

Summary

Marginal external costs of port operations

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The Norwegian Government promotes a shift from road to rail and maritime transports in long-haul freight transportation. If realized, this objective will spur increased activities in Norwegian ports. As a great number of Norwegian ports are located in proximity to human settlements, growth in maritime transports can be associated with adverse effects such as noise disturbance. This report identifies externalities caused by port operations, and examines damage costs of a marginal increase in port operations.

External costs of port operations

The Norwegian Government promotes a shift from road to rail and maritime transports in long-haul freight transportation. This strategy is consistent with growth in cargo handling and other activities in Norwegian ports.

External costs – also known as negative externalities – are negative economic consequences of one agent's activities, faced by unrelated third parties. The current study on the external costs of maritime and rail transports (Magnussen et al., 2015) concludes that the external costs of multimodal transports on water are low compared to unimodal road transport. However, the study pays little attention to the external costs of port operations. This could potentially be a drawback, as a great number of Norwegian ports are located in urban areas. Port operations therefore have a greater damage potential than maritime operations at sea, far from where people live.

An overview of external costs

Miola et al. (2009) have undertaken an extensive classification of externalities associated with maritime transports. They identify 181 adverse effects in total, of which 152 occur in port. Emissions to air, water, and ground, and noise and vibrations are found to be most important for ports. Port expansion may impact on biodiversity and habitat.

Miola et al.'s study shows that a complete mapping of externalities due to port activities is demanding. We have therefore selected some externalities that are examined in more detail, both because of what is currently on the agenda of European seaports and because of data limitations. Table S.2 provides an overview of the externalities which we have examined.

Table S.2: An overview of external costs considered in this report

Externality	Application to economic analysis
Emissions to air <i>CO₂, NO_x, PM and SO₂ per ton (container) loaded/unloaded or per call</i>	Section 3 reports a regression analysis that can be applied to estimate changes in emissions by a marginal change in cargo handling.
Noise	Section 4 provides a simple tool for calculating noise emissions of container handling, and the number of people influenced by port noise.
Dispersion of contaminated sediments	We advise treating dispersion of contaminated sediments as a non-monetized effect.
Accidental spills (oil and chemicals)	We consider accidental spills in port to be covered by the current external costs of maritime transport, presented in Magnussen et al. (2015).
Injuries and fatalities	We consider injuries and fatalities in port to be covered by the current external costs of maritime transport, presented in Magnussen et al. (2015).
Impact on landscape, natural environment, cultural environment, and outdoor life	We advise using the current methodology for evaluating the impacts of infrastructure development on landscape, natural environment, cultural environment, and outdoor life, as described in the Norwegian handbook for economic analysis.

Is maritime transport still the eco-friendly mode choice, even when port externalities are considered?

This report identifies significant external costs associated with port operations, which contribute to lower the environmental competitiveness of maritime transport. In spite of this, maritime transport is still found to be the most sustainable mode. This is illustrated by comparing the marginal external costs of different modes available for freight transport between Oslo and Rotterdam. Figure S.1 compares the alternatives where cargo is transported on board i) a ship (lite stykkgodsskip), a train (elektrisk tog), or a truck (stor lastebil). The figure shows that the external costs in port (utslippskostnader i havn) – predominately made up of costs due to emissions to air – significantly add to the external costs of maritime transports. The cost increase is, however, too small to make an impact on the ranking of the three alternative modes.

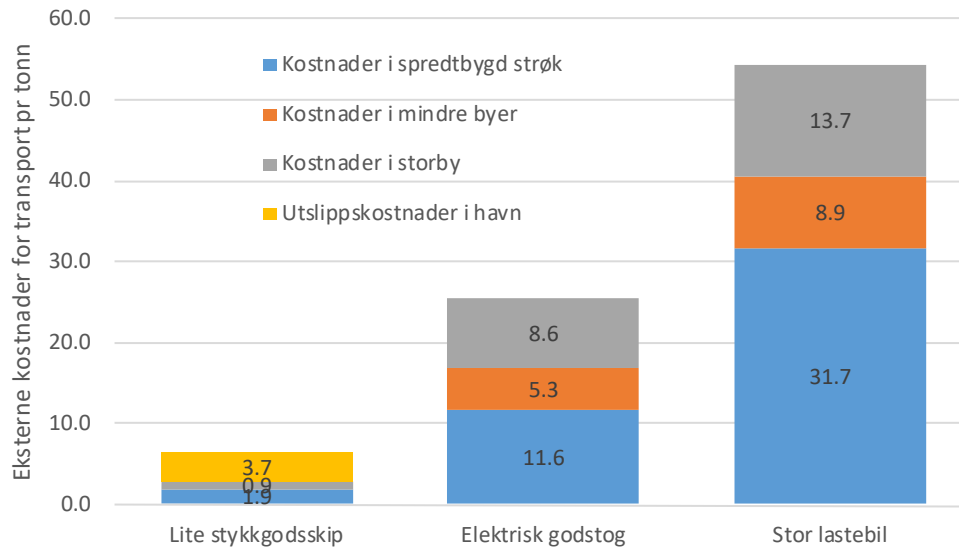


Figure S.1: The external costs associated with the marginal ton transported on a truck, train or a general cargo ship (2500 Gross Tonnage) between Oslo and Rotterdam, when the external costs in the port of Oslo is included. NOK per ton.

Further research

This report studies external costs of port operations, and concludes that emissions to air from ships at berth stands out as the key cost. However, port externalities constitute a complex and vast research area, and this report is by no means exhaustive. We urge to examine and quantify other external cost that have received less attention herein, and to reproduce and to quality ensure our results. Moreover, we are not familiar with terminal studies for rail and trucks in Norway, which should be considered if port externalities are to be embedded in the overall framework for economic analysis of the Norwegian transport sector.