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Effects of more stringent sulphur requirements for sea transports

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Abstract

In 2008 the International Maritime Organization (IMO) decided on more stringent requirements from 2015 for airborne emissions of sulphur dioxide from sea transports in the sulphur emission control areas (SECA). The European SECA comprises the Baltic Sea, the North Sea and the English Channel. The paper contains an overview of the European studies that have been carried out to investigate the impacts of IMO´s more stringent sulphur requirements. All studies were carried out after IMO´s decision in 2008 (which means that the decision was taken based on other reasons). The studies focus on different aspects but all of them estimate how IMO´s stricter requirements will affect the sea transport costs. The Swedish impact studies are described in particular: in the 2009 study the national transport model Samgods was used and in 2013 both the Samgods model and the agent-based simulation model Tapas. Impacts on the choice of transport chains, routes and ports are calculated. The results indicate that shippers to some extent can reduce the increase in transport cost by transferring flows from the Swedish east coast to the Swedish south and west coast, the Norwegian coast and the land-based route via Denmark. Modal back shifts from sea to rail and road occur. These shifts are modest, especially if higher prices for diesel and higher rail track fees are assumed on top of more stringent sulphur requirements in the SECA. One important question is to what extent the increases in costs that are due to more stringent requirements can be compensated for by improved efficiency of the transports, such as the exploitation of economies of scale.

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Keywords: sea transports; European sulphur emission control area (SECA); impact analysis; freight transport model; modal split; route choice

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1. Introduction

In 2008 the International Maritime Organization (IMO) decided on more stringent requirements for airborne emissions of sulphur dioxide from sea transports in the sulphur emission control areas (SECA). The European part of SECA comprises the Baltic Sea, the North Sea and the English Channel. The SECA along the coast of North America and Puerto Rico is not addressed in this paper. IMO`s decision implies a larger difference between the requirements inside and outside the SECA. (See Table 1.)

Ship owners can *apply* different strategies to meet IMO's stricter requirements in the SECA from 2015. Three possibilities are: 1) to use 0.1 % marine gas oil that is more expensive than the currently used heavy fuel oil, 2) to switch to cleaner energy sources such as liquid natural gas or methanol, or 3) to use scrubbers to reduce the sulphur emissions. In the short term, all strategies lead to higher costs for sea transports. Shippers have the option of adapting transport chains that include sea transport by changing route and/or mode or, in the longer run, by moving production facilities. The shift from sea to land is sometimes referred to as *modal backshift* because it goes in the opposite direction to the goal in the *EU's White Book* (COM (2011)) to shift long distance road transports to more environmental friendly transports. It is, however, not obvious how developments in the market for marine fuels will influence diesel prices in general, nor is it clear how fuel taxes, infrastructure fees and regulations for the land-based modes will develop. Possible effects of IMO's more stringent sulphur requirements for sulphur emissions in the SECA have been studied in the countries that are most affected.

Table 1- IMO's highest permitted sulphur content in marine fuels inside and outside SECA

	Within SECA	Outside SECA
Today	1.5 weight %	4.5 weight %
From 2015	0.1 weight %	
From 2020/2025		0.5 weight %

Other related topics are the plans for stronger requirements for nitrogen oxides for new vessels, and different economic measures related to carbon dioxide emissions are being discussed to internalize the external costs caused by sea transports. These are, however, not addressed in this paper.

This paper focuses on the calculation of transport impacts on freight transports in two Swedish government commissions. Key questions studied are to what extent sea transports are redistributed from the SECA to the seas outside of SECA and to what extent modal shifts from sea to rail and road can be expected. The Swedish rail share of around 22 % is about twice the average rail share of the 27 EU member states when the ton-kilometer for all modes are included. On the other hand, Sweden has no inland waterway transports. In addition, the effect on the choice of transport chains, routes and ports is calculated.

The structure of the paper is as follows. Section 2 looks at studies that have been commissioned to assess the impacts of IMO's stricter requirements in the SECA. Section 3 addresses the Swedish impact analyses of 2009 and 2013. The national freight transport model Samgods that has been used in both analyses is presented. Results from the Samgods analyses of 2009 and 2013 and two case studies that use the activity-based model Tapas are discussed. In section 4 some conclusions are drawn.

2. Studies performed

National and international impact studies have been carried out by transport ministries and public agencies, by associations of ship owners, and in research projects. The main focus has been on the impact in the respective country or region and conditions differ due to the country's location, volume and structure of transport demand, modal split, etc.

The Finnish Ministry of Transport and Communication commissioned the Centre for Maritime Studies at Turku University to study the impact of IMO's stricter sulphur requirements on the maritime industry and the manufacturing industry (Finnish Ministry of Transport and Communication (2009)). The health effects of using cleaner fuel were also estimated. Potential impacts in the form of modal shifts were not quantified. Four years later, the Finnish