

<p>SUMMARY OF SESSION: GREEN SHIPS & SMART TECH: INTEGRATING TECHNOLOGY FOR SUSTAINABLE SEAS</p>

Chair, Convenor, Speaker and Panelists, Experts

Session Chair	Shri.Subba Rao	MD, Sanmar Shipping
Convenor	Shri.Anil Kumar	Principal Surveyor, LR
Panelists	Shri.Arjun Chowgule,	Executive Director, Chowgule Group
	Shri.Hrishikesh Narasimhan,	Senior Consultant-Business Development L&T Shipbuilding
	Shri.Sanjay Verma,	Director, Wartsila Singapore
	Shri.Sajan P John,	Chief Operating Officer, Kochi Water Metro
	Shri.Ronny Hansen,	Nautical Adviser, Danish Maritime Authority

Coordinators

DGS	Shri.Nebu Oommen	Ship Surveyor cum DDG (Tech),
DGS	Shri.Pradeep Sudhakar,	Chief Ship Surveyor I/c
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Session Summary

The panel discussed the alternate technology options and its readiness level, The infrastructure needs and challenges in the supply chain, the policy changes and barriers that need to be resolved and finally arrive at a possible roadmap. The session "Green Ships & Smart Tech – Integrating Technology for Sustainable Seas" at the DGS-IMEI the Green Shipping Conclave 2025 under the chairmanship of Shri. Subba Rao, Managing Director, Sanmar Shipping and domain experts from Shipyards (Chowgule, L&T) Engine builder (Wartsila), ship owner (Kochi Water Metro) and National Administration (Denmark). Their insights significantly contributed to this important dialogue, helping to shape the strategies necessary for advancing green technology adoption in the maritime sector.

The session focused on fostering global partnerships to drive sustainable maritime practices and explored collaborative frameworks, shared technological advancements, and policy alignments that can accelerate the decarbonization of the maritime sector.





The panel discussed the alternate technology options and its readiness level, The infrastructure needs and challenges in the supply chain, the policy changes and barriers that need to be resolved and finally arrive at a possible roadmap. The following points were discussed.

1. The Technology readiness Level (TRL) is advanced as explained by the leading Engine Makers. There are challenges to overcome. We can see pilot projects using alternate fuel taken up. To make sure Technological developments are safe, the regulatory regime be are progressing well, the IMO and Class societies have developed Rules and Regulation for Gas Low Flash point for Methanol and Ammonia.
2. We need to consider, both newbuild and retrofit to achieve 5% uptake in alternate fuel by 2030. For newbuild, the decision is clear, we can have Joint development Projects by stake holders. For existing ships, there could be challenges.
3. We need to look at what we need to achieve in green shipbuilding and green technologies in short term and mid-term and then progress into long term basis.
4. Shipyard is the opinion that moving into fully alternate fuel propulsion would be an enormous engineering challenge. This would require wider supply chain collaborations.
5. Shipyard needs to focus of ship segment for alternate fuel newbuilding and same way the engine builder are focusing on alternate fuel ship type. Engine builder stated that their focus is alternate fuel engine required for Passenger vessel newbuild.
6. Efficient Shipbuilding process will cut down the timeline needed and hence energy requirements. Moreover, the GHG emission during the shipbuilding process and

manufacturing of Material, Machinery and Component manufacturing process will substantially cutdown emission.

7. Feasibility of Manufacturing the Material Equipment and Components of Green Technologies and retrofitting of Equipment and Components of Green Technologies in India needs to be explored since leading global engine builders and technology providers have presence in India.
8. The Availability of Maintenance and support service for the alternate fuel technology along the costal India, distant locations such as Lakshadweep, Andaman & Nicobar Island needs to be explored.
9. Smaller Coastal General cargo vessels are being built with Electric Propulsion system with Main generator and Battery or Hybrid Propulsion System with battery or shaft Generator.
10. For smaller passenger ferries, the design of vessel depends on the battery capacity and charging requirements.
11. For existing ship, it is limited with technology we already have. The bunker tanks and spaces on board for retrofitting need to be considered. However, the retrofitting alternate fuel for existing ship is option needs to be explored, such as, SCI has plans to retrofit Methanol propulsion system on board OSVs.
12. For alternate fuel uptakes, different ship types such as tugs, passenger vessel, cargo vessel will have different options.

Key Focus Areas:

- **Green Ship Design & Alternative Fuels:** Developing energy-efficient hulls, propulsion systems, and integrating LNG, hydrogen, and ammonia.
- **Smart Shipbuilding & Digital Innovation:** Using AI, big data, digital twins, and 3D printing for optimized construction and predictive maintenance.
- **Advanced Shipyard Infrastructure:** Automating fabrication units, building alternative fuel-ready facilities, and developing maritime clusters.
- **Regulatory Alignment & Workforce Training:** Aligning policies with IMO goals, streamlining certifications, and upskilling professionals through industry-academia collaboration.

Key Takeaways

- **Current Fuel Mix & Future Fleet Transition:** 99.17% of the fleet runs on conventional fuel, with only 0.83% using alternative fuels. Future orders show just 19% of vessels will adopt alternative fuels, highlighting the need to accelerate green fuel adoption.
- **Engineering & Supply Chain Challenges:** While India excels in hull fabrication, engineering and commissioning remains bottleneck. Green engine supply is delayed compared to demand, and India's battery technology still faces challenges related to size and lifespan.
- **Green Technologies & Hybrid Vessels:** Methanol, ammonia, and hydrogen are key green technologies gaining traction in India, with green hydrogen viewed as the future. Hybrid vessels, particularly successful in Europe, are seen as a transitional step toward fully green ships.
- **System Integration & Energy Efficiency:** Shipbuilding is evolving beyond commodity production, with a focus on system integration for safety due to alternative fuels. Energy savings can be achieved by optimizing production engineering, reducing build time, and improving emissions control.
- **Collaboration & Manufacturing Focus:** Strong collaboration among ship designers, clients, shipyards, equipment suppliers, and classification societies are essential. India's focus on manufacturing and adopting hybrid vessels aligns with global trends, as evidenced by Denmark's experience with digitalized shipping and retrofitting challenges.