Technology Fact Sheet

Modal shift in freight transport[i] /http://climatetechwiki.org/technology/modal/

General description

The demand for freight transport is strongly coupled to economic activity, and in many countries growth of demand outstrips GPD growth (Essen, 2009). Freight can be transported by several modes, including road, rail, water, air, pipeline and non-motorised. In 2005, the freight transport sector was responsible for 2.8 GtCO2-eq including international shipping (IEA, 2009).

Looking at modal shift between different modes of transport, one has to consider that, to a certain extent the different transportation modes serve different transport markets. The average distance for cargo travelling by ship is much larger than for road and rail, while the value per ton of cargo can be a order of magnitude lower (NTC, 2010; Mao, 2009). The preference for road transport for certain goods can also be explained by the need to be flexible and the trend towards 'delivery on demand'.

However, due to the environmental and social benefits of rail and water-based transport compared to road, many countries are adopting policies to induce a modal shift. For example the EU is prioritizing 'motorways of the sea' and international freight rail connections (DG-TREN, 2009).

Implementation

The modal split in freight transport varies greatly by region. In North America, China, India and the former Soviet Union, large countries moving large amounts of raw materials, the majority of transport (measured in ton-kilometers) takes place by rail, while in most other regions its share is relatively modest (IEA, 2009). In the EU and Japan water-borne freight has a comparable share to road, (Larsson, 2009; Mao, 2009).

Implementation barriers

One of the basic barriers for a modal shift is the lack of direct access of companies to the railway network or to waterways. Thus, direct train or ship services are rare. Pre- and post-haulage by truck is needed to provide a door to door freight transport service. This is also called multi-modal or combined transport, and access to multimodal terminals and their connections to other terminals.

Besides, the access to terminals, other supply side indicators like the trip duration, reliability, flexibility or transport prices are also relevant for the mode choice decision.

In general a modal shift towards water borne - and railway transport gives rise to longer transport times and thus the necessity of bigger local stocks. In addition, the need for pre- and post-haulage for water borne- and railway transport can lower the environmental benefit of these transport modes, depending on the distance over which the road transport has to take place. In addition, freight rail can face a significant set of capacity problems and so rail has only a limited ability to expand market share.

Another important financial barrier for modal shift is the high investment required for (rail) infrastructure and intermodal facilities (NTC, 2008).

GHG emissions reduction (megatons CO_2 equivalent)

Freight traffic modeling in Belgium revealed an energy consumption decrease of 23-25% (Belgium, SUA).

Impact on development priorities:

a) social

- Improved traffic safety;
- Reduced congestion;

b) economic

- Reduced expenditures for maintenance and repairs of road infrastructure (VTPI, 2010);
- Increased energy security by decreasing dependence on fossil fuels import;
- Improved balance of payments.

c) environmental

- Improved local air quality through lower emissions of NOx and particulate matter;
- Reduce noise;
- Conservation of biodiversity by reducing the land areas needed for road transport.

d) Other

Investments – no data available.

Water and rail transport are often competitive with road-based transport and net benefits for society would accrue (VTIP, 2010; Walker et al., 1999).

Operation and maintenance costs– no data available.

GHG reduction costs- less than 100 $/ton CO_2 (Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, 2007).

Technology lifetime– no data available.

Other

Source: http://climatetechwiki.org/technology/modal

[i] This fact sheet has been extracted from TNA Report - Technology Needs Assessment for climate change mitigation - Republic of Moldova. You can access the complete report from the TNA project website **http://tech-action.org/**