Decarbonization Policies in Support of Sustainable Maritime Transport in Asia and the Pacific

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Coverage of Presentation

• Importance of Decarbonization and implication of Low Carbon Initiatives in Various Industries
• Related Technologies Used to Lower Carbon dioxide
• Current Policies and Practices for Decarbonization in Maritime Transport Industry
• Policy Guidelines for Improving Decarbonization in Asia Pacific Maritime Transport Region.

“Decarbonization” refers to the reduction or elimination of carbon dioxide from energy sources by using technologies, life cycle assessment, as well as mandatory and voluntary measures to lower carbon dioxide emission.
Importance of Decarbonization and Its Development

- Decarbonization in maritime transport closely connected to UN SDG Goals, especially Goal 13 “Climate Action” to improve global environment conditions by
  - strengthening resilience and adaptive capacity to climate related hazard
  - integrating climate change measures into national policies, strategies and planning;
  - improving education, awareness raising and human and institutional capacity on climate change mitigation, adaption, impact reduction and early warning;
  - implementing commitment undertaken by developed countries financially support developing countries to reduce greenhouse emissions;
  - promoting mechanisms for raising capacity for effective climate change related planning and management in least developed countries and small island developing states.
Asia Pacific and Climate Change

• In the Asia Pacific Context, several international organizations such as ASEAN, Asian Development Bank (ADB), Asia Pacific Economic Cooperation (APEC), BIMSTEC and UNESCAP have launched initiatives aimed at creating awareness of the “green” or “low carbon” agenda issues and to promote the participation of key stakeholders, such as governments and business.

• In maritime transport sector, most countries make reference to IMO’s Green House Gas Emission Goals
## Asia Pacific Countries (East Asia)

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<th>Countries</th>
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<th>Transport Sector</th>
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## Asia Pacific Countries (Southeast Asia)

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Decarbonization Initiative Options in Production Industries

1. Demand Side Measures
2. Energy Efficiency Improvements
3. Electrification of Heat
4. Hydrogen Usage
5. Biomass Usage
6. Carbon Capture
7. Other Innovations
Decarbonization Initiatives: Demand Side Measures

- **Decreasing demand** for industrial products to lower production and carbon emission
- **Examples**
  - Light weighting product to reduce demand for steel and cement
  - Increasing circularity of products through reuse and recycling programs
Decarbonization Initiatives: Energy Efficiency Improvements

- **Energy Efficiency Improvements** to cut fuel consumption for energy use (about 15 to 20% across sectors)
- **Examples**
  - Energy saving program
  - Using value stream mapping to reduce / eliminate non value added activities such as waiting time, inventory, over production, wastes, double handling, and non-value generated activities.
Decarbonization Initiatives: Electrification of Heat

• **Electrification of heat** to shift fossil fuel use to generate heat to zero carbon electrification. This method involves change in production process and cost of investment

• Examples
  • Electrify ethylene production requires installing electric furnaces and electrically driven compressors
Decarbonization Initiatives: Hydrogen Usage

- **Hydrogen Usage** to shift fossil fuel use to generate heat to zero carbon hydrogen. This method involves change in production process and cost of investment.

- **Examples**
  - Ammonia production can be decarbonized by replacing nature of gas feedback with zero carbon hydrogen.
  - Hydrogen Fuel Cell Vehicles
Decarbonization Initiatives: Biomass Usage

• **Biomass Usage** to shift fossil fuel use by using biomass. Biomass in solid (wood, charcoal), liquid (biodiesel, bioethanol), gaseous (biogas).

• Examples
  • Steel producers use charcoal as fuel and feedstock instead of coal
  • Chemical industries experiment with bionaphtha in chemical production.
  • Thailand industries use biomass to fuel the production of electricity, paper, and cement
Decarbonization Initiatives: Carbon Capture

- **Carbon Capture and Store (CCS) and Carbon Capture, Store, and Use (CCU)** can collect carbon dioxide from exhaust gases produced by production process and prevent from entering atmosphere.
- Carbon can be storage underground (CCS) or use as feedstock in other process through carbon capture and usage (CCU)

Source: DNV GL
Selected innovation and Management Technologies Used to Decarbonize GHG in Maritime Transport

1. Ship Energy Efficiency Management Plan (SEEMP)
2. Modernizing propulsion system and hull design
3. Carbon Capture, Utilization, and Storage (CCUS)
4. Vessels powered by electricity
5. Vessels powered by hydrogen
6. Vessels powered by biomass
7. Vessels powered by wind
8. Vessels powered by LNG/LPG and Methanol
9. Berth priority for green transport unit
10. Vessel Sharing
11. Supply and Demand Matching Tool (Uber Boat / Grab Boat)
Selected Innovative & Management Technologies: Ship Energy Efficiency Management Plan (SEEMP)

• SEEMP is an operational measure to improve energy efficiency by monitoring ship performance and implementing energy efficiency technologies on board.

• The management plan consists of four processes: Planning, Implementation, Monitoring, Self-Evaluation and Improvement.

• Fuel Efficient Operations Practices
  – Improved voyage planning
  – Weather routing
  – Speed optimization
  – Optimized shaft power
  – Optimized port operation
Selected Technologies:
Ship Energy Efficiency Management Plan (SEEMP)

• Optimized Ship Handling Practices
  – Optimum trim
  – Optimum ballast
  – Optimum propeller and propeller inflow considerations
  – Hull maintenance
  – Optimum use of rudder and heading control (autopilots)
  – Propulsion system
  – Propulsion system maintenance
Selected Technologies: Ship Energy Efficiency Management Plan (SEEMP)

• Other Practices
  – Waste Heat Recovery by using thermal heat loss from exhaust gases to generate electricity or additional propulsion power via shaft motor drive
  – Improved fleet planning and capacity
  – Energy monitoring
  – Adopting alternative fuel type such as biomass, electricity, hydrogen, win, solar, LNG/LPG
Vessels powered by alternative energy

Electric passenger and car ferry in Denmark

Vessel powered by Biofuel (forest residues and waste oil) by Stena Bulk
Vessels powered by alternative energy

LPG fueled Vessels BW
Gemini registered in UK

LNG fueled Vessels Isla
Bella at Port of Jacksonville, USA
Vessels powered by alternative energy

Methanol fueled Vessel in China

Methanol fueled Vessel in China
Vessels powered by alternative energy

Hydrogen Fuel Cell Vessel

Hydrogen powered Ship
On Demand Services UBER/GRAB boats

Uber Boat in UK

Grab boat in ASEAN
Collection of Practices of Decarbonization in Maritime Transport in Asia Pacific Region

1. Planning & Partnership
   - Establishing targets for GHG for shipping and shipping related activities based on IMO or beyond IMO targets
   - Forming partnership on lowering carbon emission in maritime transport industry
   - Forming working group on Carbon Capture & reuse group and using methanation technologies for zero emission ship fuels

2. Regulatory Measures
   - Monitoring shipping within water territory in compliance with emission control rules and expanding emission control ports and routes
   - Introducing shipping carbon tax (blue carbon tax) and multimodal transport carbon tax scheme
3. Promotional Measures

- Creating public awareness on lower carbon emission in shipping industry
- Improving ecological efficiency of transport operations such as reduction of power usage in operating process
- R&D projects
- Funding shipping companies to develop and conduct pilot trials and develop GHG emission program and propulsion and ship design
- Fee discounts and tax rebates for national flagged vessels voluntarily adopted energy efficiency design solutions, using LNG, LPG, methanol, ethanol, biomass, ammonia, electricity, solar, and other low carbon fuels
- Reducing port due for vessels that exceed IMO’s energy efficiency design index or using LNG
Collection of Practices of Decarbonization in Maritime Transport in Asia Pacific Region

3. Promotional Measures (continued)

- Energy labeling for new vessels
- Mix of fossil and non-fossil fuel and establishing emission standard
- Financial support and special loans
- Improving capacity of local shipbuilding and ship repair industry
- Technology transfer partnership with developed countries
- Establishing energy service companies to facilitate efficiency solutions
- Developing energy charging stations
- Constructing green ports and green coastal towns to become low carbon society
Policy Guidelines for Improving Decarbonization in the Asia Pacific Maritime Transport

1. Establishing shared value among public and private stakeholders to drive maritime transport decarbonization based on IMO guidelines and connect with other bodies such as world ocean council, trident alliance, global green freight action,

2. Setting up working group / partnership on sustainable low carbon maritime transport and transfer technologies

3. Trade & environment issues with special treatment for LDC

4. Coverage of regulatory and promotional measures, focusing on promotional measures to drive decarbonization
   - Improving ecological efficiency of transport operations
   - R&D and funding shipping companies to develop pilot trials
   - Financial and tax incentives
   - Improving capacity of local shipbuilding and ship repair industry
Thank You