THE ENERGY CONSORTIUM
IIT MADRAS

GREEN PORTS IN INDIA

A stakeholder dialogue on pathways to sustainable maritime infrastructure

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Organised by
The Energy Consortium, IIT Madras

In Association with
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CITATION

Green Ports in India: A stakeholder dialogue on pathways to sustainable maritime infrastructure

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EXECUTIVE SUMMARY

India's ports are critical to economic growth, regional connectivity, and global trade. As the country moves toward its net-zero target by 2070, ensuring the sustainability of its maritime infrastructure is both a strategic necessity and an environmental imperative. The Ministry of Ports, Shipping & Waterways' Harit Sagar Guidelines (2023) represent a significant step towards this vision of transitioning to "Green Ports," which minimise environmental impact through renewable energy, cleaner fuels, and electrified infrastructure, which is not only a national priority but a global imperative.

Recognising this, The Energy Consortium in association with The Office of Alumni and Corporate Relations, IIT Madras, convened a high-level stakeholder roundtable on Green Ports, bringing together senior representatives from government, industry, academia, policy, non-governmental organisations, financial institutions, start-ups and bilateral agencies. The roundtable facilitated an exchange of perspectives on the pathways, challenges, and enablers of India's green port transition.

The roundtable highlighted that India's transition toward green ports must be anchored in systemic thinking, inclusive governance, and collaborative innovation. Stakeholders across the board emphasised the interdependence between green port and green shipping transitions, highlighting the urgency of establishing green shipping corridors and advancing alternative fuels such as hydrogen, ammonia, and methanol. Challenges around fuel costs, bunkering infrastructure, and ROI were underscored, along with the absence of a unified national definition of a "green port." Stakeholders called for policy coherence, regulatory mandates, lifecycle emission tracking, and enhanced operational efficiency through digitisation and electrification. The importance of involving non-major ports, greening fishing vessels, and engaging coastal communities emerged as a critical dimension of inclusive green transitions.

To move from vision to implementation, the roundtable strongly recommended the creation of a national "Green Port Readiness Framework" and taxonomy, supported by feasibility studies and demonstration projects. A robust incentivization regime comprising viability gap funding, blended finance models, and PPPs must accompany a clear investment pipeline. Stakeholders emphasised the need for a formal multi-stakeholder platform to steer the transition, backed by targeted skilling, cross-sectoral R&D, and international partnerships. The path forward calls for bold yet pragmatic action to transform Indian ports into climate leadership, innovation, and equity hubs.

This outcome document synthesises the key insights from the discussion. It outlines a collective call to action, serving as a crucial platform for converging diverse perspectives on India's maritime decarbonization journey. The outcomes underscore a collective commitment to transforming Indian ports into sustainable, efficient, and globally competitive green hubs. The path forward demands integrated strategies across policy, finance, technology, and collaboration, ensuring that the ambition for green ports translates into tangible, inclusive, and environmentally responsible growth for India's vital maritime sector.

Visionary Address:

CHARTING INDIA'S GREEN PORT AMBITION

Shri T.K. Ramachandran,

IAS, Secretary, Ministry of Ports, Shipping and Waterways (MoPSW)

In his keynote address, Shri T.K. Ramachandran, IAS, Secretary, MoPSW, articulated a clear and ambitious vision for India's maritime decarbonisation. He emphasised that ports and shipping must not be viewed in isolation green shipping and green ports are inherently interdependent, with each reinforcing the progress of the other. Framing his address within India's international commitments, he reaffirmed alignment with the International Maritime Organisation's (IMO) target of zero carbon emissions by 2050. He reiterated India's goal of achieving 60% renewable energy use in ports by 2030, as outlined in the Maritime India Vision (MIV) 2030. Highlighting successful examples like Mangalore Port—already operating on 100% renewable energy—he outlined six critical pillars for India's green port transition:

1. Standard Operating Protocols (SOPs) to guide consistent implementation;
2. Infrastructure creation for fuel bunkering, transport, storage, and generation;
3. Fuel supply chain development, including clarity on fuel choice (e.g., hydrogen, ammonia, methanol);
4. Green vessel capacity building, including domestic shipbuilding to reduce dependency and seize global opportunities;
5. Human resource development to operate and maintain emerging systems;
6. Financing strategies to underpin all of the above.

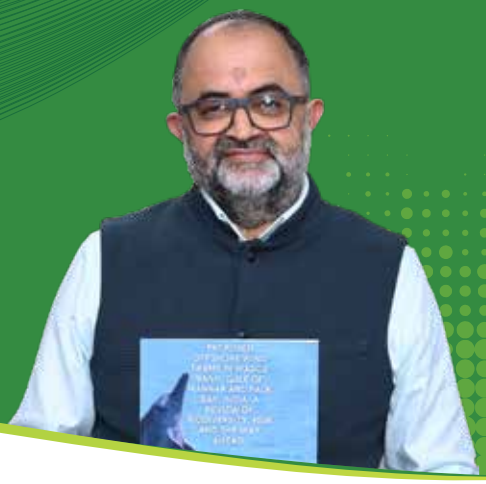
The Secretary spotlighted major initiatives underway, including land allocation at Kandla, V.O. Chidambaranar, and Paradip Ports for green hydrogen infrastructure. He pointed to regulatory advances under the Harit Sagar Guidelines, the Directorate General of Shipping, and the Green Tug Transition Programme (GTTP), which will convert the entire significant port tug fleet to green or hybrid vessels. Partnerships with academic institutions, such as TERI's Centre of Excellence, were cited as critical enablers for research-informed policy and ecosystem development.

While optimistic about the transition, the Secretary cautioned against underestimating the barriers. Cost competitiveness of green fuels remains a decisive factor—adoption will stall unless fuel costs drop to parity with conventional fuels. He acknowledged the "chicken-and-egg" dilemma between ports investing in infrastructure and vessel operators needing assurance of fuel availability. Nonetheless, the imperative is clear: "We are starting small, but we are ambitious."

Calling for a coordinated national effort—"ek sutra mein bandhna" (binding it all into one thread)—the Secretary concluded with a call to action: India must aim to deliver visible progress, including the establishment of at least one fully operational green corridor, by the end of the year. His address set the tone for the roundtable, urging collective resolve, systems thinking, and accelerated implementation.

Keynote:

INITIATIVES AT THE CHENNAI PORT



Shri. Sunil Paliwal,

IAS, Chairperson,
Chennai Port Authority

In his address, Shri Sunil Paliwal, IAS, offered a grounded and pragmatic view on the green port transition, drawing on real-time operational experience and highlighting the challenges that port authorities face on the ground. He acknowledged that the Government of India has laid a clear directional roadmap toward 2030 and beyond, but the objective complexity lies in translating high-level vision into actionable implementation pathways. He emphasised that while research and pilot initiatives are helpful, the real value will come from achieving convergence across stakeholders and moving from experimentation to scalable solutions.

On the onshore power supply, he shared that naval and certain specialised vessels already utilise such systems, but commercial shipping remains a significant challenge. Drawing examples from global practices like the Ennore port's pioneering effort in connecting onshore power to commercial vessels, he stressed the need for statutory obligations, without which private adoption would be minimal, given low ROI and extended asset life cycles.

Shri Paliwal noted that 46% of India's cargo is handled by non-major ports and private terminals, outside the purview of many green mandates. This creates a fragmented policy and incentive environment, reducing the likelihood of widespread voluntary adoption of green investments. He stressed that mandates and tender conditions such as requiring electric port equipment in new concessions are essential to drive transition, especially given the long duration of concession agreements (often 12–30 years).

He also raised the need for clarity in fuel choices, given the IMO's fuel-agnostic position and the fast-changing landscape of technologies, ranging from LNG to ammonia and green hydrogen. The lack of consensus creates hesitation in long-term investments, particularly in bunkering infrastructure.

Ultimately, he concluded with a call for detailed, forward-looking planning. Without specificity in timelines, tendering mandates, and policy harmonisation, India's green port journey risks being limited to isolated pilots and discussions, rather than achieving meaningful systems-level change.

Keynote:

ON INDIA–DENMARK GREEN STRATEGIC PARTNERSHIP

H.E. Eske Bo Rosenberg

Consul General of Denmark in Bangalore

His Excellency Eske Bo Rosenberg underscored the strength and depth of the India–Denmark Green Strategic Partnership, now in its fifth year. As a maritime and wind-rich nation, he highlighted that Denmark has centred its sustainability efforts on integrating wind energy, long-term planning, and offshore infrastructure. Energy remains a central pillar of this partnership, with ongoing collaborations across agriculture, water, and technology.

H.E. Rosenberg emphasised the shared global imperative of green port transformation, noting that this challenge transcends geography. He admired India's ambition and progress in this space and reiterated Denmark's commitment to working collaboratively through bilateral and multilateral initiatives.

Denmark's growing involvement with India's maritime decarbonization was illustrated through its support for the Maritime Centre of Excellence at TERI and active participation in the green shipping dialogue. He stressed the need for strategic mapping—connecting green ports globally—and called attention to the role of companies like Maersk, which are already investing in green shipping technologies and corridors.

A key theme of his address was the importance of cross-sectoral collaboration, with academia, such as DTU and IIT Madras, industry alliances, and strategic government stakeholders working together to define challenges and co-develop solutions. He referenced a green fuels market study initiated earlier this year as an essential step toward better planning and coordination in India.

Finally, H.E. Rosenberg emphasised the need for co-financing mechanisms to make green corridors viable, such as through the Maersk Mc-Kinney Møller Centre for Zero Carbon Shipping. He concluded with a call for ambition, collaboration, and global solidarity, affirming that solving green port and green fuel challenges is critical to the world's transition to a low-carbon future.

Keynote:

GREEN FUELS IN GREEN PORTS

Dr. Lavanya M

General Manager, R&D,
Chennai Petroleum
Corporation Limited

Dr. Lavanya framed the transition of green ports around two interdependent pillars: green fuels as carriers and green ports as gateways. While these may appear abstract in isolation, she emphasised their deep systemic interconnection, especially in hard-to-abate sectors like shipping. She noted that Governments globally are actively supporting research and innovation in this domain, with green hydrogen and ammonia emerging as key future fuels.

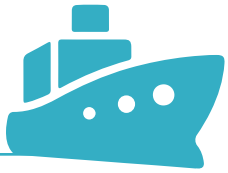
Recognising the practical reality that fossil fuels will not disappear overnight, Dr. Lavanya called for a bridge strategy that allows for a phased transition, balancing today's energy needs with tomorrow's decarbonisation ambitions. She highlighted the importance of upskilling the workforce, strengthening compliance through digital monitoring, and creating dedicated bunkering and storage protocols for each fuel type.

Drawing on international examples, she cited a recent pilot study in Amsterdam validating the safety of ammonia bunkering, positioning it as a benchmark for similar efforts in India. She stressed the need to establish a green fuel corridor in India, which would require simultaneous progress on policy, technology, and infrastructure, adopting a truly systems-level approach.

At CPCL, she shared that active exploration is underway into green hydrogen, desalination, and low-carbon bunkering solutions, aligned with a broader mission of responsible environmental stewardship. She emphasised that green fuels are no longer optional but the inevitable future of energy and port operations.

Dr. Lavanya also addressed a key industry challenge: replacing 10% of refinery hydrogen demand with green hydrogen would require an estimated ₹400 crore investment, underscoring the need for phased funding strategies and aligned capital flows. She concluded with a powerful reminder that the green future is already arriving at our dockside and bunkering stations. Indian refineries must be prepared to serve as launchpads for the next generation of low-carbon energy systems.

BACKGROUND AND RATIONALE



India's ports are vital to its economic growth and regional connectivity. Transforming them into low-emission, sustainable hubs is critical to meeting the country's net-zero target by 2070. The Harit Sagar Guidelines (2023) mark a significant step toward this transition, focusing on renewable energy, clean fuels, and electrified infrastructure as key pillars of green port development.

To advance this agenda, the Energy Consortium at IIT Madras convened a high-level roundtable with diverse stakeholders in collaboration with the Office of Alumni and Corporate Relations. The event aimed to break silos and encourage interdisciplinary dialogue, recognising that green port development requires integrated thinking across infrastructure, energy, governance, and community systems.

Ports represent a strategic opportunity for decarbonisation. Their energy-intensive operations, role as future hubs for green fuel, and importance in supply chain emissions reduction place them at the heart of India's climate ambitions. The roundtable included:

- Government officials from the Ministry of Ports, Shipping and Waterways, major and non-major ports, and investment agencies
- Industry leaders in maritime infrastructure, shipping, and green fuels
- Experts in environmental policy, coastal governance, and marine ecosystems
- Clean energy start-ups and innovation platforms
- Bilateral partners from Denmark, Singapore, the UK, and Scotland
- Financial institutions and development banks
- Academic and research institutions

Discussions emphasised the need for a systemic, inclusive, and innovation-driven approach to green port development. Key outcomes included proposals for a Green Port Readiness Framework, pilot demonstrations, targeted financing mechanisms, and a multi-stakeholder platform for coordination.

India's green port ambitions are aligned with international momentum, particularly the IMO's goal of zero carbon emissions by 2050. National frameworks such as the Maritime India Vision 2030 and initiatives like the Green Tug Transition Programme and the Green Hydrogen Mission further underline this commitment. A flagship target is achieving 60% renewable energy use at ports by 2030.

While progress is visible with Mangalore Port running entirely on renewable energy and many major ports enabling onshore power, significant challenges remain. These include ageing vessel fleets, infrastructure gaps, and the exclusion of non-major ports from transition planning.

The roundtable was convened to catalyse convergence across these efforts. This outcome document captures collective insights and presents a roadmap to operationalise India's green port vision, anchoring ports as sustainable, resilient, and equitable growth engines.

Identify key opportunities and barriers in India's transition to green ports

Gather stakeholder perspectives on environmental, social, and technological dimensions of green port development

Examine current initiatives and identify gaps relative to global green port standards

Validate and co-develop priority areas for further research and implementation

STAKEHOLDER PERSPECTIVES

The section below summarises key perspectives shared by various stakeholders during the roundtable. In line with Chatham House rules, individual attributions have been omitted to encourage open and candid dialogue; the insights presented here reflect the collective themes and priorities that emerged across sectors.

Cross cutting message from government stakeholders include:

- **Green port development must be systems-driven, integrating fuel, vessel, and logistics perspectives**
- **There's a strong appetite for collaboration with academia and international partners**
- **Mandates and incentives are crucial to overcoming inertia in port operations and private sector adoption**
- **A shared framework is needed to align national, state, and port-level actions.**

GOVERNMENT

Government stakeholders emphasised that the green port transition must be tightly aligned with developments in green shipping. Ports must prepare to accommodate next-generation vessels through infrastructure that supports a wide range of alternative fuels—such as green hydrogen, ammonia, and methanol by building end-to-end supply chains for storage, transport, and bunkering. India's commitment to the IMO's 2050 decarbonization targets and national ambitions like achieving 60% renewable energy use in ports by 2030 were underscored as key guiding frameworks.

To meet these goals, stakeholders stressed the need for domestic green vessel manufacturing capacity and greater investment in shipbuilding capabilities. The importance of cross-sectoral convergence between ministries, regulators, and industry was reiterated, alongside the call for demonstration projects such as an operational green corridor. Academia was recognised as a key partner in policy development, capacity building, and technology validation.

Cost-efficiency and return on investment were noted as major concerns, particularly for private and non-major ports. Port equipment and captive onshore power supply electrification were considered feasible near-term opportunities, though commercial vessel integration remains challenging. Lastly, stakeholders warned against infrastructure lock-ins and called for adaptive, future-proof designs, highlighting the need for clear regulatory pathways to

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INDUSTRY AND INFRASTRUCTURE

Cross cutting message from industry stakeholders include:

- **While intent is strong, industry highlighted a persistent gap between sustainability commitments and actual execution on the ground.**
- **Industry emphasized the interdependence of green fuels and ports, calling for phased transitions, fuel-specific bunkering infrastructure, and digital compliance systems.**
- **Reducing carbon through improved operational efficiency and sustainable construction materials was seen as a practical, immediate step.**
- **Green transitions must deliver tangible benefits to surrounding communities, requiring workforce upskilling and inclusive, economically viable planning.**

Industry stakeholders acknowledged the growing momentum around green port development but cautioned that implementation lags behind intent. They emphasised that sustainability must begin with material choices such as using reclaimed or low-impact construction inputs—and that improving operational efficiency represents a low-hanging fruit for reducing emissions. International examples like monopile-supported offshore power systems were cited to illustrate potential improvements in shore power availability.

The industry framed green fuels and green ports as two interdependent pillars of maritime decarbonization. While green hydrogen and ammonia are emerging globally, they noted that a phased transition from fossil fuels requires a clear bridge strategy. A systems-level approach—integrating policy, infrastructure, and technology is vital to ensure alignment across the fuel supply chain, storage infrastructure, digital compliance, and workforce capacity.

A call was made to establish a green fuel corridor in India, learning from international safety pilots like those in Amsterdam. Industry leaders, including Chennai Petroleum, are already exploring green hydrogen, low-carbon bunkering, and desalination initiatives. They underscored that green fuels are not optional but imperative and that achieving even modest substitution targets (e.g., 10% green hydrogen) would require large-scale, phased investments and precise capital alignment.

FINANCE AND INVESTMENT

Cross-cutting messages from financial stakeholders:

- **The absence of a national green port taxonomy, standardized metrics, and policy signals hampers consistent evaluation, investment, and risk assessment.**
- **Public-private blended finance models are essential to de-risk capital-intensive green infrastructure such as onshore power and bunkering systems.**
- **Local institutions play a key role in enabling investment through land, tariff incentives, and co-financing—especially for non-major ports.**
- **There is a strong willingness to invest, but capital flows depend on bankable project pipelines, feasibility data, and institutional capacity building**

Financial stakeholders underscored the importance of facilitation mechanisms such as land allocation, tariff subsidies, and streamlined regulatory procedures to attract early-stage investments in hydrogen and green fuel infrastructure. State-level institutions were key enablers, particularly in de-risking sustainability upgrades at non-major ports through localised financing and policy support. A recurring recommendation was standardised, and cross-state incentives supported long-term logistics and industrial planning.

A significant concern was the absence of a national green port taxonomy and standardised metrics, which hinders consistent evaluation, risk assessment, and financing of projects. Stakeholders emphasised the need for lifecycle emissions data, robust feasibility studies, and clear risk-return profiles to enhance the bankability of green port investments. Blended finance leveraging public capital to de-risk private investment—was seen as vital for capital-intensive infrastructure like onshore power supply and bunkering systems.

While there is readiness among financial institutions to offer concessional, long-term finance, the lack of clear policy signals and mandates remains a barrier to large-scale capital deployment. To bridge this, stakeholders called for capacity building within port authorities on financial structuring, emissions modelling, and proposal development. They also supported partnerships with state maritime boards to co-develop a credible pipeline of investable projects.

ACADEMIA AND RESEARCH

Cross-cutting messages from academic stakeholders:

- **Ports must be viewed as integrated systems; India needs a data-driven, ESG-inclusive green ports readiness framework.**
- **Green port planning should embed biodiversity, ecosystem services, and place-based, nature-based solutions.**
- **Embodied emissions and lifecycle sustainability must be addressed through circular design and LCA tools.**
- **Overcoming institutional silos requires multi-level governance and participatory models for community engagement.**

Academic stakeholders underscored the importance of a systems thinking approach, framing ports as part of larger energy, logistics, ecological, and governance networks. They called for creating an India-specific Green Port Readiness Framework anchored in emissions data, ESG metrics, and community inclusion to guide planning, benchmarking, and investment. Academic institutions were recognised as neutral conveners well-positioned to bridge knowledge gaps through multi-stakeholder dialogues, evidence-based roadmaps, and co-designed pilot projects with robust monitoring systems.

Experts highlighted the need for ecological integration in green port planning, calling for context-specific assessments that factor in ecosystem services, biodiversity, and coastal resilience. They also critiqued current Environmental Impact Assessments (EIAs) for failing to account for cumulative ecological burdens and advocated for place-based, nature-based solutions.

Material sustainability was flagged as an overlooked dimension, particularly the embodied emissions in port construction. Lifecycle analysis (LCA) tools and circularity principles were recommended to embed sustainability across the full infrastructure lifecycle.

Institutional fragmentation characterised by overlapping mandates was seen as a barrier to coordinated action. To address this, academics called for inclusive, multi-level governance frameworks and research-driven models to engage coastal communities, fishers, and informal workers, ensuring that India's green port transition is effective and socially equitable.

INTERNATIONAL COOPERATION

Cross-cutting messages from international cooperation agencies:

- **India's green port agenda has attracted strong international interest, especially for bilateral corridors and technical partnerships.**
- **Agencies are willing to support pilots, technology transfer, regulatory alignment, and capacity building.**
- **The transition presents an opportunity to blend global best practices with India-specific solutions.**
- **Collaborations should be institutionalized through MoUs, joint working groups, or centres of excellence.**

International partners expressed strong interest in collaborating with India's green port transition through knowledge exchange, joint pilots, and capacity building. The Danish Embassy emphasised the potential for green shipping corridors and highlighted Denmark's readiness to support joint R&D, technology transfer, and structured government-to-government dialogue. They also encouraged the participation of Danish companies in pilot demonstrations.

The UK positioned green ports as a key component of India–UK climate collaboration, focusing on ensuring just transitions for coastal and informal communities. The UK also supported aligning ESG and regulatory frameworks with global standards and building institutional capacity through training and development partnerships.

Singapore shared practical insights from its advanced port modernisation journey, stressing the role of digital infrastructure such as digital twins and emissions tracking in enabling green transitions. They offered to facilitate bilateral knowledge sharing and organise delegation visits to build collaborative momentum between Indian and Singaporean stakeholders.

These countries collectively underscored the value of strategic international partnerships in enabling scalable, future-ready port ecosystems grounded in innovation and equity.

POLICY AND COMMUNITY PERSPECTIVES

Cross-cutting messages from policy and community perspectives:

- **Green port transitions must be grounded in inclusive, participatory, and place-sensitive approaches that reflect the complexity of India's coastal geographies.**
- **There is a strong call for policy reform, including clear mandates, equity safeguards, and accountability mechanisms at the port planning level.**
- **Communities are not just beneficiaries or victims—they can be active co-creators in sustainable port development if meaningfully engaged.**
- **A just and inclusive transition must extend the green agenda beyond major ports to the smaller, neglected nodes of India's maritime economy.**

Policy experts highlighted the need for integrated governance to address institutional fragmentation across ministries, maritime boards, and port authorities. They stressed that green port development must be anchored in a coherent transition strategy that aligns energy, environment, and transport policies. The absence of enforceable sustainability mandates in existing port regulations and PPP contracts was flagged as a critical gap, with strong calls for climate-smart legal reforms. Emphasis was placed on viewing green transitions as technical and social transformations, prioritising equity and access.

Despite their crucial role in local economies, community stakeholders underscored the exclusion of non-major ports, fishing harbours, and coastal landing sites from mainstream green planning. They cautioned that top-down modernisation could displace artisanal fishers and informal workers if not designed inclusively. Advocating for rights-based approaches, they called for mechanisms like Free, Prior and Informed Consent (FPIC) and gender-sensitive planning. They urged place-based strategies tailored to local ecological, social, and cultural contexts to ensure that green port development is equitable and grounded in lived realities.

KEY EMERGING THEMES

Thematic area	Grouped themes
Strategy, governance and policy Alignment	• Interdependence of Green Ports and Green Shipping • Clarity in policy, definitions, and mandates • Need for a coordinated, system-level approach
Infrastructure, technology and fuels	• Advancing green fuels and bunkering infrastructure • Technology, electrification, and operational efficiency • Lifecycle Emissions and Material Sustainability
Financing and market readiness	• Financing mechanisms and market viability
People, place and partnerships	• Human capacity and institutional preparedness • Inclusivity and local context sensitivity • Global collaboration and knowledge exchange

OPPORTUNITIES AND GAPS

This section presents a consolidated view of the key opportunities and gaps identified through the roundtable discussions. It captures areas of strategic advantage India can leverage to accelerate its green port transition, ranging from technology readiness to international partnerships. At the same time, it highlights systemic barriers that must be addressed, such as the absence of unified frameworks, financing constraints, and institutional capacity challenges. This section explains where momentum exists and targeted interventions are needed to move from ambition to implementation.

OPPORTUNITIES

Category	Description
Strategic policy alignment	Strong alignment with Harit Sagar Guidelines, Maritime India Vision 2030, and India's net-zero target by 2070 provides a solid policy foundation.
Technology readiness	Advancements in port electrification, onshore power, digital monitoring, and emissions tracking enable scalable, near-term interventions.
International collaboration potential	High interest from countries like Denmark, Singapore, and the UK for joint pilots, green corridors, technology transfer, and capacity building.
Stakeholder momentum	Convergence of interest across ministries, port authorities, financiers, academia, and international partners creates momentum for coordinated action.
Pilot-ready ports	Several major and non-major ports are positioned to serve as early demonstration sites for green technologies and inclusive models.
Growing ESG and climate finance ecosystem	Increased availability of ESG-linked finance and green capital creates new avenues for funding port decarbonization efforts.

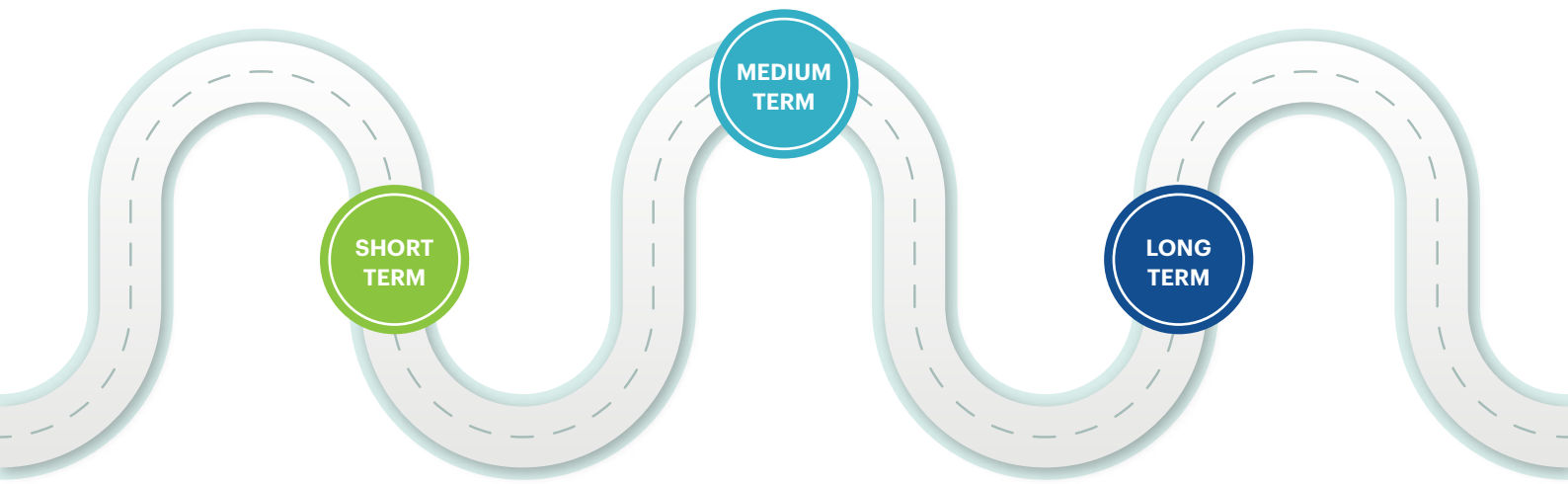
GAPS

Gap	Description
Absence of a unified Green Port framework	A nationally accepted definition, taxonomy, and assessment criteria are absent to guide and benchmark green port development.
Financing challenges	High capital costs, uncertain return on investment (ROI), and limited access to blended or concessional finance impede project bankability.
Infrastructure readiness deficits	Insufficient fuel-agnostic bunkering infrastructure, renewable integration, and digital emissions tracking and energy management systems.
Policy and regulatory ambiguity	Unclear mandates, lack of enforceable standards, and fragmented regulatory alignment across central and state bodies.
Institutional and human capacity constraints	Limited expertise within port authorities and maritime institutions to plan, implement, and sustain green transition strategies.
Exclusion of non-major ports and communities	Small ports, fishing harbours, and coastal communities are often not integrated into national green planning or investment efforts.
Fragmented governance	Overlapping roles among ministries, state maritime boards, and port operators result in coordination gaps and diluted accountability.
Weak project pipeline and data gaps	Few well-prepared, investable projects exist; lack of lifecycle emissions data and baseline assessments further limits planning and financing.

GREEN PORT TRANSITION: ACTION ROADMAP

This section outlines actionable outcomes from the stakeholder roundtable on green ports. These recommendations, grounded in cross-sectoral input, reflect immediate opportunities and long-term structural needs. The proposed actions are grouped into short-, medium-, and long-term goals, based on urgency, feasibility, and strategic importance. Collectively, they offer a practical roadmap to guide India's green port transition through pilot demonstrations, institutional coordination, and capacity building.

Timeline	Action	Objective
Short Term	Green Port Readiness Framework	Define criteria, KPIs, scoring system to guide all future actions
	Pilot demonstration projects	Implement and evaluate early interventions at 3 ports
	Multi-stakeholder working group	Establish coordination platform across govt, industry, academia
	Baseline sssessments	Collect emissions, infra, and fuel data to inform planning and financing
Medium Term	Capacity building program	Develop training modules and deliver workshops for port operators & regulators
	Investment facilitation mechanism	Outline financing models, build pipeline, engage financiers
	International collaboration	Leverage bilateral expertise and co-develop toolkits, corridors, pilots
Long Term	Align State–Central Planning	Synchronize maritime visions, regulatory coherence, and infrastructure planning



CONCLUSION

India's ambition to build a sustainable and future-ready port ecosystem is timely and necessary. As the country advances toward its net-zero targets and seeks to strengthen its position in global trade, green ports must become a central pillar of its climate and infrastructure strategy. This roundtable has shown that the ingredients for success already exist, which include clear policy intent, growing stakeholder momentum, technological readiness, and international goodwill.

Yet, the transition to green ports will require more than isolated pilots or aspirational roadmaps. It demands a coordinated, system-level response that bridges data and policy, investment and innovation, global knowledge and local inclusion. The perspectives underline the urgency of defining a unified framework for green port readiness, mobilising finance, enabling regulatory coherence, and ensuring no port or community is left behind.

This report is both a reflection of consensus and a call to action. India can be at the forefront of maritime sustainability by institutionalising collaboration, empowering states and ports, and creating scalable models. The roundtable marks not an end, but the beginning of a collective journey to anchor climate leadership, resilience, and equity at the heart of India's port sector.

GLIMPSES OF GREEN PORTS ROUNDTABLE

A stakeholder dialogue on pathways to sustainable maritime infrastructure

Dates: 27th June 2025 | Time: 3 to 5:30 pm | Venue: IIT Madras

ANNEXURE: LIST OF PARTICIPANTS

NAME	DESIGNATION	INSTITUTION
Dignitaries		
Shri TK Ramachandran, IAS	Secretary	Ministry of Shipping, Ports and Waterways, Govt of India
HE Eske Bo Rosenberg	Consul General of Denmark in Bangalore	Ministry of Foreign Affairs of Denmark in India
Prof Ashwin Mahalingam	Dean, ACR office	IIT Madras
Shri Sunil Paliwal, IAS	Chairperson	Chennai Port Authority
Industry		
Jayasurya Francis	President	Global Wind Energy Council
Manav Chidrambaram	Decarbonisation specialist	Azolla, Synergy Marine Group
Jothieswaran S	Decarbonisation specialist	Azolla, Synergy Marine Group
Ankit Seth	Asst. Tech. Superintendent	Environmental Management, Synergy Marine Group
Gurpartap	Asst. Tech. Superintendent	Environmental Management, Synergy Marine Group
Dr Lavanya	Research and Development	Chennai Petroleum Corporation Limited
Arjun Mehta	Director – Growth & Programs, Green Hydrogen India	GH2 India
Sudheer Cherukuri	VP, Head of Energy	COWI India
Sherly Jenifer	Senior Project Manager	COWI India
Daniel De Castro	Head of Technology Outlook and Strategy	Aramco
Vivek Seshan	Lead Scientist	Aramco
Policy		
Dr Robin RS	Scientist C	National Centre for Sustainable Coastal Management
Dr Dipnarayan Ganguly	Scientist C	National Centre for Sustainable Coastal Management

NAME	DESIGNATION	INSTITUTION
Policy		
Nandha Gopal	Vice President	Tamil Nadu Guidance Bureau
Baalaji Ravichandran	Senior Program Associate	World Resources Institute
Heleena Christian	Program Manager, Energy	World Resources Institute
Dr E Vivekanandan	Officer	Bay of Bengal Programme Intergovernmental Organisation
Dr R Kulasekaran	Officer	Bay of Bengal Programme Intergovernmental Organisation
Academics		
Prof Krishna Malakar	Assistant Professor	HSS, IIT Madras
Prof Jitendra Sangwai	Professor	Dept of Chemical Engg, IIT Madras
Prof Shanti Swarup	Professor	Dept of Electrical Engg, IIT Madras
Bilateral agencies		
Sareen Solomon	Senior Trade Advisor	UK trade
Ketan Pednekar	Senior Trade Specialist (Energy)	Scottish Development International
Denise Tan	Regional Director South Asia (South India)	Enterprise Singapore
Daniel Johns	Business Development Manager	Enterprise Singapore
Prithvi Sai Penumadu	Trade Advisor for Green Energy	Embassy of Denmark in India
Startups		
Bharath Srivatsava	Founder	Hylan
Harris Perinbam	Commercial Manager	Ryse Energy
Financial institutions		
Faiza Kanwal Solanki	South Asia - Green Buildings Specialist, Business Development and Climate Strategy (CBDSB)	International Finance Corporation , World Bank Group
Dr Ramana Reddy	Senior Sector Specialist - Energy	KfW, New Delhi

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