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## Editorial

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### **Baltic Sea Shipping: Ensuring Environmentally Friendly Development**

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More than 80% of the international trade is carried by sea. All over the world commercial fleet, currently consisting of more than 100 thousand ships with tonnage bigger than 100 BRT, carries over 8 billion tons of cargo and makes 32 trillion ton-nautical miles of transport work. Marine transport is an extremely important factor influencing the growth of the countries' economy. Although directly it creates only 1.1 – 1.2% of the world's GDP, indirectly shipping ensures tens of times its larger part.

Annual fuel consumption of marine transport is estimated to 320 – 360 Mt, making around 9% of the total oil consumption estimated to be above 3.8 billion tons. Burning this fuel ships emit to the environment more than 1000 Mt of carbon dioxide, 25 Mt of sulfur oxides and 1.8 Mt of particle matters.

More than 2600 Mt of oil and oil products (around 67% of the total oil extracted per year) are carried by ships. Around 1Mt of methane and other hydrocarbons are emitted from ships' holds and near 4kt of high potential stratosphere ozone depleting materials (CFC) – from their cooling systems. These emissions are significant on a global scale contributing to global warming, stratospheric ozone layer depletion and acidification of the environment. Deposition of nitrogen oxide, emitted from ships, together with the fallout of nitrogen and phosphorus from waste waters increase marine eutrophication.

Especially adverse and negative impact is due to ships sailing in the Baltic Sea. The area of the Baltic Sea basin is very small in comparison with global waters - it makes less than 0.12% of the oceans area but the intensity of shipping is probably the highest in the world. At any moment there are around 2000 ships in the Baltic Sea and their annual number entering or leaving the Baltic Sea through Denmark straits exceeds 60 000. These ships use up to 5.6 Mt of fuel oil and emit more than 390 kt of nitrogen oxide, 135 kt of sulfur oxide and around 19 Mt of carbon dioxide. Comparing this with the world's fleet indicators, we see that even without taking into account its small area and short shipping lanes (on average 400-500 km), more than 1.6% of the total world ships fuel consumption and air pollutant emissions are observed in the Baltic Sea. This indicator more than 13 times exceeds an average load of the oceans and makes a considerable negative impact not just on the Baltic Sea but also on the ecological condition of its coastal areas.

The Helsinki Committee (HELCOM) and the International Marine Organization (IMO) during their long cooperation developed and implemented a range of exclusive measures to prevent pollution from ships in the Baltic Sea and lately great attention has been given to this requirement. The Baltic Sea is the first sea where special sulfur oxide emission prevention plan has been implemented, making the Baltic Sea a sulfur emission

control area (SECA). In such an area permissible amount of sulfur in marine fuel is 3 to 5 times lower than in general marine areas. Currently 5 times stricter nitrogen oxide emission restrictions are being considered and planned for implementation in the following year making the Baltic Sea another special area (NECA). Introduction of this requirement will induce ships' power plants to be modified, providing them with special catalytic converters and stocks of exploitation materials (ammonia or urea).

Calculations have shown that the use of low sulfur fuel will cause a 30% increase in ship exploitation and freight costs. Implementation of NECA status in the Baltic will require an even bigger investment from ships owners - exploitation and freight cost will grow up another 4 – 7 %.

The implementation of these measures may significantly decrease the competitiveness of sea transport. For this reason, it can be expected that a part of marine cargo flows, on an economical basis, will be transferred to the land transportation sector. This may be economically viable, but in the end it may increase the load on the environment in European transport corridors and the whole continent.

Several international projects financed by the Baltic Sea Region Program are conducted with the aim to put a wide range of measures into practice for consistent reduction in air pollution from ships in the Baltic Sea. These projects involve partners from Finland, Sweden, Germany, Poland, Latvia, Estonia, Russia and Lithuania (Klaipeda University, Air Pollution from Ships Research Laboratory and Klaipeda Port). However ship owners, in fear of unavoidable necessity to increase freight cost, wish to gain arguments from scientists that could help them keep the competitiveness of marine transport. It is certain that such arguments could be found in doing extensive studies on the impact on the environment of land transport routes as an alternative to marine routes. The fact, that these studies were carried out in the past, does not deny actuality of the new research. It is obvious that conjuncture transformations in the land transport, related to an increase in fuel prices, more strict ecological requirements, limitation of transport movements, etc. change economical and ecological indicators of this alternative, and all this can simultaneously cause reduction in land transport competitiveness.

Taking into account what is said above, we could hope that researchers of non marine profile will devote their attention to this problem and will do thorough comparative studies on mono-modal land and multi-modal land-sea-land routes for cargo carriage in the Baltic Sea region. Such research could help determine optimal routes which introduced together with new effective emission reduction technologies could not only stop the growth but also reduce the impact of transport flow on the environment, despite its unavoidable growth.