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FURTHER TECHNICAL AND OPERATIONAL MEASURES FOR ENHANCING THE ENERGY EFFICIENCY OF INTERNATIONAL SHIPPING

Transport work for offshore and marine contracting vessels

Submitted by the Russian Federation and IMCA

SUMMARY

Executive summary:	This document provides two potential proxies against which to measure energy efficiency of offshore and marine contracting vessels
Strategic direction, if applicable:	3
Output:	3.7
Action to be taken:	Paragraph 24
Related documents:	MEPC 70/18, MEPC 70/WP.8; MEPC 71/6/2; MEPC 72/6/1, MEPC 72/6/4 and MEPC 74/INF.35

Introduction

1 The Committee will recall that MEPC 69 approved draft amendments to chapter 4 of MARPOL Annex VI, adding a new regulation 22A to establish mandatory requirements for ships to record and report data on their fuel consumption, together with additional data on proxies for the "transport work" undertaken by the ship (MEPC 70/18, paragraph 6.1).

2 At its seventieth session, the Committee invited interested Member States and/or international organizations to submit proposals for a proxy for transport work for ships that carry neither passengers nor cargo to a future session of the Committee (MEPC 70/WP.1, paragraph 6.14).

3 It is against this background that this document has been submitted.

"Transport work" for offshore and marine contracting vessels (i.e. "work/service vessels")

4 As has been discussed at previous sessions of MEPC, while the concept of "transport work" is appropriate for vessels whose main purpose is to carry passengers and/or cargo between ports of departure and destination for commercial purposes, it is not suitable for "work/service vessels", such as offshore and marine contracting vessels, which are designed and primarily used for servicing/developing offshore industrial and marine construction activities or for the public sector (salvage, rescue, ports, channels, energy, breakwaters, etc.).

5 The photographs contained in MEPC 74/INF.35 illustrate the diverse range of vessel types operating in the offshore industry.

Vessel design and equipment installed on board

6 Some of these vessels are the largest in the world fleet. Each has a specialized design which reflects its purpose for the work/service to be carried out e.g. installation, inspection, repair and maintenance of offshore energy infrastructure, heavy lifting, dredging, subsea rock installation, construction, laying subsea pipes and cables, dive support, and search and rescue. The function of these vessels dictates the dedicated "mission" equipment which is required to be fitted on board e.g. large cranes, pipe laying, rock dumping and dredging systems. Vessels are optimized for completing their intended purpose at a work location safely and efficiently.

Power and propulsion on board

7 It is important to recognize the fact that the dedicated mission equipment consumes a significant proportion of the vessel's power output and, in some cases, most of the power being generated.

8 While conventional passenger or cargo carrying vessels will generally operate their power and propulsion systems with consistent engine loads on passage, the power and propulsion loads of offshore and marine contracting vessels may be both variable and intermittent as they are a function of the industrial/mission activities themselves. For example, when working, dredgers divide their power between propulsion and dredging equipment and this may fluctuate. Certain offshore operations, such as anchor handling or dredging, demand very high levels of thrust. Consequently, the installed engine power is very high relative to vessel size, with actual output being determined by operational factors.

9 Other vessels operate with intermittent or constant slow movement, e.g. when pipe or cable laying, or when required to provide a stable lifting platform by effective station keeping (so-called Dynamic Positioning (DP)).

Operating modes for offshore contracting vessels

10 Many offshore and marine contracting vessels operate in more than one mode, e.g. ROV, diving and pipe laying, depending upon the project they are engaged on. Most are provided with DP systems and, spend much of their time maintaining the vessel in a static position (i.e. stationary) or following slowly but accurately a dynamic track. In-port operations can be part of the work/project to be carried out e.g. dredging, offshore, wind activities, etc.

Dynamic positioning

11 Many marine contracting and offshore vessels are required to maintain position close to offshore installations and other vessels, including those engaged in high-hazard activities such as drilling rigs. The dependability of position-keeping is critical to safe operation when operating in close proximity to offshore installations and other vessels.

12 The Organization's Guidelines for DP vessels, MSC.1/Circ.1580, require redundancy in power and manoeuvring systems for DP equipment classes 2 and 3, which are applied where dependability is essential. Operating engines and thrusters with this level of redundancy are less fuel efficient than when operating without redundancy. However, efforts by the offshore marine contracting industry to reduce fuel consumption so as to reduce carbon emissions must not jeopardize safety by compromising position-keeping dependability and therefore, redundancy requirements must be maintained.

Innovative energy efficiency measures already being implemented in the offshore marine contracting sector

13 The Committee will recall that, at its seventieth session, it adopted resolution MEPC.282(70) on *2016 Guidelines for the development of a Ship Energy Efficiency Management Plan (SEEMP)*. These Guidelines set out a number of energy efficiency measures, which can be utilized for fuel-efficient operation of ships.

14 Because of the power demands of many of the vessels operating offshore, many of IMCA's members are investing in modern, energy efficient vessels and technologies to reduce fuel consumption and improve energy efficiency, including:

.1 use of clean alternative fuels such as LNG, biofuels and the like, where possible;

.2 predictive computer-controlled DP systems to reduce power demand when on station;

.3 diesel-battery hybrid power, fuel cells and peak power shaving systems;

.4 common power bus DP2 and DP3 arrangements to reduce the number of running engines, allowing engines to run at more efficient loads; and

.5 energy efficiency measures such as variable speed drives, high-efficiency lighting and hotel services, energy recovery systems and use of big data to monitor assets and optimise efficiency.

15 As well as the obvious financial benefits, clients increasingly require vessel operators to demonstrate environmental impact reduction measures as part of bid evaluation processes.

Development of suitable proxies for use by offshore and marine contracting vessels

16 The co-sponsors have consulted widely on this topic in order to propose suitable proxies which may be used as an alternative to the "transport work" proxy, and wish to propose two different approaches, one based on the vessel's yearly gross energy consumption the other based on the vessel's yearly effective operational time of utilization.

Proposal A – proxy based on yearly energy consumption

17 For reference, IMO's Data Collection System (DCS) format is reproduced in the annex. The Committee's attention is drawn to the fact that "Installed Power" (data shown in the box with a green border) is already captured as part of IMO's compulsory data collection system. To be able to calculate this alternative proxy, the reporting format of hours under way and distance travelled needs to be replaced with alternative meaningful data as shown in the annex.

The co-sponsors propose to use the formula:

$$R = \frac{E}{Pg} = \frac{\text{Total kg } CO_2 \text{ emitted / year}}{\underset{\text{(i.e.} \sum \text{ installed rated power per engine x yearly running hours per engine)}}{\text{Total gross power output generated/year}}} = \textbf{kg } \mathbf{CO_2} \textbf{/ Gross kWh}$$

where:

R	The average energy ratio based on a measure of E and Pg.
E	Total kg CO_2 emitted/year i.e. the total amount of CO_2 calculated on the basis of the fuel consumed per year, taking into account the applicable conversion factors for a particular type of fuel.
Pg	Total calculated gross kWh generated/year i.e. the sum of the installed rated power per engine multiplied by the yearly running hours per engine.

18 Consequently, for the data elements in the database, as reflected in the annex:
Hours under way would be left blank.
Distance travelled would be replaced with Total calculated Gross kWhs generated per year being the sum of the installed rated power per engine multiplied by the yearly running hours per engine.

Proposal B – proxy based on effective (operational) utilization time of the vessel

19 As an alternative approach, the co-sponsors propose using the formula:

$$R = \frac{E}{U} = \frac{\text{Total kg } CO_2 \text{ emitted / year}}{\text{Total hours under way / year}} = \textbf{kg } \mathbf{CO_2} \textbf{/ operational utilization hour}$$

Where:

R	The average energy ratio based on a measure of E and U.
E	Total kg CO_2 emitted/year i.e. the total amount of CO_2 calculated on the basis of the fuel consumed per year, taking into account the applicable conversion factors for a particular type of fuel.
U	Total hours under way. Time spent undergoing repairs or mobilizing in port should not be included in the calculation.

20 Consequently, for the data elements in the database, as reflected in the annex:
Hours under way would remain unchanged.
Distance travelled would be left blank.

Proposals

21 The Committee is requested to consider the issues discussed in this document and acknowledge that the current data collection reporting scheme does not provide meaningful data for the types of vessels referred to in this document.

22 The Committee is further requested to consider the alternative proxies proposed, in paragraphs 17 to 20, as a means of assessing the CO_2 emissions of offshore contracting vessels and take action as it deems appropriate.

23 Furthermore, when it comes to the third stage of IMO's three-step approach, i.e. measures to enhance efficiency, the Committee is requested to give credit to the offshore industry for early implementation of energy efficiency measures.

Action requested of the Committee

24 The Committee is invited to consider the proposals set out in paragraphs 21 to 23 and to take action as appropriate.

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ANNEX

Method used to measure fuel oil consumption[9]		
Fuel oil consumption (t)	Other(..........)	
	(C_f ;.....)	
	Ethanol (C_f: 1.913)	
	Methanol (C_f: 1.375)	
	LNG (C_f: 2.750)	
	LPG (Butane) (C_f: 3.030)	
	LPG (Propane)	
	HFO (C_f: 3.114)	
	LFO (C_f: 3.151)	
	Diesel/Gas Oil (C_f: 3.206)	
Hours underway (h)		
Distance Travelled (nm)		
Power output (rated power) (kW)[8]	Auxiliary Engine(s)	
	Main Propulsion Power	
Ice class[7] (if applicable)		
EEDI (if applicable)[6] ($gCO_2/t.nm$)		
DWT[5]		
NT[4]		
Gross tonnage[3]		
Ship type[2]		
IMO number[1]		
End date (dd/mm/yyyy)		
Start date (dd/mm/yyyy)		

<u>Considerations and clarification on proposed proxy's A & B:</u>

For the **red lined data**, **in Proxy A** the co-sponsors propose that:

Hours under way would be left blank

Distance travelled would be replaced with Total cumulative Gross kWh of rated power used per year (i.e. ∑installed rated power per engine x the yearly running hours per engine)

1. "Total running hours" is used as many vessels will carry out "work" in port areas and at sea and capturing this data will simplify the reporting.

2. A higher calculated proxy will be an indication of a higher load-factor of the installed power due to a different operational profile of the vessel.

3. Proxy A:

.1 Provides an insight into energy consumption of work carried out (working vessels are often working in port / along quay as well);

.2 Data will be available to report for <u>all "offshore" vessels</u> without an extra administrative burden;

.3 The proposed proxy is independent of the size of vessel, the total installed kWs and is generic for all types of work/service vessels.

For the **red lined data, in Proxy B** the co-sponsors propose that:

Hours under way would remain unchanged.

Distance travelled would be left blank.

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