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PREVENTION OF AIR POLLUTION FROM SHIPS

Guidelines for the implementation of The Ship Operational Index – Ship Efficiency Management Tool

Submitted by INTERTANKO, OCIMF and BIMCO

SUMMARY

Executive summary:	Based upon the current Interim Guidelines for Voluntary Ship CO_2 Emission Indexing, this paper contains proposals for a methodology for the recording and monitoring of the individual Ship's Efficiency Energy Management Tool
Strategic direction:	7.3
High-level action:	7.3.1
Planned output:	7.3.1.1 and 7.3.1.3
Action to be taken:	Paragraph 13
Related documents:	MEPC 58/4, paragraph 3 and annex 7 and MEPC/Circ.471

Background

1 As a result of the deliberations at the first intersessional meeting of the GHG Working Group on Greenhouse Gas Emissions from Ships held in Oslo, the Working Group report (MEPC 58/4, paragraph 3.10.5 and annex 7) calls on "all Member States and Observers to submit clear and concrete proposals at MEPC 58 for the revision of MEPC/Circ.471".

2 During the trial period for the development of this index it became clear that the individual index as calculated for a specific voyage or short time period was unique to the operational circumstances that confronted the ship for that specific voyage or time period. Many of these circumstances are outside the control of the shipowner directly and are controlled by other entities in the complete transport chain. Thus, the index for a subsequent voyage or time period could well bear no relationship to the previous index for the same ship for the monitoring of operational efficiency due to changing operational circumstances. At its first intersessional meeting in Oslo, the GHG working group agreed that, while the Operational Index could prove a useful tool for ship operators, it was not suited for mandatory application.

3 Further, it became clear that comparisons between two ships, even sister ships, or two fleets of ships of the same type could produce vastly differing and varying results. Thus, the conclusions reached as a result of the co-sponsors' assessments are that:

.1 the Operational Index is seen as a useful Management Tool to monitor performance for a specific voyage of a specific ship;

.2 the Index is unique to a specific ship and comparisons between even sister ships produced little or no meaningful information; and

.3 the Index value could be used to monitor the effectiveness of any operational reduction methodology put in place onboard the ship over time or a number of voyages.

4 These findings are very much in line with general considerations and conclusions reached by Japan in document GHG-WG 1/3 and, subsequently, in line with the conclusions reached at the Intersessional Working Group meeting.

5 Different methodologies will be required by different owners to match the very different efficiency assessment needs of different ships engaged in different trades. By way of example, the following methodology has been found to be applicable to tankers.

Proposal

6 BIMCO, OCIMF and INTERTANKO (the co-sponsors) support the concept of a Ship Operational Index as a Ship Efficiency Management Tool. The current MEPC/Circ.471 Guidelines consider the "Monitoring and Verification" of the data as used for the compilation of a unique Voyage Index value. This section should now be extended, based upon the experiences gained, to include a methodology for "Monitoring and Verification" of the ship efficiency over a period of time or a number of voyages.

7 The proposal that satisfies this subsequent requirement is by averaging the individual index results with respect to either time or a number of voyages such that trends in the resulting indices can be more readily observed. This process of "averaging" needs a clear and defined methodology within the updated Guidelines as many techniques could be applied to the data mass for this task.

8 The co-sponsors would therefore propose that the principle of a "rolling average" is applied to the data mass as an acceptable methodology. This means that a suitable time period, say, one year closest to the end of a voyage for that period, or number of voyages, say, six or ten voyages, are agreed as statistically relevant to the initial averaging period. The Rolling Average Index is then calculated for this period or number of voyages by summing the constituent variables to the standard equation and applying the variable totals to the original equation as shown and explained in the equation shown in the current Appendix to MEPC/Circ.471, as follows:

$$Rolling\ Average\ Index = \frac{(\sum FC_p x C_{Carbon})_{Fuel\ type1} + (\sum FC_p x C_{Carbon})_{Fuel\ type2} + (\sum FC_p x C_{Carbon})_{Fuel\ type3} + \ldots}{\sum m_{cargo\ i}\ x \sum Dist._i}$$

where "FC_i", "$m_{cargo\ p}$" and "$Dist._i$" are: the total fuel consumptions; the total cargo transported; and the total laden distance covered by the ship for the period for which the Rolling Average Index is calculated, respectively.

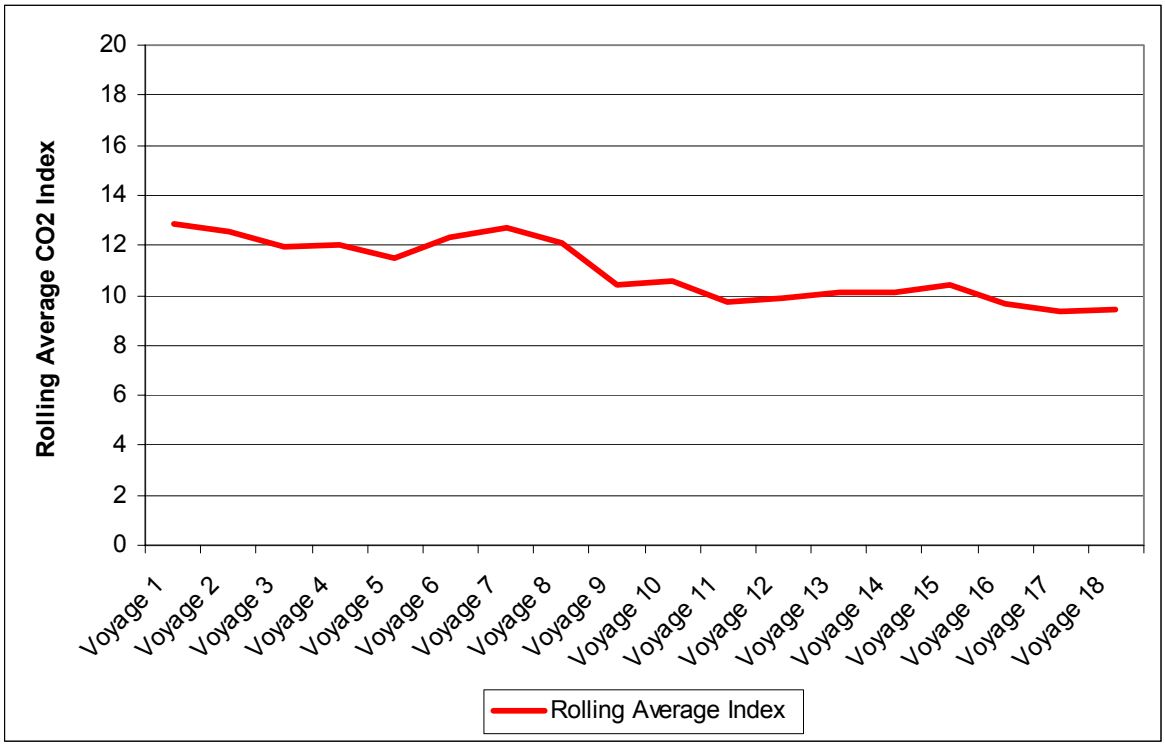
9 After this initial calculation of the Rolling Average Index for the first period, then as the period or voyages progress, the eldest voyage/period data is deleted from the data mass but replaced with the most recent data for the new time or voyage period for updating the Rolling Average Index value.

10 This process can be seen in the following example of an Aframax type tanker over a period of 27 voyages where the "rolling average" period is set at 10 voyages:

	Ballast Distance (n.m.)	**Laden Distance (n.m.)**	**Cargo Loaded (tonnes)**	**Tonne-Mile (m_{cargo} × Dist)**	**Voyage CO2 (grammes)**	**Voyage Index**	**Rolling Average Index**
Voyage 1	1,522	1,545	103,885	160,503,051	1,926,256,400	12.0	
Voyage 2	1,331	2,103	99,858	210,001,000	2,779,327,200	13.2	
Voyage 3	2,101	1,416	100,094	141,732,606	2,028,445,360	14.3	
Voyage 4	510	445	83,543	37,176,635	954,252,160	25.7	
Voyage 5	1,280	2,152	103,797	223,371,077	2,110,628,880	9.4	
Voyage 6	2,294	2,966	96,855	287,271,930	2,924,201,760	10.2	
Voyage 7	3,565	3,692	95,013	350,786,516	4,796,615,680	13.7	
Voyage 8	3,130	1,115	104,403	116,409,345	2,590,960,960	22.3	
Voyage 9	1,612	2,411	100,128	241,409,317	2,303,996,480	9.5	
Voyage 10	1,971	1,471	87,852	129,229,765	1,997,576,160	15.5	12.9
Voyage 11	740	1,497	106,467	159,381,172	1,323,931,440	8.3	12.6
Voyage 12	988	4,914	79,745	391,864,473	3,825,417,520	9.8	12.0
Voyage 13	505	39	89,229	3,479,940	531,939,520	152.9	12.0
Voyage 14	478	2,846	91,820	261,319,862	2,420,337,640	9.3	11.5
Voyage 15	4,176	1,477	100,042	147,761,307	3,047,935,040	20.6	12.3
Voyage 16	523	579	80,267	46,474,593	619,820,560	13.3	12.7
Voyage 17	1,360	1616	106,036	171,353,829	1,561,056,360	9.1	12.1
Voyage 18	1,574	4,074	106,397	433,460,135	3,031,144,760	7.0	10.4
Voyage 19	764	742	105,761	78,474,662	930,921,640	11.9	10.6
Voyage 20	4,068	6,075	100,050	607,802,565	5,182,434,880	8.5	9.8
Voyage 21	787	958	100,097	95,892,455	1,052,053,480	11.0	9.9
Voyage 22	358	364	75,709	27,558,076	571,803,840	20.7	10.1
Voyage 23	1,596	979	100,060	97,958,473	1,529,170,400	15.6	10.1
Voyage 24	341	711	77,359	55,002,176	821,703,296	14.9	10.4
Voyage 25	1,378	1,257	100,081	125,801,650	1,448,818,880	11.5	9.6

Voyage 26	784	2,194	100,263	219,976,250	1,735,343,680	7.9	9.3
Voyage 27	1,795	1,821	100,539	183,081,803	1,920,650,480	10.5	9.5

11 Within this example, note should be made of the individual voyage index for voyage 13 together with, perhaps, voyages 4, 8, 15 and 22. By utilizing the method proposed above the impact of these individual voyage indices will be "damped" within the data mass for the selected time or voyage period for the calculation of the Rolling Average Index. This can be seen more clearly as a management tool when the resulting data is shown graphically, as follows:



12 The co-sponsors would therefore propose that a new section be inserted into the current MEPC/Circ.471 Guidelines at paragraph 6*bis* explaining this methodology but setting a flexible data mass collection period that is suitable to individual ships such that it fits into the individual ship's management plan. This period, however, has to be long enough as to be statistically relevant for averaging purposes of the combined data mass within the selected period. It is suggested that the following wording may be appropriate:

6bis. Management Plan Rolling Average Index

As a Ship Energy Efficiency Management Tool, the Rolling Average Index should be calculated by use of a methodology whereby a period of time or a number of voyages that is statistically relevant is used as appropriate. "Statistically relevant" means that the period set as standard for each individual ship should remain constant and be large enough such that the accumulated data mass for the calculation reflects a reasonable mean for the operation of the ship over the selected period.

The initial Rolling Average Index is calculated using the standard period total data as summed for each variable in the standard equation. The Rolling Average Index is updated by deleting the oldest contribution to the past data mass and adding the most recent voyage or time data into the totals for each variable for the equation. The Rolling Average Index is calculated using the standard equation for the Ship's Operational Index but on which the factors "FC_p", "$m_{cargo\ i}$" and "$Dist._i$" are: the total fuel consumptions; the total cargo transported; and the total laden distance covered by the ship for the period for which the Rolling Average Index is calculated, respectively.

$$Rolling\ Average\ Index = \frac{(\sum FC_p x C_{Carbon})_{Fuel\ type\ 1} + (\sum FC_p x C_{Carbon})_{Fuel\ type\ 2} + (\sum FC_p x C_{Carbon})_{Fuel\ type\ 3} + \ldots}{\sum m_{cargo\ i} \; x \sum Dist._i}$$

Action requested of the Committee

13 The Committee is invited to consider the proposal provided by this document and take action as appropriate.