INTERNATIONAL MARITIME ORGANIZATION

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MARINE ENVIRONMENT PROTECTION COMMITTEE
70th session
Agenda item 5

MEPC 70/5/33
2 September 2016
Original: ENGLISH

AIR POLLUTION AND ENERGY EFFICIENCY

Comments on the multi-stakeholder study by EnSys/Navigistics

Submitted by the Clean Shipping Coalition (CSC)

SUMMARY

Executive summary:	This document provides comments on the multi-stakeholder study of fuel oil availability set out in the annex to document MEPC 70/5/5
Strategic direction:	7.3
High-level action:	7.3.1
Output:	7.3.1.10
Action to be taken:	Paragraph 16
Related documents:	BLG 12/6/1, BLG 12/INF.11; MEPC 70/5/5 and MEPC 70/INF.9

Introduction

1 This document is submitted in accordance with the provisions of paragraph 6.12.5 of the Committees' Guidelines and comments on document MEPC 70/5/5.

2 BIMCO and IPIECA have submitted a "Supplemental Marine Fuel Availability Study" (MEPC 70/5/5 and MEPC 70/INF.9). The report was funded by BIMCO, IPIECA and three regional fuel organizations to advocate for a delay of the introduction of a global sulphur cap of 0.50% m/m. It is essentially an update to a 2007 report by the same authors (BLG 12/INF.11). This document presents important information in comment to document MEPC 70/5/5.

3 A review of the "Supplemental Marine Fuel Availability Study" shows four major shortcomings: the model that EnSys has employed has been reviewed by several parties as inappropriate for these types of analysis; the main reason why EnSys claims that compliant fuels cannot be produced in sufficient amounts is at odds with business, economic and environmental regulation of refineries; the economic impacts are widely overstated; and the report does not really demonstrate that refineries cannot produce the required quantities of compliant fuels.

The model is not fit for purpose

4 The EnSys proprietary model is mainly used to conduct meta-analyses of refinery trends, and is less widely employed for refinery investment decision-making than the model used by the official "2016 IMO Fuel Availability Study (FAS)". Critiques of EnSys' work, including WORLD Model, were provided by i) the IMO Expert Group (BLG 12/6/1, 2007); ii) a peer-reviewed article in the journal *Nature* (2014); and iii) a white paper for the Energy Information Administration (2009):

.1 EnSys used the WORLD model in 2007 to present refining expectations in 2020 for IMO (BLG 12/INF.11) and this work was reviewed by the 2007 IMO Expert Group. The IMO Expert Group clearly enumerated in document BLG 12/6/1 several limitations of the WORLD Model: "… it is not a model that forecasts supply, demand and price. The model does not optimise supply and investments reflecting the overall highest refinery revenue potential. Nor does the model take into account competition, potential excess capacity, refinery upgrade/construction time or e.g., marine fuel or distillate availability constraints or surplus." Moreover, document BLG 12/6/1 documented EnSys model limitations (page 23 to 24): i) "does not take into account fuel blending and supply outside the refinery gate"; ii) misallocated heavy fuel oil composition to atmospheric residual oil in 2020, when it is "more likely to be of vacuum residue"; iii) method accounting for net specific energy is "not in accordance with the formula used in the marine bunker industry", overstating distillate demand; iv) the model output global average sulphur level in marine fuels exceeded the IMO three-year rolling average (validity problem); v) MDO composition requirements were "more stringent than what was proposed", leading to higher investments and energy requirements for compliant distillates; vi) the model did not take into account new technologies; and vii) the low-sulphur fuel demand was set in the prior work to underestimate demand in some ECAs;

.2 The EnSys background on the WORLD model, section 6.1 of document MEPC 70/INF.9, annex, presents a list of clients and applications that include analyses for the United States Department of State regarding the Keystone XL pipeline decision. A peer-reviewed article in the journal *Nature* (2014) by Peter Erickson and Michael Lazarus of the Stockholm Environment Institute, criticized the EnSys WORLD model used by the United States Department of State with regard to the Keystone Pipeline: "The proprietary model it uses (EnSys' WORLD model) is opaque with respect to key assumptions and features, such as global oil market response to changes in supply."[1]; and

.3 The EIA National Energy Modeling System has not used EnSys World model in close to 10 years. A 2009 white paper for EIA concluded that the underlying structure using EnSys WORLD model "lacks transparency" and "the structure has no mechanisms to query input for reasonableness."[2]

1 http://www.nature.com/nclimate/journal/v4/n9/full/nclimate2335.html?WT.ec_id=NCLIMATE-201409

2 http://www.eia.gov/forecasts/documentation/workshops/pdf/VDiVita%20LFMM%20White%20Paper.pdf

The claim that sulphur plant capacity is the bottleneck is not well founded

5 The Supplemental Study claims that "the global refining industry will lack sufficient capacity in one critical respect in 2020, namely sulphur plant (…), to fully respond to the Global Sulphur Cap" (page 3). However, this report does not present a clear rationale for this conclusion.

6 There is tremendous consistency between the Supplemental Study demand outlooks and refinery capacity and official 2016 IMO FAS by CE Delft. Projected utilization rates also appear to be in broad agreement, although this cannot be established in detail because the EnSys report does not provide sufficient transparency in reporting the regional utilization rates used in the WORLD model. This must mean that the main reason for the different conclusions is the different view on sulphur plant capacity.

7 EnSys acknowledges that the publicly-available data under-reports sulphur plant capacity (MEPC 70/INF.9, annex, page 88). EnSys adjusted the model in the calibration case by increasing the sulphur plant capacity for the year 2015. However, they appear not to have increased the sulphur plant capacity for units that become operational between 2016 and 2019. So, to the extent that the admittedly unreliable statistical databases do not report sulphur plants for these units, EnSys assumes that these will have insufficient capacity.

8 Assuming that significant amounts of H_2S are vented from new or expanded refineries lacks credibility. H_2S is not only a very poisonous gas, the smell is also unbearable. Venting would seriously threaten the wellbeing of people living in the vicinity of these refineries; uncontrolled H_2S venting is not standard practice in the industry today and it is unlikely that any government will allow this for health reasons. The alternative, burning H_2S, generates emissions of SO_X, which is equally unlikely in those parts of the world where SO_X emissions from industrial installations are usually controlled in environmental permits.

9 According to a recent review of the Best Available Technologies by the European Commission[3], the investment costs in sulphur plants are one order of magnitude smaller than the investments in corresponding hydrotreatment units. Moreover, if it is possible to expand an existing sulphur plant, as it often is, the costs are two orders of magnitude smaller. In contrast to new plants, expansions of existing plants may not be registered as projects in the statistical databases, which may explain the apparent lack of new sulphur plant capacity. It seems very strange to assume that refineries which invest in hydrotreatment units, do not at the same time ensure a sufficient capacity of sulphur plants.

10 In view of the acknowledgement of the shortcomings in the sulphur plant statistics, other assumptions (e.g. that most hydrotreatment and hydrocracking units are equipped with sufficient sulphur plant capacity) are more plausible and should have been tested by EnSys. This is even more important when their analysis shows that sulphur plant capacity is the single most important factor preventing refineries from producing compliant fuel oils in sufficient quantities.

[3] Pascal Barthe, Michel Chaugny, Serge Roudier, Luis Delgado Sancho, 2015:
Best Available Techniques (BAT) Reference Document for the Refining of Mineral Oil and Gas,
Report EUR 27140 EN, http://eippcb.jrc.ec.europa.eu/reference/BREF/REF_BREF_2015.pdf

The economic impact analysis lacks credibility

11 The impact on fuel supply costs are estimated to be $350 to $700 billion per annum (MEPC 70/INF.9, annex, page 12). To put this into perspective, if refineries would choose to allocate the additional production costs to maritime fuels only, the costs of maritime fuels would increase by approximately $1,000 to $2,000 per tonne. This contrasts dramatically with the historical data presented in the Supplemental Study Exhibit 3-4, and is two orders of magnitude larger than the €45 to €65 per tonne that CONCAWE had calculated in a report.[4]

12 While the report goes to great length in presenting the impacts on supply costs, EnSys does not offer an analysis of how these increases come about (MEPC 70/INF.9, annex, pages 106 to 114). The report defines supply costs as marginal prices. If this is true, the increase in production costs per unit of fuel will be even larger since the price increase will be diminished by reduced demand. Strangely, the detailed results do not show a reduction in demand resulting from these prices: world demand is stable across all cases at 99 to 100 million barrels per day (MEPC 70/INF.9, annex, pages 106 to 114). Possibly, the WORLD model version for this work continues to be unable to properly evaluate the economics of refining as was documented in document BLG 12/6/1.

The report lacks detail to support its claims that compliant fuels cannot be produced

13 Document MEPC 70/5/5, annex, page 8, states that "additional hydrogen plant capacity would be needed" and that "this might be plausible". Page 9 adds "Overall, on the above basis, we believe full compliance with the Global Sulphur Cap is not **feasible** [emphasis added] with the refinery equipment expected to be in place in 2020." Once EnSys undermines its assumption about unavailable refining equipment, the claim of a robust finding on insufficient supply loses credibility. Judging whether a set of investments to comply with environmental standards is feasible (i.e. economical), may represent a view of the authors. Nonetheless, the Supplemental Study indicates that EnSys constrained WORLD model conditions to conform to these viewpoints, rather than fully investigates the ability to meet 2020 compliant fuel supply.

14 The EnSys WORLD model may be overly constrained. While document MEPC 70/INF.9 reports in page 16 and in section 5.2.1.3 of the annex that "all refineries within a region are implicitly inter-connected and can share units, capacities, and blend streams" in the WORLD model, the Supplemental Study documents in page 92 that "each refinery and each region must balance in terms of inputs and outputs." These idealized constraints are not generally present and in equilibrium, and imbalances in refinery input and output at the unit level result in transfers of intermediate product among refineries. Therefore, the WORLD model may have been employed under conditions that predetermined the finding of insufficient supply.

15 In fact, the report clearly acknowledges that "…if sufficient added sulphur plant and hydrogen capacity were to become available, the industry could potentially meet the Global Fuel volumes…" (MEPC 70/INF.9, annex, page 131, and MEPC 70/5/5, annex, page 18). However, it appears not to have run these cases.

[4] CONCAWE Refinery Technology Support Group (RTSG), 2006: Techno-economic analysis of the impact of the reduction of sulphur content of residual marine fuels in Europe, Brussels: CONCAWE.

Action requested of the Committee

16 The Committee is invited to consider the views expressed in this document and to take action as appropriate.