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REDUCTION OF GHG EMISSIONS FROM SHIPS

An Examination of Regulatory and Economic Elements Critical to IMO's GHG Strategy

Submitted by The World Shipping Council

SUMMARY

Executive summary: MEPC 78 will consider further development of IMO's GHG Strategy and the specific actions needed. This paper identifies six strategic elements that WSC considers are critical to address as we consider the specific regulatory initiatives, market-based measures, and related programmes that will be necessary to successfully navigate a major energy transition in the commercial maritime sector.

*Strategic direction,
if applicable:* 3

Output: 3.2

Action to be taken: Paragraph 28

Related documents: MEPC 77/16; ISWG-GHG 10/5/6

INTRODUCTION

1 The IMO is engaged in an unprecedented effort to accelerate a major fuel and technology transition in response to the climate challenge. Many Member States and organizations have called for the world's fleet to reach zero GHG emissions¹ in 2050. The changes required and the necessary investments to achieve this objective are both massive and unprecedented. We can meet those challenges, but our success will be dependent on whether we effectively address the key strategic elements that are fundamental to the changes that will be necessary in the immediate future and over the next three decades.

2 Liner shipping companies are among those in the industry who have shown leadership in facing these challenges, and our companies are likely to be among the first-movers in putting low and zero-GHG ships on the water. Our companies are also acutely aware of the risks of

¹ For purposes of clarity WSC considers zero or near-zero GHG emission fuels to be those fuels that are formulated using zero-carbon (100% renewable) electricity, such as from solar, wind or hydro power, including emissions avoided or eliminated in the well-to-wake life-cycle, or other fuels with similar life-cycle GHG emissions as supported by credible science-based methodologies.

making poor investment decisions that fall significantly short of a zero GHG emission objective. Recognizing the challenges we face and the costs to society of failing, we have given considerable thought to what are the most important regulatory and economic issues we need to address if we are to succeed in this challenge. In this paper we outline six core regulatory and economic elements that we consider critical to meeting our goals for 2050 and earlier:

- i. Applied R&D for shipboard and shoreside systems
- ii. Global application of a carbon price (GHG price)
- iii. Life cycle fuel accounting with appropriate regulatory mechanisms for first-movers
- iv. Integrated development of global production and supply of zero GHG fuels
- v. Green Corridors as enabler of the fuel / technology transition
- vi. New build standards that support the energy transition

KEY REGULATORY AND ECONOMIC ELEMENTS CRITICAL TO IMO'S GHG STRATEGY

3 We briefly outline six issues we believe must be addressed as we refine IMO's Initial GHG Strategy and seek agreement on a revised strategy. The issues reflect a combination of technical, regulatory, and economic considerations that are important parts of an effective strategy for the commercial maritime sector.

Applied R&D and Development of Shipboard and Shoreside Engineering Systems

4 Applied R&D and development of onboard engineering systems that allow the safe use of zero GHG fuels will be necessary for putting zero GHG ships on the water. Similar work is also necessary on the shore-to-ship transfer of advanced zero-GHG fuels that present innovation challenges due to their highly toxic, corrosive, and/or explosive characteristics. Technology Readiness Levels (TRLs) need to be raised to enable the delivery and operation of thousands of zero-carbon ships, as opposed to just a handful of prototypes.

5 The study undertaken by *Ricardo* and submitted as MEPC 77/7/1 outlines the magnitude and complexity of the R&D projects needed to increase TRLs to the levels required to develop and deploy low and zero-GHG technologies and fuels. The paper identifies 120 distinct challenges for increasing TRLs and outlines 260 separate R&D projects that need to be addressed. Moreover, a review of the four appendices to MEPC 77/7/1 make it quite clear that the necessary technologies to use many of the most promising fuels (including hydrogen-based fuels) onboard transoceanic ships are not solved or immediately available absent a significant increase in the level of effort and investment devoted to applied R&D projects focused on use and deployment in the commercial maritime sector.

Establishment of a Global Carbon Price

6 Virtually all studies undertaken to date conclude that low and zero GHG fuels will cost substantially more than conventional fuel oil. If we consider those zero GHG fuels that can be produced with little or no production of GHG gases through renewable energy sources (e.g., solar, wind, and hydro power), the differential in cost of these fuels can be expected to be three to five times the cost of conventional fuel oil for a significant period of time.

7 Considering these cost differentials, the ability of companies to put zero GHG ships on the water and to operate them competitively (among a fleet of ships with dramatically lower fuel costs) requires establishment of a carbon price that effectively levels the playing field among newer low and zero GHG ships and the tens of thousands of ships that will still be burning fuels with significant GHG emissions. Alternatively, or in combination with an established carbon price, programmes that explicitly 'buy-down' the cost of specific zero GHG fuels will likely be necessary. These programmes should not be ad-hoc or dependent on

voluntary funding sources because a dependable and broad-based programme will be necessary to be effective.

8 Significant efforts over the last decade have been made by this Committee, working groups, and expert groups discussing the pros and cons of a GHG levy and emissions trading. While significant pros and cons exist for both approaches, the most important objective is to establish a carbon-price that is applied at a global scale. Consequently, WSC is open-minded to what approach (levy, ETS, or a hybrid) is taken. The important outcome is agreement on a market-based measure that provides the necessary financial conditions where companies can build and operate zero GHG ships and still remain competitive in the marketplace.

Life-Cycle Analysis of Fuels & Appropriate Regulatory Mechanisms for First Movers

9 Well-to-Wake life-cycle analysis of specific fuels and their different production alternatives is a necessary and fundamental step to determining two important parameters: 1) whether a given fuel and its production are truly zero or near-zero when considering the GHGs emitted in its production and use, and 2) to explicitly reflect the real costs associated with renewable production and transportation of these zero GHG fuels given the different production, storage, and transportation options that may be used. This information is critical to future IMO discussion and decisions concerning the appropriate value of the carbon price that is needed.

10 *How to deal with First Movers and Life-Cycle Analysis?* Some fuels that are low or zero GHG at point of use can be produced either through GHG intensive production processes or through the use of renewable energy. For example, provided the necessary engineering and safety risks are overcome, we expect to see some ammonia fueled ships introduced into the fleet in the near future. It is also very likely, at least initially, that the ammonia available for use by these ships will not be produced through 100% renewable energy or that the supply of "100% green" ammonia that is produced through renewable energy will be very limited initially.

11 This raises the question of how we treat ships with technologies using future fuels produced by an energy sector that is also in transition. First-mover activity will be critical both for ships and in the production and supply of low and zero GHG fuels, and we must encourage companies to take such actions. In the example outlined in the preceding paragraph, the ship is likely using the only ammonia available in the near future, which may be produced through "brown or blue" processes. While we believe it is appropriate to objectively assess the full well-to-wake emissions with the production and use of this fuel, we should also include regulatory provisions that will not penalize first movers because the fuel is not yet available from 100% renewable energy production sources. To penalize ship innovation and the demonstration of these systems on the water would run entirely counter to the investments we are trying to catalyze and deter the pace of transition.

12 To meet this challenge and to encourage first-movers to deploy ships using fuels with the greatest potential to reduce and eliminate GHG emissions, WSC invites the Committee to:

- a) develop an LCA process that examines GHG emissions across the full well-to-wake life cycle so we can realistically assess the relevant emissions during use and production,
- b) breaks out well-to-tank emissions from tank-to-wake emissions to distinguish emissions from combustion from those generated upstream. If emissions records are needed for accounting purposes, this can also ensure that the latter are only accounted for in national emission inventories consistent with UNFCCC practices, and

- c) develop specific regulatory provisions that incentivize first movers in using among others, hydrogen-based fuels (including ammonia). This should not exclude lower carbon fuels produced through brown/blue processes, which may be needed in the shorter term if green fuels are not yet available through renewable energy sources.

13 We do not support an approach that chooses to limit the relevant LCA analysis to a tank-to-wake approach (effectively ignoring production emissions) in the near-term because this approach is likely to encourage longer-term investments in the use of fuels with very significant GHG emissions. Moreover, well-to-wake LCA should not merely be used for informational purposes, but should be incorporated in IMO regulation to provide actual incentives for use of alternative fuels that offer significant GHG reductions across the full well-to-wake production and use of a given fuel.

Integrated Production and Supply of Zero GHG Fuels

14 The production and supply of low and especially zero GHG fuels will be one of the critical issues in the marine fuel transition. Experience to date with some alternative fuels already demonstrates that demand in the maritime sector alone is insufficient for suppliers to make large investments tailored to supplying the maritime sector alone. Supply investments to produce zero-GHG fuels through renewable energy sources will be essential as we look to zero GHG fuels. These new energy production facilities will require billions in investment and as demand emerges, supply for maritime users is unlikely to be predictable or widely available across the globe in the beginning of a major energy transition.

15 We should anticipate and design a set of IMO regulations with the expectation that zero-GHG fuels will not be immediately available, and as these fuels become available it is extremely likely that the availability of different zero-GHG fuels will be limited to specific locations that will constrain wide-spread use, both because the fuel is not yet available in the area of operation and because many older ships may not be physically able to use the fuels in question.

16 Considering the scale of these challenges we believe it is critical that our regulatory efforts address two related issues: 1) coordinated partnerships between Member States and energy providers that are specifically designed to invest in new low and zero-GHG fuel production that includes specific provisions for key supply points in the commercial maritime sector, and 2) regulatory provisions that allow for certain flexibility/adaptability in the initial stages of a major energy transition since it is expected that low and zero GHG fuels will not be available at the same time around the globe. Further discussion of this issue follows in the discussion of Green Corridors.

Green Corridors as a Vehicle for the Fuel / Technology Transition

17 The *Clydebank Declaration for Green Shipping Corridors* outlines a promising concept as we consider how a fuel and technology transition can begin in the marine transportation sector. Zero or “near-zero” GHG fuel infrastructure and the ships that are equipped to use these fuels will be limited in the early stages of a global energy transition. Green corridors may provide a realistic vehicle to introduce zero GHG ships and fuels across trade lane(s) where the necessary shoreside energy infrastructure is first introduced. These corridors can also provide *lessons learned* that can be applied to future technology and fuel infrastructure as development projects expand to a wider and continuously growing set of locations and ships across the world.

18 In one sense, green corridors may be considered those trade lanes where use of low and zero-GHG fuels first become viable because the zero GHG vessels needed for these trades match the technical requirements of a given fuel, commercial demand is high, and because the fuels are available in key locations that may be used by ships in one or more trade corridors associated with those places where the fuel is available. This is a logical and realistic pathway for new fuels and ships to be introduced globally through an expanding supply network. This step-wise expansion is especially relevant if we accept that it is not realistic that a major energy transition will occur simultaneously and uniformly across the globe. Simply put, the necessary fuels and ships that are equipped to use these fuels will not be available at the same point in time in every location across the globe.

19 Green corridors also offer a practical mechanism for the IMO, Member States, and interested parties to focus investments in a manner that enables compliance with a given set of regulations. In addition, green corridors only become real through government-to-government initiatives and coordinated public-private investments to build the necessary production facilities and supply infrastructure. This is a *critical pathway* if we are to create an environment where compliance with a given regulatory standard is feasible.

20 Specific regulatory provisions that address fuel availability are particularly relevant to the production and availability of low and zero GHG fuels because the necessary investments will be measured in billions and may require a total investment of approximately 1 trillion USD². Moreover, the necessary investments are unlikely to occur unless there is a predictable demand that reaches beyond maritime transportation.

The *proposal for a Low GHG Fuel Standard (ISWG-GHG 10/5/3)* provides an excellent example of where we should tailor regulations that recognize that the necessary fuels and the ships that can use these fuels will emerge in certain locations first and then expand as experience and investment grows across the globe. By way of example, WSC suggests that as the Committee discusses the possibility of a Low GHG Fuel Standard, it is critical to consider issues of availability and how to structure the relevant regulatory requirements in a manner where investments - both onshore and in the fleet, can be made in a manner that is realistic. In this context, we should consider and plan for fuel production and supply in key locations as it is unrealistic to think that simply mandating ships to meet a given GHG fuel standard will result in compliance through a set of organic market responses that overcome issues of availability. This is especially relevant to the maritime sector, as the magnitude of financial investments noted in paragraph 20 will require coordinated public and private investments that consider energy demands from multiple sectors.

21 Some parties may advocate an approach where green corridors are an elective undertaking that are encouraged, but are effectively independent of the IMO Strategy. Given the critical importance of creating a framework for how this energy transition can unfold in a predictable and efficient manner in the maritime sector, WSC suggests that the green corridor concept should be an *integrated and fundamental element* of the expanded IMO GHG strategy. To this end, WSC proposes three actions that will be necessary to move the Green Corridors idea from a concept to a functioning programme that is integrated with future IMO regulations and related programmes. The three actions include:

- a) Establish a “*Green Corridors Programme*” under the coordination of the IMO Secretariat that:
 - a. Seeks to establish national, bilateral, and multilateral commitments for:

²<https://www.globalmaritimeforum.org/news/the-scale-of-investment-needed-to-decarbonize-international-shipping>

- i. the production of low and zero GHG fuels using renewable energy;
 - ii. the construction of the necessary fuel supply infrastructure at key locations vital to marine transportation infrastructure; and
 - iii. supply plans for zero-GHG fuels that include specific plans and commitments to make fuels available to the maritime sector.
- b) Consider how to develop a realistic “*buy-down*” programme for the use of zero GHG fuels over a given timeframe. This will be necessary throughout the transition period (which will likely require two to three decades) where the cost of hydrogen-based fuels and other near-zero GHG fuels produced through renewable energy sources are expected to cost far more than fuels available in the market today;
- c) Integrate specific regulatory provisions in relevant IMO regulations under consideration under IMO’s GHG Strategy that address issues of fuel availability and make clear that a ship is not subject to punitive measures if the fuels necessary to comply with the relevant standard (as applicable) are not available.

22 We fully acknowledge that development of an appropriate “*buy-down*” programme that can function in an international context will be challenging and will require innovative thinking as we proceed with development of IMO’s GHG Strategy. That having been said, we must also recognize that the operation of a ship using a given fuel that costs two to five times as much as more conventional fuels used by other ships is not commercially viable. Even if we agree on a mechanism for a global carbon price, the carbon price may also require a supplemental “*buy-down*” programme because the lowest GHG fuels may command a price differential that is much greater than fuels that offer more modest GHG improvements.

23 WSC encourages the Committee to consider the specific actions outlined in paragraph 21 above, and how *Green Corridors for international shipping* can be included as an integrated component of the mid-term measures to be developed by the Committee.

The Role of New Build Standards in the Energy Transition

24 Two issues with significant technical and regulatory implications require the attention of the Committee as we consider the IMO GHG strategy: 1) what are the fuels and the associated technologies to use them, that can be used in existing marine diesel engines, and 2) what fuels require new engineering systems that may be highly impractical for use onboard existing ships? We all have heard reference to “*drop-in*” fuels, but experience to date indicates that drop-in fuels may be limited in number and many of those fuels may not meet the test of zero or near-zero when evaluated on a well-to-wake life-cycle basis. For these reasons, as well as the need to transition to a fleet that involves tens of thousands of ships, we need to consider how new-build requirements factor into our strategy to transition the world’s fleet to zero GHG fuels. Moreover, the role of new-building in our strategy is not really an elective choice, as the discussions on Phase Four EEDI standards require Member States and interested organizations to grapple with this issue.

25 Recognizing that we need to transition a fleet that includes approximately 55,000 ships, we need to consider what should be the specific nature of a new build standard and what are the appropriate dates to put those standards in place. By way of example, should the standard continue to be an efficiency-based standard as we have today in Phases 0, 1, 2, and

3 of the EEDI? Or should an appropriate new-build standard be drafted to require that the ship be capable of using one of a suite of zero-GHG fuels?

26 To consider this matter at a more practical level, we may wish to consider development of new build standards along the following lines. For example, we may consider requiring ships built on or after a specific date to be capable of operating on a defined suite of zero GHG fuels *or alternatively* no longer allow construction of ships that can operate on fossil fuels alone after a specific date. To guard against creating a situation where we inadvertently create stranded assets, we would also require that the necessary technologies to use these fuels have met a TRL 8 or 9 standard of readiness five years prior to the designated new-build requirement, and that sufficient fuel production and infrastructure is in place at key locations to enable use of these ships. This review could be undertaken in a manner roughly consistent with the review undertaken by the Committee under regulation 13 of MARPOL Annex VI to confirm the availability of low-sulfur fuel oil.

CONCLUSION

27 A successful and efficient energy transition will be greatly aided by an expanded IMO GHG Strategy that addresses each of the six elements outlined in this paper. We also believe that each of these elements need to be integrated into the regulatory provisions that we develop as we move forward with explicit regulations and programmes that will constitute the vehicle for IMO's GHG Strategy.

ACTION REQUESTED OF THE COMMITTEE

28 The Committee is invited to consider the strategic elements addressed above and take action as appropriate.
