



सत्यमेव जयते

पत्तन, पोत परिवहन  
एवं जलमार्ग मंत्रालय  
MINISTRY OF  
**PORTS, SHIPPING  
AND WATERWAYS**

# राष्ट्रीय हरित पोत-परिवहन नीति

## **NATIONAL GREEN SHIPPING POLICY**

**Minister's Message**

**Minister of State Message**

**Secretary - MoPSW Message**

**Preface**

*These sections will be populated following the final approval of the policy.*

## 1.0 Introduction

India's maritime sector is at a structural turning point. The country is simultaneously expanding port capacity, scaling inland waterways, modernising shipbuilding, and positioning itself as a global logistics and manufacturing hub. This expansion is unfolding in an era where global maritime trade is being rapidly redefined by decarbonisation mandates, lifecycle emissions accounting, ESG-linked finance, and climate-aligned regulation. India has already established a strong foundation for maritime sustainability through multiple progressive frameworks, including **Maritime India Vision (MIV) 2030**, **Maritime Amrit Kaal Vision (MAKV) 2047**, **Green Tug Transition Programme (GTTP)** and **Harit Sagar Guidelines**, alongside broader national commitments such as **Nationally Determined Contribution (NDC)** up to 2035 guided by the vision of Viksit Bharat, **Long-Term Low Emission Development Strategy**, and **India's Net Zero targets**. These frameworks collectively provide strategic direction, sectoral targets, and guiding principles for green transition across ports, shipping, and inland waterways, while also signalling India's commitment to sustainable and climate-aligned growth.

While these initiatives provide a strong and multi-dimensional foundation for maritime decarbonisation, there remains an opportunity to further strengthen implementation through a unified architecture that enhances integration across ports, shipping, and inland waterways; standardises metrics and monitoring frameworks; improves institutional coordination; and provides clearer long-term investment signals. Further, translating national climate commitments into sector-specific maritime decarbonisation pathways will support stakeholders in addressing emerging global requirements, including lifecycle emissions accounting, carbon pricing, and evolving IMO-led regulatory frameworks.

The National Green Shipping Policy (NGSP) has been formulated to bridge the gaps by providing a **cohesive, long-term, and implementation-oriented policy framework**, ensuring alignment across existing initiatives while transforming India's maritime sector into a globally competitive, investment-ready, and decarbonised ecosystem.

The National Green Shipping Policy (NGSP) serves as a critical enabler to transform India's currently fragmented green maritime initiatives into a unified, long-term, and globally aligned decarbonisation ecosystem.



Figure 1. NGSP as a Critical Enabler for Decarbonization

## 2. Rationale

India is committed to achieving both ecologically and economically sustainable growth in its maritime sector. The rationale of the NGSP is to establish a unified, binding, and comprehensive national framework that drives the decarbonisation and sustainable transformation of India's entire maritime ecosystem – covering shipping, ports, inland waterways, ship recycling, and all associated maritime services – while preserving India's commercial competitiveness, energy security, and inclusive development imperatives.

### The NGSP Aims to:

- **Comply with the Green Shipping Guidelines** by employing green practices across all maritime activities, achieving reduction of GHG emissions and carbon footprints through energy transition from fossil fuels to alternative fuels and renewable energy, in line with MIV 2030.
- **Coordinate existing programmes** - Harit Sagar Guidelines, Maritime India Vision 2030, Maritime Amrit Kaal Vision 2047, and the Green Tug Transition Programme under a single decarbonisation architecture, eliminating fragmentation and non-standardised metrics.
- **Promote investment** in the design, construction, and retrofit of low- and zero-emission vessels, port infrastructure, and clean fuel supply chains under Make in India, Sagarmala, and MIV 2030 programmes.
- **Establish measurable national baselines and SMART performance benchmarks** anchored to the 2021 emissions baseline – for ship-sourced emissions and port operational emissions.
- **Enable access to national and international green finance** through a National Green Ship Certification Framework, Green Compliance Index (GCI), and harmonised MRV systems.
- **Ensure a just and inclusive transition** that integrates coastal communities, MSMEs, informal maritime workers, inland operators, and ship recycling workforces into the green economy rather than displacing them.

At the institutional level, NGSP is anchored by the **Ministry of Ports, Shipping and Waterways**, supported by a three-tier governance model. The **National Green Maritime Governance Cell (NMGCC)** functions as the central coordinating authority, ensuring alignment across all seven pillars and monitoring implementation progress. This is complemented by the **Inter-Ministerial Taskforce on Green Shipping (IMTGS)**, which enables convergence with other ministries such as energy, finance, and environment, thereby addressing cross-sectoral dependencies like fuel supply chains, green finance and carbon markets. The execution backbone consists of seven dedicated working groups corresponding to each green pillar. These working groups are not only responsible for policy formulation but also for designing frameworks, overseeing implementation, and coordinating with industry stakeholders. Supporting mechanisms such as the **Annual National Green Shipping Dialogue**, a **Green Maritime Help Desk and grievance portal**, and a comprehensive **Monitoring, Reporting and Verification (MRV)** system ensure continuous feedback, stakeholder engagement, and transparency.

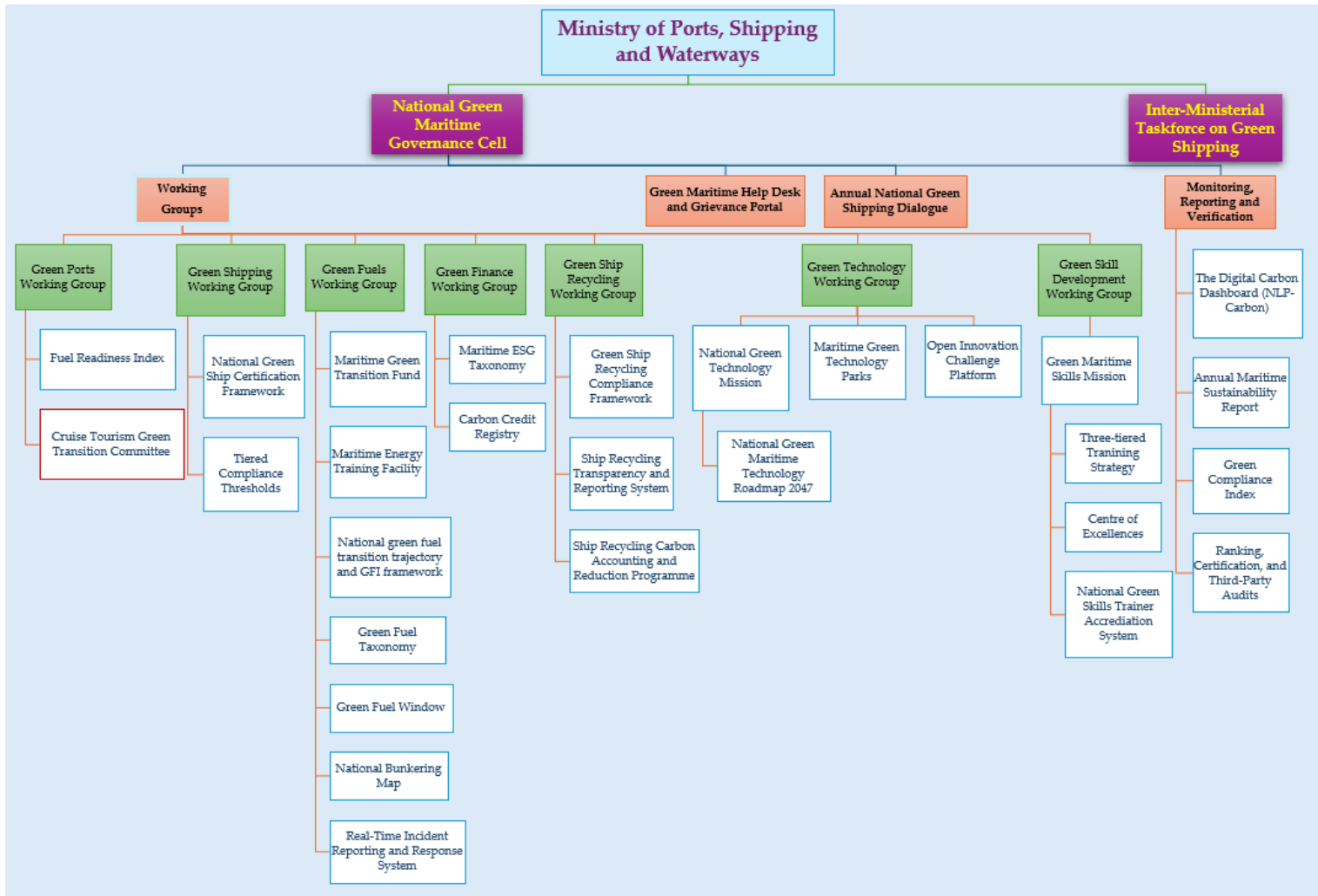


Figure 2. Institutional and Governance Framework for NGSP

## 2. Scope, Commitments and Targets

### 2.1 Scope of Coverage

This Policy applies to the entirety of India's maritime sector and shall be binding on all entities operating within the sector, as specified below:

- **International Shipping** All ships  $\geq 5,000$  GT calling at Indian ports (cargo, passenger/cruise, and service/support vessels), aligned with IMO DCS thresholds
- **Domestic/Coastal Shipping** Indian-flagged vessels  $\geq 400$  GT in coastal, inter-island, and offshore service, as per Harit Nauka Guidelines
- **Inland Waterways** IWAI-regulated vessels  $\geq 400$  GT or equivalent displacement/ installed power, with sampling and extrapolation for smaller craft
- **Port and Terminal Operations:** All major and non-major ports, inland waterway terminals, and cruise tourism terminals, including mixed-use inland ports
- **Ship Recycling Facilities:** All ship recycling yards, facilities, and operators within Indian jurisdiction, subject to HKC-aligned compliance tiers

## 2.2 Baseline Year and Strategic Decarbonisation Trajectory for India's Maritime Sector

In keeping with the principle of **Common But Differentiated Responsibilities and Respective Capabilities (CBDR-RC)**, India adopts calendar year 2021 as the national emissions baseline for the entire maritime sector, covering both ship-sourced emissions and port/terminal operational emissions. This year aligns with the post-COVID recovery phase, the formalisation of Maritime India Vision 2030, and the onset of India's modernisation and decarbonisation strategy.

India's nationally declared net-zero target year is 2070. Accordingly, the long-term decarbonisation horizon of the maritime sector is aligned with 2070. While the IMO global ambition references 2050, India's implementation pathway is structured around the 2047 milestone under Maritime Amrit Kaal Vision (MAKV 2047), with the National Green Maritime Implementation Plan (NGMIP) serving as the operational roadmap toward the broader 2070 national net-zero commitment.

## 2.3 Decarbonisation Targets

The NGSP establishes a sequenced, sector-specific decarbonisation pathway aligned with India's net-zero commitment by 2070 and consistent with indicative checkpoints in 2030 and 2040 under the IMO Revised GHG Strategy (2023). Each target is defined in accordance with the SMART framework – Specific, Measurable, Achievable, Realistic, and Time-bound – and is operationalised exclusively through the National Green Maritime Implementation Plan (NGMIP) as attached in the Annexure.

## 3. Seven Pillars of National Green Shipping Policy

This section presents the core framework of the National Green Shipping Policy (NGSP), structured around key components including definitions of the seven green pillars, their strategic rationale, targeted interventions, and the implementation roadmap. It establishes a clear and standardised understanding of each pillar covering green ports, green shipping, green fuels, green ship recycling, green finance, green skill development, and green technology, ensuring consistency in interpretation and execution across the maritime sector.

Building on these definitions, the section articulates the rationale underpinning each pillar, highlighting the need for a coordinated and systems-level transition to address challenges related to emissions, resource efficiency, infrastructure readiness, financing, and workforce capacity. It emphasises the importance of integrating these domains to enable a cohesive decarbonisation pathway rather than pursuing isolated interventions.

The section further details the specific interventions identified under each pillar, encompassing regulatory frameworks, certification mechanisms, financial instruments, technology deployment pathways, and capacity-building initiatives. These interventions are designed to translate policy objectives into actionable measures, supported by enabling ecosystems and institutional mechanisms.

Finally, the implementation roadmap outlines a phased approach to operationalising the policy, aligning near-term priorities with long-term decarbonisation goals.

Together, these components form a comprehensive and execution-oriented framework, enabling a coordinated, scalable, and outcome-driven transition of India's maritime sector under NGSP.

## 3.1 Green Shipping (including Shipbuilding and Ship Repair)

### 3.1.1 Definition – Green Ship

"A ship that integrates advanced technologies, low- or zero-emission energy systems, and operational best practices to reduce emissions, fuel consumption, and environmental pollution. The ship shall be compliant with applicable national and international regulatory standards and shall contribute toward India's maritime decarbonization goals. It includes retrofitted ships and newbuilds operating on low emission/green fuels/green technologies."

### 3.1.2 Rationale

India's merchant fleet (~1,530 vessels) is at a critical transition point, with existing frameworks like MIV 2030 and MAKV 2047 highlighting the need for green retrofitting and newbuilds but lacking a comprehensive vessel-level decarbonisation strategy. The NGSP addresses this gap through an integrated framework covering certification, propulsion, fuel transition, operational efficiency, and MRV systems, while enabling investment, regulatory alignment with global standards, and access to green finance. Additionally, with less than 15% of India's 28 shipyards engaged in advanced green shipbuilding, the policy incorporates a lifecycle approach to address the often-overlooked 10–30% emissions from construction, promoting low-carbon materials, green steel, and sustainable manufacturing practices.

### 3.1.3 Implementation Roadmap:

Phase	Interventions	Expected Outcomes
<b>Short Term (up to 2030)</b>	<ol style="list-style-type: none"> <li>1. Launch National Green Ship Certification Framework and compliance thresholds.</li> <li>2. Integrate MRV and GFI into NLP-Marine.</li> <li>3. Update SBFAS for green retrofits and propulsion.</li> <li>4. Pilot hybrid-electric ferries, battery tugs, methanol vessels</li> <li>5. Declare pilot Zero Emission Zones.</li> <li>6. Mandate Green Public Procurement for PSU vessels.</li> <li>7. Deploy JIT arrival and fuel monitoring protocols.</li> <li>8. Begin STS rollout at priority berths</li> <li>9. Develop lifecycle carbon standards (BIS LCA Code).</li> </ol>	Defined baselines; early adoption incentives; pilot corridors; functional MRV; green finance instruments launched
<b>Medium Term (2030-2040)</b>	<ol style="list-style-type: none"> <li>1. Mandatory green certification for all new builds.</li> <li>2. Large-scale retrofit programmes for domestic, ferry, and coastal vessels.</li> <li>3. National multi-fuel bunkering hubs (methanol/ammonia/biofuel).</li> <li>4. Embedded carbon disclosure mandatory <math>\geq 400</math> GT</li> <li>5. Expand STS to majority of major port berths</li> <li>6. Shipyard decarbonisation (renewable electricity + low-carbon fabrication).</li> <li>7. Expand ZEZs to high-traffic corridors</li> <li>8. Scale domestic green shipbuilding supply chains.</li> <li>9. Procurement of materials with carbon embedded accounting.</li> <li>10. GCI-linked financing becomes standard.</li> </ol>	System-wide decarbonisation; green market development; mid-term global alignment

<b>Long Term (2040-2070)</b>	<ol style="list-style-type: none"> <li>1. All new-built vessels incorporate available zero-emission technologies.</li> <li>2. Identify and develop ZEZ network.</li> <li>3. STS coverage across Indian coast.</li> <li>4. Bunkering/storage/handling readiness for hydrogen/methanol/ammonia supply chains.</li> <li>5. Carbon market integration for shipping.</li> <li>6. Net-zero Scope 1–2 maritime operations.</li> </ol>	Net-zero fleet ecosystem; India as R&D-exporter of green vessels and maritime technologies
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**\*Oversight through NGMCC with MoPSW as chair and Green Shipping Working Group**

**Table 2: Interventions and Implementation Roadmap for Green Shipping Pillar**

## 3.2 Green Ports

### 3.2.1 Definition – Green Port

"A maritime gateway that systematically integrates environmentally sustainable practices across operations, infrastructure, and governance. It seeks to minimize emissions and pollution, maximize energy and resource efficiency, preserve ecosystems – atmospheric and aquatic – and contribute to the socio-economic well-being of surrounding communities, while aligning with global decarbonization goals, India's Nationally Determined Contributions (NDCs), and national environmental frameworks such as the Harit Sagar guidelines."

### 3.2.2 Rationale

Green ports go beyond eco-efficient infrastructure, representing a system-wide transformation driven by low-emission operations, clean energy adoption, digitalisation, and circular economy practices. A clear definition enables regulatory alignment with national frameworks such as Panchamrit, MAKV 2047, Harit Sagar, and MIV 2030, while supporting benchmarking through the Green Port Performance Index (GPPI), compliance with global conventions (IMO, MARPOL), and access to green finance and ESG-linked investments. The NGSP consolidates these efforts into a unified national framework that standardises emissions, promotes digital monitoring, and enables scalable adoption of global best practices, while addressing gaps in coordination, skills, and financing.

### 3.2.3 Implementation Roadmap

Phases	Interventions	Expected Outcome
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<b>Short Term (Up to 2030)</b>	<ol style="list-style-type: none"> <li>1. Operationalise GPPI and mandate integration of ISO 14001 and ISO 50001 with voluntary compliance to EcoPorts and World Ports Sustainability Program Indicators.</li> <li>2. Launch Port-level Fuel Readiness Index into GPPI to assess and disclose infrastructure readiness for alternative fuel .</li> <li>3. (check alignment) Integrate coastal/IWT/cruise terminals into GPPI with special modules.</li> <li>4. Deploy STS at 50% of berths.</li> <li>5. Enforce MARPOL Annex VI-aligned emission limits.</li> <li>6. Issue guidelines for electric-cargo equipment and eco-dredging.</li> <li>7. Achieve minimum 60% RE share in port operations by 2030.</li> <li>8. Deploy IoT/GIS systems at major ports</li> <li>9. Install CEMS.</li> <li>10. Conduct annual third-party audits (Swachh Swachh Sagar Portal) and expand PCS 1x and NLP-marine.</li> <li>11. Promote JIT.</li> <li>12. Ensure MARPOL-compliant waste reception.</li> <li>13. Implement 5R framework.</li> <li>14. Install stormwater and oil-water systems.</li> <li>15. Pilot electric ferry corridors.</li> <li>16. ₹ Retrofit cruise terminals with STS and waste systems</li> <li>17. Establish CTGTC.</li> </ol>	<p>National certification framework operational; measurable emission reduction at berth; reduced fossil electricity dependency; transparent MRV; context-specific green terminal transition</p>
<b>Medium Term (2030–2040)</b>	<ol style="list-style-type: none"> <li>1. Achieve 100% STS at major ports.</li> <li>2. Expand to high-traffic non-major ports and IWT terminals.</li> <li>3. Scale electric/hybrid equipment and eco-dredging</li> <li>4. Expand RE integration across Port Clusters and scale BESS and hybrid systems</li> <li>5. Deploy AI optimisation and implement digital twins</li> <li>6. Predictive maintenance via IoT.</li> <li>7. Nationwide MRV integration.</li> <li>8. Install CO<sub>2</sub> reception facilities.</li> <li>9. Scale water reuse.</li> <li>10. Expand waste-to-energy at cruise-cargo hubs.</li> <li>11. Annual port-level GHG reduction targets.</li> <li>12. GPPI benchmarking nationwide and disclosure via AMSR.</li> <li>13. Scale PPPs for STS, bunkering, and carbon capture.</li> <li>14. Align with GreenVoyage2050 and green corridors.</li> </ol>	<p>Full berth electrification at major ports; near-total clean energy operations; energy-efficient smart ports; integrated carbon and circular economy systems</p>
<b>Long Term (2040–2070)</b>	<ol style="list-style-type: none"> <li>1. Progress toward 100% renewable-powered operations.</li> <li>2. Integrate microgrids and storage.</li> <li>3. Fully electrified port equipment.</li> <li>4. Universal STS coverage.</li> <li>5. Operational carbon capture and industrial utilisation.</li> <li>6. Fully circular waste and water systems.</li> <li>7. Nature-based coastal protection.</li> <li>8. Nuclear-ready berths compliant with IMO-IAEA guidance.</li> <li>9. Readiness for autonomous shipping and offshore wind, and ocean carbon removal</li> <li>10. 100% renewable inland/coastal terminals</li> <li>11. Zero-emission cruise terminals.</li> <li>12. Full GPPI special module compliance.</li> </ol>	<p>Net-zero port operations; zero-emission port interface; climate-resilient circular ecosystems; future-proof infrastructure</p>

\*Oversight through NGMCC with MoPSW as chair and Green Ports Working Group

**Table 3:** Interventions and Implementation Roadmap for Green Ports Pillar

### 3.3 Green Fuels

#### 3.3.1 Definition – Green Fuel

“Green fuels are alternative marine energy sources – such as biofuels, green hydrogen, green ammonia, e-methanol, ethanol, renewable LNG, renewable LPG, FT diesel, Dimethyl ether etc. – produced from renewable energy or sustainable biomass using acceptable sustainable practices. Their adoption in the maritime sector supports the replacement of fossil-based marine fuels and contributes directly to India’s commitments under the proposed Harit Nauka, Harit Sagar Guidelines, Panchamrit, Nationally Determined Contributions (NDCs), and the 2023 Revised IMO GHG Strategy (as applicable).”

#### 3.3.2 Rationale

The transition to green fuels is critical for decarbonising India’s maritime sector, as conventional fuels like HFO and MDO account for the majority of lifecycle emissions. With tightening global regulations and India’s commitments under Panchamrit, NDCs, and net-zero targets, adoption of fuels such as hydrogen, ammonia, methanol, advanced biofuels etc.) is becoming a strategic necessity. The NGSP addresses key challenges—high costs, infrastructure gaps, fuel availability, and lack of standardisation—through a phased transition framework that promotes bunkering infrastructure, green fuel corridors, and domestic production. By enabling scale, investment certainty, and alignment with renewable energy expansion, the policy positions green fuels as both a decarbonisation solution and a driver of industrial growth and global competitiveness.

#### 3.3.3 Interventions and Implementation Roadmap

Phases	Interventions	Expected Outcomes
<b>Short Term (Up to 2030)</b>	<ol style="list-style-type: none"> <li>1. Notify green fuel trajectory and lifecycle GFI framework.</li> <li>2. Integrate lifecycle fuel tracking into NLP-Marine.</li> <li>3. Mandate 10–15% clean fuel share in coastal/IWT fleet</li> <li>4. issue maritime biofuel blending standards.</li> <li>5. Expand LNG bunkering at priority ports.</li> <li>6. Develop minimum 4 national green fuel bunkering hubs (Kandla, Kochi, Tuticorin, Paradip).</li> <li>7. Publish National Bunkering Map.</li> <li>8. Issue ammonia/hydrogen/methanol bunkering safety codes</li> <li>9. Establish METF and train 10,000 personnel.</li> <li>10. Activate MGTF for green fuels and VGF where required.</li> <li>11. Launch 2 green fuel corridors internationally.</li> <li>12. Recognise onboard CCS compliance credits.</li> </ol>	<p>10–15% clean fuel share in domestic fleet; ≥4 operational multi-fuel bunkering hubs; METF operational; ~10,000 certified fuel handlers; fuel safety regime enforced; national lifecycle GFI registry live</p>

<b>Medium Term (2030–2040)</b>	<ol style="list-style-type: none"> <li>1. Mandate 30% lifecycle GFI compliance across fleet</li> <li>2. Establish ≥5 domestic fuel production hubs.</li> <li>3. Multi-fuel infrastructure at all major ports</li> <li>4. Mandatory LCA verification of fuels.</li> <li>5. Introduce pilot maritime carbon pricing.</li> <li>6. Major ports equipped for CCS support.</li> <li>7. Accelerate fuel PPP investments.</li> <li>8. Activate green fuel export corridors.</li> <li>9. Align road/rail carbon emission policy for modal parity.</li> </ol>	30% lifecycle clean fuel share; ≥5 national production hubs; all major ports multi-green-fuel-ready; carbon-verified bunkering ecosystem; international fuel trade corridors active
<b>Long Term (2040–2070)</b>	<ol style="list-style-type: none"> <li>1. Mandate national zero-carbon fuel dominance (70% milestone by 2047).</li> <li>2. Fossil marine fuel phase-out by 2070.</li> <li>3. All ports multi-fuel capable.</li> <li>4. Ports operate CO<sub>2</sub> logistics chain.</li> <li>5. India exports clean maritime fuels.</li> <li>6. MRV linked to global carbon markets.</li> </ol>	Fossil marine fuels eliminated; India becomes Indo-Pacific green fuel hub; net-zero maritime fuel ecosystem

**\*Oversight through NGMCC with MoPSW as chair and Green Fuels Working Group**

**Table 4:** Interventions and Implementation Roadmap for Green Fuels Pillar

## 3.4 Green Ship Recycling

### 3.4.1 Definition – Green Ship Recycling

"Green ship recycling in India refers to the process of dismantling end-of-life ships in compliance with the Recycling of Ships Act, 2019, the Hong Kong International Convention, and other international/domestic standards including the EU SRR. It prioritizes worker safety, environmental protection, and resource recovery, supported by a framework of certification, hazardous material control, and regulatory oversight."

### 3.4.2 Rationale

The Sustainable Ship Recycling pillar drives a transition from volume-based dismantling to a circular, transparent, and socially responsible model. While India is among the global leaders in ship recycling, the focus shifts toward sustainability, safety, and transparency. The NGSP introduces a Green Ship Recycling Certification Scheme, digital tracking systems, and integration with carbon markets to monetise emissions savings from high material recovery (~85–90% steel reuse). Aligned with the Recycling of Ships Act, 2019, the Hong Kong Convention, and EU-SRR, the framework promotes upgradation of medical care facilities, yard modernisation, worker safety systems, digital compliance platforms (IHM, SRP), improved and transparent waste-management systems, and integration with circular economy initiatives. It also addresses key challenges such as exclusion from EU-approved lists, occupational risks, and gaps in emissions accounting through a coordinated, ecosystem-based approach.

### 3.4.3 Implementation Roadmap

Phases	Interventions	Expected Outcome
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<b>Short Term (Up to 2030)</b>	<ol style="list-style-type: none"> <li>1. Launch GSRC-Tier framework nationwide.</li> <li>2. Register and classify all licensed yards under Tier 1–3 system.</li> <li>3. Establish SRTRS</li> <li>4. Deploy digital IHM tracking and blockchain waste reporting.</li> <li>5. FSDF modernisation grants for mechanisation and pollution control including review of existing BIS norms for optimum utilisation of re-rolled steel plates &gt; 08 mm thickness for load-bearing applications</li> <li>6. Establish common melting and scrap aggregation hubs.</li> <li>7. Launch worker safety certification programmes.</li> <li>8. Worker insurance and welfare-linked incentives</li> <li>9. Bilateral EOL ship supply agreements (EU/Japan/Korea/UAE).</li> <li>10. National green recycling certification label.</li> <li>11. Real-time energy and emissions monitoring in ≥50% of yards</li> <li>12. Pilot robotic/AI-driven dismantling technologies.</li> <li>13. Mandatory third-party environmental audits.</li> </ol>	<p>GSRC operational; SRTRS live; digital IHM tracking active; FSDF modernisation grants disbursed; common melting hubs established; worker safety certification launched; bilateral EOL supply agreements signed</p>
<b>Medium Term (2030–2040)</b>	<ol style="list-style-type: none"> <li>1. ≥70% of existing ship recycling yards upgraded to GSRC Tier 1 or Tier 2.</li> <li>2. Carbon intensity targets integrated into GSRC scoring.</li> <li>3. IoT MRV coverage across all licensed yards.</li> <li>4. Robot-driven and/or semi-mechanised dismantling processes adopted.</li> <li>5. Scrap supply chain integrated with green steel sector.</li> <li>6. Lifecycle carbon disclosure per dismantled vessel.</li> <li>7. Expanded FSDF R&amp;D for low carbon cutting technologies.</li> <li>8. Promote yards in compliance with HKC, EU-SRR and regional regulatory bodies</li> <li>9. Workforce professional certification for all ship recycling. Yards</li> <li>10. Insurance-linked safety incentive programmes scaled.</li> </ol>	<p>Industrial-scale green recycling sector; carbon accounting integrated; circular steel ecosystem operational; global certification competitiveness achieved</p>
<b>Long Term (2040–2070)</b>	<ol style="list-style-type: none"> <li>1. 100% GSRC Tier 1 compliance nationwide.</li> <li>2. Net-zero carbon dismantling operations.</li> <li>3. Fully renewable-powered recycling clusters.</li> <li>4. Closed-loop steel recovery supply chains.</li> <li>5. Lifecycle MRV integrated with global carbon markets.</li> <li>6. Zero hazardous discharge yards.</li> <li>7. Automated dismantling and waste systems universal.</li> <li>8. Global leadership in sustainable ship recycling.</li> <li>9. Integration into international green steel markets.</li> </ol>	<p>Net-zero ship recycling ecosystem; global benchmark industry; full circular economy maturity</p>

**\*Oversight through NGMCC with MoPSW as chair and Green Ship Recycling Working Group**

**Table 5: Interventions and Implementation Roadmap for Green Ship Recycling Pillar**

## 3.5 Green Finance

### 3.5.1 Definition - Green Finance

"A structured and verifiable financial mechanism — including green bonds, loans, public-private partnerships, and ESG investments — dedicated to the funding of environmentally sustainable maritime projects. This includes projects such as green ship construction, repair and retrofitting, port electrification, clean fuel infrastructure, energy-efficient terminal equipment, and circular economy-driven ship recycling including green steel production. Green finance in India shall align with international principles (e.g., ICMA Green Bond Principles, IFC Performance Standards, EU Taxonomy, IMO Zero-Net Framework) while being responsive to national sustainability priorities and regulatory frameworks."

### 3.5.2 Rationale

The green transition of India's maritime sector requires a robust, sector-specific financial architecture to de-risk investments, mobilise blended capital, and scale ESG-aligned financing. The NGSP positions green finance as a core pillar to enable growth in low-carbon ports, clean fuel infrastructure, sustainable shipbuilding, and green technologies, with an estimated investment need of ₹1.5–2 lakh crore over the next two decades. In the absence of dedicated financial mechanisms, the sector risks delayed adoption and loss of competitiveness in the evolving global green shipping landscape. This framework is anchored in four key principles: regulatory alignment with international standards and SEBI ESG mandates; maritime-specific prioritisation of funding for ships, ports, and alternative fuel infrastructure; financial innovation through blended finance, viability gap funding, and risk-sharing mechanisms; and institutional anchoring through a National Maritime Green Finance Framework to ensure standardisation, transparency, and effective impact monitoring.

### 3.5.3 Implementation Roadmap

Phase	Interventions	Expected Outcomes
<b>Short Term (Up to 2030)</b>	<ol style="list-style-type: none"> <li>1. Create dedicated green maritime lending window with MSME credit lines and blended finance desk</li> <li>2. Ring-fence MDF green tranche for ports, ships, recycling, MRV</li> <li>3. First sovereign-backed maritime green bond issuance</li> <li>4. Launch Maritime ESG Taxonomy aligned with ICMA/EU taxonomy</li> <li>5. Develop Maritime Carbon Credit Registry linked to NLP-Carbon</li> <li>6. Introduce Sovereign Green Guarantee Scheme</li> <li>7. Training for banks, ports, shipyards on ESG project finance.</li> </ol>	₹20,000+ crore green maritime credit pipeline mobilised; benchmark yield curve for maritime green bonds established; all port and ship projects tagged ESG-compliant; verified carbon accounting for finance eligibility; private capital enters alternative fuel infrastructure

<b>Medium Term (2030–2040)</b>	<ol style="list-style-type: none"> <li>1. Expand MDF, SMFCL portfolio into hydrogen/ammonia corridors.</li> <li>2. Mandatory ESG performance pricing in port loans.</li> <li>3. Enable maritime participation in domestic carbon trading.</li> <li>4. Launch Blue Economy Impact Funds.</li> <li>5. Position IFSC-GIFT City as maritime green finance hub.</li> <li>6. Implement emission-linked payouts.</li> </ol>	₹75,000 crore cumulative green investment; financial incentives tied to emissions performance; institutional investment equity enters green shipping; India becomes global green maritime finance gateway
<b>Long Term (2040–2070)</b>	<ol style="list-style-type: none"> <li>1. Integrate maritime fully into global Article 6 Paris Agreement</li> <li>2. Reduce dependence on public concessional financing.</li> <li>3. Finance linked to full lifecycle emissions (GFI-aligned)</li> <li>4. Export Indian maritime green finance models.</li> </ol>	Carbon becomes core maritime revenue stream; market-led decarbonisation funding; financing tied to lifecycle carbon performance; India becomes Indo-Pacific finance hub

**\*Oversight through NGMCC with MoPSW as chair and Green Finance Working Group**

**Table 6:** Interventions and Implementation Roadmap for Green Finance Pillar

## 3.6 Green Skill Development

### 3.6.1 Definition – Green Skill

"The process of equipping current and future maritime professionals with technical, managerial, and behavioural skills that support sustainable shipping, green port operations, alternative fuels, green ship construction, sustainable ship recycling, and decarbonization goals. It aligns with national programs such as the Environment Education, Awareness, Research, and Skill Development (EEARSD) and is implemented through institutions such as NSDC, Skill Council for Green Jobs (SCGJ), NCoEGPS, IMU, ITIs, and Port training institutes."

### 3.6.2 Rationale

India's green transition in the maritime sector demands a systemic reorientation of skills and knowledge - from alternative fuel handling to circular economy logistics, from emission monitoring to sustainable dredging. The NGSP recognises the multi-level nature of skills (from technicians to regulators and port managers), the need for convergence across education, policy, and private sector hiring, and the urgency of closing the existing green job demand-supply gap through simulation-based and classroom training in emerging technologies like hydrogen, biofuels, and carbon capture.

As per the ILO, over 24 million green jobs could be created globally by 2030. India has the potential for 35 million green jobs by 2047, especially across clean energy, port decarbonisation, and circular economy-driven maritime operations. However, India faces a considerable green skills gap: only 4.4% of youth aged 15–29 receive formal vocational or technical training (Economic Survey 2023–24), and green job awareness remains low. In maritime domains - ship recycling, LNG and alternate green fuels bunkering, renewable energy-based port operations, and sustainable shipbuilding - both technical upskilling, reskilling, and awareness generation are critically required.

### 3.6.3 Implementation Roadmap

Phases	Interventions	Expected Outcomes
<b>Short Term (Up to 2030)</b>	<ol style="list-style-type: none"> <li>1. Notify national mission integrating MoPSW and MSDE (SCGJ, IMU, IWAI, DGS, etc.).</li> <li>2. Create certified green maritime job roles and upskill existing workforce through structured training programmes.</li> <li>3. Mandatory green fuel, MRV, STS, recycling modules in pre-sea &amp; post-sea training.</li> <li>4. Training hubs at major ports and IWAI clusters.</li> <li>5. Develop national inland green training node based on NINI Module.</li> <li>6. Incorporate the DG Shipping e-learning platform.</li> <li>7. National Green Skills Trainer Certification.</li> <li>8. Reserved quotas for women, PwDs, coastal communities and marginalized communities.</li> <li>9. Link green credentials to the DG Shipping e-learning platform.</li> <li>10. Green certification required for operational licenses.</li> </ol>	~100,000 maritime personnel trained; certified green job roles created; GMCoEs functional; inland/cruise fuel safety training nationwide; national trainer accreditation system active
<b>Medium Term (2030–2040)</b>	<ol style="list-style-type: none"> <li>1. Train additional ~500,000 green maritime workers</li> <li>2. Usage of Hydrogen, ammonia, methanol and other alternative fuels</li> <li>3. Mutual recognition with IMO/BIMCO/EU training bodies</li> <li>4. Mandatory port/shipyard green apprenticeship programs</li> <li>5. Incubation support for green MSMEs and startups</li> <li>6. Mandatory sustainability officer licensing</li> <li>7. NLP-Marine operator certification nationwide</li> <li>8. Alternate fuels handling, bunkering and storage skill zones operational.</li> </ol>	≥600,000 cumulative trained workforce; India recognised as hub for green maritime skilling; all alternative fuel terminals staffed with certified personnel; dedicated cruise sustainability workforce
<b>Long Term (2040–2070)</b>	<ol style="list-style-type: none"> <li>1. Export Indian green maritime training programs.</li> <li>2. Advanced maritime decarbonisation research chairs.</li> <li>3. Fossil-dependent maritime jobs reskilled.</li> <li>4. Mandatory re-certification every 5 years.</li> <li>5. New training modules for smart shipping.</li> </ol>	Net-zero aligned maritime workforce; global training exports; fully modernised skill ecosystem; just transition safeguards achieved

**\*Oversight through NGMCC with MoPSW as chair and Green Skill Development Working Group**

**Table 7: Interventions and Implementation Roadmap for Green Skill Development Pillar**

## 3.7 Green Technology

### 3.7.1 Definition – Green Technology

“A suite of innovations — from zero-emission vessels and shore power infrastructure to carbon capture systems, energy-efficient retrofits, and port digitalisation — that enable the maritime sector to reduce emissions, adopt circular economy principles, and become more resilient. Green maritime technology encompasses onshore power supply, hybrid and electric vessel propulsion, green hydrogen and fuel

cell technology, LNG/methanol/ammonia bunkering infrastructure, wind- and solar-assisted propulsion, exhaust gas cleaning systems, port electrification and renewable integration, smart cargo handling, real-time emissions monitoring, AI-based operational optimisation, and digital twin technologies.”

### 3.7.2 Rationale

The NGSP identifies green technology as a foundational enabler across all sectors – spanning ship propulsion, energy management, cargo handling, emissions control, and monitoring systems. This includes support for: next-generation propulsion systems (hybrid-electric, hydrogen, wind-assisted, fuel cell, nuclear pse add etc. everywhere ); emission reduction technologies (scrubbers, onboard carbon capture); smart energy and routing systems (AI-enabled voyage optimisation, digital twins); automated and low-emission cargo handling equipment (electric cranes, AGVs); and technology partnerships and Make in India-based indigenisation programmes. These interventions are critical to meeting India's targets under the yet to be approved 2023 IMO Strategy on Reduction of GHG Emissions from Ships, the Pancharit declarations, MIV 2030, and MAKV 2047. The NGSP will guide the formulation of a National Maritime Green Technology Roadmap – supported by Centres of Excellence, sandbox pilots, standard-setting bodies, and a dedicated innovation fund – ensuring India remains not just a beneficiary, but a global driver of maritime green technology. Green maritime technology includes a suite of innovations from zero-emission vessels and shore power infrastructure to carbon capture systems, energy-efficient retrofits, and port digitalisation.

### 3.7.3 Implementation Roadmap

Phases	Interventions	Expected Outcomes
<b>Short Term (Up to 2030)</b>	<ol style="list-style-type: none"> <li>1. Notify National Maritime Green Technology Roadmap with priority technology clusters.</li> <li>2. Launch technology sandboxes at 5 major ports.</li> <li>3. Establish 3 R&amp;D clusters (ship, port, fuel tech) as Maritime Green Tech Parks.</li> <li>4. Create dedicated SMFCL innovation window (Green Technology Fund).</li> <li>5. Convert 50% of major-port tugs to electric/hybrid (GTTP).</li> <li>6. Demonstration cold ironing (STS) at ports.</li> <li>7. Deploy port and vessel digital twin simulation systems.</li> <li>8. Conduct FNPP and nuclear vessel readiness assessment.</li> <li>9. Issue BIS/IRS green equipment standard.</li> <li>10. Launch Harit TARANG open innovation annual maritime tech challenge.</li> </ol>	<p>3 national green tech hubs active; 50% tug electrification achieved; STS pilots operational; national standards issued; funded startups pipeline; nuclear readiness assessment completed</p>
<b>Medium Term (2030–2040)</b>	<ol style="list-style-type: none"> <li>1. Scale electrification and propulsion upgrades for mass green retrofit.</li> <li>2. Scale electric cargo equipment as standard at all ports</li> <li>3. Commercial alternative propulsion vessels (hydrogen/fuel-cell demonstrations).</li> </ol>	<p>Majority port equipment electrified; commercial hydrogen vessels operational; AI-driven port systems mainstream; domestic green tech manufacturing base; safety architecture defined for</p>

	<ol style="list-style-type: none"> <li>4. Deploy AI routing and MRV automation nationally via NLP-Marine backbone.</li> <li>5. Inland and coastal vessel automation trials</li> <li>6. Make-in-India maritime equipment push.</li> <li>7. Define regulatory framework for nuclear ports/vessels.</li> <li>8. Establish technology export partnerships.</li> </ol>	nuclear integration; export-ready technology ecosystem
<b>Long Term (2040–2070)</b>	<ol style="list-style-type: none"> <li>1. Mandatory green propulsion baseline for all vessels (fossil propulsion obsolete).</li> <li>2. Operationalise autonomous vessel networks.</li> <li>3. Achieve carbon-neutral port systems.</li> <li>4. Explore FNPP-powered port clusters if technically viable and safety-compliant.</li> <li>5. Export maritime decarbonisation systems globally</li> <li>6. Maintain next-generation propulsion and energy R&amp;D pipeline through IITs and global partners.</li> </ol>	Net-zero technology ecosystem; India as maritime innovation exporter; fossil-based port/ship technology phased out

**\*Oversight through NGMCC with MoPSW as chair and Green Technology Working Group**

**Table 8:** Interventions and Implementation Roadmap for Green Technology Pillar

## 4. Institutional Mechanism

The institutional architecture is structured at three tiers:

### 4.1 National Green Maritime Coordination Cell (NGMCC) – Apex Authority

The NGMCC – expanded and formalised from the existing Green Cell within MoPSW – serves as the statutory coordination authority for NGSP implementation. It shall be formally notified through a Government of India Resolution/Gazette Notification under the Allocation of Business Rules of MoPSW.

**The NGMCC functions as** the coordination authority for maritime decarbonisation planning, convergence platform for inter-ministerial action, national custodian of emissions data and MRV systems, approving authority for green incentive eligibility, anchor for international maritime climate engagement, institutional guardian of just transition principles.

#### Composition of the NGMCC

The NGMCC shall be structured as a permanent inter-agency coordination body with both executive and advisory representation.

##### (1) Permanent institutional members

- Ministry of Ports, Shipping and Waterways (MoPSW) – Chair
- Directorate General of Shipping (DGS)
- Inland Waterways Authority of India (IWAI)
- Indian Register of Shipping (IRS)
- State Maritime Boards (SMB)
- Sagarmala Development Company Ltd (SDCL)
- Sagarmala Finance Corporation Ltd (SMFCL)

- National Centre of Excellence in Green Ports and Shipping (NCoEGPS)
- Indian Maritime University (IMU)
- NITI Aayog (Observer)
- Ministry of Petroleum and Natural Gas (MoPNG)
- If required, any additional Ministry representative, Department, Regulatory Body, Public Sector Undertaking, Technical Institution, or Domain Expert as deemed necessary based on the subject matter under consideration.
- Centers of Excellences like NTCPCW, CEMS, CMEC, etc.

## **(2) Rotational advisory participation**

- Indian Register of Shipping (IRS)
- Indian Ports Association (IPA)
- Indian National Shipowners' Association (INSA)
- Ship Recycling Industry representatives
- Technical institutions and academic experts
- Civil society and workforce observers

This composition ensures regulatory authority, technical credibility, and industry interface without creating regulatory capture.

## **(3) Internal Structure**

Within the NGMCC, the NCoEGPS will carry out the duties of the permanent secretariat, and the specialized working groups shall mirror the seven NGSP pillars.

Each group coordinates directly with sectoral stakeholders (like the Indian Register of Shipping (IRS), the Indian Ports Association (IPA), the Indian National Shipowners' Association (INSA), the Ship Recycling Industry representatives, technical institutions and academic experts, civil society and workforce observers, representatives from OEMs and logistics and allied industry experts) and reports into the NGMCC secretariat.

**NGMCC shall be accountable for** biannual (6-monthly) implementation and emissions progress reports to Secretary, MoPSW. Consolidated Annual Green Maritime Report for public disclosure. Annual reviews inform updates to the NGMIP. A dedicated budget head established under MoPSW for NGMCC operations.

## **4.2 Inter-Ministerial Taskforce on Green Shipping (IMTGS)**

An Inter-Ministerial Taskforce on Green Shipping (IMTGS) shall be constituted under the MoPSW to support high-level convergence parallel to NGMCC . The Taskforce shall be chaired by the Secretary, Ministry of Ports, Shipping and Waterways (MoPSW), and shall comprise representatives, at appropriate senior level, from the following Ministries/Departments/Agencies:

- Ministry of Petroleum and Natural Gas
- Ministry of Power
- Ministry of New and Renewable Energy
- Ministry of Environment, Forest and Climate Change
- Ministry of Finance / Department of Economic Affairs
- Ministry of Commerce and Industry / DPIIT

- Ministry of Heavy Industries
- Ministry of Steel
- Ministry of Railways
- Ministry of Road Transport and Highways
- Ministry of Skill Development and Entrepreneurship
- Department of Science and Technology
- NITI Aayog
- Ministry of External Affairs
- Directorate General of Shipping
- Inland Waterways Authority

The Chair may co-opt any additional Ministry, Department, Regulatory Body, Public Sector Undertaking, Technical Institution, or Domain Expert as deemed necessary based on the subject matter under consideration. The IMTGS shall constitute for an annual implementation and emissions progress meeting.

### 4.3 Green Pillar Working Groups

Seven specialised working groups mirroring the NGSP's seven pillars shall function within the NGMCC. Each working group coordinates directly with sectoral stakeholders and reports into the NGMCC. Each working group is responsible for technical implementation within its pillar; formulating thresholds, certification criteria, and review schedules; ensuring linkage to NGMIP targets and MRV systems; and coordinating finance eligibility with SMFCL.

## 5. Roles and Responsibilities

The NGSP operates through a multi-level governance architecture ensuring that roles are clearly delineated, accountabilities are binding, and implementation is coordinated across all maritime stakeholders.

### 5.1 Governance Structure:

The NGMCC is the apex institutional mechanism for implementation oversight, inter-agency coordination, and governance of the NGSP. The National Green Maritime Implementation Plan (NGMIP) shall function as the rolling implementation framework for operationalising the NGSP through phased five-year implementation cycles, aligning targets, funding mechanisms, governance arrangements, and monitoring frameworks for India's green maritime transition.

The NGMCC shall retain final authority over coordination and oversight of NGMIP implementation. All participating institutions, agencies, and implementing bodies shall operate within NGMCC-approved frameworks to ensure unified delivery, prevent duplication, and maintain policy coherence across the maritime transition ecosystem.

The following governance structure anchors the NGSP:

**Table 9:** Governance Architecture

Governance Level	Entity	Key Roles and Responsibilities
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<b>Nodal Ministry</b>	Ministry of Ports, Shipping and Waterways (MoPSW)	Policy formulation, gazette notification of NGMCC and NGMIP, allocation of dedicated budget head, inter-ministerial taskforce chairmanship, approval of 5-year NGMIP cycles	
<b>Central Apex Body</b>	NGMCC	Strategic oversight; inter-ministerial coordination if required (MoEFCC, MNRE, MoF, MSDE); policy coherence with India's LT-LEDS and sectoral missions; final authority over NGMIP implementation; biannual emissions progress reports to Secretary, MoPSW; Annual Green Maritime Report for public disclosure	
<b>Inter-Ministerial Coordination</b>	Inter-Ministerial Taskforce on Green Shipping (IMTGS) – chaired by Secretary, MoPSW	High-level convergence across MoEFCC, MNRE, MoPNG, DST, MSDE; climate alignment; financing integration;	
<b>Pillar-wise Supporting Bodies under the Working Groups</b>	<b>Finance Anchor</b>	Sagarmala Finance Corporation Ltd (SMFCL) and Maritime Development Fund	Fund mobilisation (green bonds, blended finance), ESG evaluation, project de-risking, long-tenure debt, viability gap funding for emerging segments
	<b>Regulatory Arms</b>	DG Shipping; Tariff Authority for Major Ports (TAMP); BIS; BEE	Compliance monitoring, emission standards, performance-linked incentives, certification frameworks, EEDI/EEXI/CII administration, Merchant Shipping Act implementation
	<b>Digital Backbone</b>	NLP-Marine; MAITRI app; NLP-Carbon (proposed)	Emission accounting, real-time carbon dashboard reporting, digital workflows, MRV data aggregation, GCI score computation
	<b>Port and State Nodes</b>	Port Authorities; State Maritime	Project execution at port level, local environmental monitoring, community

	Boards (SMBs); IWAI	engagement, workforce skilling, Just-in-Time arrival coordination
<b>Classification/Certification</b>	Indian Register of Shipping (IRS); DGS-approved classification societies	Green Ship Certification, technical surveys, IHM verification, GSRC-Tier audits, lifecycle emissions validation
<b>Stakeholder Advisory Platform</b>	Green Maritime Partnership Forum (Industry–Academia–NGOs–IFIs)	Feedback integration, innovation co-creation, peer benchmarking, annual National Green Shipping Dialogue
<b>Inland Waterways</b>	IWAI; National Inland Navigation Institute (NINI)	IWT vessel regulation, zero-emission corridor designation, green ferry deployment, inland MRV adaptation, NINI as National Maritime Energy Training Node
<b>Ship Recycling Oversight</b>	MoPSW; DG Shipping; State Maritime Boards; GMB; IRS	GSRC-Tier framework oversight, SRTRS administration, biennial third-party audits, FSDF allocation, bilateral framework coordination with EU/Japan/Korea

Progression between implementation phases under the NGMIP shall be determined based on verified performance milestones rather than calendar timelines alone. Advancement to subsequent phases shall be subject to MRV-based assessment and validation to ensure that policy escalation reflects demonstrated sectoral readiness and implementation maturity.

## 5.2 National Green Maritime Implementation Plan

National Green Maritime Implementation Plan (NGMIP) is a rolling, phased implementation framework translating NGSP into measurable actions through 5-year cycles, aligning targets, funding, governance, and monitoring for India’s green maritime transition. NGMIP adopts a **three-phase timeline** aligned with MAKV 2047 aspirations. Each phase represents a progressive checkpoint, with implementation guided by verified MRV performance milestones. The NGMIP is structured as a rolling 5-year plan, updated biennially and formally approved by MoPSW.

**Table 10:** Phases of NGMIP

Phases	Key Actions	Expected Outcomes
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<b>Phase I (up to 2030)</b>	<p>Launch Green Ship Certification Framework and Green Port Performance Index (GPPI); Roll out STS at 50% of major port berths; Pilot-led transition achieving 10–15% alternative fuel penetration in coastal/IWT fleet; Operationalise ESG-linked finance tools via SMFCL; Develop 100% electrification roadmap for cargo handling equipment at major ports; Roll out MRV platforms (NLP-Marine, NLP-Carbon); Establish Maritime Green Skills Clusters; All major ports publish carbon-neutral transition roadmaps with interim 2035 milestones; Establish National Green Maritime Innovation Platform under Centres of Excellence; Develop strong marine design ecosystem ('Design in India')</p>	<p>Defined baselines; early adoption incentives; pilot corridors; functional MRV; green finance instruments launched</p>
<b>Phase II (2030-2040)</b>	<p>Scale Green Fuel hubs (Deendayal, Paradip, VOCPA); Green Ship Certification mandatory for all new builds; Establish National Maritime Carbon Market; Digital traceability for ship recycling and emissions; Expansion of Zero-Emission Port Zones (ZEPZs) to non-major ports; 30% clean fuel adoption in Indian fleet; Large-scale retrofit programmes for domestic vessels and coastal fleet; Embedded carbon disclosure mandatory for vessels ≥400 GT; Shipyard decarbonisation (renewable electricity + low-carbon fabrication)</p>	<p>System-wide decarbonisation; green market development; carbon credit exchange; mid-term global alignment</p>
<b>Phase III (2040-2047)</b>	<p>Zero-emission mandates in select zones (NW1 Ganga–Haldia corridor, Gujarat Marine National Park); Achieve 70% transition to clean fuels; Digitised MRV linked to global shipping networks; All major ports achieve carbon-neutral operations (consistent with MAKV 2047); Export green vessels and maritime technologies – India as R&amp;D-exporter; National green maritime fuel network integrated with global supply chains; Position India in top 5 green shipbuilding nations</p>	<p>Full-scale transformation of port–ship–fuel systems; global competitiveness; domestic technology leadership</p>

Target recalibration shall be undertaken through biennial NGMCC-led NGMIP review cycles with formal stakeholder consultation and MoPSW approval.

## 6. Monitoring, Reporting and Verification

### 6.1 The Digital Carbon Dashboard (NLP-Carbon)

The proposed Digital Carbon Dashboard (NLP-Carbon) is an integrated, IT-enabled monitoring system designed to track maritime emissions in real time across ports, vessel categories, and fuel types. It functions as a centralized MIS platform, enabling regulators and stakeholders to continuously assess decarbonisation progress, identify inefficiencies, and take timely corrective actions. Emissions data, primarily uploaded by the Directorate General of Shipping (DGS) from major Indian-flagged fleets, is standardized and verified before integration. The system supports transparency, performance benchmarking, and policy decision-making, forming the backbone of Monitoring, Reporting, and Verification (MRV) under the green maritime framework.

### 6.1.1 Operational Monitoring: NLP-Carbon Module within NLP-Marine

All emissions and performance indicators tracked through NLP-Carbon shall be measured relative to the **2021 national maritime emissions baseline** to ensure consistency across implementation cycles and prevent shifting benchmarks.

The NLP-Carbon module shall generate operational KPIs covering emissions intensity, fuel transition, infrastructure electrification, and reporting compliance. These indicators shall allow year-on-year comparison against the baseline and support both national aggregation and entity-level performance tracking (such as port specific, vessel specific, NW specific or coastal shipping specific etc.).

Integration of NLP-Carbon into NLP-Marine shall be implemented under the direction of the NGMCC. A working group of NGMCC, shall be responsible for:

1. system architecture and digital integration
2. defining specific parameters
3. verification workflows
4. dashboard analytics
5. cybersecurity and data governance
6. interoperability with national climate reporting systems

Ports, vessel operators, and fuel suppliers shall submit standardized emissions and operational data through NLP-Marine.

The NGMCC shall remain the custodian of aggregated emissions data and shall use NLP-Carbon outputs as the primary operational monitoring tool for NGMIP implementation. Working group members will decide and request for third-party verification wherever needed, before inclusion in national datasets.

## 6.2 The Annual Maritime Sustainability Report (AMSR)

The Annual Maritime Sustainability Report (AMSR) is a mandatory, audited reporting mechanism requiring all major ports and Indian-flagged shipping entities to disclose their emissions, operational performance, and sustainability progress each year. Submitted to the MoPSW and made publicly available, it ensures transparency, accountability, and data standardisation across the maritime sector. The AMSR compiles verified data from MRV systems to track national decarbonisation progress and benchmark performance. It also enables India's integration into global carbon markets and offset mechanisms under the Paris Agreement Article 6, supporting international compliance and climate finance access.

### 6.2.1 Annual Maritime Sustainability Report (AMSR)

The Annual Maritime Sustainability Report (AMSR) shall provide a verified national overview of maritime decarbonisation progress. It shall function as the primary public accountability document of NGSP implementation.

**The report shall include** national emissions trajectory and sector breakdown, port and fleet performance comparisons, green finance deployment and investment impact, workforce transition metrics, compliance improvement trends, corrective actions and policy adjustments.

1. The AMSR shall be prepared by the NGMCC. The report shall be independently audited before publication. The AMSR shall explicitly track progress against pillar-wise targets defined under the NGSP and present them as measurable contributions toward the objectives of MIV 2030 and MAKV 2047.

2. Each edition of the AMSR shall include a dedicated alignment matrix mapping NGSP pillar indicators to corresponding MIV 2030 and MAKV 2047 sustainability milestones. This ensures that maritime decarbonisation is reported not as a standalone environmental agenda, but as an integrated component of India's long-term maritime development strategy.
3. The AMSR shall be formally submitted to MoPSW leadership as an implementation reflection of national maritime vision targets, enabling strategic review and course correction at the policy level.

### **6.3 Green Compliance Index (GCI)**

The Green Compliance Index (GCI) shall serve as the official composite performance rating framework under the National Green Shipping Programme (NGSP), integrating MRV-verified emissions data, certification status, operational benchmarks, and transition readiness indicators into a unified environmental performance assessment mechanism for the maritime sector.

The GCI shall link environmental performance to eligibility for government incentives, concessional financing, certification benefits, and other regulatory or fiscal support mechanisms under the NGSP. Participation in the GCI framework shall be mandatory for all entities seeking financial, fiscal, or regulatory benefits under the NGSP. Entities receiving adverse GCI ratings may be subject to restrictions in access to central maritime funding and associated support mechanisms.

The GCI shall evaluate verified performance across the following core categories:

- Emissions reduction relative to the 2021 national maritime baseline;
- Infrastructure and clean energy readiness;
- MRV reporting integrity, transparency, and audit compliance;
- Transition, technology adoption, and innovation efforts.

### **Operational Framework**

1. Composite GCI scores shall determine priority and eligibility for access to funding windows, incentive schemes, concessional finance instruments, and certification classifications under the NGSP.
2. The GCI framework shall be developed and operationalised by the designated working groups under the NGMCC within twelve (12) months of its establishment. Quarterly ratings shall be calculated using verified data from NLP-Marine, NLP-Carbon, and other approved MRV data systems.
3. Independent audit panels accredited by the NGMCC shall review the GCI methodology, datasets, and outputs periodically. Final validation and certification of GCI ratings shall rest with the NGMCC.
4. Financial institutions and implementing agencies operating under NGSP-linked programmes shall align financing eligibility criteria, lending filters, and incentive access thresholds with notified GCI rating tiers.
5. Annual GCI performance summaries shall be submitted to the Ministry of Ports, Shipping and Waterways (MoPSW) to support funding allocation decisions, programme prioritisation, and policy recalibration.

## **Framework Integration and Harmonisation**

6. The Green Port Performance Index (GPPI) shall constitute an integrated sub-component of the GCI framework.
7. All relevant maritime environmental, efficiency, and transition assessment frameworks, including but not limited to the Green Fuel Index (GFI), Energy Efficiency Design Index (EEDI), Energy Efficiency Existing Ship Index (EEXI), Fuel Readiness Index, and other notified performance or compliance metrics, shall be progressively integrated into the GCI architecture to establish a unified national green maritime performance framework.
8. Prior to incorporation within the GCI framework, all constituent indices, methodologies, and performance indicators shall undergo technical validation, standardisation, and harmonisation by the NGMCC and/or designated technical working groups to ensure methodological consistency, eliminate duplication, and strictly avoid overlap or conflict with existing national or international regulatory, certification, or reporting frameworks.

### **6.4 Ranking, Certification, and Third-Party Audits**

Maritime entities, including ports, vessels, terminal operators, and other covered stakeholders, shall be periodically assessed on the basis of their environmental performance using verified operational, emissions, and compliance data under the applicable MRV framework. Performance rankings shall be derived from approved metrics and integrated within the Green Compliance Index (GCI) and other notified evaluation frameworks.

Based on assessed performance, entities shall be assigned certification tiers under the National Green Shipping Programme (NGSP). Such certification tiers shall determine eligibility for incentives, concessional financing, regulatory benefits, and participation in designated green maritime schemes. Final approval and governance of certification classifications shall rest with the NGMCC.

To ensure data integrity, transparency, and credibility of the evaluation process, independent third-party audits shall be conducted biennially. Such audits shall verify MRV data accuracy, compliance with notified standards, and adherence to applicable certification methodologies. Audit agencies shall be accredited and supervised by the NGMCC.

#### **Linkage to Incentives and Governance**

Performance outcomes under the evaluation and certification framework shall be directly linked to incentive and support mechanisms under the NGSP. High-performing entities may receive preferential access to financial incentives, tariff rebates, concessional financing, certification upgrades, and priority consideration under relevant funding programmes. Conversely, entities demonstrating persistent underperformance or non-compliance may be subject to certification downgrades, reduced incentive eligibility, and other corrective measures as may be notified by the NGMCC.

# Annexure

## Key Interventions for all the NGSP pillars:

### A. Green Shipping

#### 1. National Green Ship Certification Framework (NGSCF) and Compliance

Establish **Tiered Compliance Thresholds (GFI/GFS Model)** for Indian Flagged and Domestic Vessels.

##### Objective

- To provide a measurable and transparent benchmark for green vessel classification, NGSP incorporate the **GFI Index** — a measure of the total GHG emissions intensity of a ship's fuel use, expressed in **grams of CO<sub>2</sub>-equivalent per megajoule (gCO<sub>2</sub>e/MJ) of energy generated by combustion of a particular type of fuel**
- To set **progressively tightening limits** on the carbon intensity of marine fuels used in India, expressed in gCO<sub>2</sub>e/MJ.
- To align domestic shipping with **IMO mid-term measures**, the **EU FuelEU Maritime Regulation**, and emerging **Asia-Pacific green corridor standards**.
- To provide **clarity for shipowners, ports, fuel suppliers, and financiers** on what qualifies as "green" at each stage.
- This framework will be **overseen and periodically reviewed by the National Green Shipping Coordination Cell (NGMCC)**.

##### How does the two-tier GFI compliance mechanism work? (proposed !)

Ships are **evaluated** annually (calendar year) based on their GFI performance against a reference trajectory. Those exceeding the intensity limit must buy Remedial Units priced at:

- Tier 1: USD 100 per tonne of CO<sub>2</sub> equivalent for mild non-compliance.
- Tier 2: USD 380 per tonne of CO<sub>2</sub> equivalent for significant non-compliance.

Ships that perform better than required can generate Surplus Units, which are tradable or eligible for rewards under the IMO incentive scheme.

Establish **National Green Ship Certification Framework (NGSCF)**, aligned with global benchmarks (EEDI, EEXI, CII) for Indian flagged and domestic vessels.

##### Institutional Architecture for NGSCF

- **NGMCC** oversees certification and appoint Green Shipping working group members to design and formulate thresholds, and reviews.
- **DGS** administers compliance. DGS will be tasked with formulating retrofitting guidelines and emission thresholds for existing ships across segments (cargo, cruise, and coastal) that will also be a sub-part of the **National Green Ship Certification Framework**.
- **Classification Society** certifies.
- **BIS/BEE** maintains factors and handbooks.

##### How NGSCF Works?

- Penalties escalate from corrective action plans to **tender ineligibility** for repeat non-compliance; **bonus tariff** rebates are for outperformers at major ports.
- Compliance with the **provisions of the Merchant Shipping Bill, 2025** including environmental and sustainability obligations, should be operationalized through integration with **vessel registry updates**. The **proposed Green Shipping Pillar Working Group** would be responsible for coordinating this linkage, ensuring that green compliance parameters such as emissions limits, alternative fuel readiness, and shore-to-ship power compatibility are incorporated into statutory registration, certification, and survey processes.
- Compliance to registry upgrades, incentives under SBFAS, and eligibility for green finance through GCI should be assured by the Green Shipping working group.

## B. Green Ports

### 1. Green Cruise Tourism Green Transition Committee (CTGTC)

Establish a dedicated **Cruise Tourism Green Transition Committee (CTGTC)** under the Ministry of Ports, Shipping and Waterways (MOPSW) to oversee the development and implementation of green priorities for cruise tourism terminals.

#### Institutional Architecture

- Directorate General of Shipping (DGS)
- Indian Ports Association (IPA)
- State Tourism Departments
- Inland Waterways Authority of India (IWAI)
- National Centre of Excellence in Green Ports and Shipping (NCoEGPS)
- Indian Maritime University (IMU)
- Ministry of Tourism
- Industry stakeholders from cruise operators and port authorities.

The CTGTC’s activities will be periodically reviewed by the National Green Maritime Coordination Cell (NGMCC).

## C. Green Ship Recycling

### 1. 3-Tiered Green Compliance Framework

Tier	Compliance Criteria	Key Features	Support and Benefits
<b>Green Tier 1</b>	<p>Full compliance with <b>HKC, EU SRR, and national laws</b> (Recycling of Ships Act, 2019)</p> <p>Advanced environmental infrastructure</p>	<ul style="list-style-type: none"> <li>➤ Impermeable floors, enclosed drainage, stormwater treatment</li> <li>➤ Digital IHM and SRP system.</li> <li>➤ Verified CO<sub>2</sub> avoidance metrics.</li> <li>➤ Worker health/safety certifications</li> <li>➤ Certified downstream waste processing</li> </ul>	<ul style="list-style-type: none"> <li>➤ Highest access to green finance instruments (green bonds, ESG loans)</li> <li>➤ FSDF (are the yards aware of this, did not crop up during our discussions) eligibility for advanced automation</li> <li>➤ Proposed National “Green Yard” certification.</li> <li>➤ Priority in award of international ship</li> </ul>

			dismantling contracts (e.g., EU/IMO approved)
<b>Green Tier 2</b>	Full HKC compliance with partial adoption of digital and environmental upgrades	<ul style="list-style-type: none"> <li>➤ Functional IHM and SRP mechanisms</li> <li>➤ Partial digital reporting</li> <li>➤ Basic stormwater and effluent systems</li> <li>➤ Segregated waste material zones</li> </ul>	<ul style="list-style-type: none"> <li>➤ Targeted grant/loan access under FSDF</li> <li>➤ Technical support for Tier 1 transition</li> <li>➤ Training and digital on-boarding via SCGJ/NSDC</li> <li>➤ Inclusion in domestic circular economy value chains</li> </ul>
<b>Green Tier 3</b>	Basic HKC requirements met; limited infrastructure and digitalization	<ul style="list-style-type: none"> <li>➤ Manual dismantling methods</li> <li>➤ Minimal pollution control infrastructure</li> <li>➤ Basic waste material segregation</li> <li>➤ Worker PPE provided but not certified</li> </ul>	<ul style="list-style-type: none"> <li>➤ Conditional registration under NGSP</li> <li>➤ Mandated modernization roadmap (5–7 years)</li> <li>➤ Limited access to public finance</li> <li>➤ Linked to skill upgrade and compliance-based funding</li> </ul>

### Institutional Architecture along with MRV

- **Oversight Agency:** MoPSW, DG Shipping, and in partnership with State Maritime Boards and Classification Societies.
- **Verification:** Third-party audits (biennial) + online self-reporting dashboard.
- **Upgradation Support:** Access to tools under the Harit Sagar, FSDF, and SENSREC partnership.

## 2. Ship Recycling Transparency and Reporting System (SRTRS):

A **mandatory reporting platform** to be introduced to track hazardous waste flows, workers' safety practices, and carbon intensity in dismantling.

### How SRTRS works?

Real-time monitoring via **IoT sensors**, **blockchain-based IHM tracking**, and **open-access sustainability dashboards** will underpin transparency and accountability.

SRTRS will be expanded to mandate quantification of GHG emissions generated during the recycling stage, covering deconstruction, waste removal, disposal, and transport phases. The methodology will account for:

- Clearing hazardous loose items.
- Handling and processing of oils, liquids, and sludge.
- Sequential dismantling (non-metal followed by metal structures).
- Oxy-LPG torch cutting and associated energy/fuel usage.
- Hazardous material removal, packaging, secure storage, and authorized disposal.
- Machinery dismantling for reuse/recycling.
- Size-reduction cutting of steel plates for transport.

This will be standardised via a National Ship Recycling Carbon Accounting Methodology (SRCAM) developed by MoPSW, GMB, and technical partners such as TERI and NIOT, in alignment with ISO 14067 and GHG Protocol standards.

### 3. Ship Recycling Carbon Accounting and Reduction Program (SRCARP):

The SRCARP will establish India’s first dedicated carbon accounting and reduction framework for the ship recycling sector, with the following initial priorities:

#### a. Baseline Mapping:

Conduct a one-year, sector-wide emissions baseline study for Alang and other recycling clusters, capturing energy/fuel use, cutting processes, waste transport, and disposal-related emissions.

#### b. Emission Intensity Targets:

Establish voluntary yard-level reduction targets (e.g., kg CO<sub>2</sub>e per LDT processed) to be progressively integrated into the Green Ship Recycling Certification (GSRC) Tier Framework.

#### c. MRV Integration:

Propose deployment of IoT-enabled real-time fuel and electricity consumption meters at participating yards, with automated data uploads to the Ship Recycling Tracking and Reporting System (SRTRS).

#### d. R&D Support:

Fund and test renewable-powered dismantling systems and alternative low-carbon cutting technologies.

## D. Green Finance

### 1. Proposed Instruments Under NGSP

Instrument	Description	Potential Anchors
<b>Green Maritime Bonds</b>	Bond issuances for port and ship retrofits, green fuel bunkering, digital emissions platforms	SMFCL, DVC, state maritime boards
<b>ESG-linked Port Finance</b>	Loans or equity with performance-based pricing	EXIM Bank, SIDBI, SBI Capital Markets

	(e.g., lower rate of interest if GHG targets met)	
<b>Maritime Climate Credit Facility</b>	Advances paid to ports or shipowners based on ex-ante carbon savings	Ministry of Finance (via GCF accreditation)
<b>Green MSME Maritime Grants</b>	Dedicated green credit line for port service providers, inland vessel builders, and fuel startups	NABARD, NSIC, Startup India
<b>Blue Economy Impact Funds</b>	Equity investments in sustainable ship recycling, coastal eco-tourism, and circular economy ventures	NIIF, Climate Fund Managers, GFAI
<b>Sovereign Green Guarantee Scheme</b>	Central government partial guarantee for first-mover private green fuel projects	MoPSW

## 2. Establish Maritime ESG Taxonomy to scale green finance

NGSP proposes a Maritime ESG Taxonomy that:

- a) Defines “green” vs. “transitional” vs. “brown” activities for finance eligibility.
- b) Aligns with the **EU Taxonomy, ICMA Green Bond Principles, and IFC Performance Standards.**
- c) Enables classification and tagging of all MoPSW and port projects as per ESG criteria.

## 3. Develop Maritime Carbon Credit Registry (linked with MoEFCC) to allow:

- a) Emission offsets from green fuel use, STS, zero-emission vessels, and ship recycling.
- b) Port-wise GHG reduction accounting under a national MRV framework.
- c) Participation in international offset markets and carbon trading under Article 6 of the Paris Agreement.

## E. Green Skill Development

### 1. Green Maritime Skills Mission (GMSM)

An inter-ministerial initiative led by MoPSW, in partnership with MSDE, SCGJ, IWAI (NINI), IMU and the Directorate General of Shipping (DGS), to establish India as a **Global Hub for Green Maritime Skills** by 2030.

#### Key objectives:

- Develop green maritime job roles and quality personnel (e.g., green tug operator, hydrogen bunkering technician, shore power engineer, etc.).

- Integrate green modules in pre-sea and post-sea maritime training (via DGS, IMU, training institutes).
- Establish Green Maritime Centres of Excellence (GMCoE) across major ports for upskilling.

## 2. Three-Tier Training Strategy

Tier	Focus	Target Group
Tier 1	Mass awareness & orientation	Youth, maritime cadets, entry-level staff
Tier 2	Vocational & hands-on skilling	Technical workers, port operators, SMEs
Tier 3	Advanced research & innovation	Engineers, faculty, startup incubators

3. Establish **Green Maritime Centres of Excellence** at strategic coastal and inland hubs for role-based training.
4. Introduce a **National Green Skills Trainer Accreditation system** to standardise delivery quality across institutes.

## F. Green Fuels

### 1. Maritime Green Transition Fund (MGTF)

Establishment and implementation of **Maritime Green Transition Fund (MGTF)** by MoPSW in collaboration with the **Ministry of Finance**, **NITI Aayog**, and the **Securities and Exchange Board of India (SEBI)** for capital market-linked instruments.

2. A **Green Fuel Fund Window** under the ₹25,000 crore Maritime Development Fund, with Viability Gap Funding (VGF) for bunkering infrastructure and private blending units.

3. Establish a **Maritime Energy Training Facility (METF)** under the Ministry of Ports, Shipping and Waterways (MoPSW), dedicated to training a minimum of 10,000 personnel every year through hybrid programs in advanced bunkering operations, fuel handling, emergency response, and safety management, with a special focus on alternative and renewable fuels.

### 4. Establish Green Fuel Taxonomy

This taxonomy distinguishes between **zero-emission fuels, near-zero/carbon-neutral fuels, transitional green fuels, and low-carbon transition fuels**, based on lifecycle greenhouse gas (GHG) emissions, production pathways, and compatibility with the existing maritime fleet.

5. Creation of a **National Bunkering Map** including safety bunkering standards in accordance with PESO/BIS and IMO interim guidelines for LNG, ammonia, methanol, and hydrogen infrastructure.

6. Establish **Real-Time Incident Reporting and Response System** integrated into NLP-Marine.

### 7. Global Compliance for International Trade Vessels

- For Indian-flagged ships in international trade, the Greenhouse Gas Intensity (GFI) of marine fuels shall comply with the IMO Net Zero Framework under MARPOL Annex VI.
- The National Logistics Portal – Marine (NLP-Marine) shall track and publish the share of zero- and near-zero-emission (ZNZ) fuels in total annual energy use for vessels under this scope.

### 8. Domestic GFI Reduction Trajectory for Coastal and Inland Vessels

- For coastal and IWT vessels, a dedicated GFI reduction trajectory will be developed by MOPSW/DGS to achieve Net Zero by 2070, factoring in fuel affordability, local availability, infrastructure readiness, and vessel retrofitting potential.

9. **Tax exemptions or rebates** on fuel infrastructure and pilot projects.

10. **Maritime Fuel Certification Protocols**, aligned with IMO LCA standards, for all alternative fuels.

11. **Milestones and Recommended Implementation Conditions**

Phases	Target Green Fuel Share*	Priority Fuels	Implementation Conditions/ Exceptions
Up to 2030	10–15% in coastal & IWT vessels	Drop-in fuels, hybrids, biofuels, e-LNG, green methanol	<ul style="list-style-type: none"> <li>• Prioritize <b>hybrid, drop-in, and dual-fuel</b> solutions to avoid stranded assets.</li> <li>• Carbon capture (onboard CCS) pilots eligible for compliance credits.</li> <li>• STS (Shore to Ship Power Supply) to be used where available to reduce fuel dependency.</li> <li>• Fuel blending mandates applied <b>only where domestic supply meets the projected demand</b>.</li> </ul>
2030–2040	30% in Indian-flagged fleet (domestic & international)	Green hydrogen, green ammonia, green-methanol, bio-LNG	<ul style="list-style-type: none"> <li>• Target contingent on <b>at least 5 domestic green-fuel hubs</b> operational by 2032.</li> <li>• Flexibility to substitute fuels with equivalent or better lifecycle GHG performance (ISO 14067 / LCA verified)</li> <li>• Transitional credits for hybrid vessels or retrofits achieving <math>\geq 50\%</math> GFI reduction.</li> <li>• Coastal/IWT exemption could be considered if fuel cost exceeds <math>2 \times</math> HFO price for <math>&gt;18</math> months.</li> </ul>
2040–2047	70% across all vessel types	Green Hydrogen, Green ammonia, Green methanol	<ul style="list-style-type: none"> <li>• Requires full-scale bunkering &amp; safety infrastructure at all major ports and majority of non-major ports.</li> <li>• Mandates reviewed in 2040 to align with global market maturity and IMO policy.</li> <li>• Carbon capture (onboard or port-based) is recognised as a compliance mechanism for vessels unable to adopt green fuels.</li> <li>• Exceptions for specialised vessels with no viable green fuel pathway (Approval of DGS on case-by-case basis).</li> </ul>

\*Green fuel share is calculated on a **lifecycle GHG intensity basis** (well-to-wake) using national MRV system data.

## G. Green Technology

### 1. National Green Maritime Technology Roadmap 2047

A dedicated **National Green Maritime Technology Roadmap 2047** should be developed, encompassing Technology foresight and benchmarking, sector-specific innovation pathways (ports, ships, shipyards, fuel infrastructure etc.), financing instruments, monitoring & evaluation, and Global partnerships and trade alignment (e.g., IMO decarbonisation targets, EU Fuel EU Maritime etc.).

2. Establish **Maritime Green Technology Parks** in partnership with academic institutions and shipyards to incubate indigenous technologies like hybrid vessel prototypes, hydrogen fuel cells, and shore power modules.

3. Develop an **Open Innovation Challenge Platform** called *Harit TARANG – Green Technology Accelerator for Responsible And Next-Gen shipping*—under the Sagarmala Innovation initiative for green maritime solutions

## Definitions and Policy Standards

### Operational and Technical Definitions

To ensure clarity, consistency, and effective implementation of the National Green Shipping Policy (NGSP), a comprehensive set of operational and technical definitions has been established. These definitions provide a common reference framework for all stakeholders across ports, shipping, inland waterways, and associated maritime activities, enabling uniform interpretation of key concepts related to decarbonisation, compliance, monitoring, and reporting.

Table of Definitions

<b>Domestic Vessels</b>	Means any ship, craft, barge, or floating structure, whether self-propelled or non-self-propelled, operating exclusively within the internal waters, territorial waters, or maritime zones of India and not engaged in an international voyage as defined under Regulation I/2 of SOLAS.
<b>GHG Fuel Intensity (GFI)</b>	A metric representing the lifecycle greenhouse gas intensity of a marine fuel, measured in grams of CO <sub>2</sub> equivalent per megajoule (gCO <sub>2</sub> eq/MJ). The IMO has set progressive GFI limits under the proposed Net Zero Framework; fuels such as bio-diesel, green hydrogen, ammonia, and methanol typically have significantly lower GFI values. (NGSP V5, Footnote 35)
<b>Monitoring, Reporting and Verification (MRV)</b>	A comprehensive system for the transparent collection, reporting, and third-party verification of GHG emissions data from ships and ports. MRV compliance is a mandatory condition for certification status, funding eligibility, and participation in green incentive schemes under NGSP.
<b>National Green Maritime Coordination Cell (NGMCC)</b>	The apex statutory coordination authority for implementation of the NGSP – a mission-oriented governance platform evolved from the existing Green Cell within MoPSW, with defined cross-ministerial authority, staffing, and mandate. Directives issued by the NGMCC on certification, MRV compliance, and funding eligibility are binding on all implementing agencies under MoPSW.
<b>National Green Maritime Implementation Plan (NGMIP)</b>	A rolling 5-year implementation plan – the operational backbone of the NGSP – translating policy commitments into measurable phased actions through pillar-specific action items, state/port-level targets, fund allocations, technology milestones, and skilling quotas. The NGMIP is formally notified and treated as a binding implementation directive for central maritime agencies.

<b>Green Compliance Index (GCI)</b>	A composite performance indicator used to determine eligibility for government incentives and green financing under NGSP. The GCI integrates MRV-verified emission data, certification status, and operational performance benchmarks.
<b>Annual Maritime Sustainability Report (AMSR)</b>	A mandatory annual report submitted by all major ports and Indian-flagged shipping entities, feeding into the Digital Carbon Dashboard (NLP-Carbon) and serving as the primary public accountability document for NGSP implementation progress.
<b>Shore-to-Ship Power (STS) / Onshore Power Supply (OPS)</b>	The provision of clean shore-side electricity to ships while at berth, enabling vessels to switch off auxiliary engines and eliminate associated air emissions in port. Phased deployment is mandated across major and non-major ports under NGSP short- and medium-term targets.
<b>Just-in-Time (JIT) Arrival</b>	A vessel arrival management protocol under which ships adjust their sailing speed to arrive at port only when a berth is available — eliminating unnecessary waiting time at anchor and the associated fuel consumption and GHG emissions. JIT protocols are to be operational at all major ports by 2027.
<b>Carbon Intensity Indicator (CII)</b>	An IMO-mandated operational metric that rates ships on their annual carbon intensity — grams of CO <sub>2</sub> emitted per cargo-carrying capacity and nautical mile travelled. Under MARPOL Annex VI, ships receive ratings from A (best) to E (worst), with mandatory corrective actions for poor performers.
<b>EEDI / EEXI</b>	Energy Efficiency Design Index (EEDI) — a technical measure setting minimum energy efficiency levels for new ships. Energy Efficiency Existing Ship Index (EEXI) — the equivalent measure applied to existing ships. Both are mandatory under MARPOL Annex VI and serve as baseline compliance thresholds within India's National Green Ship Certification Framework.
<b>Tank-to-Wake (TtW) / Well-to-Wake (WtW)</b>	Tank-to-Wake (TtW): GHG emissions from combustion of fuel onboard a ship, measured from the fuel tank to engine exhaust. Well-to-Wake (WtW): The full lifecycle GHG accounting including upstream fuel production, processing, and transport — providing a more complete measure of a fuel's environmental impact. NGSP uses WtW where lifecycle assessment data is available.
<b>Fuel Unavailability Report (FUR)</b>	A formal mechanism (analogous to IMO's Fuel Oil Non-Availability Report — FONAR) under which a ship master/operator documents inability to procure compliant or low-carbon fuel. FUR cases are logged and reviewed by NGMCC; ships will not be penalised for verified unavailability but must implement operational efficiency measures (JIT, slow steaming) for affected voyages.
<b>Capital Intensive Green Project</b>	Any green project intervention with a payback period of more than 10 years and an investment requirement of more than 10% of the yearly revenue of the implementing entity. Such projects are eligible for viability gap support and targeted green financing under NGSP.

<b>Viability Gap Support Funding</b>	A funding support grant — one-time or staggered <del>deferred</del> — provided to support green projects or interventions that are economically justified but fall short of financial viability under current market conditions, enabling them to proceed with public or blended finance support.
<b>Green Taxonomies</b>	Activities that deliver on environmental objectives — helping direct capital more efficiently toward priority environmentally sustainable maritime projects, defining what qualifies as 'green' versus 'transitional' versus 'brown' for purposes of investment eligibility and ESG reporting.
<b>Scope 1 Emissions</b>	Direct GHG emissions from owned or controlled sources — for ports, these include direct fuel combustion from yard equipment, auxiliary generators, dredging operations, and ships alongside. For ships, Scope 1 covers all onboard fuel combustion.
<b>Scope 2 Emissions</b> <b>Pse define Scope 3 also</b>	Indirect GHG emissions from the generation of purchased electricity, steam, heating, and cooling consumed by port authorities or port operators. Calculated using the prevailing grid emission factor (2021 baseline: 0.72 kgCO <sub>2</sub> per kWh).
<b>Major Port / Major Port Authority (MPA)</b>	A Major Port as defined in clause (8) of Section 3 of the Indian Ports Act 1908 (as amended), administered directly by the Central Government.
<b>Non-Major Port</b>	A port other than a Major Port, declared as such by the State Government by notification in the Official Gazette and managed by the State Maritime Board or State-level port department.
<b>State Maritime Board (SMB)</b>	A state-level body which administers conservancy, licensing of crafts, levying of fees, and regulation and control of traffic for non-major ports within that State.
<b>PPP Port Operators</b>	Private operators involved in the operations and management of terminals or operations in major ports based on a predetermined revenue sharing or royalty model — covering both existing and future PPP concessionaires.
<b>Renewable Sources</b>	Clean energy derived from natural sources or processes that are constantly replenished — including solar, wind, tidal, hydro, and green hydrogen — as applicable to port and maritime energy transition under NGSP.
<b>Third Party Agencies</b>	Entities not directly involved in the core operations of ports or shipping but engaged for specific services such as third-party MRV verification, environmental auditing, certification, or technical assessment under NGSP frameworks.

## Policy Standards

The NGSP draws upon and integrates an extensive body of national and international standards applicable to green maritime fuels, vessel energy efficiency, emissions monitoring, environmental management, and port operations. Key applicable standards include:

### *BIS Standards for Green Fuels*

The Bureau of Indian Standards (BIS) has published nine standards in line with national green initiative goals. The following BIS standards are applicable to green marine fuels:

1. IS 15464:2022 — Anhydrous Ethanol for Use as Blending Component in Motor Gasoline — Specification
2. IS 15607:2022 — Biodiesel B-100 (Fatty Acid Methyl Esters/FAME) — Specification
3. IS 16087:2016 — Biogas (Biomethane) — Specification (First Revision)
4. IS 16531:2022 — Bio-diesel Diesel Fuel Blend B8 to B20 — Specification
5. IS 16629:2017 — Hydrous Ethanol for use in ED95 Automotive Fuel — Specification
6. IS 16634:2017 — E85 Fuel (Blend of Anhydrous Ethanol and Gasoline) — Specification
7. IS 17021:2018 — E20 Fuel (Admixture of Anhydrous Ethanol and Gasoline) for Spark Ignited Engine Powered Vehicles — Specification
8. IS 17081:2019 — Aviation Turbine Fuel (Jet A-1) containing Synthesised Hydrocarbons — Specification
9. IS 17821:2022 — Ethanol as a Fuel for Positive Ignition Engine Powered Vehicles — Specification

Development of a standard on paraffinic (green) diesel derived from 2G feedstock is also under progress. These standards are designed to contribute to national net-zero by 2070, 50% energy from renewable sources, Make in India, Atmanirbhar Bharat, and Waste to Wealth objectives.

### *Energy Efficiency and Emission Standards*

As per the National Energy Conservation Act Amendment 2023, the Bureau of Energy Efficiency (BEE) shall provide emissions standards for marine vessels. The NGSP stresses the provision of engine emission standards for ship engines designed for different bio-fuels available in the market conforming to BIS standards. DGS Merchant Shipping Notice (File No. 13-20011/3/2020-ENGG-DGS, C-3205) allows usage of bio-fuels and their blends by Indian ships as per specified categories. This MSN is applicable to all seagoing Indian ships registered under the MS Act 1958 this has been upgraded and all bunker suppliers registered with the Government of India under MARPOL Annex VI Regulation 18.

By 2028, all newly constructed coastal and inland vessels with  $\geq 130$  kW engine power shall meet NO<sub>x</sub> and SO<sub>x</sub> emission limits equivalent to MARPOL Annex VI Regulations 13 and 14, through compliant engine certification, approved exhaust after-treatment systems, or verified equivalent national standards.

### *International Standards Framework*

The NGSP aligns with and mandates compliance with the following international standards and conventions as applicable:

1. MARPOL 73/78 (Annexes I, II, IV, V, and VI) — Prevention of Pollution from Ships
2. IMO Energy Efficiency Design Index (EEDI) — MARPOL Annex VI, Regulation 21
3. IMO Energy Efficiency Existing Ship Index (EEXI) — MARPOL Annex VI, Regulation 23
4. IMO Carbon Intensity Indicator (CII) and Rating System — MARPOL Annex VI, Regulation 28
5. IMO GHG Fuel Standard (GFS) / Net Zero Framework — under development for adoption under MARPOL Annex VI

6. IGF Code — International Code of Safety for Ships Using Gases or Other Low-Flashpoint Fuels
7. IMO SEEMP/Data Collection System (DCS) — MARPOL Annex VI Regulation 28; MEPC.315(74)
8. Hong Kong International Convention (HKC) for Safe and Environmentally Sound Recycling of Ships (in force 26 June 2025)
9. ISO 14001 — Environmental Management Systems (for ports and shipyards)
10. ISO 50001 — Energy Management Systems (for ports and shipyards)
11. ISO 14067 — Carbon Footprint of Products (for lifecycle carbon accounting in shipbuilding and recycling)
12. ICMA Green Bond Principles; IFC Performance Standards; EU Taxonomy for Sustainable Activities (for green finance eligibility)

Green fuels under NGSP shall be defined in accordance with standards published by competent national authorities: green hydrogen as defined by India's National Green Hydrogen Mission (NGHM). The G20 Global Bio-fuel Alliance (GBA), launched at the 18th G20 Summit under India's presidency, provides an additional multilateral framework for green fuel standardisation.