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PREVENTION OF AIR POLLUTION FROM SHIPS

The need to reduce emissions of nitrogen oxide from existing engines

Submitted by the Friends of the Earth International (FOEI)

SUMMARY

Executive summary:	This document urges adoption of measures to substantially reduce emissions of nitrogen oxides from existing engines as part of the prospective amendments to MARPOL Annex VI. This document was produced by a coalition of environmental NGOs[1]
Action to be taken:	Paragraph 10
Related documents:	BLG 11/5/5; BLG 11/5/6; BLG 11/INF.3; BLG-WGAP 1/2/11; BLG 10/14/13; MEPC 53/4/1 and MEPC 53/4/8

Introduction

1 The BLG Sub-Committee agreed at its tenth session to further consider Amendments to the regulations under MARPOL Annex VI, and continued its review of potential international control of air pollution from ships at its eleventh session during April 2007.

2 This paper urges adoption of meaningful reduction of emissions of nitrogen oxides (NOx) from existing engines as amendments to regulations of MARPOL Annex VI.

Reduction of NOx Emissions from Existing Ships

3 Due to time constraints at BLG 11, as well as the nature of the issues, the discussion concerning the reduction of NOx from existing ships was not concluded. Nevertheless, discussions focused on relatively small NOx reductions, in the range of 20%. FOEI believes that due to the long service life of most ships and low scrappage rates, it is critical that emissions from the existing fleet be addressed in a more substantial way. Specifically, in view of the serious and increasing health and environmental impacts from shipping emissions (as previously

[1] Clean Air Task Force, Friends of the Earth-US, Bellona Foundation, European Environmental Bureau, European Federation for Transport and Environment, North Sea Foundation, Seas at Risk and Swedish NGO Secretariat on Acid Rain.

discussed in FOEI and other submissions to IMO, including BLG 11/5/5, BLG 11/5/6, BLG 11/INF.3, BLG-WGAP 1/2/11, BLG 10/14/13, MEPC 53/4/1 and MEPC 53/4/8), IMO must establish emission standards for existing engines at levels that reflect application of the best available emission control technology.

4 Without substantial NOx reductions from the existing fleet, even assuming substantial improvement in the emissions performance of new engines, fleet-wide NOx emissions will increase as a result of low fleet turnover, combined with expected rapid fleet growth in coming years. A simple example, taken from BLG 11/INF.3, illustrates the point:

> "[A] 20% reduction in emissions for a fleet that has a 2% scrappage rate would imply only a 0.4% (20% x 2%) reduction in annual fleet emissions; this per-year reduction is an order of magnitude smaller than annual emissions growth (~4%) due to increased seaborne trade activity. Even a 50% reduction in emissions from new vessels leads to only a 1% overall annual reduction under a 2% scrappage rate scenario. Controls reducing fleetwide shipping emissions by at least 60% would need to be fully implemented for both new and existing engines within the next two decades, in order to maintain 2002 global shipping pollution levels….reductions of this magnitude cannot be achieved through new-engine standards alone." [emphasis supplied] BLG 11/INF.3, annex at 21.

5 There has been recent discussion at the BLG Subcommittee level of a "goal based approach" to emission reductions. See, e.g., BLG 11/5/8. IMO should consider such an approach to reducing NOx emissions from existing engines, with a reduction goal of 70-90%. Current levels of NOx emissions from ships are already unacceptably high–shipping is responsible for roughly 1/4 to 1/3 of all global NOx emissions.[2] As discussed above, without a greater than 60% reduction from existing ships, NOx emissions from the global shipping fleet are expected to increase, and will increase even more relative to land-based emissions as the latter emissions are reduced further. This will cause unacceptable impacts to human health, the environment and the global climate. If IMO does not require substantial shipping reductions, affected coastal States will find ways to do so.

6 While discussion at BLG of potential NOx controls for existing ships has not yet proceeded much beyond simple slide valve replacement, there are many other measures – both technical and operational – that should be considered. As noted by FOEI previously (see, e.g., BLG 10/14/13 and BLG-WGAP 1/2/11), cost effective measures are available to reduce NOx from existing ships. For example, a recent Entec report to the European Commission has estimated the costs of NOx reductions from ships and found that the cost-effectiveness of those shipping reductions were an order of magnitude below the cost of additional reductions from land-based sources.[3]

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[2] See, e.g., Corbett, J.J. and Koehler, H.W. (2003); "Updated Emissions from Ocean Shipping", Journal of Geophysical Research, Vol. 108(D20), 4650, and Vol. 109, D23303; and Eyring, V., Kohler, H.W., van Aardenne, J. and Lauer, A. (2005); "Emissions from International Shipping: 1. The last 50 Years", Journal of Geophysical Research, Vol. 110(D17), 17305.

[3] Entec UK Limited (August 2005), Final Report for European Commission Directorate-General-Environment, "Service Contract of Ship Emissions: Assignment, Abatement and Market-based Instruments", available on the Internet at: http://europa.eu.int/comm/environment/air/transport.htm.

Entec estimated the marginal cost of additional NOx abatement for existing power and district heating plants at over 4000 euro/tonne, while the cost for heavy-duty trucks and buses was over 8000 euro/tonne – over 13 times the cost of the most costly shipping abatement measure.

Measure	NOx Reduction	Cost (retrofit) (euro/tonne NOx)
Basic Internal Engine Modifications (IEM) (2-stroke only	20%	15-24
Advanced IEM	30%	Variable
Direct Water Injection	50%	Variable
Humid air motors	70%	263-282
SCR	90%	358-612[a]

[a] SCR operating costs depend on the fuel burned, increasing with fuel sulphur content.

7 Subsequent work in Europe has confirmed that these measures are technically feasible for the vast majority of existing ships.[4] Information from engine manufacturers also recognizes that various measures are capable of reducing NOx emissions from existing ships. For example, MAN B & W, in a presentation at the November 2006 BLG Intersessional meeting (BLG 11/5/Corr.1, annex 3, pp. 6-9) , noted potential NOx reductions of up to 35% from low NOx slide valve retrofits, up to 50% from water emulsification, from 30-50% with SAM, and even greater reductions with SCR.

8 FOEI notes that several European countries indicated at BLG 11 an intention to investigate which classes of existing engines are likely not suitable for slide valve retrofits. FOEI believes that those efforts would be much more useful if the applicability of all of major potential retrofit measures were investigated, not just slide valve retrofits.

9 It is likely that there will be some older engines that cannot apply any of the technical retrofit measures discussed above. In that case, emissions from those engines must be addressed in other ways – either through operational restrictions or economic incentives. A failure to address those engines will not only result in higher fleet emissions, but will also provide the unregulated ships with a competitive economic advantage over cleaner ships. Operational restrictions could include speed reduction, the use of distillate fuel, a prohibition on travel in certain sensitive port and coastal areas, fixed retirement dates, among others. Economic incentives could include differentiated fairway dues, increased docking fees, among others. The important point is that older ships cannot be given a "free ride;" ultimately, they must be encouraged or required to reduce emissions or be retired and replaced with newer, cleaner ships.

Action requested of the Committee

10 The Committee is invited to consider the above comments during the ongoing Annex VI revision process and to adopt stringent limitations for NOx emissions from existing engines.

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[4] Interim Report (October 2006) prepared by the International Institute for Applied Systems Analysis, MET.NO and ENTEC UK Limited on behalf of the European Commission under Service Contract N° 070501/2005/419589/MAR/C1, at page 22-23, Table 4.2, available on the Internet at: http://forum.europa.eu.int/Public/irc/env/cafe_baseline/library?l=/thematic_strategy/contract_emissions&vm=detailed&sb=Title.