

# CLIMATE CHANGE AND MARITIME INDUSTRY

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## Abstract

Climate change is regarded as one of the major environmental and socioeconomic issues that Earth has to face. Maritime industry contributes significantly to the global greenhouse effect as shipping emissions are increased significantly with time. Efforts have to focus on green shipping initiatives under an international and holistic approach.

*Keywords: Atmospheric Input, Global Change, Pollution, Temperature*

Nowadays, climate change represents one of the greatest environmental and socioeconomic threats of Earth. It is the product of natural processes, responsible for long-term climate fluctuations, and anthropogenic activities, that over the past several decades had a rapid increase in global average temperatures. Human influences are related mainly to ozone layer depletion and greenhouse effect reinforcement. There is a general tendency for a global agreement to control climate change, reduce further human impact and find all possible ways to achieve a reasonable adaptation to the current change.

Maritime industry has various environmental effects associated with the life cycle of the ships, the construction and use of ports and the carried goods. It affects the environmental quality of air, water and land. The most important pollutants are carbon dioxide, nitrogen oxides [1], sulphur dioxide, heavy metals, petroleum hydrocarbons, antifouling agents, particulates, invasive species from ballast water discharges, various scrapping materials including hazards. They are discharged from maritime traffic (cargo spills, oily bilge discharges, ballast water, antifouling paints and sewage), port activities (sewage, cooling waters, spills), solid waste (dumping), port construction and maintenance dredging, shipyards and repairing zone. Often, they lead to eutrophication, acidification and biodiversity loss. World maritime community focuses attention on the importance of shipping safety, maritime security and environmental health. Maritime industry has an effect to climate change mainly due to the greenhouse gases emitted. Although pollutant emissions from land based sources are gradually decreased, those from shipping are increased. In the coming future the situation will be worse, if no action will be taken, as transport at sea is increasing by an annual 5% on average. Last forty years, the world merchant fleet has grown by 70% while the transport has almost tripled [2, 3]. Respective problems are more severe in coastal areas and especially ports. Dirty smoke pouring out from ships funnels has a major impact on the air quality of coastal cities. Oxides emitted to the air are responsible for the acid rain that affects seawater pH in the semi-closed water basin of a port. The same does not apply to the open sea.

Considering the Mediterranean basin, the situation asks for an effective action to be taken, as the sea is a major oil transportation route. It is estimated that each year, up to one million tons of crude oil from accidental spills, illegal bunkering and tank cleaning practices, as well as inadequate harbour facilities are discharged into the sea. The effects of the respective pollution are very severe, as the Mediterranean, besides its rather small extent equal to the one per cent of the world's marine areas it is regarded as the biotope of up to six per cent of the total marine species, including some of the most endangered ones.

However, it has to be mentioned that shipping is basically an environmentally sound means of transport, able to carry large quantities of goods with a relatively low energy demand. Emissions of air pollutants from ships can be eliminated by applying engine technology innovations, using after treatment techniques, burning better quality fuel. Both, the adoption of air pollution prevention regulations and the application of economic tools will be very useful. The general concept of the environmental status stabilization and the further environmental quality improvement should also incorporate the general public awareness of the issue. Current research focuses on green shipping that considers limitation of ecosystem impacts from shipping activities, less fossil fuel dependence, promotion of renewable technologies and limitation of safety hazards. The matter asks desperately for an international as well as holistic approach.

Maritime industry, due to its international character, needs a global agreement to control its negative effects to the environmental quality. Such attempts have been made in the Marine Environment Protection Committee of the International Maritime Organization of United Nations. In addition, The

European Union has also studied the various implications derived from an EU co-ordinated action aiming to the reduction of air pollutants emitted from ships.

Marginal external costs of air pollution from shipping can be estimated using the impact pathway approach that traces emissions through dispersion and environmental chemistry, exposure of sensitive receptors, impacts and economic valuation using the willingness to pay approach. These estimates could be very helpful especially as the contribution of shipping emissions to trans-boundary air pollution impacts is increasingly recognized.

## References

- 1 - Corbett, J.J and Köehler, H., 2003. Updated emissions for Ocean Shipping. *J Geophys. Res.*, 108(D20), 4650 doi:10.1029/2003JD003751.
- 2 - UNCTAD, 2005. Review of Maritime Transport. United Nations Conference on Trade and Development.
- 3 - Eyring, V., Köhler, H.W., van Aardenne, J. and Lauer, A., 2005. Emissions from international shipping: 1. The last 50 years. *J. Geophys. Res.*, 110, D17305, doi:10.1029/2004JD005619.