INTERNATIONAL MARITIME ORGANIZATION

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

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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

Goal based approach and speed optimization

Submitted by France and Monaco

SUMMARY

Executive summary:	This document proposes a short-term measure, for effective implementation by 1 January 2023 at the latest. This proposal is based on an objective-based approach, using the SEEMP plan. The objective approach has the advantage of not imposing any technology or operational solution that may not be appropriate for all types of ships and all types of operations. However, it is necessary for the Organization to be able to offer an operational method that is immediately available on 1 January 2023. This proposal considers that each ship should have an individualized speed/consumption interrelation in its SEEMP. This interrelation could thus be used by the shipowner to carry out speed optimization. The shipowner will in any case have the choice to use any other alternative method. The submission also aims to ensure a level playing field by defining the conditions for certification and control of measures.
Strategic direction, if applicable:	3
Output:	3.2
Action to be taken:	Paragraph 35
Related documents:	Resolution MEPC.304(72); ISWG GHG 5/4/11; MEPC.74/18 and ISWG-GHG 6/1/1

Introduction

1 The *Initial IMO Strategy on reduction of GHG emissions from ships* (resolution MEPC.304(72)) was adopted at MEPC 72.

2 The Initial Strategy defines the first step of the short-term measure: "possible short-term measures could be measures finalized and agreed by the Committee between 2018 and 2023. Dates of entry into force and when the measure can effectively start to reduce GHG emissions would be defined for each measure individually."

3 In order to meet the Organization's commitments for 2023, taking the rules of the MARPOL Convention into account, the Organization's programme and working methods, the draft amendments to MARPOL Annex VI need to be approved at MEPC 75. MEPC 76 will then have to adopt these amendments. In the period 2020-2023, it will be necessary to adopt guidelines as soon as possible to specify how these new provisions will be applied.

4 Considering the very limited time available, the co-sponsors wish to make simple, pragmatic and effective proposals.

5 With this in mind, during ISWG-GHG 5, France submitted document ISWG-GHG 5/4/11 presenting the concept of "Speed regulation followed by a goal-based measure".

6 Following discussion during the fifth intersessional meeting of the Working Group on Reduction of GHG Emissions from Ships, it was considered in the report that: "The Committee also noted that proposed measures should be goal-based and could include energy efficiency measures for existing ships, speed optimization and reduction, alternative fuels and National Action Plans." (MEPC 74/18, paragraph 7.37)

7 In the light of the discussions of ISWG-GHG 5 and MEPC 74, having heard the comments expressed on the various proposals submitted, in particular on the goal-based approach, the "speed regulation or optimization", the co-sponsors wish to submit a new proposal.

8 This proposal is drafted according to the structure requested by the Chair, as presented in document ISWG-GHG 6/1/1.

Explanation of the main elements of the proposal ("the concept")

9 The objectives of this proposal are guided by the following key principles:

.1 the proposed amendments for adoption must ensure that measures are implemented in accordance with the quantitative commitments of the reduction strategy;

.2 the implementation must be effective from 1 January 2023;

.3 the proposal must ensure a level playing field;

.4 these measures must be certified and verified by the flag State;

.5 port State control (PSC) must be able to verify the actual implementation of its measures;

.6 the use of monitoring instruments should make it possible to verify actual physical data;

.7 the mechanism should allow industry to invest in innovative and less polluting technologies (not only in terms of CO_2 release).

10 The co-sponsors noted during ISWG-GHG 5 and MEPC 74 the interest for a goal-based approach. The main benefit of this goal-based approach is that it can be applied to all fleets and types of operations while allowing industry to invest in innovative solutions. This goal-based approach could be adopted within a reasonable timeframe, although guidelines will have to be developed after the amendments have been approved.

11 However, it should be noted that up to now, no technical or operational solution to achieve significant emission reductions is immediately available. Only speed optimization can produce this immediate effect. It should also be noted that many ships have already implemented measures to optimize their speed.

12 In view of these two observations, the co-sponsors suggest the following "concept":

.1 **Goal-based approach**: Adoption of a goal-based approach within the SEEMP framework of rule 22 of Annex VI requiring that all ships (new and existing) of 400 gross tonnage and above have a SEEMP. This plan contains the objectives and means of reducing emissions for the ship. It is certified through an annual survey. The outcome of this survey is a condition for the issuance and renewal of the International Energy Efficiency (IEE) Certificate;

.2 **Quantifying the objective**: The co-sponsors would like the carbon intensity reduction objective (gCO_2/tonne.mile) to be determined in a global perspective for the entire fleet. Finally, this objective must have a linear annual increase until 2030:

	Year	Target
	Objective 2023 =	X_0 (gCO_2/tonne.mile)
X_1 =	Objective 2024 =	X_0-2%
X_2 =	Objective 2025 =	X_1-2%
X_3 =	Objective 2026 =	X_2-2%
X_4 =	Objective 2027 =	X_3-2%
X_5 =	Objective 2028 =	X_4-2%
X_6 =	Objective 2029 =	X_5-2%
X_7 =	Objective 2030 =	X_6-2%

.3 **Allocation of the objective on the basis of speed optimization**: For the sake of simplicity and time constraints, it is suggested that the assignment of these objectives be converted into a reduction in the fuel consumption of the vessel and therefore also into a speed optimization. Thus, in 2023, the Organization will have the guarantee of having an instrument enabling shipowners to optimize speed in order to achieve their objectives. However, shipowners will still have the possibility to use an alternative method. The adaptation of the objective must take into account the reduction already achieved by EEDI;

The mechanism could thus be summarized as follows for a given ship:

GOAL $_{\text{for an individual ship}}$ $=X_{0\text{corrected}}= X_0$ – (attained EEDI – required EEDI)

For ships built after 1 January 2013, and not subject to the EEDI, a flat-rate reduction value is assigned to the ship according to its type and date of construction.

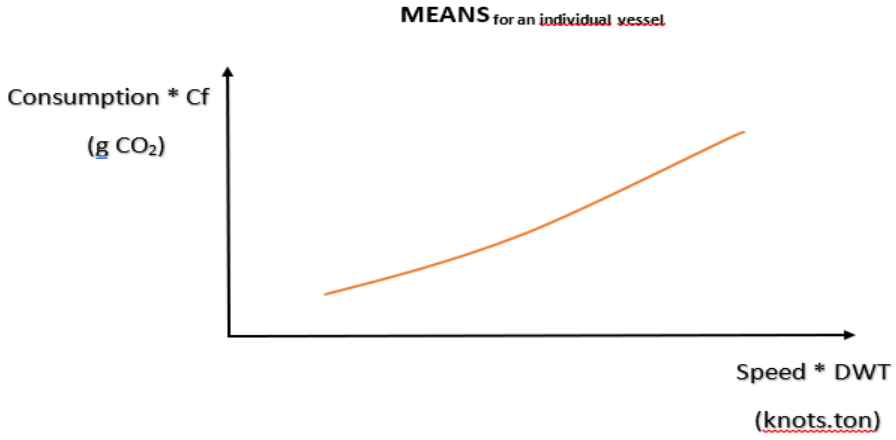
MEANS $_{\text{for an individual vessel}}$:

Furthermore, each ship has an individualized Speed / Fuel Consumption correlation certified by the Administration according to the guidelines adopted by the Organization:

This correlation can be converted into g/CO_2 as a function of speed using the conversion factor C_f used in the calculation of EEDI.

	Type of fuel	Reference	Carbon content	C_F (t-CO_2/t-Fuel)
1	Diesel/Gas Oil	ISO 8217 Grades DMX through DMB	0.8744	3.206
2	Light Fuel Oil (LFO)	ISO 8217 Grades RMA through RMD	0.8594	3.151
3	Heavy Fuel Oil (HFO)	ISO 8217 Grades RME through RMK	0.8493	3.114
4	Liquefied Petroleum Gas (LPG)	Propane	0.8182	3.000
		Butane	0.8264	3.030
5	Liquefied Natural Gas (LNG)		0.7500	2.750
6	Methanol		0.3750	1.375
7	Ethanol		0.5217	1.913

To integrate the capacity, the ship's deadweight is then used to convert this relationship to gCO_2/tonne.mile, in the same way as EEDI.



To achieve its objective, the ship can either:

a. only use speed optimization; or

b. partially use speed optimization and complete the objective with an alternative method certified by the Administration; or

c. only use an alternative method certified by the Administration.

In the event that the ship chooses to use speed, it is its responsibility to demonstrate in the SEEMP how it uses the speed/consumption relationship with regard to its operation in order to achieve the carbon intensity reduction objective;

.4 **Continuous monitoring**: Regardless the method chosen by the shipowner to achieve the reduction objective, the ship must have a means of continuous monitoring enabling both the Administration and PSC to ensure the implementation of SEEMP. This monitoring and the role of Administration and PSC is the best way to ensure a level playing field; and

.5 **Compliance with the strategy's commitments**: Amendments to the MARPOL Convention will ensure that in the event of a delay in the adoption of the various guidelines, the speed optimization measure would be implemented by default in a mandatory manner, in line with the Strategy's commitments.

13 The mechanism takes into account ships that will implement measures on a voluntary basis before 2023. These efforts will be deducted from their future objectives.

Justification of the proposal (goal-based approach)

14 If the objective-based approach is a method that allows industry to define a very large number of technological and operational solutions, this approach must not remain at the concept stage. This approach must allow the implementation of appropriate certification and control measures.

15 With regard to time constraints, the difficulty in defining a short-term measure is in setting a target in terms of percentage GHG emission reduction and assigning it to a given ship. This declination must consider the different typologies of the world fleet.

16 The definition of the carbon intensity reduction target must be determined globally and then be declined at the level of each ship. The creation of reference lines is too approximate and would penalize certain categories of ships.

17 The consideration of the effort made in EEDI is essential in order not to penalize ships that go beyond the strict regulatory requirements. Thus, EEDI considered in the calculation of the objective is the calculated EEDI and not the required EEDI.

Description of legal nature

18 The co-sponsors propose amendments to MARPOL Annex VI for mandatory application to any ship of 400 gross tonnage and above (see annex 2), including ships not currently subject to EEDI.

19 SEEMP contains the objectives and means of reducing emissions for the ship. It is certified by the Administration as part of an annual survey. The result of this survey is a mandatory condition for the issuance and the renewal of the International Energy Efficiency (IEE) Certificate.

Application of the proposed measure

20 The application of the measure should apply to all new and existing ships, and the measure should be effective by 1 January 2023 at the latest.

Estimation of the number of ships affected and expected benefits in terms of GHG emissions reduction

21 According to document ISWG-GHG 5/4 (Norway), 53,300 ships fell within the scope of MARPOL Annex VI in 2015.

22 It can be estimated that on 1 January 2023 about 60,000 ships will fall within the scope of MARPOL Annex VI.

23 Ships not covered by Annex VI account for less than 1% of emissions from the maritime sector. Thus, the proposed measure concerns 99% of emissions from the maritime sector. This short-term measure therefore makes it possible to meet the objectives of the Strategy.

Indication of the additional workload for the Organization;

24 The Committee's priority should be to approve and adopt the amendments first. Draft amendments to MARPOL Annex VI are set out in annex 2.

25 As soon as the amendments are approved by MEPC 75, the Committee should continue its work on the guidelines. As a first step, the co-sponsors consider that resolution MEPC.282(70) on *Guidelines for the development of a ship energy efficiency management plan (SEEMP)* should include the necessary amendments for the implementation of the measure.

26 In addition, the III Sub-Committee should be requested to consider the issue for the creation of a guideline on Port State Control, as well as amendments to the resolution on the Harmonized System of Survey and Certification (HSSC).

27 Finally, the co-sponsors reaffirm their wish that a "standing technical group", as presented in document MEPC 74/7/1 (Secretariat), be set up without delay. The establishment of this group would make it possible to develop the various guidelines necessary for the implementation of the amendments, without any significant impact on the Organization's budget.

Review of implementation aspects

28 The co-sponsors consider that the implementation of the measure should be carried out exclusively within the framework of MARPOL Annex VI.

29 Although the verification technique can be similar to ISM Code certification, the SEEMP certification audit must be carried out in accordance with MARPOL provisions.

30 It is proposed that each ship be subject to an additional survey no later than 31 December 2022.

31 This survey is intended to review / approve the new SEEMP. Part of the survey must be conducted using an audit technique, a second part must allow tests to be carried out to validate consumption/speed diagrams, monitoring devices, as well as to test the proper functioning of any installation that reduces emissions. This survey should allow the issuance of a new IEE Certificate.

32 A survey of the ship must be carried out annually to verify the proper functioning of the technical devices and the achievement of objectives. This survey should confirm the endorsement of the IEE Certificate.

33 In the event of non-compliance with the annual target, the shipowner is required to reduce emissions by a speed optimization measure until the ship meets its target again.

Initial impact assessment

34 The initial impact assessment is set out in annex 1 to this document.

Action requested of the Working Group

35 The Group is requested to consider the proposal set out in this document and take action as appropriate.

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ANNEX 1

INITIAL IMPACT ASSESSMENT

This annex is prepared in accordance with MEPC.1/Circ.885 of 21 May 2019. In accordance with paragraph 8 of the circular, each "impact" item listed below provides its description, its quantification and its positive and negative aspects, if any.

Introduction

The proposed measure is an objective-based approach. It therefore does not impose any specific methods and the shipowner has the obligation to demonstrate the effectiveness of his chosen methods in terms of reduction in carbon intensity in line with the values adopted in the Strategy.

The impact of potential gains for operational measures is documented as for example in the OECD study (2018). The GHG reduction potential by influencing the speed parameter varies from 0% to 60% depending on the speed reduction value. It is now the only operational parameter that can offer such a reduction gain in the context of rapid implementation.

Measures	CO_2 emissions reduction potential
Speed	0-60%
Ship size	0-30%
Ship-port interface	1%
Onshore power	0-3%

(source OECD 2018)

The proposal presented gives priority to the use of "speed optimization" to reduce the carbon intensity of the ship. The initial impact assessment favours therefore that shipowners will choose speed optimization as a priority method.

The question of slow steaming has been the subject of numerous studies. These studies have already very widely estimated the various possible impacts of the variation of this parameter in terms of emissions, ship operations and the potential cost involved

1 Impacts on ships and emissions

Investments

The proposed measure does not impose any technological solution and allows the shipowner to choose his preferred method. It does not require any additional investment for new or existing ships other than the installation of control equipment.

The speed optimization measure does not require investments. In addition, the measure contributes to reducing the ship's operating costs.

The only provision that may generate an additional cost is the need for equipment to ensure continuous monitoring. However, the cost is limited because the recording of the necessary parameters already exists. Nevertheless, it would be necessary to provide the aggregation of these data in an easy-to-use system.

Safety

In terms of technical impacts, a change in speed requires changes in some engine settings. However, the "slow steaming" method is already used by many companies without raising any particular problems.

For new ships, the provisions on minimum power must be specified in EEDI to ensure the safety conditions. Current work on the Shaft Power Limitation principle (MEPC 74/5/5 (France et al.)) will facilitate the implementation of these provisions.

The risk that could be identified would be the use of a nominal speed on most of the trips and a very low speed to meet the annual average. If the speed is too low, it could lead to problems in the maintenance and reliability of the ship's propulsion system.

Emissions

The 2017 CE Delft study estimated that CO_2 emissions reductions of 10%, 20% and 30% were possible as part of the speed reduction of the entire world fleet, assuming that the energy consumption of a ship's main engine per unit of time has a cubic relationship with its speed and that the efficiency of auxiliary engines is not affected by a speed reduction.

Even if this proposal is not limited to the speed optimization method, the shipowner can implement alternative methods. The proposed mechanism must achieve the same emission reduction values. Thus, they will have to use alternative methods that can demonstrate the achievement of the goal values.

For example, the 2009 Stopford study presents the potential for reducing the consumption of a Panamax bulk carrier:

Speed	Main engine fuel consumption	Fuels savings
[kn]	[tons/ day]	[%]
16	44	0%
15	36	17%
14	30	35%
13	24	45%
12	19	58%
11	14	67%

Source: Stopford (2009), own calculations.

A reduction in CO_2 emissions resulting from a reduction in fuel oil combustion will automatically result in a reduction in emissions of other pollutants such as SO_X, NO_X and Black Carbon.

A reduction in speed also has benefits in terms of reducing the noise emission and also limits the risk of collisions with marine mammals.

Impacts on world fleet

Declining ship speed can lead to an increase in the number of ships.
This relationship has already been documented and a relationship has already been defined by IMarEST in 2010:

$$F_1 = F_0 \left(\frac{\frac{DAS}{1-\Delta s} + (365 - DAS)}{365} \right)$$

Where

F_0 – the number of vessels of ship type and size category in the fleet
DAS – days at sea per year for ship type and size category
Δs – speed reduction as % of the baseline speed.

The 2017 CE Delft study showed that the impact of the increase in the number of ships due to a constant demand for transport supply from the market was relatively limited (around 4% to 6% of the emission reductions achieved) in order not to lose the benefit of the speed optimization measure.

	10% speed reduction	20% speed reduction	30% speed reduction
Container fleet	7% (6-8%)	15% (14-18%)	26% (23-30%)
Dry bulk fleet	6% (5-6%)	13% (12-14%)	22% (21-25%)
Crude & product tanker fleet	5% (5-8%)	12% (11-17%)	21% (18-29%)
Total	**6%**	**13%**	**23%**

(Percentage ranges in brackets give fleet growth range, depending on ship size categories.)

Growth of active fleet required in 2018 in terms of number of ships (source CE Delft)

However, the increase in the number of ships resulting from the measure must also be examined sector by sector in the light of whether or not there is overcapacity. The impact is therefore very different from one sector to another.

Design speed

The "design speed" must also be taken into consideration, especially considering the impact of speed modification on engine efficiency. Several studies have documented this negative impact. In particular, the 2012 study (Yu et al. (2012)) presents the example of a ship equipped with a slow engine to which a 33% speed reduction is applied. In this case, the engine runs at only 25% of its MCR. The authors show that there is a 12% deterioration in efficiency and the fuel saving is only 67% instead of 71% owing to the loss of efficiency. A speed reduction of 33% is an important value. However, the additional consumption due to the significant difference between speed and design speed remains relatively low. This example simply shows that the fuel consumption gain associated with a reduction in speed is very much higher than an additional fuel consumption associated with a lower efficiency of the propulsion system.

2 Geographic remoteness of and connectivity to main markets

A decrease in speed results in longer transit times, which could involve additional supply chain costs for shippers. It can also encourage modal shift for time-sensitive goods to air or rail transport.

This type of impact could potentially be significant in the case of speed regulation. However, in this case, speed optimization is proposed, which allows the vessel to have a high speed during certain phases and a lower speed for other phases. Thus, the impact on the transport of seasonal products would be significantly reduced.

3 Cargo value and type

Establishing an impact on cargoes is a very complex process because each type of cargo responds to very different market logics.

The 2017 CE Delft study focused on the case of several cargoes and products considering the speed reduction impact. For both products, the study illustrates that the additional expenses calculated as a result of a speed reduction were minimal, ranging from 0.08% to 0.31% of the total value for oilcake exports, and from 0.06% to 0.23% of the total value of beef exports.

4 Transport dependency

In the light of the various studies, and provided that the speed reduction is not more than 30%, the speed optimization measure constitutes an operational gain. However, the flow of goods could be slowed down.

This impact will differ depending on the type of ships. In areas where transport overcapacity exists, the issue of slowing down flows will be less relevant than in sectors with no overcapacity.

For States very strongly dependent on these flows, CO_2 emission reduction measures should not be only achieved by slow steaming measures in order to limit the potential impact. The size and type of ships on this type of trip will have to be adapted.

5 Transport costs

The OECD Ronald A. Halim study of 2018 presented the CO_2 emission intensity across the main shipping routes:

Figure 1: Visualisation of CO_2 emission across global shipping routes in 2015 (top) and 2035 (bottom)
Source: OECD, Ronald A. Halim, 2018

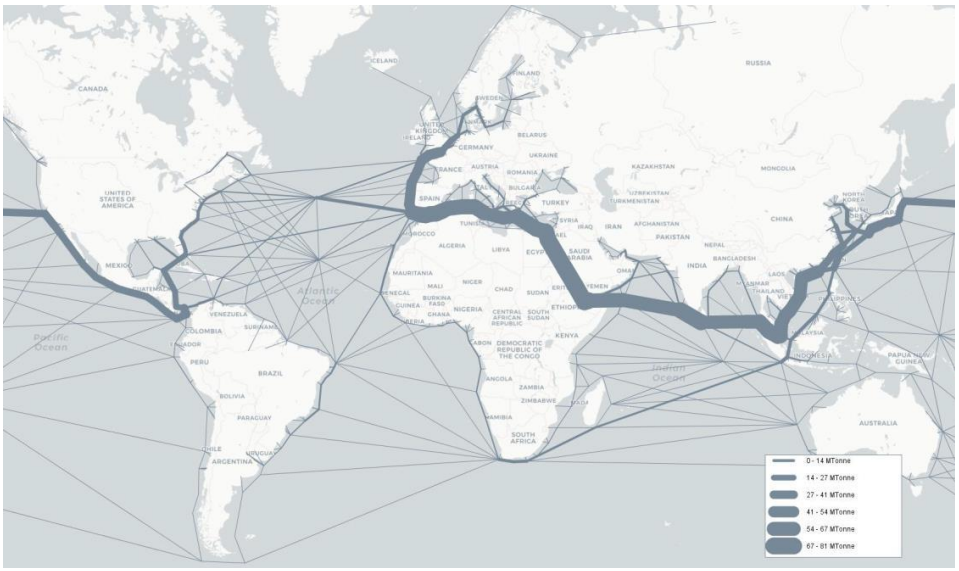


Figure 2: Different projections for shipping's CO_2 emissions to 2035
Source: OECD, Ronald A. Halim, 2018

The 2012 Rodrigue and Notteboom study highlights that the cost of maritime transport represents only a small part of the total transport cost. In particular, 80% of the transport cost is linked to land transport.

The 2017 UNCTAD study mentions the fact that average transport costs represent about 21% of the value of imports for least developed countries. As mentioned in the 2019 Öko-Institut e.V. study, this means that on average, sea freight costs represent only about 4% of the cost of the final product. A change in transport costs, for example for bulk transport, will have a marginal impact in almost all cases.

The average transport cost representing only 15% of the value of import (UNCTAD 2017), the potential impact on the price of products will be lower for other countries.

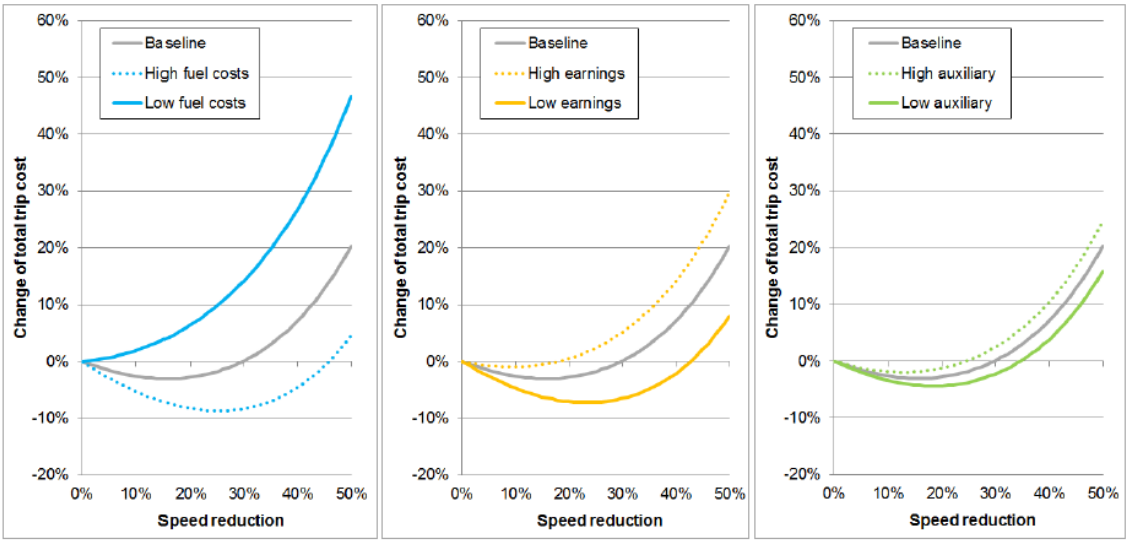
Several studies have analyzed specific cases. The 2017 CE Delft study examined the export of soybean oilcake from Argentina to the Netherlands, considering several speed reduction values of 10%, 20% and 30%. The additional cost generated varies between 0.08% and 0.31%.

Speed reduction	Extra travel days	Additional interest expense (€ 1,000)	Additional insurance expense (€ 1,000)	Total additional expenses (€ 1,000)	Additional expenses % of total value
10%	2.42	254	51	305	0.08%
20%	5.45	572	114	686	0.18%
30%	9.35	980	196	1,176	0.31%

Source: CE Delft calculations based on Eurostat, EXTRA EU Trade Since 2000 By Mode of Transport (HS6).

The same study analyses the case of beef exports with approximately similar values, from 0.06% to 0.23%.

The 2019 Öko-Institut e.V. study focused on the case of bulk carriers, considering several scenarios for fuel costs (between $750/ton and $250/ton), earnings (between $5,000 and $15,000) and the use rate of auxiliaries. Considering the median values (fuel, earnings and auxiliary costs), in the case of a Panamax class vessel, the speed decrease can generate a reduction in the cost of travel up to 30%.



On the question of the risk of shifting to other modes of transport, this seems relatively low. However, in some cases it cannot be totally excluded. For example, the OECD Ronald A. Halim study modelled the effects of modal shift using as an assumption a 100% increase in the cost of maritime transport per travel unit. By applying the model to the Europe-Asia route, the authors highlight a 1.4% risk of shipping being shifted to other means. Considering all routes, the value falls to 0.16%, still considering a 100% increase in the cost of maritime transport per travel unit.

6 Food security

As for transport dependency, food security is not considered as part of an objective-based approach.

For territories very heavily dependent on maritime connections, the size and type of ships providing this type of trip will have to be adapted.

7 Disaster response

Regulation 3.1.1.1 of MARPOL Annex VI shall not apply to any emission necessary for the purpose of securing the safety of a ship or saving life at sea. This proposal is in line with this principle.

Certification of SEEMP by the Administration can only be done if the proposed provisions do not affect the provisions of other conventions such as SOLAS in particular.

8 Cost-effectiveness

The cost-effectiveness ratio results from the analysis presented in paragraph 5 "Transport Cost" and 1 "Impacts on ships and emissions".

This cost/efficiency ratio depends on a large number of parameters (fuel cost, size and types of ships, presence or not of overcapacity, type of operation, etc.) and an overall response would be very inaccurate.

The 2019 Öko-Institut e.V. study presents these different cases for bulk carriers. For this fleet, it is obvious that reducing speed to a certain level, depending on the size of the ships, is highly effective in reducing emissions and significantly reduces operating costs. It can therefore be confirmed that for this category, the benefit of a speed optimization measure is important.

9 Socio-economic progress and development

An objective-based approach allows innovation and therefore the development of new technologies. The proposed measure can only have environmental benefits.

It also promotes economic development, research and the implementation of innovative technologies.

10 Indicate both positive and negative potential impacts

Considering the above (paragraphs 1 to 9), the following elements can be identified as negative impacts related to the implementation of an objective-based approach relying on speed optimization:

.1 low risk of modal shift for some shipping routes;

.2 slight increase in the cost of maritime transport;

.3 limited impact for countries highly dependent on maritime transport;

.4 low impact on the increase in the number of vessels required to maintain a constant transport flow;

.5 for ships that choose speed optimization:

.1 risk of increased costs in the event of a very significant decrease in speed; and

.2 deterioration of the efficiency and risk of fatigue of certain propelling elements in the event of a too important decrease in speed.

The possible positive impacts are the following:

.1 capacity to reduce emissions in line with the Initial Strategy;

.2 compliance with the deadline of 1 January 2023;

.3 choice of method or technology left to the shipowner;

.4 consideration of the efforts made in the framework of EEDI;

.5 for ships that choose speed optimization:

.1 significant reduction in ship consumption (example for a bulk carrier 1kt = 17% fuel economy);

.2 reduction in the cost of operating ships;

.3 no investment required for the ship and infrastructure;

.4 no impact on safety with the implementation of the SHAPOLI mechanism;

.5 maintaining the competitiveness of maritime transport in relation to other modes of transport; and

.6 possible implementation without delay.

.6 no impact for emergency situations; and

.7 promotes research and development of innovative technologies.

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ANNEX 2

DRAFT AMENDMENTS TO MARPOL ANNEX VI

(New text is shown as underlined and text to be deleted as ~~strikethrough~~)

Regulation 5
Surveys

1 Every ship of 400 gross tonnage and above and every fixed and floating drilling rig and other platforms shall, to ensure compliance with the requirements of chapter 3 and regulation 22 of this Annex, be subject to the surveys specified below taking into account the guidelines adopted by the Organization:*:

.1 An initial survey before the ship is put into service or before the certificate required under regulation 6.1 to 3 of this Annex is issued for the first time. This survey shall be such as to ensure that the equipment, systems, fittings, arrangements and material fully comply with the applicable requirements of chapter 3, and approved the SEEMP required by regulation 22;

.2 A renewal survey at intervals specified by the Administration, but not exceeding five years, except where regulation 9.2, 9.5, 9.6 or 9.7 of this Annex is applicable. The renewal survey shall be such as to ensure that the equipment, systems, fittings, arrangements and material fully comply with applicable requirements of chapter 3 and verified the application of the SEEMP required by regulation 22;

.3 An intermediate survey within three months before or after the second anniversary date or within three months before or after the third anniversary date of the certificate which shall take the place of one of the annual surveys specified in paragraph 1.4 of this regulation. The intermediate survey shall be such as to ensure that the equipment and arrangements fully comply with the applicable requirements of chapter 3 and regulation 22 and are in good working order. Such intermediate surveys shall be endorsed on the IAPP Certificate and the IEE Certificate issued under regulation 6 or 7 issued under regulation of this Annex;

.4 An annual survey within three months before or after each anniversary date of the certificate, including a general inspection of the equipment, systems, fittings, arrangements and material referred to in paragraph 1.1 of this regulation to ensure that they have been maintained in accordance with paragraph 5 of this regulation and that they remain satisfactory for the service for which the ship is intended. Such annual surveys shall be endorsed on the IAPP Certificate and the IEE Certificate issued under regulation 6 or 7 of this Annex; ~~and~~

.5 An additional survey either general or partial, according to the circumstances, shall be made whenever any important repairs or renewals are made as prescribed in paragraph 5 of this regulation or after a repair resulting from investigations prescribed in paragraph 6 of this regulation, or in the case provided in regulation 22.7. The survey shall be such as to ensure that the necessary repairs or renewals have been effectively made, that the material and workmanship of such repairs or renewals are in all respects satisfactory and that the ship complies in all respects with the requirements of chapter 3~~.~~; and

.6 For existing ships, the verification of the requirement to have a SEEMP on board in accordance with the requirements in chapter 4 of this Annex shall take place on [date of entry into force].

[…]

4 Ships to which chapter 4 applies shall also be subject to the surveys specified below, taking into account Guidelines adopted by the Organization:

.1 An initial survey before a new ship is put in service and before the International Energy Efficiency Certificate is issued. The survey shall verify that the ship's attained EEDI is in accordance with the requirements in chapter 4 of this Annex~~, and that the SEEMP required by regulation 22 pf this Annex is on board~~;

.2 A general or partial survey, according to the circumstances, after a major conversion of a new ship to which this regulation applies. The survey shall ensure that the attained EEDI is recalculated as necessary and meets the requirement of regulation 21, with the reduction factor applicable to the ship type and size of the converted ship in the phase corresponding to the date of contract or keel laying or delivery determined for the original ship in accordance with regulation 2.23; and

.3 In cases where the major conversion of a new or existing ship is so extensive that the ship is regarded by the Administration as a newly constructed ship, the Administration shall determine the necessity of an initial survey on attained EEDI. Such a survey, if determined necessary, shall ensure that the attained EEDI is calculated and meets the requirement of regulation 21, with the reduction factor applicable corresponding to the ship type and size of the converted ship at the date of the contract of the conversion, or in the absence of a contract, the commencement date of the conversion. The survey shall also verify that the SEEMP required by regulation 22 ~~is on board~~ and for a ship to which regulation 22A applies, has been revised appropriately to reflect a major conversion in those cases where the major conversion affects data collection methodology and/or reporting processes.

~~.4 For existing ships, the verification of the requirement to have a SEEMP on board according to regulation 22 shall take place at the first intermediate or renewal survey identified in paragraph 1 of this regulation, whichever is the first, on or after 1 January 2013;~~

Regulation 6
Issue or endorsement of Certificates and Statements of Compliance related to fuel oil consumption reporting

International Energy Efficiency Certificate

4 An International Energy Efficiency Certificate for the ship shall be issued or renewed after a survey in accordance with the provisions of regulation 5.4 to any ship of 400 gross tonnage and above before that ship may engage in voyages to ports or offshore terminals under the jurisdiction of other Parties.

5 The certificate shall be issued or endorsed either by the Administration or any organization duly authorized by it. In every case, the Administration assumes full responsibility for the certificate.

Regulation 9
Duration and validity of Certificates and Statements of Compliance related to fuel oil consumption reporting

International Energy Efficiency Certificate

10 The International Energy Efficiency Certificate shall be issued for a period by the Administration, which shall not exceed five years ~~be valid throughout the life of the ship~~ subject to the provisions of paragraph 11 below.

11 An International Energy Efficiency Certificate issued under this annex shall cease to be valid in any of the following cases:

.1 if the ship is withdrawn from service or if a new certificate is issued following major conversion of the ship; ~~or~~

.2 upon transfer of the ship to the flag of another State. A new certificate shall only be issued when the Government issuing the new certificate is fully satisfied that the ship is in compliance with the requirements of chapter 4. In the case of a transfer between Parties, if requested within three months after the transfer has taken place, the Government of the Party whose flag the ship was formerly entitled to fly shall, as soon as possible, transmit to the Administration copies of the certificate carried by the ship before the transfer and, if available, copies of the relevant survey reports; or

.3 if the ship does not meet its Carbon Intensity goal as expressed in the SEEMP as defined in regulation 22.7.

Regulation 22
Ship Energy Efficiency Management Plan (SEEMP)

1 Each ship shall keep on board a ship specific Ship Energy Efficiency Management Plan (SEEMP). This may form part of the ship's Safety Management System (SMS).

2 On or before 31 December 2018, in the case of a ship of 5,000 gross tonnage and above, the SEEMP shall include a description of the methodology that will be used to collect the data required by regulation 22A.1 of this Annex and the processes that will be used to report the data to the ship's Administration.

3 The SEEMP shall be developed taking into account guidelines adopted by the Organization. and shall contain:

.1 the method used by the shipowner to enable the ship to meet the carbon intensity reduction targets as defined below:

Year	Target
Objective 2023 = X_0 (gCO_2/tonne.mile)	
X_1 = Objective 2024 =	X_0-2%
X_2 = Objective 2025 =	X_1-2%
X_3 = Objective 2026 =	X_2-2%
X_4 = Objective 2027 =	X_3-2%
X_5 = Objective 2028 =	X_4-2%
X_6 = Objective 2029 =	X_5-2%
X_7 = Objective 2030 =	X_6-2%

.2 the target for year X_0 can be reduced by the difference between the required EEDI value as defined by regulation 21 and the attained EEDI value as defined by regulation 20:

$$X_{0corrected} = X_0 - (\text{attained EEDI} - \text{required EEDI})$$

For ships built after 1 January 2013, and not subject to the EEDI, a reduction value is assigned to the ship according to its type and date of construction taking into account guidelines adopted by the Organization.

.3 the ship's index curve establishing the relationship between fuel consumption * C_f and speed * DWT There may be several curves if the ship uses several types of fuels;

.4 the method and the indicators by which the ship will achieve its objective. To achieve its objective the ship can:

.1 use only speed optimization; or

.2 partially use speed optimization and complete the objective with an alternative method; or

.3 use only an alternative method; and

.5 the means of continuous monitoring.

4 In the event that the guidelines for the certification of alternative methods were not adopted by the Organization by 1 January 2023, only the speed optimization method could be used in SEEMP.

5 The ship, having demonstrated the application of a voluntary measure before 1 January 2023, has a reduced target X_0 taking into account the guidelines adopted by the Organization.

6 SEEMP contained goals, method and indicators for five years.

7 If, during the annual survey as provided for in Regulation 5.1.1, it is established that the ship has not complied with its carbon intensity reduction objective, the ship must imperatively use the speed optimization method to achieve its goal. An additional visit as provided for in rule 5.1.5 shall be conducted after [X] months.

Appendix VIII – Supplement to the IEE certificate

5 Ship Energy Efficiency Management Plan

5.1	The Ship is provided with an approved Ship Energy Efficiency Management Plan (SEEMP) in compliance with regulation 22…….....		☐
5.2	The ship meets the objective values in relation with the carbon intensity target as defined by the SEEMP.....		☐