INTERNATIONAL MARITIME ORGANIZATION

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MARINE ENVIRONMENT PROTECTION COMMITTEE
57th session
Agenda item 4

MEPC 57/4/40
22 February 2008
Original: ENGLISH

PREVENTION OF AIR POLLUTION FROM SHIPS

Comments on the outcome of BLG 12 on the review of MARPOL Annex VI and the NO_x Technical Code

Submitted by the Friends of the Earth International (FOEI)

SUMMARY

Executive summary:	Document BLG 12/6/33 provides observations by IPIECA and OCIMF with respect to BLG 12/6/9 (FOEI) and the first scientific study of global premature mortality resulting from air pollution from ocean-going ships. Many of these observations are either incorrect or misleading, and need to be corrected. This document was produced by a coalition of environmental NGOs[1]
Strategic direction:	7.3
High-level action:	7.3.1
Planned output:	7.3.1.1
Action to be taken:	Paragraph 10
Related documents:	BLG 10/14/13; BLG 11/5/5, BLG 11/5/6, BLG 11/INF.3, BLG-WGAP 1/2/11; BLG 12/6/9, BLG 12/6/33; MEPC 53/4/1 and MEPC 57/4/23

Introduction

1 This document provides comments on MEPC 57/4/23 and is submitted in accordance with paragraph 4.10.5 of the Committees' Guidelines (MSC-MEPC.1/Circ.1) and the relaxed deadline for comments documents on the air pollution item to MEPC 57 with prior authorization of the MEPC Chairman following consultations with the Secretariat in line with paragraph 4.12 of the Committees' Guidelines.

2 BLG 12/6/33 commented on BLG 12/6/9. This latter document summarized the first scientific analysis estimating global premature deaths resulting from primary and secondary

[1] Clean Air Task Force, European Federation for Transport and Environment, North Sea Foundation, Seas at Risk, Swedish NGO Secretariat on Acid Rain and Bellona.

particulate matter ("PM") emissions from ocean-going ships. This peer-reviewed Study was conducted by an international team of leading scientific researchers, and was published as the lead article in the December 15, 2007 issue of the American Chemical Society journal *Environmental Science & Technology* (hereinafter the "Corbett and Winebrake Study" or the "Study").[2] The Study estimated that approximately 60,000 people die prematurely each year from PM air pollution emitted by oceangoing ships, and estimated that these deaths will increase with global trade by 40% by 2012.

3 Document BLG 12/6/33 provides a variety of observations by IPIECA and OCIMF on the Corbett and Winebrake Study. However, many of these observations are misleading or false. It must be remembered that the oil industry and some shipping industry representatives have consistently met progressive proposals for meaningful reductions of air pollution from ships with the objection that more information is needed. The Corbett and Winebrake Study provides exactly the type of information industry has been requesting. The Study is a scientific, fully peer-reviewed article, uses methodology accepted throughout the world, and was published in an extremely well respected scientific journal, the America Chemical Society's *Environmental Science & Technology*. Some have attempted to characterize the Study as a Clean Air Task Force or FOEI advocacy piece; it is not. Rather, it is a completely independent work of scientific research conducted by some of the world's leading scientific researchers in the field. While the Study was supported in some part by CATF, it was also supported by the German Helmholtz-Gemeinschaft Deutscher Forschungszentrum (HGF) (Germany's largest scientific research organization) and by the German Aerospace Center (DLR).

Response to major assertions of BLG 12/6/33

4 BLG 12/6/33 first claims that the Study results are too uncertain, asserting that "the use of a different dispersion model alone, results in a 50% decrease in estimated deaths." This assertion is incorrect. In fact, Table 2 in the Study is quite transparent and clearly shows that a lower death toll was estimated in model runs that did not examine all PM constituents, but rather omitted nitrates and ammonium.[3] The two "PM: All" runs (cases 1c and 2b), including all pollutants, both yield over 60,000 deaths annually. What the differences between the total PM runs and the partial PM runs do imply is that sulphur is not the only PM constituent that contributes to PM health effects. Sulphur's effect is nonetheless very significant, as subsequent research reported by FOEI in document MEPC 57/4/15[4], demonstrates.

5 The next claim in BLG 12/6/33 is that the Study relies on cause-effect relationships that are not firmly established, and thus overestimates the global death toll from shipping air pollution. In fact, the researchers did consider other concentration-response (C-R) functions, but like the US National Research Council, chose the C-R function used in the so-called 2002 American Cancer Society (ACS) Study.[5] This was clearly a reasonable choice – the ACS Study

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2 Corbett, J.J., Winebrake, J.J., Green, E.H., Kasibhatla, P., Eyring, V., and Lauer, A., "Mortality from Ship Emissions: A Global Assessment," *Environmental Sci. Technol,* American Chemical Society, 42(24), p. 8512–8518, December 15, 2007. It is available on the Internet at: http://pubs.acs.org/cgi-bin/sample.cgi/esthag/asap/pdf/es071686z.pdf .

3 Two runs were conducted using a GEOS-Chem dispersion model; these runs did estimate lower deaths, but they only analyzed partial PM constituents, and furthermore, this model is a non-dynamic model that does not account as well for coastal effects as does the E5/M1-MADE model used in the majority of runs (and in all of the total PM runs).

4 MEPC 57/4/15, entitled "Avoided Global Premature Mortality Resulting from Reduction of Sulphur in Marine Fuel," 25 January, 2008.

5 Pope, CA; Burnett, RT; Thun, MJ; Calle, EE; Drewski, D; Ito, K; Thurston, GD, "Lung cancer, cardiopulmonary mortality and long-term exposure to fine particulate pollution," *JAMA* 2002, 287 (9), 1132-1141.

is probably the most extensive and robust long-term air pollution health study ever performed. The C-R function used in the ACS Study, and selected for use in the Corbett and Winebrake Study, have been approved by the US EPA's Scientific Advisory Board and systematically used by US EPA for similar purposes in its recent rulemakings. For further information on this matter (see paragraphs 8 and 9 of BLG 12/6/9). Unlike BLG 12/6/33, the US EPA and the authors of the Corbett and Winebrake Study did not select a study that produces results that over-estimated or under-estimated the risks of premature mortality from air pollution. Rather, they chose the best study available. Furthermore, FOEI notes that the ACS Study specifically found that the association between PM and mortality persists regardless of regional differences in particle species, and that elevated mortality risk was associated with fine particles and sulphur oxides. The ACS Study also controlled for many non-air pollution factors, such as smoking, diet, occupational exposure, regional differences, etc.

6 BLG 12/6/33 next asserts that the Corbett and Winebrake Study uses "a linear no threshold approach to assess mortality," and that this is not appropriate.[6] A no-threshold approach is irrelevant to the Study, because it does not examine shipping mortality in a vacuum assuming no other emissions sources. Rather, the Study modelled PM ambient concentrations resulting from both a baseline case where all PM sources EXCEPT shipping are considered and a case where all emissions (including shipping) are considered; the differences between the two resulting ambient air concentrations were those attributed to shipping. Thus, the concentrations attributable to shipping occur above any level even suggested as a "threshold."

7 In any event, there is no consensus that any use of a threshold is appropriate. Pope, *et al.*, in the 2002 ACS study, which superseded the HEI reanalysis referred to in BLG 12/6/33, stating: "within the range of pollution observed in this analysis, the concentration response function appears to be monotonic and nearly linear." In its comprehensive review of PM health effects and the relevant literature, the US EPA recently stated:

> "In summary, while staff recognizes that there are likely individual biological thresholds for specific health responses, existing studies do not support or refute the existence of thresholds for PM-mortality relationships at the population level for either long-term or short-term PM exposures within the range of air quality in these studies."[7]

8 Lastly, BLG 12/6/33 suggests that the estimation of premature deaths due to air pollution is not meaningful. IPIECA and OCIMF prefer a different metric that is used only in Europe, the so-called "loss of life expectancy" (LLE) approach. However, the estimation of premature deaths in the Study is an approach commonly used worldwide; for example, it is employed by the US Environmental Protection Agency in evaluating the benefits from its air pollution regulations.[8] In any event, the Study points out that "patterns of health impacts for Europe among our cases appear consistent with patterns reported for (the 2007 Cofala study)[9] health effects analysis." With the same underlying populations and similar ship pollution concentrations, the risk based functions used in either study show that human health is impacted.

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[6] We initially note that the Study did not use a linear approach, but rather employed a log-linear approach.

[7] US EPA, (December 2005), Review of National Ambient Air Quality Standards for Particulate Matter: Policy Assessment of Scientific and Technical Information, OAQPS Staff Paper, art p. 3-56.

[8] *See*, e.g., US EPA (2004), "Control of Emissions of Air Pollution from Nonroad Diesel Engines and Fuel; Final Rule," 69 Fed. Reg. 38958 (June 29, 2004); and US EPA (2004), "Final Regulatory Impact Analysis: Control of Emissions from Nonroad Diesel Engines," Chapter 9, p9-21, EPA Doc. No. EPA420-R-04-007 (May 2004).

[9] Cofala, J; Amann, M; Heyes, C; Klimont, Z; Posch, M; Schopp, W; Tarasson, L; Jonson, JE; Whall, C; Stavrakaki, A; *Final Report: Analysis of Policy measures to Reduce Ship Emissions in the Context of the Revisions of the National Emissions Ceilings Directive;* International Institute for Applied Systems Analysis: Laxenburg, Austria, 2007; p74.

The Corbett and Winebrake Study has the advantage of a global design, and thus puts to rest any question about whether shipping emissions produce human health impacts only in Europe and parts of North America.

Conclusion

9 The Corbett and Winebrake Study is peer-reviewed scientific research conducted by leading world researchers. It is also the best estimate of human mortality from air pollution from international ships available today. None of the complaints by IPIECA and OCIMF in BLG 12/6/33 cast any real doubt on the validity of the major conclusion of the Study – namely, that air pollution from international shipping is cutting short the lives of tens of thousands of people annually across the globe. The major policy implications of the Study are likewise unaffected – it is not necessary to know the exact number of lives lost each year to conclude that substantial reductions in shipping emissions are necessary to protect human health and that even the most ambitious options under consideration at BLG and MEPC will produce benefits to society far in excess of costs.

Action requested of the Committee

10 The Committee is invited to consider the above information and to adopt stringent limitations for air emissions from ships.