

New model for estimating ship emissions to guide policy

EU-supported research has established a new model to calculate air pollution emissions from ships. Its calculations could create a database that lists emissions per ship type and size as well as by country.

Emissions from ships have increased alongside the growth in international trade. Without the intervention of legislation, EU maritime emissions of both nitrogen oxides and sulphur dioxide within EU seas would have stood to become higher than emissions from all land sources combined by 2020. In November 2002, the European Commission adopted a strategy to reduce atmospheric emissions from seagoing ships¹.

As part of the EX-TREMIS project², the research constructed a database of ship emissions for all 27 EU Member States for the years 1980-2005. It also included projected emission data for up to the year 2030. It covers all major pollutants, such as CO₂, nitrogen oxides, sulphur dioxide, carbon monoxide, methane and small and fine particles suspended in the air (PM).

The model collected three types of data: the characteristics of the ships, such as loading capacity and engine type, the activity of the ships in terms of the journeys and amount of cargo transported, and the emissions of the ships. Emission data was collected both in terms of emissions produced by fuel (i.e. CO₂ and sulphur dioxide) and emission produced by the engines and technology onboard (i.e. nitrogen oxides, PM and carbon monoxide). Data were obtained from reliable sources, such as EUROSTAT and the Intergovernmental Panel on Climate Change (IPCC).

The study presented preliminary results on ship emissions. For the year 2005, Germany, Spain and the Netherlands produced some of the largest ship emissions whereas new Member States had relatively low emissions. The combination of Germany, Spain, the Netherlands, UK, Italy, Belgium and France represented more than 80 per cent of the EU's emissions for maritime transport. An analysis of the different elements of a ship's journey indicated that the cruising phase produced 99 per cent of emissions for main engines and 80 per cent for auxiliary engines.

The results also clearly demonstrate the effect of regulations on the maximum sulphur content allowed in fuels adopted by the International Maritime Organisation (IMO) and the EC. For example, from 2007 onwards there is a substantial drop in the amount of sulphur dioxide emissions per kWh produced by ship activity in several countries. The data also indicated an increase in PM emissions per kWh starting around 1985 with an average increase of 18 per cent between 1980 and 2010. This is thought to be due to a change in fuel for the auxiliary engines and in the main engines for maneuvering activities from diesel oil to heavy fuel oil at the end of the 1980s.

The study provides both European and national policy makers with a methodology for estimating maritime emissions to create targeted reduction strategies. Further research to investigate emissions on a 'per port' basis has been suggested, although this may prove to be time consuming.

1. See <http://ec.europa.eu/environment/air/transport/ships.htm>
2. EX-TREMIS (Exploring non road Transport EMISsions in Europe) was financed by the Institute for Prospective Technological Studies (ITPS) of the EU's Joint Research Centre. See www.ex-tremis.eu/about.htm

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