based modes of transport.

However, the trend is shifting. In **FY 2023–24**, India's **coastal cargo volume reached 187.22 million tonnes**, marking a **1.97% increase** over the previous year.
The primary commodities moved through this mode include **POL, crude, containers, and iron ore**, with **Paradip and Deendayal Ports** emerging as leading hubs for coastal freight.

Policy and Reform Landscape

The upcoming **Coastal Shipping Bill, 2025**, is set to transform this sector by introducing a **modern legal and regulatory framework** aligned with **global cabotage standards**.
It aims to simplify licensing, enhance port coordination, and promote private participation — all directed toward achieving the national target of **230 million tonnes of coastal cargo by 2030**.
Parallelly, the **National Coastal & Inland Shipping Strategic Plan**, along with a **National Database for Coastal Shipping**, is being formulated to provide a single source of verified data for planning, investment, and performance tracking.
Together, these reforms directly support the vision of **Atmanirbhar Bharat** and **Viksit Bharat 2047**, integrating maritime transport into India's sustainable logistics architecture.

Environmental and Economic Advantages

Coastal shipping stands out as the **most carbon-efficient mode of transport**, producing the **lowest CO_2 emissions**

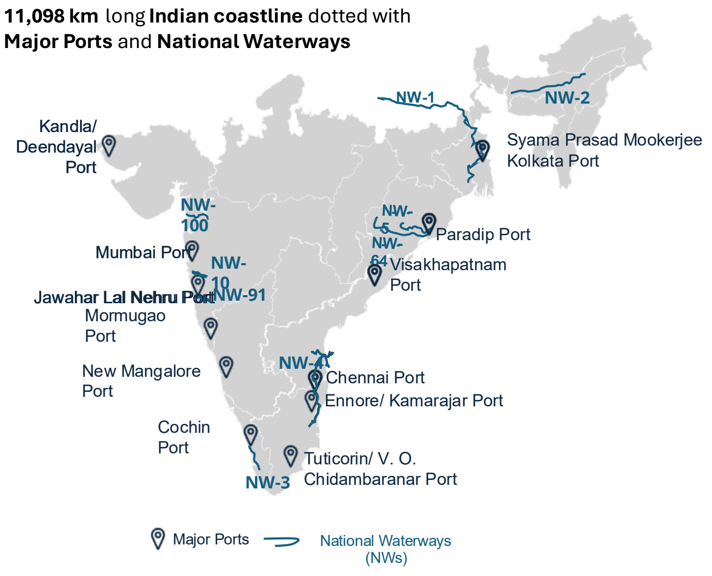
per tonne-kilometre compared to road, rail, or air.
By **shifting freight from highways and railways to sea routes**, India can significantly cut **urban air pollution**, **reduce highway congestion**, and **lower logistics costs**.
This transition is also central to **green logistics** — enabling **low-carbon supply chains**, supporting India's **Net Zero commitments**, and aligning with **IMO's 2050 decarbonization goals**.

Strategic Impact
Every tonne of cargo shifted from road to coastal shipping translates into measurable savings in **fuel, emissions, and congestion costs**.
Beyond economics, it also strengthens **port connectivity, coastal employment, and intermodal integration** — positioning coastal shipping as a **key enabler of India's Blue Economy and Green Growth vision**.

"The Coastal Shipping Act 2025 is not just a reform — it's a signal of intent to make maritime logistics the backbone of India's sustainable transport future."

Multi Component Ecosystem for Indian Maritime Sector

11,098 km long **Indian coastline** dotted with **Major Ports** and **National Waterways**



Key components of the Indian Maritime Sector

EXIM Ports	55
Non- EXIM Ports	23
Total cargo handling ports	78

Cargo type	Cargo handled-Ports MMT (FY25)
Coastal	331
Overseas	1,262
Total	**1,593**

Ship type	No. of Ships (FY24)	Capacity Mn GT (FY24)
Coastal	1,056	1.6
Overseas	489	11.8
Total	**1,545**	**13.5**

Number of Waterways	Cargo handled MMT (FY25)
111 (29 operational)	**145**

Multi Component Ecosystem for Indian Maritime Sector

"India's maritime sector is a vast, interconnected system, linking ports, shipping, and inland waterways into one unified logistics and economic ecosystem."

India's coastline extends **11,098 kilometres**, dotted with **major ports, non-major ports, and national waterways** — all functioning as critical nodes in trade, energy transport, and logistics.
At the heart of this system are **78 cargo-handling ports** — comprising **55 EXIM ports** that manage international trade and **23 non-EXIM ports** that cater primarily to domestic and regional cargo flows.

Cargo Handling and Throughput
During **FY 2024–25**, India's ports handled a combined **1,593 million metric tonnes (MMT)** of cargo —
1,262 MMT from **overseas trade**, and
331 MMT from **coastal movement**.
This represents the strength of India's dual maritime character — **global in scale**, yet **deeply rooted in domestic logistics**.
It also underlines how coastal and EXIM sectors complement each other — the former ensuring national supply chain resilience, and the latter anchoring India's position in global trade.

Fleet Strength and Capacity
As of **FY 2023–24**, India's registered merchant fleet stood at **1,545 vessels**, with a cumulative **capacity of 13.5 million gross tonnage (GT)**.
Of these:
1,056 ships serve the **coastal segment**, with **1.6 million GT**, and **489 ships** operate in **overseas trade**, with **11.8 million**

GT capacity.
This composition reflects both **India's growing coastal connectivity** and its **continued expansion in international shipping tonnage**.

National Waterways Integration
Inland and coastal connectivity is reinforced through **111 National Waterways**, of which **29 are currently operational**, handling about **145 MMT of cargo in FY 2025**.
The integration of **port infrastructure with waterways** through initiatives like **Sagarmala**, **PM Gati Shakti**, and **Harit Sagar** ensures last-mile multimodal connectivity and reduced logistics costs.

Strategic Vision
This multi-component structure — spanning **ports, shipping, and waterways** — underpins the transition toward a **Green and Blue Economy**.
It ensures seamless flow of goods, diversified trade routes, and balanced development across both coasts and hinterlands.

"The maritime sector today is not a set of isolated components — it is a single, synchronized ecosystem driving India's trade competitiveness and sustainable growth."

Coastal Shipping Act, 2025 (1/2)

"Coastal Shipping Bill, 2025 aims to boost coastal cargo up to 230 million metric tonnes by 2030"
- Shri Sarbananda Sonowal, Hon'ble Union Minister MoPSW

"National Coastal and Inland Shipping Strategic Plan to Steer Future Infrastructure and Policy Under new Act"
- Shri Sarbananda Sonowal, Hon'ble Union Minister MoPSW

- In a landmark move to strengthen India's coastal economy, the **Coastal Shipping Bill, 2025** was passed by the **Rajya Sabha**, marking a significant step toward unlocking the vast potential of India's **11,098 km coastline**, which spans **nine coastal states and four union territories**
- The bill was introduced by **Sarbananda Sonowal**, Union Minister of Ports, Shipping & Waterways.
- Previously approved by the **Lok Sabha on April 3, 2025**, the legislation aims to **modernize and simplify** the legal framework governing coastal shipping.
- It replaces **Part XIV of the Merchant Shipping Act,1958** with a **progressive, globally aligned law** that reflects contemporary cabotage standards and supports the growth of coastal trade.

Coastal Shipping Act, 2025 (1/2)

"The Coastal Shipping Act, 2025 marks a defining reform in India's maritime sector — one that transforms our coastline into a dynamic corridor of trade, connectivity, and green growth."

The **Coastal Shipping Bill, 2025**, recently passed by the **Rajya Sabha**, is a landmark step to unlock the full potential of India's **11,098-kilometre coastline**, which stretches across **nine coastal states and four Union Territories**.
This Bill, introduced by **Hon'ble Union Minister Shri Sarbananda Sonowal,** strengthens India's position as a maritime nation by creating a **modern, simplified, and globally aligned legal framework** for coastal shipping.

Legislative Milestone
The Bill was **earlier approved by the Lok Sabha on April 3, 2025**, and subsequently cleared by the **Rajya Sabha**, signalling Parliament's commitment to modernising India's maritime laws.
It **replaces Part XIV of the Merchant Shipping Act, 1958**, bringing in a **progressive and internationally benchmarked legal structure**.
This shift aligns India's coastal shipping governance with **global cabotage and trade standards**, while also promoting **ease of doing business** for Indian operators.

Core Objectives and Features
The Coastal Shipping Act, 2025, is designed to:
Create a robust regulatory framework for the commercial activity of coastal trade.
Simplify licensing by eliminating the requirement for Indian vessels to obtain separate permissions for engaging in coastal operations.
Establish a National Database for Coastal Shipping, consolidating information on licenses, vessels, and operators — ensuring transparency and data-driven decision-making.
Enable a framework of updated regulations consistent with international maritime norms, thereby boosting investor confidence and operational efficiency.

Strategic Vision

This Act underpins the government's broader goal to **boost coastal cargo volumes to 230 million tonnes by 2030**, as envisioned by **Hon'ble Minister Shri Sarbananda Sonowal**.
It also supports the **National Coastal and Inland Shipping Strategic Plan**, which will steer future infrastructure and policy development under this new legislative framework.

"The Coastal Shipping Act is not just a legal reform — it is a national strategy to make coastal shipping the backbone of India's sustainable logistics network."

- The Coastal Shipping Bill, 2025, passed by both Houses of Parliament, marks a major reform in India's maritime sector.
- It replaces outdated provisions of the Merchant Shipping Act, 1958, introducing a modern legal framework aligned with global cabotage standards.
- The Bill includes 6 chapters and 42 clauses, simplifying licensing and regulating foreign vessels in coastal trade.
- It mandates a National Coastal and Inland Shipping Strategic Plan to guide infrastructure and policy development.
- A National Database for Coastal Shipping will provide real-time, transparent data to support investment and planning.
- The legislation aims to boost Indian ship participation, reduce reliance on foreign vessels, and curb foreign exchange outflow.
- It supports the vision of Atmanirbhar Bharat and Viksit Bharat, promoting local economic growth and employment in coastal regions.
- With this Bill, India completes a trio of key maritime reforms alongside the Merchant Shipping Bill and Carriage of Goods by Sea Bill, paving the way for a modern, efficient, and self-reliant maritime ecosystem.

Coastal Shipping Act, 2025 (2/2)

"The passage of the Coastal Shipping Bill, 2025 by both Houses of Parliament marks a historic milestone in India's maritime reform journey — one that aligns domestic law with global maritime standards and future growth priorities."

The **Coastal Shipping Act, 2025** replaces outdated provisions of the **Merchant Shipping Act, 1958**, establishing a **modern, streamlined, and globally compliant framework** that governs coastal trade and vessel operations.

Key Structural Provisions

The Act is structured into **six chapters and forty-two clauses**, covering the full lifecycle of coastal operations — from licensing and compliance to vessel registration and enforcement.
It **simplifies licensing procedures**, particularly for Indian vessels, and rationalises the regulation of foreign participation in coastal trade.
This approach balances **domestic fleet promotion** with **international competitiveness**, ensuring ease of operation without compromising sovereignty or safety.

Institutional and Digital Reforms

A major innovation under this Act is the creation of a **National Coastal and Inland Shipping Strategic Plan** — a long-term blueprint for infrastructure, connectivity, and capacity enhancement.
Additionally, the **National Database for Coastal Shipping** will introduce **real-time, transparent data systems** — enabling accurate tracking of vessel movements, operational licensing, and investment planning.
These digital initiatives will make India's coastal sector **data-driven, investor-friendly, and globally benchmarked**.

Strategic Outcomes

The legislation directly supports the Government's **Atmanirbhar Bharat** and **Viksit Bharat 2047** vision by:

- **Encouraging Indian ship participation**, thereby reducing dependence on foreign vessels.
- **Conserving foreign exchange** through reduced charter costs.

- **Promoting employment and industrial activity** in coastal regions.

Broader Reform Context

With this Bill, India completes a **trilogy of transformative maritime legislations** — alongside the **Merchant Shipping Bill** and the **Carriage of Goods by Sea Bill**. Together, these laws pave the way for a **modern, efficient, and self-reliant maritime ecosystem** — one that seamlessly integrates shipping, ports, and inland waterways under a unified vision of sustainable logistics.

"The Coastal Shipping Act, 2025 thus signifies not just legal reform — but a decisive policy shift toward making India's coasts the engines of national growth and green trade."

- **High-Risk Profession**: Commercial fishing casualty rate is *10x higher* than merchant shipping; ~24,000 lives lost annually worldwide.
- **Regulatory Gap**: No binding global instrument for fishing vessel design, construction, or safety equipment.
- **Impact**: 39 million people in fishing vs 2 million in shipping – yet SOLAS & MLC apply only to shipping, not fishing.
- **Need**: Stronger oversight by flag states, adoption of international instruments, improved monitoring & certification.

Safety of Fishing Vessels

"Fishing remains one of the most dangerous professions in the world, and yet, it is among the least regulated from a safety perspective."

The **commercial fishing sector** experiences casualty rates **ten times higher than merchant shipping**, with nearly **24,000 lives lost globally every year**. Despite this, the **safety framework for fishing vessels remains fragmented** — lacking a comprehensive, binding global instrument equivalent to **SOLAS** or **MLC**, which apply only to conventional shipping.

Scale and Socio-Economic Impact

The disparity is striking: Over **39 million people** are engaged in fishing activities worldwide, compared to just **2 million in shipping**. This means the majority of maritime workers operate **outside the protection of established international safety conventions**, exposing them to high risks of accidents, equipment failure, and poor working conditions.

In India, the stakes are even higher — the fishing fleet forms a vital component of the **blue economy**, supporting coastal livelihoods and local food security. However, incidents of **capsizing, overloading, lack of life-saving appliances, and extreme weather vulnerability** continue to claim lives each year.

Regulatory Gaps and Challenges

Currently, there is **no globally enforceable convention** governing **fishing vessel design, construction, or equipment standards**.

While frameworks like **SOLAS** (Safety of Life at Sea) and **MLC** (Maritime Labour Convention) cover shipping, they exclude the fishing sector.

This has created a **significant regulatory void**, especially in developing countries where artisanal and small

mechanized fishing vessels dominate.

Way Forward

The situation calls for:

Stronger oversight by flag states and coastal authorities.

Adoption of international instruments such as the **Cape Town Agreement (2012)** and **FAO/ILO/IMO Guidelines** on fishing vessel safety.

Mandatory certification, crew training, and vessel registration systems to standardize safety compliance.

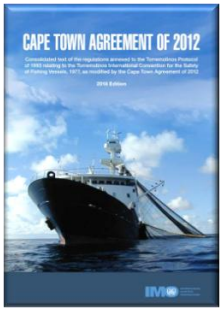
Integration of digital monitoring tools — including GPS tracking, distress alert systems, and inspection databases — to improve traceability and accountability.

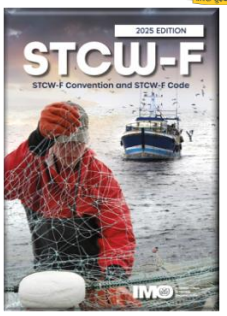
"Protecting those who harvest from the sea is not only a matter of safety — it is a matter of dignity and sustainability."

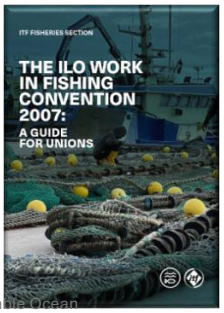
Enhancing fishing vessel safety will strengthen **coastal resilience**, safeguard **livelihoods**, and align India's fisheries sector with the **UN Sustainable Development Goals**, particularly **SDG 14 – Life Below Water**.

Major International Conventions / Agreements

- **Cape Town Agreement (2012)** – Safety standards for fishing vessels ≥24m; design, construction, stability, fire safety, equipment. *(Not in force yet)*.
- **STCW-F Convention (1995)** – Certification & minimum training standards for fishing vessel personnel. *(In force, 31 States parties)*.
- **ILO Work in Fishing Convention (C188, 2007)** – Decent working & living conditions on fishing vessels. *(In force, 14 States parties)*.
- **FAO Port State Measures Agreement (PSMA, 2009)** – Prevents IUU fishing vessels from using ports/landing catches. *(In force, 55 States parties)*.







Major International Conventions / Agreements

"The international community has recognized that fishing vessel safety, crew welfare, and sustainable fishing practices cannot be addressed in isolation — they must be governed by a coherent global framework."

This slide highlights the **four principal international instruments** that collectively shape the **safety, labour, and compliance architecture** for the global fishing sector. Together, they aim to close long-standing gaps in **vessel safety, crew protection, and illegal fishing oversight**.

1. Cape Town Agreement (2012) – IMO

The **Cape Town Agreement**, adopted by the **International Maritime Organization**, sets **safety standards for fishing vessels of 24 metres and above**.
It covers vessel **design, construction, stability, fire safety, and life-saving equipment** — areas where fishing vessels have historically lacked uniform regulation.
However, the Agreement is **not yet in force**, as it awaits ratification by a sufficient number of States. Once implemented, it will serve as the **fishing sector's equivalent to SOLAS**, dramatically improving vessel integrity and crew survival rates.
India has expressed its support for the objectives of the Agreement and continues to strengthen domestic safety codes in alignment with its principles.

2. STCW-F Convention (1995) – IMO

The **STCW-F Convention** establishes **minimum certification and training standards for fishing vessel personnel**, ensuring competency at sea and safer operations.
It is **in force with 31 State Parties** and complements the Cape Town Agreement by addressing the **human factor** — skill, awareness, and emergency preparedness.
Incorporating STCW-F principles into national training modules would greatly enhance the safety performance of India's

coastal and deep-sea fishing fleets.

3. ILO Work in Fishing Convention (C188, 2007) – ILO

The **Work in Fishing Convention** by the **International Labour Organization** sets out **decent working and living conditions** for fishers, covering accommodation, hours of rest, medical care, and repatriation rights.
It is **in force with 14 State Parties** and focuses on crew welfare, complementing the technical safety obligations of IMO conventions.
As India modernizes its fishing sector under the Blue Economy vision, alignment with C188 would reinforce social sustainability alongside economic gains.

4. FAO Port State Measures Agreement (PSMA, 2009) – FAO

The **FAO's PSMA** combats **Illegal, Unreported, and Unregulated (IUU) fishing** by preventing non-compliant vessels from accessing ports and landing catches.
It is **the first binding international agreement targeting IUU fishing**, currently **in force with 55 State Parties**. This agreement strengthens global maritime law enforcement and promotes responsible fisheries management.
India's active engagement with PSMA mechanisms will be crucial to safeguarding marine resources and maintaining traceable, sustainable seafood exports.

"Together, these four conventions create the foundation for safer seas, fairer work, and sustainable fisheries — a triad essential for the Blue Economy era."

IUU Fishing

A Global Challenge

What is IUU Fishing?

- *Illegal*: Fishing in violation of national or international laws.
- *Unreported*: Failure to report catches or misreporting to authorities.
- *Unregulated*: Fishing by vessels not under effective control, often "stateless."

Why It Matters:

- Major threat to **marine ecosystems & fish stocks**.
- Causes **economic losses** for licensed fishers and coastal communities.
- Linked to **organized crime, forcedlabour, and trafficking**.

Impact:

- Undermines sustainability and food security.
- Leads to **collapse of local fisheries** and loss of livelihoods.
- Difficult to monitor due to weak **surveillance & reporting systems**.

Controls & Responses:

- **MCS Tools**: Monitoring, Control, and Surveillance.
- **Vessel Tracking**: IMO Numbers, AIS, VMS, LRIT.
- **Port State Measures (FAO PSMA 2009)**: Block IUU vessels from landing catches.

Fishing Vessel Casualty (2023-2024)

16

Total Number of Collision

Delay in Reporting

Min	Max
4 hrs.	196 hrs.

IUU Fishing – A Global Challenge

"Illegal, Unreported, and Unregulated (IUU) fishing has emerged as one of the gravest threats to ocean sustainability — undermining fisheries management, maritime security, and coastal livelihoods."

Understanding IUU Fishing

The term **IUU Fishing** covers three interlinked dimensions:

Illegal: Fishing activities conducted in violation of national or international laws — for example, operating without licences or entering prohibited zones.

Unreported: Failure to report catches or deliberate misreporting to fisheries authorities to evade quotas or taxes.

Unregulated: Fishing by vessels not under the control of a flag state or operating in areas where governance frameworks are absent.

Together, these practices create **systemic data gaps**, making it difficult for nations to manage marine resources or enforce conservation measures.

Why It Matters

IUU fishing poses a **major ecological threat**, depleting fish stocks and damaging fragile marine ecosystems.

It results in significant **economic losses** for licensed fishers and coastal communities, eroding legitimate market share.

It has deep **social and security dimensions** — frequently linked to **organized crime networks, forced labour, and human trafficking**.

Estimates suggest IUU fishing costs the global economy more than USD 20 billion annually, with developing coastal states bearing the brunt.

Impact on India and the Region

For India, IUU fishing undermines **food security**, **fisheries sustainability**, and **livelihood resilience** across its 11,000 km coastline.

The **collapse of local fisheries** due to illegal overexploitation directly affects small-scale coastal fishers.

Weak **reporting and surveillance mechanisms** make it challenging to detect, trace, or deter such activities.
Between **2023 and 2024**, **16 fishing vessel casualties** were recorded, often associated with poor reporting practices. Incident reporting delays ranged from **4 hours to 196 hours**, highlighting the urgent need for **digital surveillance and immediate incident reporting protocols**.

Global Controls and India's Response
To tackle this challenge, the international community relies on three key instruments:
MCS Tools – Monitoring, Control, and Surveillance systems for data-driven enforcement.
Vessel Tracking Systems – Including **IMO numbers, AIS, VMS, and LRIT**, for traceability and transparency of fishing operations.
FAO Port State Measures Agreement (PSMA, 2009) – Which prevents IUU vessels from landing or transshipping catches in compliant ports.
India's growing use of electronic tracking and inter-agency coordination through the Directorate General of Shipping and the Department of Fisheries is a decisive step toward regional compliance with FAO and IMO frameworks.

"IUU fishing is not merely an environmental issue — it is a governance challenge. Effective implementation of monitoring and port state controls will be key to securing India's fisheries and its blue economy."

Marine Waste Dumping

– Plastics & ALDFG

Pollution by Plastics :
- Persistent, non-biodegradable → damages marine ecosystems.
- Enters food chain → risk to fish, humans & biodiversity.
- Major sources: packaging, cargo residues, single-use plastics from vessels & ports.

ALDFG (Abandoned, Lost, Discarded Fishing Gear) :
- Nets, ropes & traps left at sea → cause **"ghost fishing"**.
- Entangles turtles, dolphins, seabirds, and marine mammals.
- Often linked to **IUU fishing** (gear discarded to avoid detection).

Impacts :
- Environmental: Habitat destruction, species mortality.
- Economic: Loss to fisheries & tourism.
- Safety: Hazards to ships & navigation.

Controls & Solutions :
- **MARPOL Annex V** – prohibits dumping plastics at sea.
- **Port Reception Facilities** for waste disposal.
- IMO & FAO initiatives: *GloLitter, Fishing Gear Marking*.
- National programs: Recycling & waste management at ports.

Marine Waste Dumping – Plastics & ALDFG

"Marine litter — particularly plastics and abandoned fishing gear — represents one of the most visible and pressing environmental challenges facing our oceans today."

Context and Scale

Marine waste is no longer an isolated problem; it is a **global transboundary issue** directly affecting biodiversity, navigation safety, and coastal economies.
Every year, **8–10 million tonnes of plastic** enter the oceans — a large share originating from land-based activities, port operations, and vessels.
In the maritime context, this pollution manifests primarily in two forms:
Plastic Waste from packaging, single-use items, and cargo residues.
ALDFG (Abandoned, Lost, or Discarded Fishing Gear) — one of the deadliest yet least regulated forms of marine debris.

Pollution by Plastics

Plastics are **persistent and non-biodegradable**, fragmenting into microplastics that infiltrate marine food webs. These fragments are ingested by fish and plankton, ultimately entering the **human food chain** and posing serious **health and ecological risks**.
Sources include **vessels, ports, and coastal infrastructure**, where inadequate waste reception or improper disposal remains common.
The issue extends beyond pollution — it is an indicator of poor compliance and operational inefficiency across maritime supply chains.

ALDFG – Abandoned, Lost, and Discarded Fishing Gear

ALDFG includes nets, ropes, and traps that continue to **catch and kill marine life long after being lost** — a phenomenon known as **"ghost fishing."**

This gear entangles **turtles, dolphins, seabirds, and marine mammals**, leading to widespread mortality and habitat damage.
It is often linked to **IUU fishing**, as operators discard gear to evade detection or enforcement.
It is estimated that ALDFG accounts for nearly 10% of all marine litter but causes over 70% of macro-plastic entanglements involving marine megafauna.

Impacts
Environmental: Habitat destruction, biodiversity loss, and contamination of coral ecosystems.
Economic: Damage to tourism and fisheries, estimated losses exceeding USD 1 billion annually worldwide.
Safety: Navigational hazards from drifting nets and floating debris that endanger vessels and offshore installations.

Controls and Solutions
MARPOL Annex V – Prohibits discharge of plastics and synthetic fishing gear at sea; mandates onboard waste management plans.
Port Reception Facilities – Enable proper waste collection and disposal from ships, a key compliance point under MARPOL.
IMO & FAO Initiatives:
GloLitter Partnerships – supporting developing countries in reducing marine litter from shipping and fisheries.
Fishing Gear Marking Guidelines – enabling identification and recovery of lost gear.
National Measures:
Implementation of port waste management plans.
Recycling programs and **circular economy initiatives** for fishing gear and plastic waste.
Integration with **Swachh Sagar and Green Port** programs in India to ensure coordinated marine waste reduction.

"From ghost nets to single-use plastics, marine waste is not just an eyesore — it is a systemic challenge requiring behavioural change, regulatory enforcement, and technology-driven monitoring."

India's alignment with **MARPOL, GloLitter, and national waste management programs** positions it to play a leadership role in **regional marine litter mitigation and sustainable port practices**.

Coastal State Workshops

Coastal state workshops are proposed to be organized to advance welfare, ship recycling, shipbuilding, and repair initiatives in collaboration with State Maritime Boards.

The Coastal State Workshops will be structured around six key pillars :

i. **Pillar 1** : Maritime Safety and Casualty Response

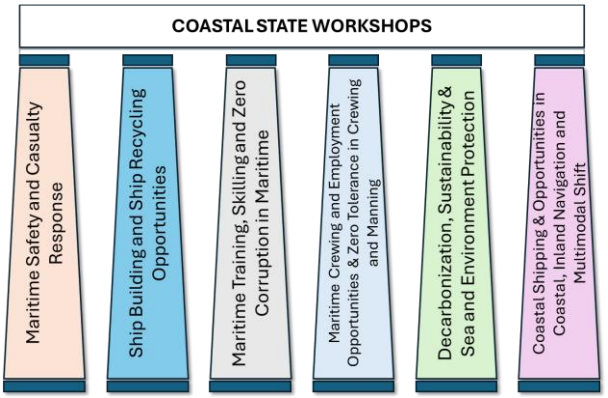
ii. **Pillar 2 :** Coastal States- Ship Building and Ship Recycling Opportunities

iii. **Pillar 3** Maritime Training, Skilling and Zero Corruption in Maritime

iv. **Pillar 4** : Maritime Crewing and Employment Opportunities & Zero Tolerance in Crewing and Manning

v. **Pillar 5** : Decarbonization, Sustainability & Sea and Environment Protection

vi. **Pillar 6 :** Coastal Shipping & Opportunities in Coastal, Inland Navigation and Multimodal Shift



It is proposed that the SWFS may contribute to such coastal state workshops from the funds budgeted towards the crew welfare events (Rs. 20 lakh/annum split as Rs. 5 lakhs/quarter) to foster interaction and joint projects, strengthening the maritime domain through focused discussions and capacity-building engagements.

Upcoming Pilot Coastal State Workshop in Andhra Pradesh

Coastal State Workshops

"Coastal State Workshops are envisioned as a unifying platform to build state-level maritime capacity, align local initiatives with national maritime reforms, and foster collaboration between central authorities and State Maritime Boards."

Purpose and Context

The Directorate General of Shipping, in collaboration with **State Maritime Boards and coastal administrations**, plans to conduct **Coastal State Workshops** aimed at improving welfare, safety, and sustainability in India's coastal and offshore maritime domains.

These workshops are a **strategic mechanism** to strengthen policy execution at the grassroots level — bringing together shipyards, training institutes, port authorities, and local maritime clusters under a single, structured dialogue.

They serve as the operational bridge between central maritime policy and coastal implementation — where policies translate into projects.

Structure: Six Pillars Framework

The workshops will be built around **six key thematic pillars**, each addressing a critical dimension of India's coastal maritime ecosystem:

1. **Maritime Safety and Casualty Response**
   – Strengthening coastal preparedness, search and rescue (SAR), and casualty management protocols.
   – Building coordination frameworks among DG Shipping, Coast Guard, and State Maritime Boards.
2. **Shipbuilding and Ship Recycling Opportunities**
   – Identifying new ship repair and recycling capacities, particularly in eastern and southern states.
   – Facilitating PPP investments and green shipyard models aligned with **HKC and NGSP** frameworks.
3. **Maritime Training, Skilling, and Zero Corruption in Maritime**
   – Expanding skilling networks for coastal seafarers, surveyors, and shipyard workers.
   – Promoting ethical practices and digital governance to ensure transparency and zero tolerance for corruption.

4. **Maritime Crewing and Employment Opportunities**
   – Creating state-specific seafarer employment portals and promoting inclusion in crewing and manning sectors.
   – Encouraging gender diversity and equitable access, aligning with the *Sagar Mein Samman* initiative.
5. **Decarbonization, Sustainability, and Sea & Environmental Protection**
   – Mainstreaming green shipping practices, port electrification, and pollution control mechanisms at the state level.
   – Encouraging port-level implementation of **Green Port Index** and **Harit Sagar Guidelines**.
6. **Coastal Shipping & Multimodal Shift**
   – Promoting intermodal connectivity between **coastal, inland, and road-rail networks**.
   – Supporting coastal cargo growth through regional industrial corridors and port-linked logistics hubs.

Pilot Workshop – Andhra Pradesh

The **first pilot workshop** is proposed in **Andhra Pradesh**, leveraging its strategic east coast location, shipyard infrastructure, and expanding blue economy footprint.

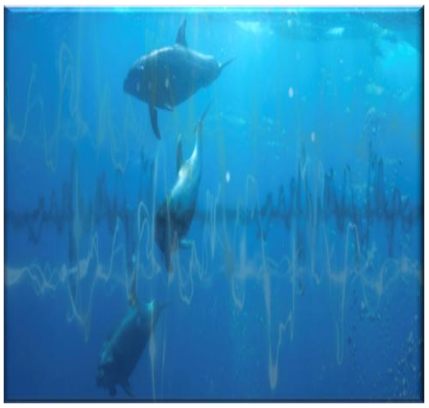
The focus will be on **shipbuilding, green recycling, and skill development**, in collaboration with the **Andhra Pradesh Maritime Board** and **local port authorities**.

Additionally, it is proposed that the **Seafarers' Welfare Fund Society (SWFS)** may allocate funds — approximately **₹20 lakh annually (₹5 lakh/quarter)** — to support these workshops as part of crew welfare and engagement initiatives. This funding model will foster **joint projects and inter-agency collaboration** for long-term maritime capacity building.

"The Coastal State Workshops are more than events — they are frameworks for state empowerment, knowledge sharing, and coordinated action.
Through them, India's nine coastal states can collectively anchor the next phase of maritime growth under the Maritime Amrit Kaal Vision 2047."

GloLitter :
Tackling Plastics and Marine Litter

Green Voyage 2050 :
Advancing IMO GHG Reduction Strategies



GloNoise :
Reducing Underwater Radiated Noise Pollution

IMO Led Projects

"India's maritime sustainability journey aligns closely with the International Maritime Organization's global initiatives under the Glo-series projects — addressing marine litter, greenhouse gas emissions, and underwater noise pollution."

Overview

The IMO, in partnership with the **United Nations Development Programme (UNDP)** and the **Food and Agriculture Organization (FAO)**, is leading a series of **global environmental partnerships** — collectively referred to as the *Glo-initiatives*.

Each project addresses a critical challenge to the marine environment and supports **capacity building**, **technical assistance**, and **policy development** across member states.

India's participation in these projects demonstrates its commitment to the **IMO Initial GHG Strategy**, **MARPOL**, and the **UN Sustainable Development Goals (SDGs 13, 14, and 17)**.

1. GloLitter Partnerships – Tackling Plastics and Marine Litter

Launched jointly by **IMO and FAO**, GloLitter focuses on **reducing sea-based plastic litter** originating from ships, ports, and fishing activities.

It assists partner countries in developing policies, port reception systems, and awareness programs for waste segregation and recycling.

Core Objective: Preventing marine plastic leakage into the ocean through improved waste management in shipping and fisheries sectors.

Key Focus Areas: Port reception facilities, recycling of fishing gear, and implementation of **MARPOL Annex V**.

India's Relevance: Supports initiatives such as *Swachh Sagar, Harit Sagar Guidelines*, and national port waste management frameworks.

"Through GloLitter, India can strengthen its circular economy model for maritime waste, reducing the environmental footprint of ports and vessels."

2. Green Voyage 2050 – Advancing IMO GHG Reduction Strategies

Green Voyage 2050, implemented in partnership with **Norway's Ministry of Climate and Environment**, accelerates the **decarbonization of the maritime sector** in developing countries.

It provides technical support for implementing **IMO's Initial GHG Strategy**, including EEXI, CII, and carbon-intensity reduction measures.

Focus: Promoting pilot projects on **low- and zero-carbon fuels**, **port electrification**, and **GHG monitoring frameworks**.

Impact: Establishes National Action Plans (NAPs) for maritime decarbonization and fosters private-sector collaboration for technology adoption.

India's Alignment: Complements the **National Green Shipping Policy (NGSP)** and pilot projects under **Green Port Index**, **shore power**, and **biofuel bunkering** initiatives.

"This partnership directly reinforces India's target to achieve net-zero by 2070 and IMO's global ambition of reducing GHG emissions by 100% by or around 2050."

3. GloNoise Partnerships – Reducing Underwater Radiated Noise Pollution

The most recent initiative under the IMO's environmental portfolio, **GloNoise** addresses the growing concern of **underwater radiated noise (URN)** from ships, which disrupts marine life, especially cetaceans and fish.

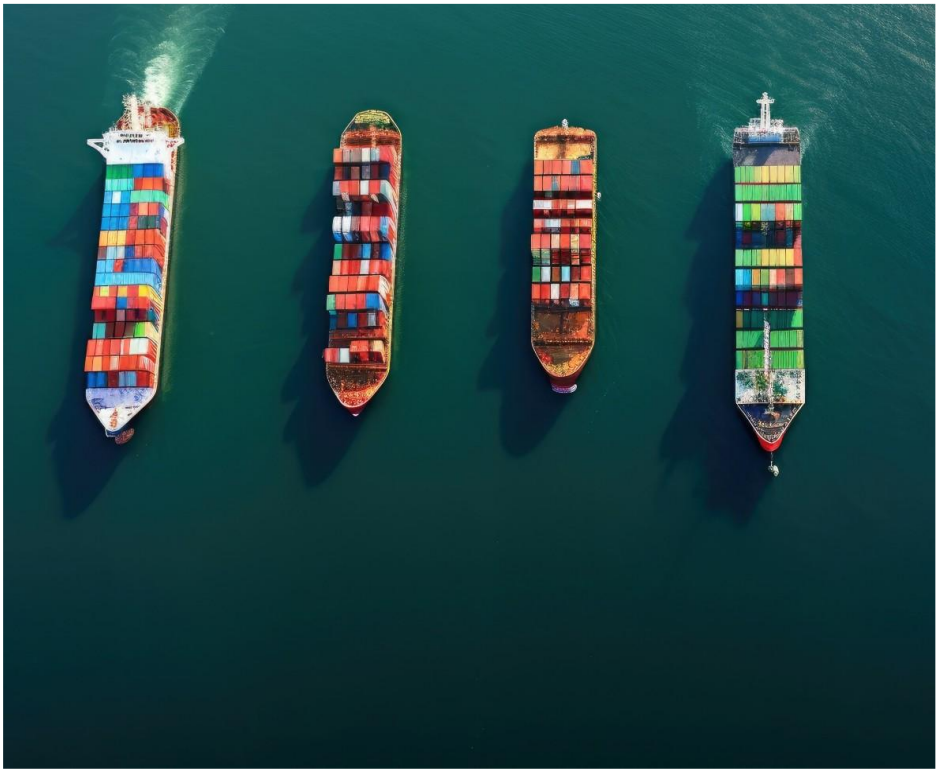
Objective: Develop practical mitigation measures, guidelines, and technical innovations to reduce URN from ship design, operation, and propeller noise.

Impact: Improves habitat health, biodiversity, and ecosystem balance — contributing to **SDG 14.1 (Life Below Water)**.

India's Future Scope: Pilot URN baseline studies along major shipping corridors, in coordination with research institutions and classification societies.

"GloNoise marks the next frontier of marine environmental protection — where sound, not just emissions or litter, becomes a focus of sustainable shipping."

"Together, GloLitter, Green Voyage 2050, and GloNoise exemplify the IMO's integrated approach to ocean sustainability — addressing waste, carbon, and acoustic pollution in a unified framework. India's engagement with these initiatives not only elevates its maritime environmental standards but also positions it as a regional leader in implementing the IMO's decarbonization and blue economy agenda."



संगच्छध्वं
संवदध्वं
सं वो मनांसि
जानताम्।

"Move together,
speak together,
may your minds
be in harmony."
(Rigveda 10.191.2)

Ministry of Ports,
Shipping & Waterways
Government of India