INTERSESSIONAL MEETING OF THE WORKING GROUP ON REDUCTION OF GHG EMISSIONS FROM SHIPS
6th session
Agenda item 2

ISWG-GHG 6/2/13
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FURTHER CONSIDERATION OF CONCRETE PROPOSALS TO IMPROVE THE OPERATIONAL ENERGY EFFICIENCY OF EXISTING SHIPS, WITH A VIEW TO DEVELOPING DRAFT AMENDMENTS TO CHAPTER 4 OF MARPOL ANNEX VI AND ASSOCIATED GUIDELINES, AS APPROPRIATE

Initial impact assessment of the proposal to regulate ship operational speed together with a description of criteria that should be used to identify short-term measures for adoption and implementation

Submitted by CSC

SUMMARY

Executive summary:	This document provides an initial impact assessment of the proposal to regulate ship operational speed contained in documents ISWG-GHG 4/2/8 and MEPC 74/7/8 and proposes the use of certain criteria to ensure that all short-term measures chosen are an appropriate response to the climate emergency
Strategic direction, if applicable:	3
Output:	3.2
Action to be taken:	Paragraph 8
Related documents:	ISWG-GHG 4/2/8 and MEPC 74/7/8

Introduction

1 At its seventy-fourth session, the Marine Environment Protection Committee (MEPC) considered a number of short-term measures to address the emissions of greenhouse gases from ships in line with the *Initial IMO Strategy on Reduction of GHG Emissions from Ships*.

2 Since the adoption of the Initial GHG Strategy, more evidence has emerged regarding the potentially devastating impact of the climate crisis, particularly on small island developing States (SIDS) and least developed countries (LDC). According to the Intergovernmental Panel on Climate Change (IPCC) Special Report on Oceans and Cryosphere, if GHG emissions continue to increase strongly, sea levels could rise by 60 to 110 cm globally by 2100

(IPCC, 2019). Shifts in fish distribution, in abundance and fisheries catch will endanger the livelihoods and food security of marine-dependent communities across the globe, and coastal communities could face extreme sea levels and coastal flooding (IPCC, 2019). The difference between 1.5°C rather than 2°C is also significant. Maintaining global warming under 1.5°C could mitigate potentially catastrophic increases in food and water stress globally, in addition to preventing considerable adverse economic impacts (IPCC, 2018). It is also noted that the oceans themselves have not only enabled the global maritime trade, but absorbed more than 90% of the excess heat in the climate system (IPCC, 2019).

3 CSC believes that a higher level of ambition is needed to meet the goal "as a matter of urgency" to phase out GHG emissions from the shipping industry. To meet such ambitions, IMO should anticipate a target of at least 70% reduction of carbon intensity by 2030 compared to 2008 levels, and full decarbonization by 2050 at the latest.

Initial impact assessment of the proposal to regulate ship operational speed

4 The initial impact assessment annexed to this submission is conducted in accordance with the procedure set out in MEPC.1/Circ.885, and concludes that the proposal would have a significant positive impact on both the reduction of GHG emissions and transport costs. Where potential negative impacts have been identified, the assessment concludes that they can be mitigated by careful design of the measure.

Criteria for the selection of measures that are an appropriate response to the climate emergency

5 The impact assessment process is an important one, both in respect of identifying the environmental effectiveness of the proposed measures and ensuring that economic impacts on vulnerable States are understood and where appropriate addressed. However, CSC does not believe that the impact assessments alone will be sufficient to identify a shortlist of candidate reduction measures that are an appropriate response to the climate emergency.

6 For this reason, in addition to providing information in line with the procedure set out in MEPC.1/Circ.885, CSC would here like to suggest that the Group has the following criteria in mind when it is considering and identifying measures to take forward, and indeed when those measures are being developed and refined:

.1 the measures must have the potential to be adopted and implemented quickly;

.2 the measures must have the potential to reduce emissions deeply in the short term, with significant emission reductions achieved before 2023;

.3 the measures as a whole must ensure that the GHG mitigation potential of both technical and operational changes are fully realized. Particular attention must be paid to the measures' susceptibility to the "rebound effect"; and

.4 the emission reductions achieved by the measures must be transparent and auditable.

7 While the process to identify short-term measures is being undertaken as a result of the adoption of the Initial GHG Strategy, the selection of short-term measures must also take into account that the levels of ambition in the Initial GHG Strategy are lower than the levels of ambition necessary to meet the Paris Agreement goal of keeping warming below 1.5°C, and that the Strategy's level of ambition will have to rise when it is reviewed in 2023. In short, any short-term measures identified now must be future proof in that they must be capable of delivering significantly higher levels of ambition than that included in the Initial GHG Strategy.

Action requested of the Working Group

8 The Group is invited to consider the initial impact assessment of a speed regulation annexed to this document and the criteria for the selection of measures described above when considering the selection of short-term measures and to take action as appropriate.

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ANNEX

INITIAL IMPACT ASSESSMENT OF THE PROPOSAL TO REGULATE SHIP OPERATIONAL SPEED

1 Impact on ships and emissions

1.1 Under the Initial GHG Strategy, the Organization set a goal to peak GHG emissions from international shipping "as soon as possible", and to reduce total annual GHG emissions by at least 50% by 2050 with the overall goal "as a matter of urgency" of phasing out GHG emissions as soon as possible (MEPC.304(72)).

1.2 As submitted in documents ISWG-GHG 4/2/8 and MEPC 74/7/8, CSC proposes establishing a measure to control the maximum average speed of ships so that they can meet the second level of ambition while minimizing adverse impacts. By regulating maximum average speed on an annual basis, individual ships could vary their speed over the course of a calendar year while remaining below a predefined maximum value (while this is the approach proposed, CSC remains open to the consideration of a maximum absolute speed regulation if the shipping industry so prefers). In this desk-based initial impact assessment, we look at the potential impacts of this measure.

1.3 This approach would give ships a degree of flexibility regarding their speed depending on cargo, voyage, weather conditions or other factors at the operator's discretion while remaining below a baseline for the year. Maximum average speed should also be further refined by determining baseline speeds for different ship types and sizes and applying a percentage (%) reduction to each.[1] This would also affect which segments of the industry would require additional ships, if any, to offset increased voyage times.

1.4 In an analysis by the International Council on Clean Transportation (ICCT) the largest ship types and sizes (e.g., containers, bulkers, tankers, general cargo ships, liquid gas carriers and cruise ships) in the global fleet, accounting for 30% of the global fleet, emit 75% of total shipping GHG (Olmer et al., 2017). According to the *Third IMO GHG Study 2014*, from 2008 to 2012, global shipping emissions fell by 15%, which the study concluded was largely due to reduced ship speeds. The greatest share of this reduction came from these ships traversing large trade routes between distant markets (multi-trade and Europe/Far East) (Balcombe et al. 2019).

1.5 Consequently, certain types of ships that contribute less to international GHG emissions, such as specialized reefer ships (representing less than 1.6% of GHG emissions), as well as ships mostly engaged in coastal shipping (such as RoRo passenger/cargo vessels) could be exempted from the speed regulation without seriously affecting the measure's overall goal of GHG reduction.

1.6 A maximum average speed could be implemented quickly, and with a larger scope than many other short-term actions (CE Delft and UMAS, 2019). This is especially important in meeting the Initial GHG Strategy's goal of peaking GHG emissions as soon as possible. After years of decline, shipping emissions grew by 2.4% from 2013 to 2015 (Olmer et. al., 2017).

1.7 As detailed in document MEPC 74/7/8, any baseline speeds established could be verified and optimized by comparing AIS data with bottom-up operational data collected by the

[1] Document MEPC 74/7/8, paragraphs 11 to 14.

IMO Data Collection System (DCS).[2] This will ensure any speed regulation is both enforceable and comparatively straightforward to adjust if deviations are identified.

1.8 In almost every scenario, reducing ship speed would have an immediate effect on reducing a ship's fuel consumption and GHG emissions. In two modelling scenarios, UMAS and CE Delft found that simply capping speed for different ship types and sizes at their 2012 levels would reduce CO_2 emissions 13% by 2030, while reducing speeds by 20% from the 2012 baseline would deliver up to 34% emissions reduction, overshooting the Initial GHG Strategy's 2030 carbon intensity objective (CE Delft and UMAS, 2019).

1.9 Even accounting for the additional ships that will be needed to maintain transport supply, fleet-wide fuel consumption and emissions will be reduced under slower speed scenarios (Faber et. al., 2017 and CE Delft and UMAS, 2019). In other words, these studies conclude that it is better to sail more ships slower, than fewer ships faster.

2 Impacts to be assessed

2.1 Geographic remoteness and connectivity to main markets

2.1.1 Impacts on distant markets connected to slower speeds is likely to be neutral or positive for most goods. For SIDS and other nations away from major trade routes, the freight rates for shipping are typically higher. However, this cost is not strictly connected to distance from major routes.

2.1.2 In their analysis of Caribbean freight rates, Willsmeier and Hoffman found that competition between multiple shippers, the level of port infrastructure, low volumes of trade and the possibility for trans-shipment were just as important in determining freight rates to more geographically remote markets (Willsmeier and Hoffman, 2008).[3] This suggests that freight rates to these States are determined more by the degree to which the market is controlled by an oligopoly of shippers than the speed at which ships travel. If any effect is likely, the potential cost savings from reduced fuel consumption (see section 2.4) should benefit operators, although the factors mentioned above are likely to determine whether these would subsequently be reflected in the freight rates.

2.1.3 While the research does not suggest an adverse effect, if it could be shown that SIDS were likely to be negatively affected by this regulation then they could easily be excluded without significantly compromising the overall reduction in emissions. But in a well-functioning competitive market, one could expect that at least some of these costs savings would be passed on to the final consumers.

2.1.4 As discussed in section 1.5 and in document MEPC 74/7/8, for perishable goods carried by specialized ships like reefers, an exemption from speed regulations could be considered to prevent adverse impacts. Other limited exemptions for smaller ships like passenger ships could also be considered.

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[2] Document MEPC 74/7/8, paragraphs 13 and 18.

[3] See also document ISWG-GHG 1/2/14.

2.2 Cargo value and type

2.2.1 Document MEPC 74/7/8 considered the impact of slower speeds on reefers and perishable goods, and multiple studies have evaluated the effect of slower speeds on different market goods. As noted in document 1.5, when establishing a speed regulation, the chosen speeds could be set to specific ship types and sizes, which would allow for the different needs and considerations regarding cargo type to be taken into account.

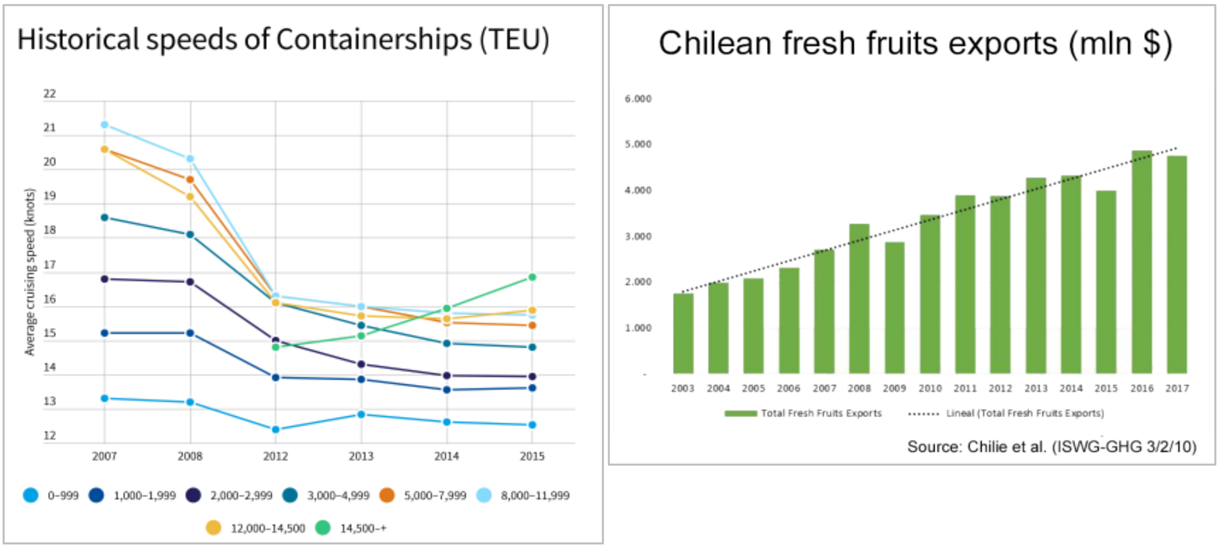

Figure 1: comparison of historic speeds of containerships and exports of Chilean fresh fruits

2.2.2 With regard to perishable goods specifically, concerns have been raised about the potential negative impact of reduced ship speeds on these products. Data supporting these concerns is scarce, but there is evidence pointing in the opposite direction. The above-left graph (which is based on the *Third IMO GHG Study 2014*) shows all container size segments which normally carry perishable produce in reefer containers reduced their operational speeds between 2007 and 2015, while the table on the right shows that for the same period fresh fruit exports from countries like Chile have increased almost linearly. This limited evidence allows a tentative conclusion at least that speed regulation will not adversely impact perishable goods.

2.2.3 However, while other factors will likely influence cargo value, regulating slower speeds may have a different effect on costs based on cargo value and type. In addition to reefers, CE Delft found that time costs were more likely to affect products like machinery and vehicles than manufactured food products like chilled beef or oil cake, but this could also be affected by the availability of local alternatives to the imported product (Healey and Graichen, 2019). In the case of the latter products, the additional expenses were calculated to range between 0.08% and 0.031% of total value for oilcake and 0.06% and 0.23% for total value of beef exports (Faber et al., 2017).

2.2.4 More generally, Öko-Institut e.V. found that shipping also only accounted for a modest fraction of the overall transport costs reflected in a product price, and even in circumstances of low fuel oil or high operator costs the final impact on most cargo costs is likely to be negligible (Healey and Graichen, 2019).

2.3 Transport dependency

2.3.1 For States that depend on international maritime transportation, some consideration could be given for non-luxury passengers ships that may be adversely affected by a speed regulation. Since fuel oil consumption is a major component of total transport costs, slower speeds will invariably reduce transport costs for voyages.

2.4 Transport costs

2.4.1 Regulating ship speed directly affects ship operating costs during a voyage, but in most cases the effect is likely to be positive. Fuel oil is the single most important factor in overall transport costs, and up to a break-even point the savings from reduced fuel consumption will exceed other operational costs as a result of extra time at sea (Carriou, 2011).

2.4.2 The point at which ships reach this break-even point depends on the price of fuel oil, speed reduction levels and freight rates (potential earnings). While Carriou estimated that slow speeds would cease to be viable when the price of fuel oil per ton dropped to $350 to $400, many container ships continued to slow steam at fuel prices as low as $170 per ton due to low charter rates (Barnard, 2016).

2.4.3 In a study by Öko-Institut e.V. of Germany, a modelling exercise also found that slower ship speeds could be cost effective for operators in a wide range of scenarios. While non-fuel oil costs for operations, such as capital, increased operation and travel costs, fuel consumption for auxiliary engines, and earnings increased, in most scenarios these increases were offset by the savings from reduced fuel consumption by the main engines (Healey and Graichen, 2019).

2.4.4 In the Öko-Institut study, three different sizes of bulk carrier (Handysize, Capesize, and Panamax) were modelled under different scenarios of higher and lower fuel prices and speed reduction scenarios. In all but the most exceptional cases of low fuel prices or high daily earnings slower regulated speeds of up to around 30% could remain below the break-even point (Healey and Graichen, 2019). While the effect was more pronounced on smaller bulk carriers, all ship types and routes could benefit to a considerable degree.

2.4.5 With marine fuel prices expected to rise as a result of the stricter 2020 global marine sulphur standard, one could reasonably expect that speed reductions of up to 30% below the (2012) baseline would deliver cost savings to operators (in addition of course to the environmental benefits).

2.5 Food security

2.5.1 CSC does not believe slow ship speeds will negatively impact food security. As noted in sections 2.1 and 2.2 above, in instances where specific goods like perishable foods are of concern, past evidence does not support a negative impact from slow speeds on food prices, and other factors are often responsible for market prices or availability.

2.5.2 More generally it is worth observing that the climate crisis is the single biggest challenge to the food security of humanity as a whole, and indigenous peoples in particular, and that reductions in shipping emissions will make a significant contribution to tackling the climate crisis and to improving global food security.

2.6 Disaster response

2.6.1 Adopting speed regulations will not alter a ship's technical capacity to operate at higher speeds. IMO could consider developing specific guidelines and rules describing the circumstances, e.g. a verifiable disaster response, when ships would be allowed to sail beyond the limits set by the regulation.

2.7 Cost-effectiveness

2.7.1 As noted in section 2.4, regulating ship speeds below a break-even point is a cost-effective measure that can be enacted on existing ships. In most cases the reduced fuels costs associated with slower speeds will more than offset the additional costs associated with the longer time at sea. In that sense, a speed regulation is not only an effective way of reducing emissions, it is also a way of reducing costs.

2.7.2 While further analysis could be considered to precisely quantify the effects of slow shipping as a percentage of GDP or other metrics, we find the overall effect of a regulated maximum average speed to be positive.

2.8 Extent of impacts

2.8.1 The effect of slower ship speeds on GHG emissions, on the economics of ship operations and on States has been addressed above, but this assessment would not be complete without mention of the other positive impacts of slower ship speeds on the environment.

2.8.2 Carbon dioxide is not the only air pollutant that reduces with slower ship speeds. The reduced fuel burn associated with lower speeds will also reduce emissions of sulphur and Black Carbon. Sulphur emissions are proportional to fuel burn and as such a 10% or 20% reduction in speed will result in a similar reduction in sulphur emissions (CE Delft, 2012). For Black Carbon (BC) the situation is slightly more complicated and without engine derating, emission reductions will be more modest as in most cases emission factors increase as engine load decreases (Comer et. al., 2017).

2.8.3 There is also a significant and growing body of evidence that slower operating speeds have a positive effect on marine life by reducing underwater noise and the chance and severity of collisions with marine mammals. Leaper estimates that a 10% reduction in ship speeds could reduce the total sound energy from international shipping by as much as 40% (Leaper, 2019), and the same 10% reduction in ship speeds could reduce fatal ship strikes on large whales by as much as 50% (Leaper, 2019).

2.8.4 The multi-issue mitigation potential of slow steaming is an important consideration when assessing competing proposals for a short-term ship GHG mitigation measure (GL Reynolds, forthcoming). Air pollution, underwater noise pollution and ship whale interactions are all issues on the IMO agenda and the opportunity to help tackle them at the same time as taking action on ship GHG emissions should not be ignored.

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