Emissions scenarios for international shipping from an energy technology perspective

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Paris, 20 November 2017
International Energy Agency (IEA) and the Mobility Model

- "The IEA is an autonomous organisation which works to ensure reliable, affordable and clean energy for its 29 member countries and beyond"
  - **Increasing cooperation with non-members, mainly BRICS**

- IEA mobility model (MoMo) used for most transport analysis

- Recently the IEA is more involved in the area of shipping
  - Energy Technology Perspective publication
  - Tracking clean energy progress publication
  - Involvement IMO climate negotiations
To meet the ambition of the Paris Agreement, energy sector CO$_2$ emissions need reach net zero in the second half of the century.
Decarbonizing Transport is a formidable challenge

Transport accounts for 28% of global final energy demand and 23% of global carbon dioxide (CO₂) emissions from fuel combustion. In 2015, international shipping accounted for 2% of global CO₂ emissions from fuel combustion.

Decarbonising long-distance transport modes – in particular aviation, heavy-duty road transport and shipping – is most challenging.

Decarbonising the international shipping sector requires:

• major improvements in efficiency
• rapid transitions in the energy mix to low-carbon fuels

Increased policy efforts are necessary to support the reduction of GHG emissions
A broad portfolio of measures is needed

WTW GHG emissions in international shipping (freight) in the 2DS and B2DS relative to RTS

The largest share of GHG abatement in shipping results from operational and technological efficiency improvement combined with wind assistance in the 2DS and B2DS.
In earlier years the contribution of retrofits to reducing GHG emissions is significant.
Why is LNG not included?

Switching 50% of the international Marine bunker fuel mix to LNG reduces GHG emissions by only 10%
How is hydrogen addressed in the 2DS and B2DS?

H₂ could play a role in the future of international shipping. Technologically feasible.

Barriers:

- High costs: limited technology learning and economy of scales
- Limited prospects of growth H₂ demand in other sectors
- Need for low-carbon hydrogen production
- Global refueling infrastructure network needed

H₂ is not included in the MoMo shipping model, but considered as a future option
IMO policy needs: short-term measures (2018-2023)

- Raise the ambition of the EEDI, and implement changes as soon as possible
- Fast track the development of an operational efficiency standard
- Develop a mechanism introducing a CO$_2$ price for maritime fuels taking into account the lifecycle performance of energy carriers
  - making conventional fuels more expensive and low carbon fuels more cost competitive
- Start the development of a low-carbon fuel standard or mandate
- Expand port-based incentives
IMO policy needs: medium-term measures (2023-2030)

• **Further raise the ambition of the EEDI**, preferably requiring new ships to be 50-60% more efficient by 2030 compared with the EEDI baseline

• Implement and strengthen an operational efficiency standard

• **Fully implement a CO$_2$ pricing mechanism**

• **Fully implement a low-carbon fuel standard or mandate**, aiming to have a share of 5-10% of low-carbon fuels (advanced biofuels or better) in the marine fuel mix by 2030
<table>
<thead>
<tr>
<th>Transport mode</th>
<th>2DS</th>
<th>B2DS</th>
</tr>
</thead>
<tbody>
<tr>
<td>2- and 3-wheelers</td>
<td>99%</td>
<td>&gt;100%</td>
</tr>
<tr>
<td>LDVs</td>
<td>73%</td>
<td>92%</td>
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<tr>
<td>Trucks</td>
<td>70%</td>
<td>91%</td>
</tr>
<tr>
<td>Bus</td>
<td>65%</td>
<td>93%</td>
</tr>
<tr>
<td>Rail</td>
<td>87%</td>
<td>&gt;100%</td>
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<tr>
<td>Aviation</td>
<td>69%</td>
<td>85%</td>
</tr>
<tr>
<td>Shipping</td>
<td>54%</td>
<td>71%</td>
</tr>
</tbody>
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Carbon reduction rates differ by transport mode