Environmental Aspects of Short Sea Shipping and Intermodal Logistics Chains

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Introduction and Background

- There is an increasing pressure on the environment caused by transport, particularly rapidly-growing road and air transport.
Freight Transport in EU

Source (DG Energy & Transport)

- Mode of transport
  - Road
  - Rail
  - Inland waterways
  - Short sea Shipping
  - Oil pipelines

- Billion tonne-km transported in 2000 in the EU
  - 1348
  - 249
  - 125
  - 1270
  - 85
Introduction and Background

- The Common Transport Policy advocates integrated transport systems and a shift to short sea Shipping

- The European Commission has introduced a regulation to implement the TENs-T programme, including “Sea Motorways” which will also lead to a modal shift
Environmental Impact

- It is important to understand the environmental aspects associated with the shift of freight from road to sea:
  - e.g. Improved air quality, decreased noise, etc. on land, but
  - an increased air pollution, etc. in the coastal environment.
Environmental Impacts of Transport

- Some impacts are common to all modes of transport and therefore comparisons can be made: e.g.
  - Air emissions - local and global
  - Energy consumption
  - Noise
- There are other areas where comparisons should be made e.g.
  - Accidents
  - Congestion
  - Waste
Environmental Impacts of Transport

- Other impacts are very specific to the mode of transport and therefore direct comparisons are very difficult:
  
  - e.g. Contamination by antifouling compounds of ships
Air pollution

- CO2 emissions from transport increased by 15% between 1990 and 1998 (TERM 2001).

- 1990 and 1998, Generally, emissions from transport are falling (NOx, VOC).

- Transport is responsible for 24% of the EU’s total man-made emissions of CO2 (84% from road).
<table>
<thead>
<tr>
<th>In g/tonnekm</th>
<th>CO</th>
<th>CO₂</th>
<th>NOₓ</th>
<th>SO₂</th>
<th>CH₄</th>
<th>nm-VOC</th>
<th>PM10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road transport</td>
<td>0.2 – 2.4</td>
<td>50 – 333</td>
<td>0.24 – 3.6</td>
<td>0.03 – 0.4</td>
<td>0.2 – 0.9</td>
<td>0.025 – 1.1</td>
<td>0.005 – 0.2</td>
</tr>
<tr>
<td>Rail transport</td>
<td>0.02 - 0.2</td>
<td>9 - 102</td>
<td>0.07 - 1.9</td>
<td>0.04 - 0.4</td>
<td>0.02 - 0.9</td>
<td>0.01 - 0.1</td>
<td>0.01 - 0.08</td>
</tr>
<tr>
<td>Maritime transport / SSS</td>
<td>0.02 - 0.2</td>
<td>7.7 - 31</td>
<td>0.11 - 0.72</td>
<td>0.05 - 0.51</td>
<td>0.04 - 0.08</td>
<td>0.01 - 0.02</td>
<td>0.002 - 0.04</td>
</tr>
<tr>
<td>Inland navigation</td>
<td>0.11</td>
<td>33 – 81</td>
<td>0.26 – 1.45</td>
<td>0.04</td>
<td>-</td>
<td>0.03 - 0.05</td>
<td>0.02</td>
</tr>
</tbody>
</table>

Energy Consumption
## Energy consumption per transport mode

<table>
<thead>
<tr>
<th>Mode of transport</th>
<th>Energy use in MJ/tonne-km</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road</td>
<td>1.8 - 4.5</td>
</tr>
<tr>
<td>Rail</td>
<td>0.4 – 1</td>
</tr>
<tr>
<td>Maritime transport</td>
<td>0.1 - 0.4</td>
</tr>
<tr>
<td>Inland navigation</td>
<td>(0.42-0.56)</td>
</tr>
</tbody>
</table>

Source: CSD, 2001
Energy Consumption

- Energy consumption by the transport sector has increased by 47% since 1985.

- There has been no increase in the energy efficiency of freight transport by road and little change in rail or shipping.

- Air transport remains the least energy efficient mode of transport despite technological advances (TERM 2001).
Noise

- Noise from rail and shipping, are generally considered to be less annoying than that of road (trucks)

- From an intermodal comparison perspective, the noise levels produced by shipping can be considered as insignificant

(Realise Project 2003)
Accidents

- The environmental and social impacts of transport accidents should be considered e.g. fuel or freight spills

- However it is very hard to assess and compare the impacts
Congestion

- Congestion is mainly associated with road transport and is environmentally and socially damaging.
- Can amplify the environmental impacts e.g. exhaust on congested roads
- It is difficult to assign the damage at modal hubs with any one transport mode, e.g. port/road
Waste

- Currently no figures available to help make a comparison!
Infrastructure
Infrastructure – Land-Use

- Transport infrastructure is increasing damaging the Land Environment
- The length of the EU motorway network has increased by more than 70% since 1980
- During the same period conventional railway lines and inland waterways have fallen by about 9% (TERM2001).
- The impact is extremely difficult to assess, particularly when looking at intermodal nodes e.g. Ports.
Possible Impacts of Sea Motorways

- There could also be a considerable improvement to the marine environment by nature of:
  - Reduction in the environmental “footprint” of shipping.
  - Well-defined Sea motorways allow for effective and efficient environmental monitoring, permitting the rapid detection of environmental change.
Possible Impact of Sea Motorways (2)

- Design of new shipping specifically designed for the routes, with features that reduce the environmental impact of shipping.
- Modern Port developments techniques and design (new and upgrading of facilities) can contribute to a reduction in pollution by various means e.g. efficient emissions control, effective waste disposal etc.
Possible Impacts of Sea Motorways (3)

- The efficient policing and enforcement of international, national and local environmental regulations
Conclusions

- Currently there is no consensus on the overall comparative environmental impacts of the various modes of transport
- **Emissions** – Very complicated picture depending on chemical emission. Railways lowest

- **Water Pollution** – Road and rail lowest polluting - SSS and inland waterways highest polluting
Conclusions

- **Land Pollution** SSS and inland waterways least polluting - Road highest polluting

- **Noise Pollution** SSS and inland waterways insignificant – Road and Rail highest levels

- **Land use for Infrastructure** SSS and inland waterways least use- Road highest use
Conclusions

- There is an urgent need for a methodology for the meaningful comparative environmental impact method across all modes of transport
  - Realise project has developed an intermodal comparative tool.

- There is an urgent need for integrated transport plans, particularly looking at increases in rail and shipping
References

- TERM 2001 and 2002
  [http://reports.eea.eu.int/term2001](http://reports.eea.eu.int/term2001)
- Eurostat [http://europa.eu.int/comm/eurostat](http://europa.eu.int/comm/eurostat)
- SEAM Project [www.mettle.org/seam](http://www.mettle.org/seam)
- Realise Project [www.realise-sss.org](http://www.realise-sss.org)
- [www.amrie.org](http://www.amrie.org)