Reducing carbon footprint in freight transport: Perspectives from ASEAN

Yerevan, Armenia
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Freight Transport climate impact is large and growing

8-10% of Global GHG Emissions

+45% by 2050

It’s URGENT

( Smart Freight Centre, 2022 )

Source: International Transport Forum Outlook 2021
Logistics and Transport sector is highly FRAGMENTED and COMPLEX sector (Emissions Reporting: Scope 1, 2, 3, Dynamic Supply Chain)

Reducing Carbon Footprint Challenges
$2.4 Trillion in funding is needed for transportation to achieve NET ZERO EMISSIONS by 2050

70% is for alternative or future FUELS

(BCG and GFMA, 2020)
Freight Transport GHG Emissions Reduction Levers

**Operational Efficiency (Mode)**

- **Freight Demand Growth is Managed**
  - Supply chain restructuring
  - Localization and nearshoring
  - Decentralization of production and stockholding
  - 3D printing
  - Dematerialization
  - Consumer behavior

- **Transport Modes are Smartly Used and Combined**
  - Increased use of rail
  - Increased use of short sea shipping and inland waterways
  - Modular road transport
  - Cargo bikes
  - Multi-modal optimization
  - Synchromodality

- **Fleets and Assets are Shared and Used to the Max**
  - Load optimization
  - Load consolidation and asset sharing
  - Reduce empty moves
  - Modular packaging and boxes
  - Open transport networks and warehouses
  - Increase storage density and energy efficiency

**Energy Efficiency (Fuels)**

- **Fleets and Assets are Energy Efficient**
  - Cleaner and efficient technologies
  - Efficient vehicles and vessels
  - High capacity vehicles and vessels / duo trailers
  - Driving behavior
  - Fleet operation
  - Fleet maintenance

- **Fleets and Assets Use Lowest Emissions Energy Source Feasible**
  - Electric / hybrids
  - Solar / Wind
  - Biofuels
  - Hydrogen
  - CNG/bio-LNG
  - Cleaner diesel
  - Fuel management

© Smart Freight Centre and ALICE-ETP based on A. McKinnon ‘Decarbonizing Logistics’ (2018)
Operational Efficiency (Modal Shift)

Figure 21. Examples of WTW emission intensity values for different types of freight transport, based on 2019 GLEC default factors.
Example of success initiatives

Road to inland barges: Commodities in Colombia

Annual savings: 228 less trucks & 36% less CO2

( Smart Freight Centre, 2023 )

Source: Trafìgura leadership story and WEF case study
Source map: Colombia SK
EXAMPLE of success initiatives

Road to rail (multimodal) in Thailand

Multimodal Transportation
- Converted 155,520 road trip to rail
- Reduced 47% of CO2e emissions
EXAMPLE of success initiatives

Rotterdam – Singapore Green and Digital Shipping Corridor

Aim to reduce GHG Emissions 30% by 2030
- Enabling the use of new fuels
- Digital trade lane
EXAMPLE of success initiatives

Multimodal connectivity in Rotterdam

Improved connectivity between the port and rail and inland waterways was condition of port expansion

( Smart Freight Centre, 2023 )

Source: Port of Rotterdam
EXAMPLE of success initiatives

Road to rail and short sea in China

Road to rail
- Reduced 56% of CO2e emissions
- 4.6% of IKEA’s carbon footprint in China
- Savings 600K Euro per year

Road to short sea
- 1200 containers per month

( Smart Freight Centre, 2023 )
# Energy Efficiency (Fuels)

<table>
<thead>
<tr>
<th>ENERGY SOURCE</th>
<th>ROAD</th>
<th>SEA</th>
<th>AIR</th>
<th>RAIL</th>
<th>LOGISTICS SITE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Fossil Fuel</td>
<td>- Diesel</td>
<td>- Heavy Fuel Oil</td>
<td>- Kerosene</td>
<td>- Diesel</td>
<td>- Diesel - LPG</td>
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<tr>
<td>(Petroleum)</td>
<td>- LPG</td>
<td>- Marine Diesel Oil (MDO)</td>
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<tr>
<td></td>
<td></td>
<td>- Kerosene</td>
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<td>- Diesel</td>
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<td>2. Fossil Fuel</td>
<td>-CNG</td>
<td>- LNG</td>
<td>- LNG</td>
<td>- LNG</td>
<td>- CNG - LNG</td>
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<td>(Natural Gas)</td>
<td>- LNG</td>
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<tr>
<td></td>
<td>- Renewable Diesel</td>
<td>- Bio LNG</td>
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<td>- Bio methane,</td>
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<td></td>
<td>- Bio CNG</td>
<td></td>
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<td>- Bio ethanol</td>
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<tr>
<td>4. Electric</td>
<td>- Electric (EV, Hybrid)</td>
<td>- Electricity</td>
<td>- Electricity</td>
<td>- Electric</td>
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<td>5. Hydrogen</td>
<td>- Hydrogen</td>
<td>- Hydrogen</td>
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<tr>
<td></td>
<td></td>
<td>- E-Fuels</td>
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</tr>
<tr>
<td>6. Other</td>
<td></td>
<td>- Solar</td>
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<td>- Solar</td>
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<td></td>
<td></td>
<td>- Wind</td>
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<td>- Wind</td>
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</table>

Options for FUEL and ENERGY

- Which way to go?
- Now or later?
- Current VS Future
- Pros VS Cons

**Operator**

**Shipper**

**Energy Provider**

**Policy Maker**

**Vehicle**

**Manufacturing**
Energy Efficiency (Fuels)

What makes an energy source “low” or “zero” emission

Fuel production & distribution + Fuel combustion = Fuel life cycle emissions

- Well-to-Tank
- Tank-to-Wheel
- Well-to-Wheel
ASEAN Countries: Climate Policy and GHG Emissions Reduction in Transport Sector
<table>
<thead>
<tr>
<th>Country</th>
<th>Climate policy and GHG emissions reduction in transport sector</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thailand</td>
<td>- 20% of GHG Emissions reduction by 2030</td>
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<tr>
<td></td>
<td>- Promote and electrification of transport and technical support for EV charging</td>
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<td></td>
<td>- 30@30 Policy</td>
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<td>- Tax incentive</td>
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<tr>
<td>Vietnam</td>
<td>- 9-27% of GHG Emissions by 2030</td>
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<td></td>
<td>- Promote a shifting from conventional fuels to biodiesel, natural gas and electric</td>
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<td>- Action plan for green energy</td>
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<tr>
<td>Indonesia</td>
<td>- 29-41% GHG Emissions mitigation by 2030</td>
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<td></td>
<td>- Promote biofuel (B20 and B30) and CNG</td>
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<tr>
<td></td>
<td>- Roadmap on low carbon emissions vehicle</td>
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<tr>
<td>Philippines</td>
<td>No mentioned any strategies or actions in transportation sector GHG Emissions reduction</td>
</tr>
<tr>
<td>Malaysia</td>
<td>- No mentioned any strategies or actions in transportation sector GHG Emissions reduction</td>
</tr>
</tbody>
</table>
THAILAND  : Transportation Sector Carbon Emissions Reduction Strategies
THAILAND : Target to reduce GHG Emissions by 20% by 2030 (Thailand NDC Roadmap 2021-2030 - Transportation Sector)

- Modal Shift, 23 MtCO2
- Renewable Energy Transition, 10 MtCO2
- Enhance Efficiency of Energy Utilization, 8 MtCO2

Office of Transport and Traffic policy and Planning, Ministry of Transport (2023)
**THAILAND : Target to reduce GHG Emissions by 20% by 2030 (Thailand NDC Roadmap 2021-2030: Transportation Sector)**

<table>
<thead>
<tr>
<th>TRAFFIC DEMAND MANAGEMENT</th>
<th>PROMOTE PUBLIC TRANSPORT</th>
<th>MODAL SHIFT</th>
<th>IMPROVE VEHICLE EFFICIENCY</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Traffic Demand Management</td>
<td>• Public Transport</td>
<td>• Double rail track infrastructure</td>
<td>• Vehicle efficiency</td>
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<tr>
<td>• Road user pricing</td>
<td>• Service improvement</td>
<td>• Promote short sea shipping</td>
<td>• EV/hybrid/Hydrogen infrastructure</td>
</tr>
<tr>
<td>• Parking pricing</td>
<td>• Infrastructure and operation system development</td>
<td>• Improve transport facility; multimodal</td>
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<tr>
<td>• Regulatory and physical</td>
<td>• Integrated ticketing</td>
<td>• Facilities/dry ports, Logistics centers, freight villages</td>
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<tr>
<td>• Restrictions on car use</td>
<td>• Incentives for public transport (PT) investments and operations</td>
<td>• Incentive; rail, multimodal</td>
<td></td>
</tr>
<tr>
<td>• Low-emission zones</td>
<td>• Campaigns public transport promotion</td>
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<td>• Tax, incentive</td>
</tr>
<tr>
<td>• Empty hauling reduction</td>
<td></td>
<td></td>
<td>• Tax Incentives, rebate for efficient vehicle</td>
</tr>
</tbody>
</table>

**Regulation Support**

**Collaboration among all stakeholders**

**Improve GHG Emissions Measurement, Reporting and Verification System**

Office of Transport and Traffic policy and Planning, Ministry of Transport (2023)
THAILAND: Transportation Sector NDC Roadmap to achieve 20% GHG reduction by 2030 - a pathway to NET ZERO Emissions -

Implement Thailand Roadmap and NDC Action Plan Transport sector (2021-2030)

- 2023
  - Rail Based Infrastructure development
  - Exercise CO2 Tax

- 2024
  - Exercise CO2 Tax

- 2025
  - EV Truck
  - Modal shift strategy

- 2026
  - EV Bus (Public Transport)

- 2027
  - Port Infrastructure
  - Multi-modal transportation

- 2028
  - Renewable
  - EV, car, truck, motor-cycle

- 2029

- 2030
  - GHG Reduction 20%

- 2050
  - Carbon Neutrality

- 2065
  - NET ZERO

Office of Transport and Traffic policy and Planning, Ministry of Transport (2023)
1. Freight transportation play an important role in global economy, making it a significant contributor to global emissions

2. GOVERNMENT play an important role to accelerate GHG emissions reduction in transport on Regulatory, Technology, Funding

3. SHIPPER can influence the CHANGE
   • Choose mode of transportation
   • Structure Supply Chain Network
   • Select a carrier and LSP
   • Work with Government, Associations, Customer

4. GHG Emissions reduction in transport sector need collaboration among all stakeholders
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