



Global Biofuel Alliance

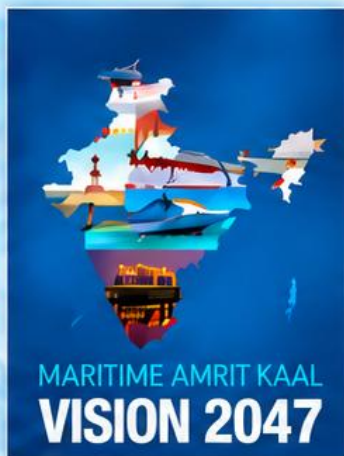
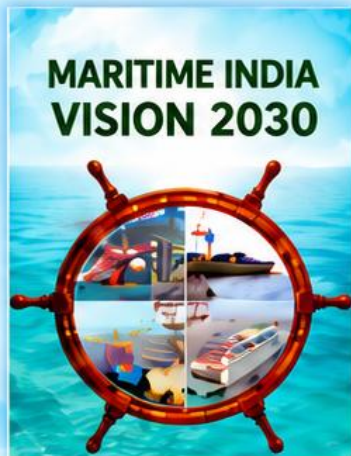
Presentation by :

Shri Killi Mohana Rao, Chief Surveyor & Addl. Director General
Directorate General of Maritime Administration
Ministry of Ports, Shipping and Waterways
Government of India
29th September 2026





India's Maritime Sector



**A UNIFIED NATIONAL
MARITIME VISION**



60+
SHIPYARDS
Small and Large



200+
PORTS
Major and Non-major



11,098
KM COASTLINE



1500+
VESSEL FLEET



3.2 Lakh+
SEAFARERS



INDIA'S KEY DECARBONISATION TARGETS FOR 2030

National commitments shaping India's maritime transition



500 GW

Non-Fossil Power Capacity



Foundation for green hydrogen, green ammonia, green methanol and port electrification

50%



Installed Power Capacity from Non-Fossil Sources

Target share of cumulative installed electricity capacity from non-fossil fuel sources by 2030

45%



Reduction in Emissions Intensity

Reduction in emissions intensity of GDP from 2005 levels under India's updated NDC.

1 Billion tCO₂e



Cumulative Emissions Reduction

Reduction of one billion tonnes of projected emissions by 2030.

5 MMTPA

Green Hydrogen Production



Target under the National Green Hydrogen Mission; key enabler for maritime fuel transition and green bunkering.

MARITIME AMRIT KAAL VISION 2047

KEY SUSTAINABILITY AND DECARBONISATION ASPIRATIONS



14 CARBON NEUTRAL MAJOR PORTS

All major ports to become carbon neutral by 2047.



14 HYDROGEN / AMMONIA HUBS

Green hydrogen / ammonia storage and bunkering facilities to be established at all major ports by 2047.



8 LNG BUNKERING FACILITIES

LNG bunkering facilities to be available at eight major ports by 2047.



14 SHORE-TO-SHIP POWER FACILITY

Shore-to-ship power facility to be provided at all major ports by 2047.



1st GLOBALLY IN SHIP RECYCLING

Position India as a global leader in safe and green ship recycling, with expansion of Alang and development of new recycling locations in Andhra Pradesh, Odisha and West Bengal.



GREEN & LOW-CARBON SHIPPING

Promotion of alternative and low-carbon fuels, low-carbon vessels, vessel retrofits and implementation of green maritime pilot projects to support a sustainable and resilient maritime sector.





India's Maritime Sector





National Regulatory Framework



Legislative Frameworks driving Maritime Ecosystem

MERCHANT SHIPPING ACT 2025



Vessel
registration



Ownership



Seafarer
welfare



Digital
regulatory
framework

COASTAL SHIPPING ACT 2025



Maritime
transport



Coastal
trade



Port
efficiency

INDIAN PORTS ACT 2025



Port
governance



Safety
compliance



Disaster
management

BILL OF LADING ACT 2025



Clear
Documents



Legal
Certainty



Transport of
Goods

CARRIAGE OF GOODS BY SEA ACT 2025



Modern
liability



Dispute
resolution



International
conventions
alignment



Blue Economy



The Blue Economy constitutes 95% of India's trade volume and 65% of India's trade value

~4%

Contribution to
National GDP

Potential: 10% by 2047

95%

India's Trade
by Volume via Sea

70% by value

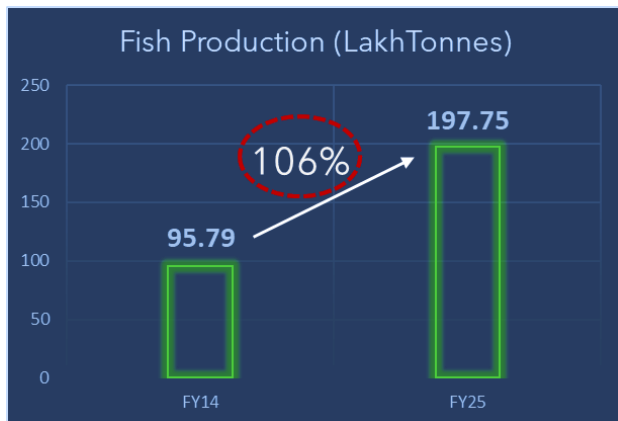
₹80L Cr

MIV 2030 + Amrit
Kaal Vision Roadmap

Combined policy investment

Strategic investments in the Blue Economy could raise this contribution from 4% to 10% of GDP by 2047

Fisheries & Aquaculture

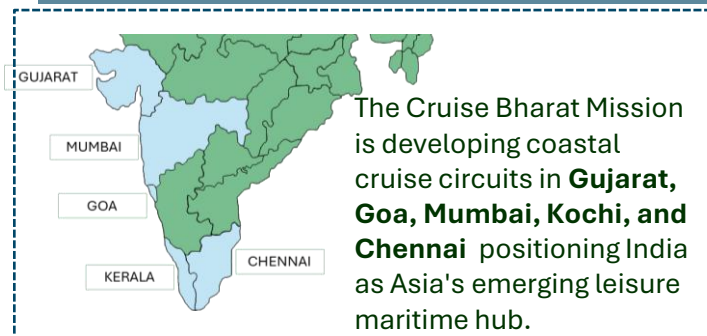


- India is the world's **2nd** largest fish producer, contributing **8%** to global fish output
- Seafood exports have more than doubled in a decade from **₹30,213 crore** in 2013-14 to **₹62,408 crore** in FY 2024-25
- The Fisheries sector has created **58 lakh** employment opportunities, supporting approximately **3 crore** fishers and fish farmers at the primary level.

Coastal & Cruise Tourism



India's coastal tourism sector is projected to grow to **₹1.2 lakh crore**, with the government identifying **13** coastal districts for priority development.



Marine Biotechnology & Deep Ocean



- Samudrayaan:** India is developing crewed submersibles to reach **6,000 m**, enabling a first-of-its-kind manned deep-sea research station.
- India's 6,000 m **deep-sea station** aims to set a global benchmark, envisioned as a permanent international research hub by 2047, akin to the International Space Station
- India's **333** cultivable seaweed species position it strongly for expansion, with current ~1% global production highlighting a significant opportunity to scale up in marine biotech, pharmaceuticals, and biofuels.



Imperative for Maritime Energy Transition



CURRENT REALITY



Maritime transport contributes ~3% of global GHG emissions



IMO Net-Zero Framework is driving global maritime decarbonization



Increasing regulatory, commercial and financial pressures



Continued dependence on fossil fuels exposes the sector to energy security and price volatility risks



Growing demand for sustainable and future-ready maritime transport solutions



WHY TRANSITION?



Reduce greenhouse gas emissions



Enhance energy security



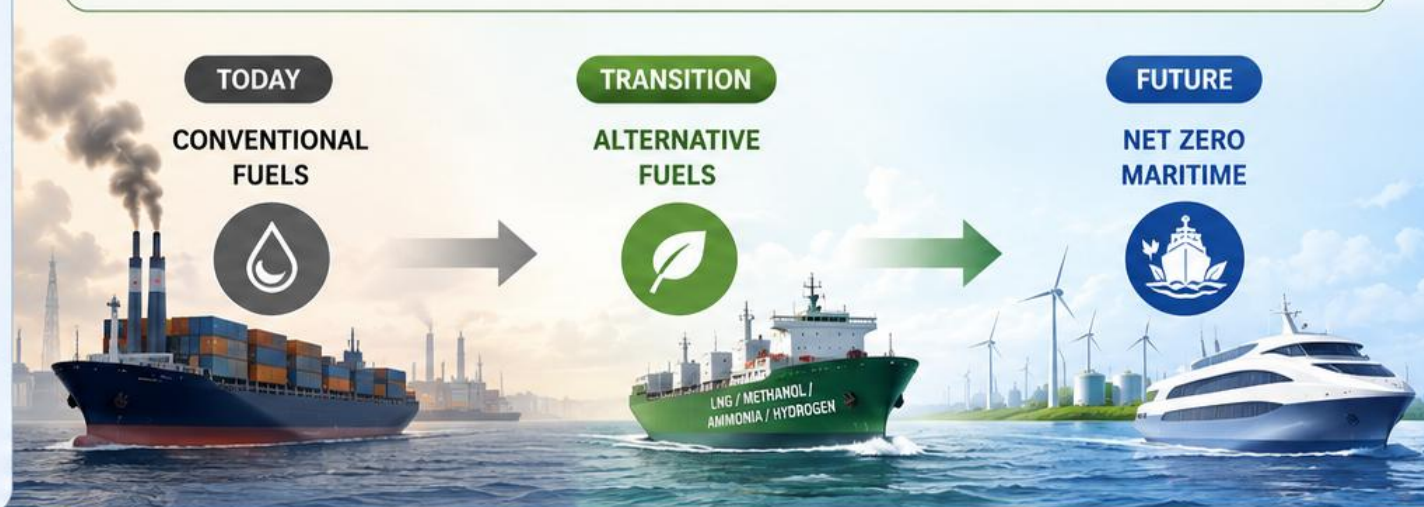
Improve long-term competitiveness of shipping



Support sustainable economic growth



Enable transition towards Zero and Near-Zero (ZNZ) emission fuels



KEY MESSAGE

“

Alternative fuels are not merely an environmental requirement but a **strategic pathway** towards a **resilient, competitive and sustainable** maritime sector.

”



DECARBONIZE OUR OCEANS



SECURE OUR ENERGY FUTURE



STRENGTHEN MARITIME COMPETITIVENESS



BUILD SUSTAINABLE ECONOMIC GROWTH



India's National Maritime Decarbonization Policy-Framework



An integrated policy-framework architecture to transition India's maritime sector towards a low-carbon, competitive and future ready ecosystems

The NMDP brings together action across ships, ports, finance, skills, technology and environmental performance, Its eight interconnected pillars are designed to move maritime decarbonization beyond isolated initiatives towards a coordinated national transition A



How the NMDP is designed to work

Creates a common national direction across infrastructure, vessels, energy, technology, finance and human capital.

Combines near-term implementation actions with medium- and long-term transition pathways.

Links domestic policy measures with international regulation, cooperation and market development.

NMDP FRAMEWORK OUTCOME





Alternative Fuels in Maritime



 LNG	 BIOFUEL	 METHANOL	 AMMONIA	 HYDROGEN
				
 Mature technology and in use today	 Renewable and derived from sustainable feedstocks	 Liquid at ambient conditions – easy to handle	 Zero carbon at point of combustion	 Zero carbon fuel – only water as by-product
 Lower CO ₂ emissions than conventional fuels	 Lower lifecycle GHG emissions	 Lower emissions potential (when green methanol used)	 High energy density than hydrogen	 Highest gravimetric energy density
 Transitional fuel towards lower carbon future	 Can be used in existing engines with blends	 Engine technology maturing rapidly	 Toxic and requires stringent safety measures	 Low volumetric energy density; storage challenge
21.2	~ 30–37*	15.7	12.7	8.5
Cryogenic –162 °C	Ambient (varies by fuel)	Ambient (up to 65 °C)	Refrigerated –33 °C	Cryogenic / Compressed –253 °C / >250 bar
1.8 times	~ 1.2 – 1.5 times*	2.5 times	3 times	5–7 times
5–15 (Methane)	Varies (low–moderate)	6–36.5	15–28	4–75

* Varies depending on feedstock and fuel type



Multiple fuel pathways for a net-zero future



Safety, infrastructure and regulation are critical



Collaboration across the entire maritime ecosystem is essential



Enabling a resilient, competitive and sustainable maritime sector



Choice of fuel depends on route, vessel type, infrastructure & availability



Alternative Fuels in Maritime

LNG	BIO	CH ₃ OH	NH ₃	H ₂
LNG	BIOFUEL	METHANOL	AMMONIA	HYDROGEN
MANDATORY CODE	MEPC GUIDANCE	INTERIM SAFETY	INTERIM SAFETY	INTERIM SAFETY
S IGF Code – MSC.391(95), as amended	S No dedicated IMO fuel-safety circular; assess blend/fuel properties	S MSC.1/Circ.1621 – methyl/ethyl alcohol as fuel	S MSC.1/Circ.1687 – ammonia as fuel	S MSC.1/Circ.1701 (2026); fuel cells: MSC.1/Circ.1647
E MEPC.391(81) LCA; CH ₄ included in WtW accounting	E MEPC.1/Circ.905/Rev.1 for DCS/CII + MEPC.391(81) LCA	E MEPC.391(81) LCA; default/actual factors via IMO LCA framework	E MEPC.391(81) LCA; N ₂ O included in lifecycle framework	E MEPC.391(81) LCA; production pathway determines GHG benefit
T STCW V/3 + IMO Model Courses 7.13 / 7.14	T Generic alternative-fuel training framework applies as relevant	T STCW.7/Circ.26 (2026) – methanol/ethanol fuel training	T STCW.7/Circ.27 (2026) – ammonia fuel training	T STCW.7/Circ.25 generic; H ₂ -specific provisions under development
! Cryogenic fuel; methane-slip management	! Sustainability, traceability, certified lifecycle GHG intensity	! Low flashpoint, toxicity, leak/fire protection	! Toxicity, release control, ventilation & emergency response	! Very low ignition energy; storage/ventilation challenges



Alternative Fuel Transition : Challenges and Safety Considerations



SHIPS AND PROPULSION SYSTEMS

- New fuels, new engines
- Retrofit and newbuild solutions



PORTS AND BUNKERING INFRASTRUCTURE

- Dedicated storage & handling
- Safe bunkering operations



FUEL PRODUCTION AND SUPPLY CHAINS

- Scalable production
- Reliable & resilient supply chains



REGULATORY AND SAFETY FRAMEWORKS

- Standards, guidelines & certification
- Risk-based safety management

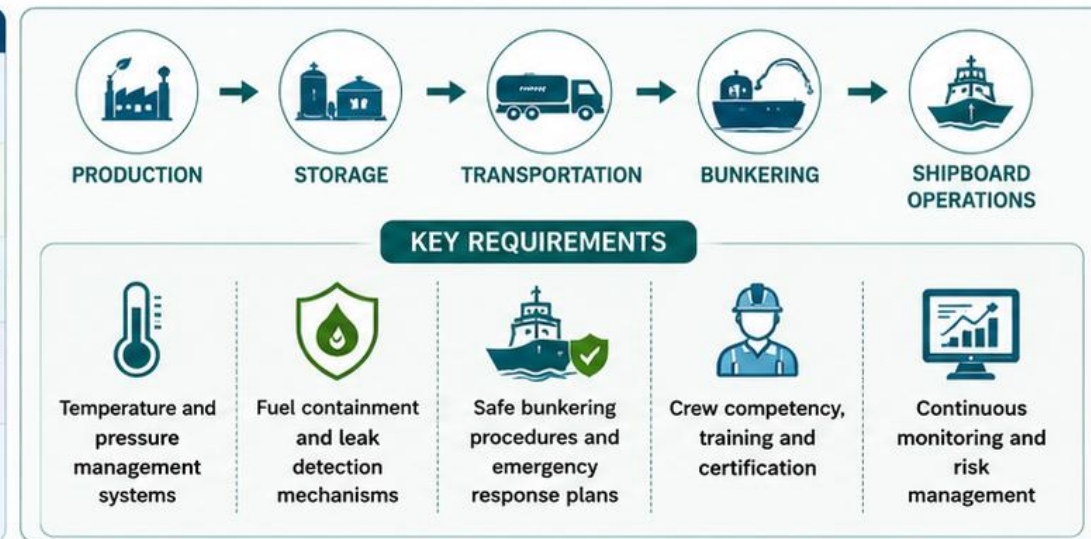


MARITIME TRAINING AND COMPETENCY DEVELOPMENT

- Skilled & competent workforce
- Training, drills & certification



FUEL	KEY CHALLENGES	KEY SAFETY CONSIDERATIONS
 LNG	• Cryogenic storage requirements; methane slip; higher storage volume than conventional fuels	 • Extreme low-temperature handling; • Gas leakage; fire and explosion risks
 BIOFUELS	• Feedstock availability; fuel quality consistency; compatibility with existing engines and fuel systems	 • Oxidation, microbial growth, fuel degradation and storage management
 METHANOL	• Lower energy density requiring larger fuel tanks; higher fuel cost; limited bunkering infrastructure	 • Highly flammable; toxic if ingested or inhaled; nearly invisible flame during combustion
 AMMONIA	• Limited commercial availability; storage and distribution challenges; engine technology still evolving	 • Highly toxic vapours; personnel exposure risks; leak detection and emergency response requirements
 HYDROGEN	• Low volumetric energy density; large storage requirements; immature bunkering ecosystem; high production cost	 • Highly flammable; leakage due to small molecular size; cryogenic storage and material embrittlement concerns



KEY MESSAGE

The transition to alternative fuels is not merely a fuel replacement exercise. It requires coordinated development of **infrastructure, regulations, safety systems** and **human competencies** to enable a safe, secure and sustainable maritime energy transition.





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



GREEN VOYAGE
2050

Demand Outlook • Fuel Transition Pathway • Priority Gateways • Phased Market Development

OBJECTIVE

Assess demand, pricing and competitiveness of alternative marine fuels and identify pathways for India to emerge as a regional low- and zero-carbon bunkering hub.

Strategic Opportunity

77.6%

of assessed passing traffic in Zone A, closest to India

>80%

of fair-share bunker demand linked to international fleets

Container vessels account for nearly half of passing vessel traffic — a key addressable segment.

Fuel Transition Pathway



Biofuels are expected to dominate the earlier transition period, with e-fuels gaining momentum roughly from 2033–2038 onward.

What Determines Competitiveness?

- Delivered Fuel Cost** Primary decision factor
- Reliable Supply** Availability at the vessel
- Port Efficiency** Low time / operational penalty
- Integrated Services** Bunkering alongside cargo & services
- Regulatory Clarity** Predictable approvals & safety requirements

Alternative Fuel Demand Outlook

Scenario	2035	2047
Slow & Steady Growth	42 PJ	113 PJ
Accelerated Progress	49 PJ	166 PJ
Breakthrough Growth	65 PJ	293 PJ

Priority Bunkering Gateways

- MUNDRA**
Container gateway
- JNPT**
Container gateway
- CHENNAI**
Multi-purpose
- TUTICORIN**
Regional / southern gateway

Supported by nearby production centres / hydrogen hubs such as Deendayal (Kandla) and Tuticorin.

Geographic proximity alone is not enough — price, reliability and operational efficiency will determine whether vessels bunker in India.

Phased Roadmap

**2026–2030
ESTABLISH**

Build initial operations at selected ports; methanol identified as the most suitable starting fuel.

**2030–2035
SCALE**

Expand proven operations into regional clusters and prepare infrastructure and safety frameworks for ammonia.

**2035–2047
POSITION**

Develop multi-fuel capability and connect Indian ports with regional and global green shipping networks.

KEY MESSAGE India can build a competitive regional alternative-fuel bunkering hub by leveraging cargo flows, strategic ports and emerging clean-energy capabilities.



National Green Hydrogen Mission – Green Hydrogen Hubs



The **National Green Hydrogen Mission (NGHM)** aims to position India as a **global hub for green hydrogen production, utilisation and export**, with a target of **5 MMT annual production by 2030**, supporting decarbonisation and energy transition.

Deendayal Port Authority (Kandla) – Western Hub

- **1 MW** green hydrogen plant commissioned (electrolyser-based) 
- **3,400 acres** land allocated for Green Hydrogen / Ammonia projects
- **3.5 MMTPA** jetty compatible for Green Ammonia handling
- **Port Readiness Level 6 (7)** for green fuel / methanol bunkering 
- Advancing methanol bunkering ecosystem and alternative fuel transition 
- Western gateway for green fuel production + bunkering + export corridors

Paradip Port Authority – Eastern Hub

- **₹797 crore** Green Hydrogen / Ammonia jetty approved 
- **4.0 MTPA** handling capacity for green energy cargo
- Development includes jetty, storage, pipelines and handling systems
- Implemented under PPP / BOT 
- Designed to connect eastern hydrogen clusters to global markets
- Anchor hub for bulk handling, storage and export logistics 

V.O. Chidambaranar Port (Tuticorin) – Southern Hub

- **10 Nm³/hr** Green Hydrogen pilot plant commissioned (Apr 2025) at cost of **INR 3.87 Crore** 
- Pilot supports port operations (lighting, EV charging)
- **205.72 acres** land allocated for GH2 / Ammonia projects 
- Developing Green Methanol Bunkering Facility (2 × 750 m³)
- Emerging as green fuel + digital + renewable integrated port 
- Southern hub for pilot deployment, innovation and green bunkering



Biofuel Blending: A Ready-Now Path to a Lower-Carbon Fleet



A phased blending mandate lets Indian shipping cut carbon intensity now, using ships and infrastructure already in service

62 of 227

Indian-flagged vessels rated **D or E** on **CII** in **2025**

CII requirements tighten every year; the reduction factor rises from **11% (2026) to 21.5% (2030)**

Biofuel blends can lift this performance without waiting for new-build, alternative-fuel ships

Deployable today, on the existing fleet

Blends such as **B10/B20/B30** run in current engines and bunkering systems with little or no retrofit, subject to fuel quality and OEM approval.

Directly improves CII compliance

The lowest-rated ships can raise their carbon-intensity rating now, rather than waiting on fleet renewal or new propulsion technology

Builds a durable domestic value chain

A predictable mandate gives feedstock, production, certification and bunkering investment the demand signal it needs to scale.

IMO permits the use of biofuel blends in marine engines, subject to MARPOL Annex VI fuel quality and emissions compliance requirements (Regulation 18.3; MEPC.1/Circ.795 Unified Interpretations).

DGMA released the Biofuel bunkering guidelines in 2025

Industry Example: BPCL has launched first biofuel blend High Flash High Speed Diesel (HFHSD) bunker by an OMC at Mumbai Port



भारत सरकार / GOVERNMENT OF INDIA
पत्तन, पोत परिवहन और जलमार्ग मंत्रालय
MINISTRY OF PORTS, SHIPPING AND WATERWAYS
नौवहन महानिदेशालय, मुंबई
DIRECTORATE GENERAL OF SHIPPING, MUMBAI
DGS (Engineering) Circular No. 32 of 2025

File No. - 13-22011/5/2025-ENGG – DGS, C. No: 34580	Date: 22/07/2025
Subject: Biofuel Bunkering Guidelines	
References:	(1) Merchant Shipping Notice No. 03 of 2014 (2) Merchant Shipping Notice No. 14 of 2023
1. Background 1.1 Increasing global emphasis on decarbonising the maritime sector has accelerated the adoption of biofuels as a sustainable alternative to conventional marine fuels. Biofuels, particularly drop-in types such as Fatty Acid Methyl Esters (FAME), Fatty Acid Ethyl Esters (FAEE), Straight Vegetable Oils (SVO), Hydrotreated Vegetable Oils (HVO), Bio-FT-diesel (bio-Fischer-Tropsch diesel) and Biomass-to-Liquid (BTL) fuels, offer considerable benefits by reducing lifecycle greenhouse gas emissions without necessitating major modifications to existing shipboard fuel systems. However, the absence of standardised national guidelines for biofuel bunkering operations in India introduces potential challenges related to safety, fuel quality assurance, environmental protection, and operational consistency. 1.2 This proposed circular aims to bridge these gaps by establishing a clear regulatory framework for permitting, operational protocols, safety management, documentation, environmental safeguards, training requirements, and enforcement mechanisms specific to biofuel bunkering. By implementing these guidelines, the Directorate seeks to ensure safe and reliable bunkering practices, promote the use of cleaner fuels in alignment with India's environmental commitments, and support the growth of sustainable maritime infrastructure. 1.3 These guidelines are crucial for facilitating the responsible uptake of biofuels in the shipping sector, aligning Indian practices with international conventions, and contributing to a modern, resilient, and environmentally conscious maritime ecosystem. 1.4 The Directorate General of Shipping (DGS), recognizing the critical need to reduce greenhouse gas emissions and improve air quality in Indian coastal waters and port regions, issues this circular to enable and regulate biofuel bunkering activities in accordance with established global standards and best practices.	

9वीं मंजिल, बीटा बिल्डिंग, आई थिंक टेक्नो कैम्पस, कांजुर गौव रोड, कांजुरमार्ग (पूर्व) मुंबई- 400042
9th Floor, BETA Building, I-Think Techno Campus, Kanjur Village Road, Kanjurmarg (E), Mumbai-400042
फोन/टेल. No.: +91-22-2575 2040/1/2/3 फैक्स/Fax.: +91-22-2575 2029/35 ई-मेल/Email: dgship-dgs@nic.in वेबसाइट/Website: www.dgshipping.gov.in

Page 1 of 22



Bharat Petroleum
energising lives

BPCL Unveils India's First Biofuel Blend HFHSD Bunker at Mumbai Port

Mumbai, India, August 16, 2024: Bharat Petroleum Corporation Limited (BPCL) has set a new benchmark in the Indian maritime industry by launching first biofuel blend High Flash High Speed Diesel (HFHSD) bunker by an OMC at Mumbai Port. This pioneering initiative by BPCL underscores its unwavering commitment to green energy solutions and aligns with the global mandate to decarbonize the shipping sector.

As the maritime industry globally pivots towards reducing carbon emissions and mitigating environmental impact, BPCL's introduction of the biofuel blend HFHSD bunker provides shipping companies with a cleaner, biodegradable alternative to traditional fuels. This initiative not only supports environmental sustainability but also strengthens BPCL's position as a leader in the Indian bunkering market.

Speaking on the occasion, **Shri. Sukhmal Jain, Director (Marketing), BPCL**, remarked, "Today's launch is a testament to our commitment to sustainable energy solutions. Our Project Aspire, with its focus on green energy, is driving our efforts towards a cleaner future. This biofuel blend bunker is a significant step in that direction and positions BPCL as a global bunkering leader."

BPCL has consistently demonstrated its leadership in the Indian bunkering sector, being the first to introduce IMO 2020 compliant bunker fuel in the country. With a strong presence along the Western coast, BPCL has become a trusted supplier of marine fuels. The company's foray into biofuel blends is part of a broader strategy to expand its portfolio of green bunker fuels, including LNG, hydrogen, and methanol, thereby staying ahead in the evolving energy landscape.

This initiative is in alignment with the Government of India's vision for a clean energy future, as outlined in the National Biofuels Policy and Maritime India Vision 2030. The event was attended by industry leaders, including **Shri Rajeev Jalota, Chairman MbPA** and **Shri Atul Patne, Commissioner of Fisheries, Govt. of Maharashtra**.

Business Head (Industrial & Commercial) for BPCL, Mr. Rahul Tandon, during the launch program remarked "The launch of India's first biofuel blend HFHSD bunker is a testament to our commitment to sustainability. This is yet another #TheGoodPrint effort of BPCL's, where we believe that every small step, we take towards green energy makes a significant impact on creating a better world for future generations"

Speaking at BPCL's Biofuel Blended Bunker Fuel launch at Mumbai Port, **Dr. Atul Patne (IAS), Principal Secretary (Fisheries), Govt. of Maharashtra** highlighted the importance of closer collaboration between BPCL and the Department of Fisheries to provide eco-friendly fuel options for fishermen. He also expressed his appreciation to BPCL for considering joint efforts to develop



India Green Corridors Pre-Feasibility Study



By Mærsk Mc-Kinney Møller Center for Zero Carbon Shipping

Structured screening of routes to identify priority corridors for detailed feasibility

230+ ROUTES SCREENED



40 POTENTIAL CORRIDORS



8 PRIORITY CORRIDORS

8 Priority Corridors Identified

Shortlisted through the Consortium Incubation Workshop for the bridging phase

PRIORITY CORRIDORS 01-04

01 NW-5 – Dry bulk transport
from Paradip

02 West Coast inter-port
from Kandla

03 UAE – Kandla
Petroleum products import

04 Mundra
Container corridor

PRIORITY CORRIDORS 05-08

05 Kandla – Rotterdam

06 VOC – Singapore

07 Singapore – VOC – Rotterdam –
Duisport

08 Paradip – Singapore – Antwerp /
Rotterdam – Duisport/Delta

Study Basis

14 selected Indian ports

Inland, coastal and deep-sea routes

Fuel & renewable readiness

Alternative fuel availability and timing

Port & operational readiness

Storage, bunkering, vessels and trade

Policy & stakeholder commitment

Regulatory, finance and implementation factors

WAY FORWARD

Corridor-specific feasibility studies

KEY ENABLERS

Green fuels • Port & bunkering infrastructure • Safety & regulation • Vessel readiness • Stakeholder commitment • Commercial viability



Harit Sagar Guidelines (2023)



Establish a three-phase transition plan with clearly defined targets for renewable energy use, waste minimization, and port equipment electrification by 2030 and 2047.

Share of renewable energy at Ports should exceed **60 percent** by the Year **2030** and **90 percent** by year **2047**

Increasing the share of renewable energy to over **60% by 2030** and over **90% by 2047**

Electrifying more than **50% of port equipment and vehicles by 2030**, rising to over **90% by 2047**

Ports shall develop the infrastructure to provide “**Shore to Ship**” power in a phased manner: 1st Phase- To Port Crafts (By 2023); 2nd Phase- To Coast Guard/Navy and small coastal vessels (By 2024); 3rd Phase- To EXIM vessels (By 2025)

Expanding green cover by over **20% by 2030** and over **33% by 2047** to improve environmental quality

Aiming for **100% wastewater reuse** and reduce **freshwater consumption** by over **20% by 2030**



Green Ports : Driving Sustainable Maritime Growth

Cleaner Ports, Greener Operations, Sustainable Future



WHAT IS A GREEN PORT?



Ports designed and operated with minimal environmental impact.



Integration of clean energy, efficiency and circular economy practices.



Focus on reducing emissions, conserving resources and enhancing community well-being.



SUSTAINABLE INDICATORS FOR GREEN PORTS



Green Port Index (GPI)

Measures overall environmental performance of ports.



Port Readiness Level (PRL)

Assesses preparedness for green and sustainable port operations.



Shore Power Readiness Indicator (SPRI)

Measures readiness for Onshore Power Supply (OPS) infrastructure



Environmental Ship Index (ESI)

Evaluates environmental performance of visiting ships.



PORT EMISSION SCOPES



SCOPE 1 Direct Emissions

- Port equipment & vehicles
- On-site fuel combustion
- Port owned vessels



SCOPE 2 Indirect Emissions (Energy)

- Purchased electricity
- Steam / heating / cooling consumed at port



SCOPE 3 Other Indirect Emissions

- Ships at berth & in port
- Cargo handling activities
- Waste & water treatment
- Employee & visitor travel
- Upstream & downstream logistics



Measuring, Monitoring & Mitigating Across All Three Scopes is Key to a Low-Carbon Port Ecosystem



SHORE TO SHIP POWER (ONSHORE POWER SUPPLY)

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



WHY IT MATTERS

- ✓ Cuts CO₂, NO_x, SO_x 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



POSSIBLE FINANCING OPTIONS

- Blended finance → govt + MDBs + private capital
- Green/blue bonds → earmarked for OPS infrastructure
- PPP models → private players co-invest in OPS roll-out



IMPLEMENTATION STATUS IN INDIAN PORTS



Kamarajar Port
500 kW, 400V, 50-60 Hz in Coal Berth 1 & 2



VO Chidambaram 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)



Paradip Port
Newly commissioned. Delivered full load power to MV APJ Indrani at CB1 Berth.



GREEN TUG TRANSITION PROGRAM (GTTP)



Initiative of MoPSW for transition of harbour tugs to green propulsion.



Targets progressive replacement of diesel-powered tugs.



Applicable to ~400 harbour tugs operating across Indian ports.



Implemented through **Approved Standard Tug Designs & Specifications (ASTDS-GTTP)**.



Initial focus on **battery-electric tugs**, with provision for **hybrid, methanol and hydrogen**.

PHASE 1 (2024-27)



- Induction of battery-electric green tugs at Major Ports.
- Deployment based on ASTDS-GTTP.

PHASED IMPLEMENTATION FRAMEWORK

PHASE 2-3 (2028-33)



- 30%-60% of operational tug fleet to be ASTDS-GTTP compliant.
- Introduction of alternate fuels and hybrid technologies.

PHASE 4-5 (2034-40)



- 100% transition of harbour tugs at Major Ports.
- Nationwide adoption aligned with vessel life / charter cycles.



Towards a **Low-Carbon, Efficient and Resilient Port Ecosystem**



Clean Energy



Energy Efficiency



Circular Economy



Climate Action



Sustainable Growth



Building Green Ports Today
for a Sustainable Tomorrow



Shore-to-Ship Power Supply (SPS) – Enabling Cleaner Port Operations



Enabling cleaner, standardized and interoperable port operations

What SPS enables

UP TO **90%** reduction in emissions at berth

CO₂

NO_x

SO_x

PM

Shore power replaces auxiliary diesel generation while vessels are berthed.

How it works

SHIP AT BERTH

SHORE CONNECTION

CLEAN ELECTRICITY

National framework

DGS Engineering Circular No. 09 of 2025

Recommended technical, safety and operational standards for SPS implementation across:

Major & non-major ports

All ships • any flag

1

Standards & Interoperability

IEC/IEEE 80005-1 • 80005-2 • 80005-3
IEC 62613 • IEC 60309-5

2

Safety & Operations

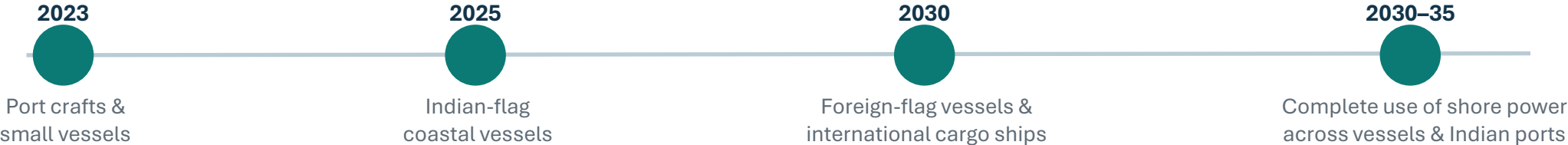
Port-specific SOPs • Compatibility checks
Real-time monitoring • Emergency shutdown
Risk assessment & safe disconnection

3

Carbon Measurement & Certification

Metering → Emission calculation → Verification → Certification
Records kWh supplied and associated carbon emissions

Phased adoption pathway





Port Decarbonization in India

From cleaner power to electrified operations; and from pilots to measurable performance

Major ports with SPS infrastructure

12

Ports with commercial vessel
(coastal) SPS

4+

India's first shore power port

2016

Target: all foreign-flag
vessels on SPS

2030

SHORE POWER

- VOC — SPS since 2016
- Kamarajar — 500 kW, Coal Berths 1 & 2
- Paradip — CB-1 operational
- JNPA — port-craft SPS; terminal rollout underway

PORT OPERATIONS

- JNPA — 15 e-RTGCs commissioned
- 49% of 210 CHEs electric / hybrid
- EV fleet + charging infrastructure
- GTTP — first-wave green tugs at 4 pilot ports

RENEWABLE ENERGY

- Deendayal — 20 MW solar / wind
- Visakhapatnam — 10 MW solar operational
- Cochin — floating + rooftop solar
- Harit Sagar — >60% RE share by 2030

Establishing common emissions reporting, verified data and comparable benchmarks to track **India's decarbonization journey**

IoT

real-time environmental monitoring

MRV

Scope 1 & 2 emissions reporting

GPPI

annual port-wise performance

3P

third-party verification

DATA

national benchmarking

By **2030**

cleaner electricity + electrified equipment + connected vessels + comparable, verified emissions data



Progress across the three major green fuel hubs



Work completed and initiatives underway at Kandla, Tuticorin and Paradip.

POSITION AS OF 26 AUG 2026

KANDLA / DEENDAYAL

OPERATIONAL DEMONSTRATION

1 MW

Green hydrogen plant

WORK COMPLETED / UNDERWAY

- 1 MW electrolyser-based plant commissioned
- Methanol bunkering trial completed at PRL 6
- 3,400 acres allotted for green H₂/ammonia
- 3.5 MTPA ammonia-compatible jetty
- 150 TPD e-methanol plant MoU

TUTICORIN / VOC PORT

PILOT + INFRASTRUCTURE BUILD

10 Nm³/h

Pilot green hydrogen plant

WORK COMPLETED / UNDERWAY

- 10 Nm³/h pilot commissioned in Apr 2025
- 205.72 acres allotted for green H₂/ammonia
- Foundation laid for methanol bunkering infrastructure
- 2×750 m³ facility under development

PARADIP PORT

APPROVED FOR DEVELOPMENT

4 MTPA

Green H₂ / ammonia jetty

WORK COMPLETED / UNDERWAY

- ₹797.17 crore project approved
- 4 MTPA jetty through PPP/BOT
- Dedicated jetty, storage, pipelines and handling systems
- 20% port support; 24-month delivery target

COMMON POSITION

All three are recognised Green Hydrogen Hubs under the National Green Hydrogen Mission.



Just Transition in Maritime



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

Just Transition: Putting People at the Core of Decarbonisation

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

Decarbonisation is not only a fuel shift. It is a workforce shift.



~3.23 lakh Indian seafarers (as of 2025)



~12% of global maritime workforce



Alternative fuels introduce new safety risks



New technologies demand new competencies



Transition must **protect jobs, safety and dignity**



1. Skills & Training

- Large-scale upskilling for green fuels and technologies
- Modernised STCW-aligned training standards
- Investment in maritime training infrastructure



2. Safety & Standards

- Health-and-safety-first approach
- Safe handling of ammonia, hydrogen and low-flashpoint fuels
- Alignment with MLC 2006 and global labour norms



3. Equity & Inclusion

- Avoid widening global skills gaps
- Support developing maritime nations
- Promote diversity and gender inclusion



4. Well-being & Social Protection

- Seafarer welfare and mental well-being
- Fair transition with social protection
- No one left behind



Cleaner Oceans



Safer Workplaces



Stronger Economies



Resilient Communities



Sustainable Future

A green transition must also be a fair transition.

- Recycling governed internationally by the **Hong Kong Convention (HKC)**
- Integral to the **circular economy**, reducing the demand for virgin raw materials (97-98% Materials recoverable)

India is a leading hub with world's largest ship recycling cluster

35%

of global ship recycling tonnage in 2025

115

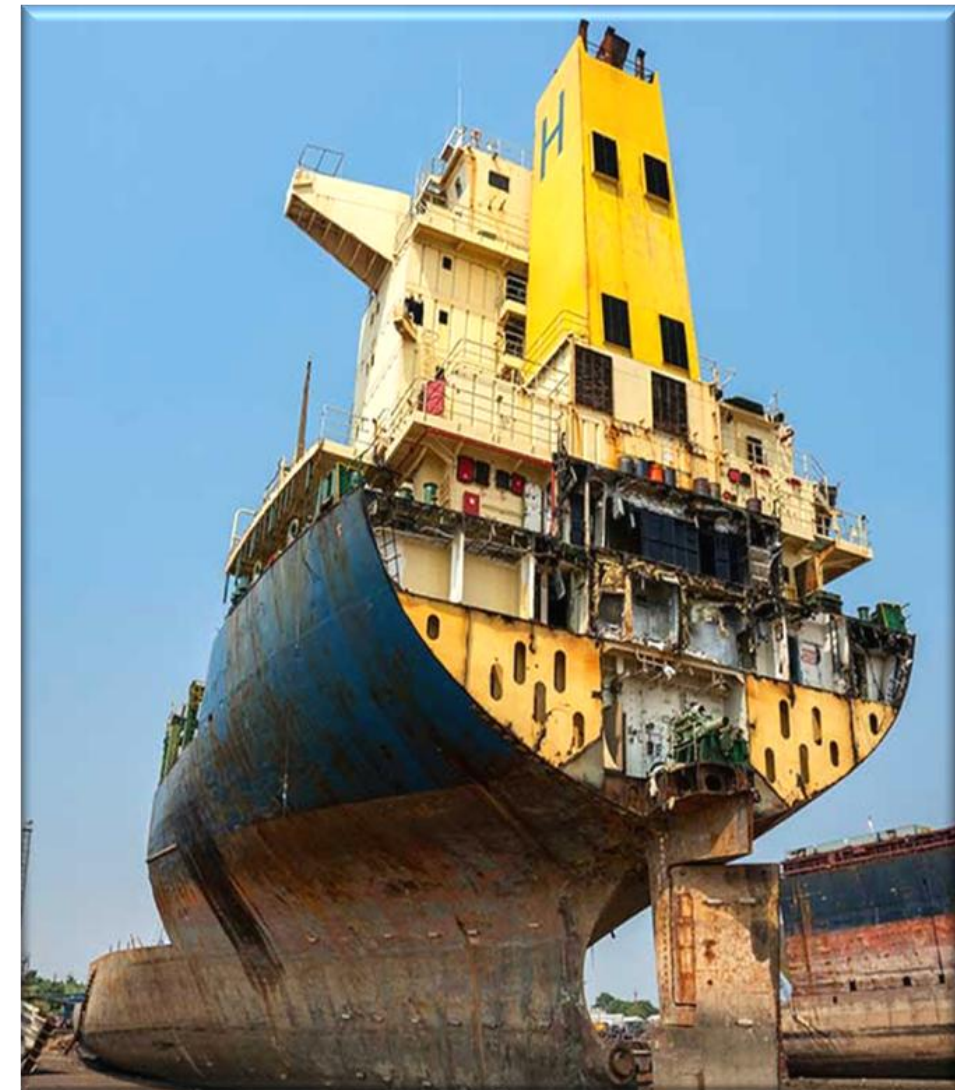
HKC Compliant Yards present in India

20-25%

India's ferrous scrap requirement met, reducing import dependence

15k+

Direct employees & indirect livelihood opportunities for thousands





Ship Recycling Statistics in India



Yard	Total Number of Plots	Operational Plots	HKC Compliant yards
Alang, Bhavnagar (Gujarat)	150	128	115
Steel Industries Limited (Kerala)	1	1	0
Amar Iron Udyog, Kolkata (West Bengal)	1	1	0

36 DASR issued to HKC Compliant Recycling Yards





India's Ship Recycling Target



**TARGET SHIP
RECYCLING CAPACITY**

4.5
MILLION LDT
Current Target



9
MILLION LDT
Future Target



GLOBAL OUTLOOK



16,000
VESSELS

expected to be scrapped
in next **10 years.**



INDIA'S TARGET

CURRENT
400-450
VESSELS PER YEAR



FUTURE
800+
VESSELS PER YEAR



**Strengthening
Domestic Capacity**
Building world-class,
HKC compliant yards



**Generating Employment
and Livelihoods**
Direct and indirect jobs for
lakhs of workers



**Sustainable & Responsible
Approach**
Safe, environmentally sound
and resource efficient recycling



**Enhancing Global
Leadership**
Positioning India as the
global hub for ship recycling



Four Pillar Approach



Cabinet approves ₹ 69,725 crore Package to Revitalize India's Shipbuilding and Maritime Sector



Shipbuilding Financial Assistance scheme

Allocation: ₹24,736 crore

- Overcome cost differential vis-a-vis foreign shipyards.
- **Credit note for new builds against ship scrapping in India ₹ 4001 crore allocated**
- Establish National Shipbuilding Mission



Maritime Development Fund

Allocation: ₹25,000 crore

- Enable long-term financing to maritime sector through equity & debt-based funding:
- Maritime Investment Fund
 - Interest Incentivization Fund
 - Credit Guarantee Fund



Shipbuilding Development Scheme (SbDS)

Allocation: ₹19,989 crore

- Greenfield cluster creation
- Brownfield capacity expansion to **4.5 million GT**
- Risk outlay for shipyards
- Setting up of India Ship Technology Centre (ISTC) as Apex body under IMU



Legal, Policy and Process Reforms

- Demand aggregation
- Large Ships as infrastructure
- Taxation issues
- Flagging reforms



Ship Recycling Credit Note

Global First

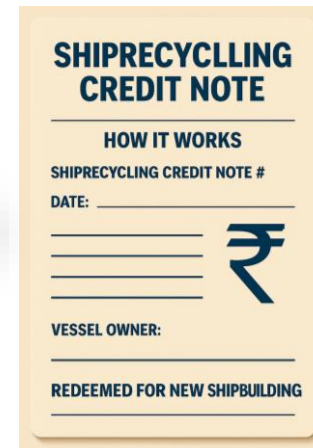


₹ 4,001 Cr allocated under the SBFAS with 10-year validity from 24th September 2025 to 31st March 2036



SHIP RECYCLING
(HKC compliant Indian recycling yard)

40%
Fair Scrap Value



Valid for 3 Years from date of completion of recycling

New Build Offset



Upto 5% of new vessel value



NEW SHIPBUILDING
(Indian Shipyard)



Stackable



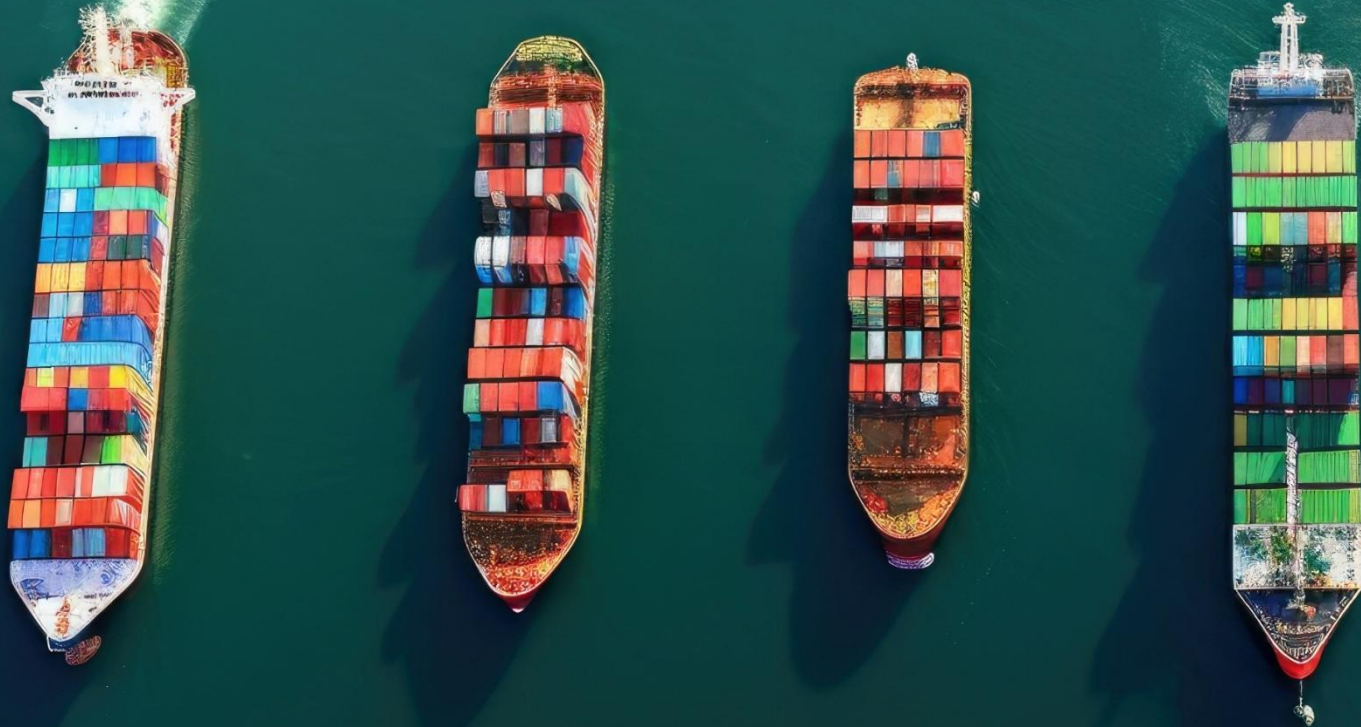
Partial Utilization



Transferable



Market-Driven



**संगच्छध्वं
संवदध्वं
सं वो मनांसि
जानताम्।**

*“Move together,
speak together,
may your minds
be in harmony.”
(Rigveda 10.191.2)*

Mr. Killi Mohana Rao,
Chief Surveyor & Addl. Director General,
Directorate General of Maritime Administration
E Mail : cs-dgs@nic.in



सत्यमेव जयते

Ministry of Ports,
Shipping & Waterways
Government of India

