

Fresh Air for Port Cities

Research project explores ways to reduce pollutant emissions from ships in Baltic Sea ports

Problems faced by Baltic Sea ports due to ship emissions

The Hanseatic City of Lübeck, like many other Baltic Sea towns, is caught in a conflict of interest:

On the one hand, the port industry is one of its most important economic sectors; on the other hand, emissions from ships in the form of exhaust gas, noise and vibrations jeopardise another important economic sector – tourism.

Lübeck's historic centre – recognised by UNESCO as a world cultural heritage site – attracts many visitors to the Hanseatic city every year. Moreover, since the mid-1950s Lübeck has the status of a Baltic Sea spa resort. Continued positive tourism development is, however, hindered by increasing air pollution due to traffic growth, particularly ferry and ship traffic in the port.

Environmentally harmful emissions from ships

While low-sulphur fuel ($S < 10$ ppm) has been used as fuel for motor vehicles throughout Germany for years, ships are still mostly fuelled with so-called heavy oil. Heavy oil is a residue occurring in oil refineries after extraction of lighter components such as petrol, petroleum, diesel fuel and heating oil from crude oil. This heavy oil is so thick that it has to be preheated in the engine room of the ship before it can be combusted in its diesel engines. In exaggerated terms, one could refer to this as "waste incineration at sea and in port".

The engines must be kept running for generation of electricity and heat during the time the ships and ferries are in port. This is causing high levels of air pollution by diesel soot, sulphur dioxide and nitrogen oxide compounds. In addition, noise and vibrations from the ships' engines are transmitted to commercial and residential buildings near the shore. The further expansion of Baltic Sea ports and the associated growth in ferry and ship traffic is making the problem increasingly severe.

Research project on ship emissions

The problem outlined above was examined in a research project launched by the Federal Environmental Agency, entitled "Implementation of Agenda 21 in European ports by the example of Lübeck-Travemünde". The project was carried out by Stadtwerke Lübeck (Lübeck municipal utility) and GAUSS mbH (environmental protection and safety in shipping company). The project consisted of the following stages:

- performance of emission measurements and calculations in the Lübeck-Travemünde area, including calculation of emissions in different emission abatement concepts
- examination of technical possibilities for pollutant reduction
- analysis of legal instruments to implement pollution abatement measures in Baltic Sea ports and on ships and ferries.

Emission situation in Baltic Sea ports

The emission investigations carried out in the project show that ships and ferries are the main source of sulphur dioxide and nitrogen oxide emissions at the example port Lübeck-Travemünde (see annexed figure: data on SO₂, NO₂ and CO₂ emission sources).

Emission abatement concepts

The analysis of different emission abatement concepts showed that supplying the ships and ferries with shore-side electricity while they are in port (cold ironing) is the most favourable variant. Cold ironing makes it unnecessary for the vessels to keep their engines running while in port. This measure would significantly reduce all emission impacts – emissions to air as well as noise and vibrations.

Other possible emission reduction measures are the use of low-sulphur fuel or the use of catalytic converters. With both, however, the ships' engines would still be running in port and pollution from emissions, noise and vibrations would persist.

Legal instruments for the implementation of reduction measures

Under Directive 2005/33/EC of 6 July 2005, ships at berth in ports must, in future, use marine diesel oil with a significantly lower sulphur content (not exceeding 0.1 % by mass). This Directive applies in principle to ships at berth in Community ports. To supplement these provisions, the research project proposes that Baltic Sea ports should conclude a voluntary agreement ("Memorandum of Understanding") in which they mutually commit to meet specific standards. This Memorandum of Understanding could, for example, contain stricter requirements and address additional aspects of environmentally friendly shipping not covered by the Directive. Such a mutual agreement has the advantage that it would create common environmental practices in all Baltic Sea ports and stop the trend towards environmental dumping. The final report of the research project includes a draft Memorandum of Understanding for agreement between Baltic Sea ports and shipping companies.

International cooperation

The study results obtained for the example port in Lübeck-Travemünde, and the resulting proposals, should be implemented by agreement between major ports. To achieve this, the European Commission has approved a follow-up project, entitled "New Hansa of Sustainable Ports and Cities", which is to be carried out under the umbrella of "Baltic 21", the initiative for sustainable development in the Baltic Sea area.

Online information on the project: <http://www.umweltbundesamt.de/ius/baltic.htm>

Online information on the follow-up project: www.newhansa.net

Online information on "Baltic 21": <http://www.baltic21.org/>

Federal Environmental Agency, Section I 1.2 (L) "International Environmental Protection, International Sustainability Strategies, National Focal Point for the EEA"

CO2 emission sources t/a

Ships	11890
Cars/trucks	14183
Rail	1260
Buses (public tr	387
Heating	42306

SO2 emission sources t/a

Ships	393
Cars/trucks	5
Rail	0,4
Buses (public tr	19
Heating	0,4

NOx emission sources t/a

Ships	547
Cars/trucks	94
Rail	22
Buses (public tr	4,3
Heating	27

Source: German Meteorological Service/Hanseatic City of Lübeck, Environmental Protection Department

