

New Pioneering Study Highlights Need For Clean-up of Global Shipping Air Pollution

CATF-Supported Study Finds Tens of Thousands Die each Year from Shipping Air Pollution.

The first scientific study to demonstrate that international shipping emissions have significant impacts on human health around the world was released today by the American Chemical Society journal *Environmental Science & Technology*. The study was conducted by an international team of leading researchers, led by Dr. James Corbett of the University of Delaware, USA, and by Dr. James Winebrake of the Rochester Institute of Technology, USA. It was commissioned in part by the Clean Air Task Force with support from the Oak Foundation. The study estimated that the ***global death toll in 2002 from particulate air pollution emitted by oceangoing ships was some 60,000 premature deaths per year.*** And the shipping death toll is estimated to grow by 40% by 2012 along with a continued large increase in global trade and shipping traffic. Europe and Asia are particularly affected—about 1/3 of all shipping deaths occur in Europe, and about 1/4 in each of East Asia and South Asia.

The peer-reviewed journal article was published just as international negotiations on new air pollution standards for oceangoing ships are reaching a critical stage. These negotiations have been ongoing for over two years at the International Maritime Organization (IMO), the international body charged with regulating international marine environmental issues. Progress to date at the IMO has been quite slow. However, the problem of ship emissions is serious and growing, and a number of impacted states and countries are considering the adoption of their own limits on shipping pollution.

The study has some important implications for the policy decisions facing the IMO and other concerned nations and states. The death toll from shipping is substantial—more than twice that from all US power plants combined. The Clean Air Task Force, a US-based environmental non-governmental organization participating in the IMO discussions as part of the Friends of the Earth-International delegation, has estimated the social cost of shipping's premature death toll as found in the Corbett study. Using cost methodology employed by US EPA in recent rulemakings to value the benefits of particulate emission reductions, CATF estimates that the 60,000 annual death toll from oceangoing ships carries a cost of about \$330 BILLION per year. This cost would increase with the study's projected increase in premature deaths, to roughly \$460 billion annually by 2012. Although the oil industry and shipping industries have been complaining about the cost of cleaning up the world's shipping fleet and the fuel that it burns, these cleanup costs pale in comparison to the cost of the continuing toll in human lives that will continue—year after year—until shipping pollution is dramatically reduced.

Background.

The Problem.

Emissions of air pollution from ocean-going ships are large and growing rapidly—

Worldwide shipping emissions are estimated to be—

- 15-30% of global nitrogen oxide (NO_x) emissions;
- 5-7% of global sulfur dioxide (SO₂) emissions; and
- 3-4% of global carbon dioxide (CO₂) emissions.

Moreover, shipping emissions are growing rapidly. An updated shipping emissions inventory recently prepared by Dr. Corbett and others projected that emissions from ocean-going ships will increase at an average rate of over 4% per year, compounded annually, through at least 2040. Without strong action by international, national and regional air regulatory agencies, shipping emissions in 2030 will be roughly *triple* those in 2002.

In contrast, emissions from land-based transportation sources have been reduced significantly in recent years in the United States, Europe, Japan and other countries. As a result, emissions from ocean-going ships have come to represent an increasingly large share of global air pollution. In fact, emissions of NO_x and SO₂ from shipping in European waters are projected to be greater than such emissions from European land-based sources within a decade or so.

Shipping emissions have substantial human health and environmental impacts—

Diesel-powered ocean-going ships burn some of the dirtiest fuel on the planet today—on average, fuel having almost 2000 times the sulphur content of highway diesel fuel in the US and Europe. Ocean-going ships are a significant source of primary (directly emitted) fine PM, as well as NO_x and SO₂. These latter two pollutants also can be converted into sulfate and nitrate aerosols, among the more common forms of fine PM. And most shipping emissions occur near the coast where they can be transported over land.

The new study published today by *ES&T* estimated premature mortality from cardiopulmonary problems and lung cancer resulting from shipping emissions of fine particulates. In addition to premature death, shipping emissions damage human health and the environment in a number of other ways, including—

- Fine PM is associated with a variety of heart and lung problems, including heart attacks and lung cancer, as well as atherosclerosis, stroke and permanent respiratory damage.
- Ozone (formed by secondary atmospheric reactions of NO_x) causes a host of respiratory problems, up to and including premature death.
- Diesel exhaust contains many other toxic materials such as metals, formaldehyde and PAHs, many of which are carcinogenic.

- NO_x and SO₂ emissions contribute to acid rain, eutrophication of coastal and inland areas, crop damage, visibility impairment and regional haze.
- NO_x emissions (e.g., via ozone formation) and black carbon emissions contribute to climate change.

The Regulatory Context.

After years of inaction, regulators are finally turning their attention to shipping emissions. The IMO enacted initial regulations (Annex VI to MARPOL) governing emissions of NO_x from ships built after 2000 and governing the sulphur content of marine fuel. However, these IMO regulations did little more than codify current practice. For example, Annex VI set sulphur limits at 4.5%, substantially higher than the global average, recently about 2.7%.

Reacting to the clear need to strengthen international air pollution standards, IMO member countries agreed in 2005 to begin a process of review and revision of emissions standards for both new and existing ships. Work at the IMO on these revisions, however, is already a year behind schedule, with additional delay possible. Furthermore, it is not yet clear that the political will exists at IMO to require the deep pollution reductions necessary to protect human health and the environment. While the United States and several European countries favor substantial reductions of NO_x and SO₂, other countries have voiced less progressive positions, and the oil industry seems opposed to any real progress. A lively debate is proceeding among the shipping industry, with some groups favoring a global switch to a cleaner, lower sulphur marine distillate fuel, but others opposing this approach.

While the IMO is in the best position to regulate emissions from international shipping, if IMO members collectively fail to seize the opportunity presented by the current Annex VI revision process, it is likely that individual regions, countries and states will proceed on their own to do so. In fact, some, like the European Union and California, already have.

Action Needed.

Substantial reductions in shipping emissions are both achievable over the next decade and necessary to protect public health and the environment. In view of the ongoing and rapid growth in seaborne traffic and resulting shipping emissions, the IMO (or individual countries, states and regions in the event of insufficient IMO action) should require the following—

- *Reductions of NO_x emissions in the 90% range* for both new and existing ships must be required as soon as possible, but no later than 2015—
 - This can be accomplished through the use of selective catalytic reduction (SCR), in-engine controls (such as injector timing modification and slide valve installation), and water technologies (such as humidification and emulsified fuel), as well as other approaches.

- *Reductions of SO₂ emissions in the 70-90% range* should be required for both new and existing ships as soon as possible, but no later than 2015—
 - This can be accomplished through the use of low sulphur fuels, as well as seawater scrubbers (once the sludge and wastewater disposal issues have been appropriately resolved).
 - The worldwide limit for the sulphur content of marine fuel should be substantially lowered – interim targets could be, for example, a maximum 1% by 2010 and 0.5% by 2015; the sulphur content of fuels used near the coast and in sensitive port and harbour areas may need to be lower still.
- *Substantial PM reductions* are also needed, but the co-benefits of NO_x and SO_x reductions should be considered.

Longer term, in view the huge anticipated increases in shipping traffic and the resulting environmental and human health impact, more substantial air pollution reductions will be needed. These approaches will likely include alternate fuel and propulsion systems, such as liquified natural gas, fuel cells, wind (sails) and hybrid electric or electric.

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