The External Cost of Speed at Sea: An Analysis Based on Selected Short Sea Shipping Routes

Xavier Martínez de Osés and Marcella Castells*
Universitat Politècnica de Catalunya

Abstract
According to the mid-term review of the EU White Paper on Transport, Short Sea Shipping (SSS) is expected to grow at a rate of 59% (metric tonnes) between 2000 and 2020. If we consider that the overall expected increase in both freight exchanges and volume is 50%, sea transport is one of the most feasible alternatives to reduce traffic congestion on European roads. Maritime transportation may compete with road transport as far as certain traffics are concerned, but only when assuming external costs. This paper analyzes several intermodal transport chains involving a sea leg by comparing the effect of pollutant emissions from different ship types and road transport in terms of potential external cost savings. The translation of these emissions into environmental costs shows, for certain conditions, savings in the case of sea transport that would justify the use of an environmental bonus to promote the sea option.

Key words: Short Sea Shipping, Southwest Europe, External Costs, Environmental Bonus

1 Introduction
The European transport policy undertakes to enhance sustainability in transport in order to boost economic activities in the whole European Union. The reduction of pollutant emissions and a better balance among transportation modes to cut road congestion are the pillars of the above policy. Although most developed countries use their national road network to transport freight despite its high cost, pollutant conditions and high rate of fuel consumption per cargo unit (Baird 2004), some public and private stakeholders have began to use freight rail and maritime options more extensively in search for a better alternative.

Maritime transport is one of the least polluting modes of transportation. Additionally, it contributes to the reduction of traffic congestion on European roadways. In particular, short sea shipping is considered the fastest way to sustainability although it could pose problems such as higher traffic growth rates and a subsequent increase of pollutant emissions in port areas. On the other hand, another advantage of ships over trucks and trains is that vessels need less fuel as a result of the relatively low...
speeds at which they travel (Mulligan and Lombardo 2006). Nevertheless, the IMO MEPC has noted that although sea transport is a fuel-efficient alternative, special attention must be paid to the issue of greenhouse gases (Burgel 2007).

Today increasingly faster ships are in a position to compete with trucks. However, the greater power demand and consumption rate of the former result in higher pollutant emission levels which, in turn, lead to the loss of their environmental advantage over road transport. This problem is analyzed below.

The present paper is divided into four sections. First, a brief review of previous research in this field by European research groups is presented. Second, environment regulations applied to transport policies and external impacts are defined. Next, the external costs of a particular short sea shipping route in SW Europe are quantified and evaluated. Finally, the conclusions propose an environmental bonus based on external cost savings associated with the use of the short sea alternative instead of road-only transport.

2 Previous Research
In 2005 the TRANSMAR research group, which belongs to the Technical University of Catalonia, initiated the INECEU\textsuperscript{1} project which, after an exhaustive study, suggested alternative intermodal lines to road transport in SW Europe. Keeping in mind the figures of road traffic crossing the Pyrenean borders, the group analyzed most of the volumes moved between France, Italy, Germany and Spain.

Regarding the nature of the cargo, we should note that the South and South-East of the Iberian Peninsula, together with the Valencia coast, are big producers of fruit and vegetables, manufactured and canned food, and alcoholic drinks. These products are some of the largest cargo groups exported from Spain. Traffic also involves the transport of solid bulk such as building materials or scrap iron, along with oil and chemical products from ports near oil refineries. The study recommended to avoid using trucks for carrying dangerous or toxic substances and use ships with specially designed containers, or Ro/Ros, instead, which will provide a benefit to society as a whole. This study was further extended in other projects in 2007, where the environmental efficiency of several ships with different output power engines was assessed. Source data have been obtained from the REALISE\textsuperscript{2} project, which concluded that higher speeds imply higher fuel consumption rates and result in increased pollutant emission levels. On the other hand, fast ships have a limited cargo capacity; in consequence, they are extremely environmentally inefficient in terms of fuel demand per tonne of freight.

\textsuperscript{1} Intermodality between Spain and Europe. Project funded by the Spanish Ministry of Transport (2005).