



## **Integrated Assessment of an Emission Trading Scheme to reduce emissions from international shipping and the related environmental impact over Europe**

Nele Veldeman (1), Stijn Janssen (1), Felix Deutsch (1), Kris Vanherle (2), Pieter Lodewijks (1), Jan Duerinck (1), and Paul Campling (1)

(1) VITO, Boeretang 200, 2400 Mol, Belgium, (2) Transport & Mobility Leuven, Diestsesteenweg 57, 3010 Leuven, Belgium

Shipping transports the majority of goods traded internationally and although it is acknowledged as being the most efficient and the most environmentally friendly mode of transport it is also an important contributor to anthropogenic emissions.

This study assesses the use of an Emission Trading Scheme (ETS) for the year 2020 to reduce the emissions from international ships entering European Community ports. Additional costs and benefits of including the maritime sector into a land-based ETS for  $\text{NO}_x$  and  $\text{SO}_2$  are quantified.

An analysis of  $\text{SO}_2$  emission projections and the expected costs to abate  $\text{SO}_2$  emissions in the year 2020 indicated that an ETS or any other market based instrument to reduce  $\text{SO}_2$  emissions from shipping was not required, because the current and upcoming legislation to reduce  $\text{SO}_2$  emissions will have a significant impact and result in very low  $\text{SO}_2$  shipping emissions by 2020. The situation for  $\text{NO}_x$  emissions, however, is different. In 2020 the projected maritime  $\text{NO}_x$  emissions in European seas is expected to be 20% higher than land based industrial installations. We carried out a full integrated modelling assessment starting from emission trade simulations, spatial disaggregation of the emission trading outcome, an air pollution dispersion modelling with the BeIEUROS model for the whole of Europe and a GIS analysis to assess the environmental impact on population and sensitive ecosystems. The effect of different ETS pricing scenarios and ETS set-up (all shipping versus restricted shipping emissions) on primary and secondary pollutant levels across Europe is presented.

A monetary assessment using the Clean Air For Europe (CAFÉ) approach indicated that although the total volume of emissions is substantially reduced if an European ETS including land based IPPC emissions and shipping emissions from all EU waters is set up, the actual effectiveness of incorporating only the emissions from ships in the port context and the territorial seas of EC Member States is greater. The reason for this is that the majority of the  $\text{NO}_x$  emissions reduced in the EU waters are too far from land to make an environmental impact.

The principle recommendation from the study is to have a geographically restricted and compulsory ETS for  $\text{NO}_x$ . This will provide market based incentives for land based IPPC installations and international shipping to implement emission abatement technologies in order to improve the health of EU citizens and ecosystems in the coastal areas of Europe.