Energy Efficiency Operating Indicators (EEOI) for Baltic Exchange Dry Routes

Version 6

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Table of contents

1. Introduction

This document outlines the proposed incorporation of the Energy Efficiency Operating Indicator (EEOI) as a Baltic Exchange administered market comparison and benchmarking tool. The proposed system will calculate indicative EEOI values for commonly plied maritime trade routes using standard vessel characteristics and publish these to the market in a way that is similar to the existing Baltic Exchange indices. Such reference benchmarks will provide the shipping industry with a valuable point of reference and comparison as the market seeks to understand the inherent variability in operating efficiencies across routes and size classes and take practical steps to minimise its carbon footprint.

This document is a starting point for the Baltic Exchange EEOI benchmarks. Members will contribute their findings and vessel operating performance to validate and update the route EEOI assumptions and values, ensuring they reflect as close as possible the actual performance of vessels.

To ensure the standard vessel characteristics and reference EEOI values remain useful over time, the Baltic Exchange also proposes to work with members through forums and working groups to reflect actual EEOI figures for the routes in question. This activity mirrors the change process that the Baltic governs in relation to the standard Baltic vessel descriptions and routes.

2. An overview of the Energy Efficiency Operating Indicator

The International Maritime Organisation's (IMO) initial strategy on greenhouse gas reduction sets out sectoral targets to reduce absolute emissions from global maritime activity by 50% in 2050 compared to 2008 levels. Combined with increasing scrutiny by regional organisations and national governments and the advent of numerous sectoral initiatives focused on emissions reduction, tackling the challenge of maritime decarbonisation is a priority across the shipping industry.

Alongside publishing sectoral emissions targets, a suite of metrics and indicators has been developed and endorsed by the IMO and other maritime bodies to support and measure the industry's progress towards its carbon reduction goals. One of these metrics is the Energy Efficiency Operating Indicator (EEOI), an IMO endorsed[1] measure developed to help monitor and quantify emissions and vessel operating efficiency. The EEOI is the ratio of a vessel's CO_2 emissions to work performed and is a complementary measure to the Energy Efficiency Design Index (EEDI). The EEDI provides indicative information on a vessel's achievable efficiency based on its design characteristics and distance travelled in a year. In contrast, the EEOI provides insight into a vessel's actual efficiency on the water.

The EEOI is used for understanding and monitoring the operating efficiency of individual vessels for a particular voyage[2]. More recently, however, the measure has also gained traction to measure portfolio efficiency across a fleet of vessels or activities. An annualised, weighted-average portfolio level calculation of the EEOI serves as the primary metric used by the Sea Cargo Charter (SCC) to track organisational alignment to IMO decarbonisation trajectories.

3. Calculating the Energy Efficiency Operating Indicator

Vessel operating efficiency may vary between voyages for numerous reasons. The amount of cargo carried, fuel consumed in ballast, changes in speed or behaviour, maintenance measures such as hull cleaning, or the installation of new components which impact the vessel's operating profile can all cause efficiency variation over time and from voyage to voyage. The EEOI provides visibility of the impacts of such changes. At the vessel level, repeated per voyage calculation of the EEOI provides valuable insight into a vessel's actual efficiency on the water across its life span.

The EEOI is defined by the IMO as the ratio of mass of CO_2 emitted per unit of transport work done. For a given voyage, this can be presented as:

$$EEOI = \frac{\sum_j (FC_j \times C_{Fj})}{m_{cargo} \times D}$$

Equation 1

Where EEOI is the Energy Efficiency Operating Indicator, j the fuel type, FC_j the mass of fuel consumed during the voyage (including the port time and ballast leg), C_{Fj} the CO_2 conversion factor for fuel j, m_{cargo} the mass of cargo carried (or equivalent work done) and D the laden distance in nautical miles.

For tankers and dry bulk carriers, the mass of cargo is expressed as metric tonnes of cargo carried. Conversion factors for common fuels are displayed in Table 1.

Table 1 Fuel Type conversion factors for use in EEOI calculations

Fuel Type	Reference	Carbon Content	Conversion factor (tonnes of CO_2 produced per tonne of fuel consumed)
Diesel/Gas Oil	ISO 8217 Grades DMX through DMC	0.875	3.206000
Light Fuel Oil (LFO)	ISO 8217 Grades RMA through RMD	0.86	3.151040
Heavy Fuel Oil (HFO)	ISO 8217 Grades RME through RMK	0.85	3.114400
Liquified Petroleum Gas (LPG)	Propane Butane	0.819 0.827	3.000000 3.030000
Liquified Natural Gas (LNG)		0.75	2.750000

Equation 1 allows the calculation of the EEOI on a per vessel, per voyage basis, using vessel measurements commonly known and communicated as part of everyday operations and noon reporting.

4. Creating EEOI reference values for Baltic standard vessels and routes

It is possible to calculate actual EEOI values for given vessels and fleet portfolios, allowing the examination of changes in efficiency over time. In addition, it is also often useful to compare values across similar vessels and portfolios for a given snapshot in time. Such a frame of reference would be a helpful market comparison tool for

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[1] MEPC Circ. 684 - Guidelines for voluntary use of the ship energy efficiency operational indicator (EEOI).
[2] A voyage consists of a ballast to a load port, load cargo and then proceed laden to a discharge port and discharge the cargo

organisations engaged in commercial maritime trade, seeking to meet targets related to their carbon footprint and operating efficiency levels. However, whilst vessel owners and operators may have access to such information on their own fleets, a lack of available reference data makes market level comparisons more challenging.

To address this, the Baltic Exchange has calculated indicative EEOI reference values based on Baltic standard vessel characteristics trading on the Baltic standard routes. The approach generates values for all the routes on which the Baltic Exchange already publishes a freight index, "Baltic Route EEOI values" (BREEOI). Table 3 outlines the steps in the calculation methodology used to calculate the BREEOI:

Table 2 Baltic Exchange Reference EEOI Calculation Methodology

Step	Details
1.	Define the characteristics of the standard vessel to be used in the reference EEOI calculation, including: a) Cargo carried as restricted by deadweight, stowage factor or draft b) Fuel consumption rates for laden and ballast legs, and whilst in port c) Steaming speed on laden and ballast legs
2.	Define the physical characteristics of the route in question, including: a) Laden and ballast leg distances b) Distance of any route portions where relevant fuel type regulations are applicable (e.g. Emission Control Areas)
3.	Calculate the total of each type of fuel consumed using consumption rates, steaming speeds and voyage distance information
4.	Convert the fuel consumption values into CO_2 emissions using the conversion factors outlined in Table 1
5.	Calculate the work done on the reference voyage by multiplying the cargo tonnage by laden distances
6.	Calculate the reference EEOI value for the route and vessel size by dividing the CO_2 emissions figure by the calculated work done

Table 3 shows example calculation values for Capesize Route C2 (Tubarao to Rotterdam) using both full and Eco speed steaming regimes.

Table 3 Standard values used in the Reference EEOI calculation for Capesize route C2 – refer to Table 5

Parameter	Value at Full Speed	Value at ECO Speed
Cargo carried (tonnes)	175,000	175,000
Laden fuel consumption g/pd	62000000	43000000
Ballast fuel consumption g/pd	62000000	43000000
At-port fuel consumption g/pd	4000000	4000000
Laden leg steaming speed (knots)	14	12
Ballast leg steaming speed (knots)	15	13
Laden leg mileage (nm)	5003	5003
Laden ECA mileage (nm)	424	424
Laden non-ECA mileage (nm)	4579	4579
Ballast leg mileage (nm)	5003	5003
Ballast leg ECA mileage (nm)	417	417
Ballast leg non-ECA mileage (nm)	4586	4586
CO_2 emissions produced (g)	6052158288	4888582067
Work done (tnm)	875525000	875525000
Reference EEOI value (gCO_2/tnm)	6.91	5.58

BREEOI values are calculated based on the vessel operating both at Full speed and a slower but more economical speed (Eco speed). Performing the voyage at Full or Eco speed impacts the amount of fuel consumed (CO_2 emitted) and the time taken to perform the voyage.

Route	BREEOI Route Values		
	Full BREEOI	Eco BREEOI	Delta Eco-Ful
C2	6.91	5.58	-1.33
C3	6.78	5.47	-1.31
C5	6.88	5.58	-1.30
C7	7.38	5.98	-1.40
C8	5.38	4.35	-1.02
C9	4.67	3.78	-0.89
C10	6.88	5.58	-1.30
C14	6.78	5.47	-1.31
C16	4.56	3.70	-0.86
C17	6.82	5.51	-1.31
P1A	8.07	6.53	-1.55
P2A	6.06	4.81	-1.24
P3A	9.72	7.86	-1.86
P4	5.55	4.42	-1.13
P6	8.90	7.17	-1.73
P7	6.06	4.81	-1.24
P8	8.90	7.17	-1.73
P5	9.41	7.65	-1.75
S1B	7.00	5.94	-1.06
S1C	6.87	5.83	-1.04
S3	6.81	5.78	-1.03
S4A	7.19	6.10	-1.09
S4B	7.30	6.19	-1.11
S5	7.83	6.57	-1.26
S9	9.49	7.92	-1.57
S2	12.20	10.11	-2.09
S8	9.73	8.13	-1.60
S10	11.53	9.57	-1.96
HS1	8.66	7.02	-1.64
HS2	8.82	7.16	-1.66
HS3	8.58	6.96	-1.62
HS4	8.56	6.94	-1.62
HS5	13.16	10.75	-2.42
HS6	15.11	12.36	-2.75
HS7	10.75	8.77	-1.99

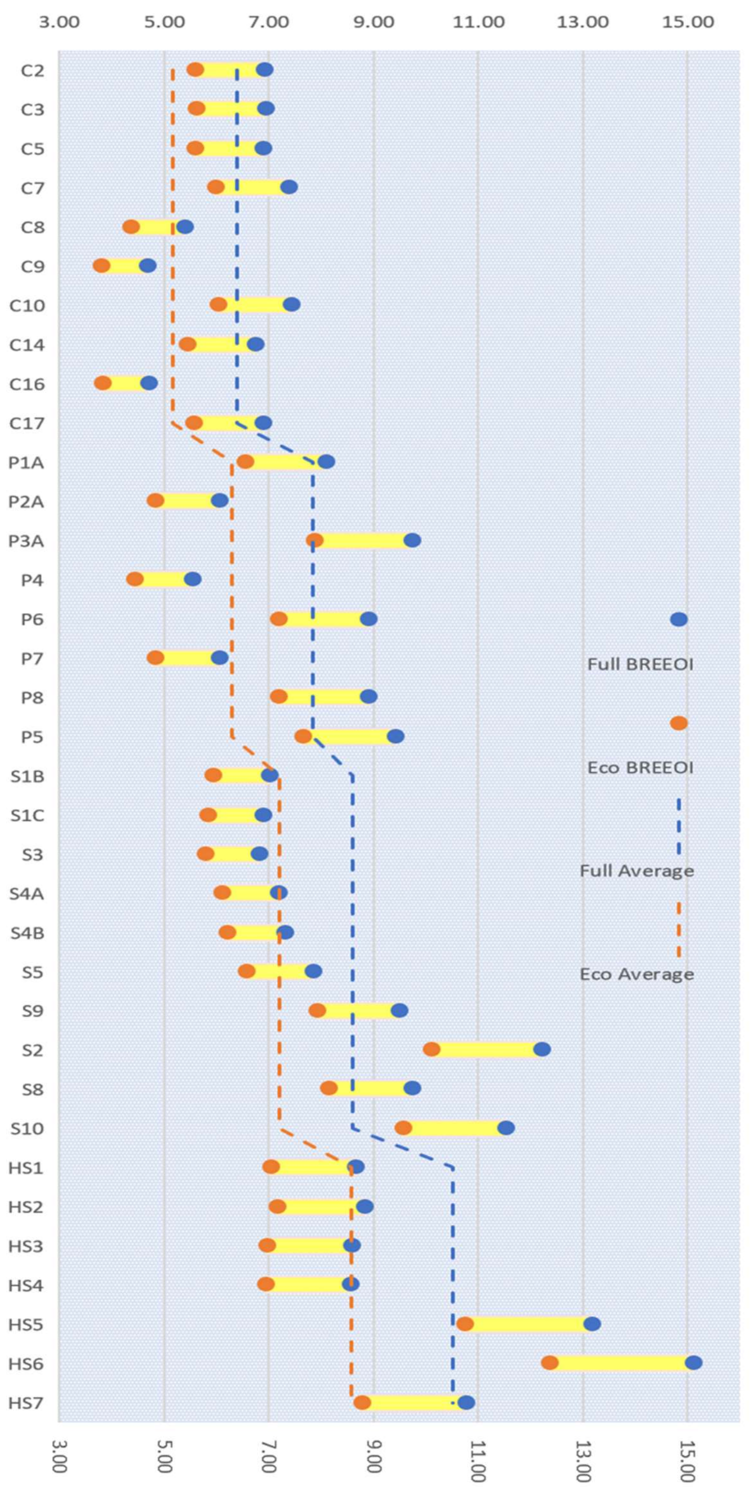

Figure 1

Observations

As expected, the Eco BREEOI values shown in Figure 1 are lower than the Full BREEOI values, a vessel operating at slower speed emits less CO_2 and carries the same amount of cargo (same amount of work) as a vessel performing at full speed on the same voyage.

- The larger vessels, on average, have lower EEOI scores than smaller counterparts reflecting their overall improved efficiency compared with smaller vessels.
- The routes with a more significant ballast to the laden leg generally have higher EEOI values
- Smaller vessels with a more significant ballast to laden leg will generally see more impact as a result of slow steaming than a larger vessel.

5. Calculating an Annual Operating Energy Efficiency value

The IMO uses two definitions of carbon intensity, the EEOI and the Annual Efficiency Ratio (AER); both are a ratio of CO_2 emissions and work done.

EEOI represents the ratio of CO_2 emissions and work done for a specific voyage, whereas AER represents the ratio of a year's CO_2 emissions and the work done in the year, but with the following differences:

- EEOI calculates work as cargo carried multiplied by the distance of the laden leg
- AER calculates work as the deadweight of the vessel multiplied by total distance travelled in a year (ballast and laden)

The AER includes the ballast as work and ignores operational designs such as cubic capacity and deadweight draft ratios, as a result it assumes the vessel performs more work than the EEOI calculation.

To better represent an annual value the Baltic calculates an annual operating efficiency ratio based on the BREEOI calculations for each vessel size, Equation 3. An annual EEOI value reflects a vessel spot for one year[3]. To calculate a Baltic Annual EEOI (BAEEOI) the Baltic selects the same routes used for the Baltic weighted timecharter averages[4] and applies the same weightings and a time factor. A vessel operating at Eco speed does less work in a year than at Full speed, it performs fewer voyages, and the *TimeFactor* takes this into account, Equation 2.

$$TimeFactor = \frac{\text{VoyageDuration}}{360}$$

Equation 2

[3] 360 trading days. Five days are assumed to allowed for off-hire, repairs where the vessel is not available for trading

[4] Baltic Weighted Timecharter Averages are used by the dry bulk market to benchmark annual earnings.
Routes and weightings for each vessel
Cape 180,000dwt: C8=0.25, C9=0.125, C10=0.25, C14=0.25, C16=0.125
Panamax 82,500dwt: P1A=0.25, P2A=0.1, P3A=0.25, P4=0.10, P6=0.30
Supramax 58,328dwt: S1B=0.05, S1C=0.05, S2=0.20, S3=0.15, S4A=0.075, S4B=0.10, S5=0.05, S8=0.15, S9=0.075, S10=0.10
Handysize38,200dwt: HS1=0.125, HS2=0.125, HS3=0.125, HS4=0.125, HS5=0.20, HS6=0.20, HS7=0.20

$$BAEEOI = \frac{Sum\left(\sum_{i=1}^{r} \frac{(Fuel \times Conversion \ \times Weighting)}{TimeFactor}\ i\right)}{Sum\left(\sum_{i=1}^{r} \frac{(LadenMileage \times Cargo \times Weighting)}{TimeFactor}\ i\right)}$$

Equation 3

Figure 22 displays plots indicating the spread and distribution of BAEEOI differences within major size classes (Capesize 180,000dwt, Panamax 82,500dwt, Supramax 58,328dwt and Handysize 38,200dwt). A summary of key calculation information can be found in Table 4.

Vessel Size	BAEEOI Values		
	Full Speed	Eco Speed	Delta
Capesize	5.75	4.65	-1.10
Panamax	8.00	6.44	-1.55
Supramax	8.62	7.25	-1.37
Handysize	10.52	8.56	-1.97

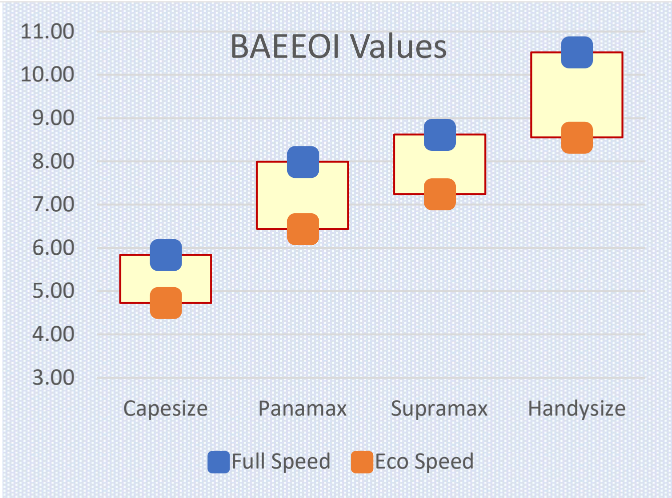

Figure 2

6. Calculating the annual carbon footprint

As set out in Table 2 step 4, the EEOI calculation process calculates the amount of CO_2 by converting the fuel consumption into carbon emissions using the conversion factors outlined in Table 1. The annual amount of CO_2 can be calculated, Equation 4, using the same routes and weightings to calculate the BAEEOI for each vessel size at Full and Eco speed.

$$AnnualCO2 = Sum\left(\sum_{i=1}^{r} \frac{(Fuel \times Conversion \ \times Weighting)}{TimeFactor}\ i\right)$$

Equation 4

Vessel Size	Annualised CO_2 (Tonne)		Eco-Full	
	Full	Eco	Delta	%
Capesize	55,445	39,801	-15,644	-28%
Panamax	30,202	21,620	-8,583	-28%
Supramax	28,791	21,575	-7,216	-25%
Handysize	23,523	16,858	-6,665	-28%

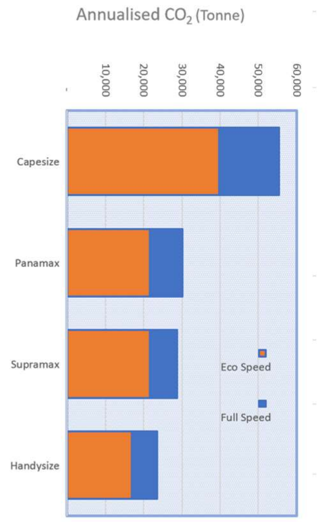

Figure 3

Observations

Figure 3 shows the CO_2 emissions are less operating at Eco speed, which was expected, however only looking at the quantity of CO_2 emitted overlooks that a vessel operating at slower speeds will carry less cargo in a year, or more ships are needed to carry the same amount of cargo.

7. Calculating the annual cargo carried

The annual amount of cargo carried can be calculated, Equation 5, using the same routes and weightings to calculate the BAEEOI for each vessel size at Full and Eco speed.

$$AnnualCargo = Sum\left(\sum_{i=1}^{r} \frac{(Cargo \times Weighting)}{TimeFactor}\, i\right)$$

Equation 5

Vessel Size	Annualised Cargo Carried (Tonne)		Eco - Full	
	Full	Eco	Delta	%
Capesize	1,340,381	1,193,534	-146,846	-11%
Panamax	519,414	463,032	-56,382	-11%
Supramax	652,834	585,545	-67,289	-10%
Handysize	442,253	390,121	-52,132	-12%

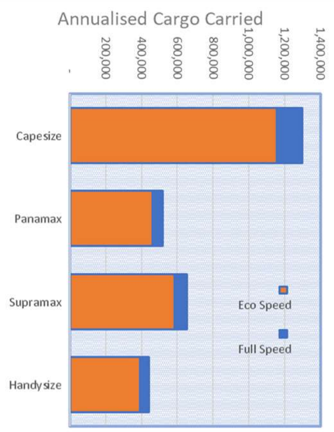

Figure 4

Observations

Figure 4 shows the calculated annual quantity of cargo carried in one year. When comparing the amount of cargo carried and the CO_2 emitted in a year.

- A Capesize vessel carries 11% less cargo operating at Eco Speed and emit 28% less CO_2.
- A Supramax vessel carries 10% less cargo operating at Eco speed and emits 25% less CO_2

This simplistic view would indicate it is better to have more vessels operating at Eco speed. The BAEEOI numbers imply an additional Capesize voyage at Eco speed will carry 170,000mt of cargo and emit 5,788 tonnes of CO_2 for an averaged voyage. However, the carbon footprint of building more vessels, inefficiencies in positioning and many other factors such as enforcement of slow speed, need to be considered.

The main observation is that the ratio of CO_2 emissions to work done enables comparison between vessels, the way they operate and are operated. It supports the IMO position to use a ratio calculation of CO_2 and work done for the Carbon Intensity Indicator (CII) journey.

8. Comparing Sea Cargo Charter EEOI values with BAEEOI values

The Sea Cargo Charter[5] (SCC) is a maritime organisation set up to help signatories understand their operating carbon footprint and determine whether their overall emissions intensity aligns with IMO targets to reduce absolute emissions from global activity by 50% compared to 2008 levels. The EEOI is the primary metric used by the SCC to track and evaluate a signatory organisation’s emissions footprint.

To determine alignment with IMO targets, the SCC has defined overall decarbonisation trajectories to be attained by signatories across their maritime activities. Decarbonisation trajectories are calculated pathways to reach IMO targets following progressive reductions in carbon intensity, as measured by the EEOI, over time. Each year, the SCC publishes data provided by signatories indicating whether their carbon intensities align with the requirements set by the decarbonisation trajectory. Because carbon intensities vary depending on ship type and size, as well as publishing annualised, aggregated figures of alignment for the entire portfolio of a signatory, the SCC also examines alignment within vessel size and type classes.

We compare the SCC required EEOI values with the Baltic Exchange's BREEOI and BAEEOI calculated values in the section below.

SCC Required EEOI values and Decarbonisation Trajectories

To determine climate alignment, SCC signatories reference annualised vessel EEOI figures to compare with decarbonisation trajectory derived required values. Because carbon intensity varies across vessels, EEOI values are provided for defined categories relating to vessel size and type.

[5] https://www.seacargocharter.org/

Trajectory Values were calculated by examining the IMO target of a 50% reduction in emissions compared with 2008, with additional allowance made for projected growth in shipping activity levels over time. Between the 2012 and 2050 calibration points, a linear trajectory is assumed, reflecting a constant improvement in carbon intensity figures over time. Technical guidance of the SCC is available on its website[6].

SCC EEOI values over time

The SCC process allows signatories to compare their carbon intensity alignment at the portfolio and category level with defined values mathematically derived from decarbonisation trajectories. However, whilst this comparison is helpful for showing progress towards overarching annual goals, it does not provide a mechanism for relative benchmarking based on voyages performed. Such a frame of reference would be a useful additional market comparison tool.

Comparing Sea Cargo Charter EEOI values with Baltic annualised EEOI values, BAEEOI

Figure 5 displays box plots indicating the spread and distribution within vessel sizes of the BAEEOI Full and Eco Speed over the SCC 2023 values.

Vessel Size	Baltic Annual EEOI Values (BAEEOI)		
	Full Speed	Eco Speed	SCC EEOI
Capesize	5.75	4.65	4.58
Panamax	8.00	6.44	6.59
Supramax	8.62	7.25	7.75
Handysize	10.52	8.56	9.44

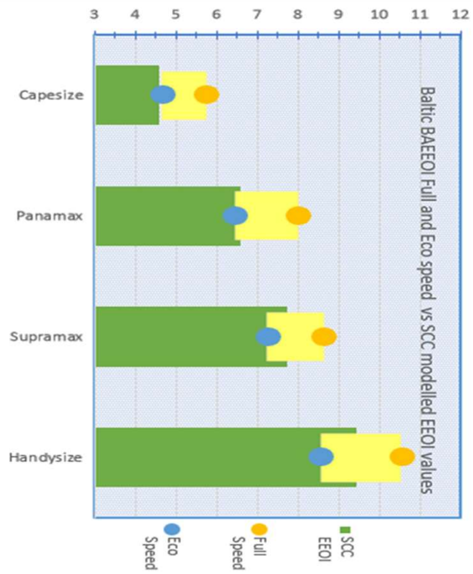

Figure 5

Observations

The Baltic BAEEOI values map well to the SCC values, in both Baltic and SCC values, larger vessels have lower EEOI scores than smaller counterparts reflecting their overall improved efficiency compared with smaller vessels

- All vessels, except capesize, performing at Eco speeds have BAEEOI values lower than the SCC
- Supramax and Handysize vessels are largely below the SCC requirement

6 https://www.seacargocharter.org/resources

9. Comparing Sea Cargo Charter EEOI values with BREEOI values

Figure 6 plots the Baltic route EEOI values against the SCC 2023 target values

Route	EEOI Values Route			Delta BREEOI-SCC	
	BREEOI Full	BREEOI Eco	SCC2023 V2.2	Full	ECO
C2	6.91	5.58	4.58	2.33	1.01
C3	6.78	5.47	4.58	2.20	0.89
C5	6.88	5.58	4.58	**2.31**	**1.00**
C7	7.38	5.98	4.58	**2.80**	**1.40**
C8	5.38	4.35	4.58	**0.80**	**-0.22**
C9	4.67	3.78	4.58	**0.09**	**-0.80**
C10	6.88	5.58	4.58	**2.31**	**1.00**
C14	6.78	5.47	4.58	**2.20**	**0.89**
C16	4.56	3.70	4.58	**-0.02**	**-0.88**
C17	6.82	5.51	4.58	**2.24**	**0.93**
P1A	8.07	6.53	6.59	**1.49**	**-0.06**
P2A	6.06	4.81	6.59	**-0.53**	**-1.77**
P3A	9.72	7.86	6.59	**3.13**	**1.27**
P4	5.55	4.42	6.59	**-1.04**	**-2.17**
P6	8.90	7.17	6.59	**2.31**	**0.59**
P7	6.06	4.81	6.59	**-0.53**	**-1.77**
P8	8.90	7.17	6.59	**2.31**	**0.59**
P5	9.41	7.65	6.59	**2.82**	**1.06**
S1B	7.00	5.94	7.75	**-0.75**	**-1.81**
S1C	6.87	5.83	7.75	**-0.87**	**-1.91**
S3	6.81	5.78	7.75	**-0.93**	**-1.97**
S4A	7.19	6.10	7.75	**-0.56**	**-1.65**
S4B	7.30	6.19	7.75	**-0.45**	**-1.56**
S5	7.83	6.57	7.75	**0.08**	**-1.17**
S9	9.49	7.92	7.75	**1.74**	**0.17**
S2	12.20	10.11	7.75	**4.46**	**2.36**
S8	9.73	8.13	7.75	**1.99**	**0.39**
S10	11.53	9.57	7.75	**3.78**	**1.82**
HS1	8.66	7.02	9.44	**-0.77**	**-2.41**
HS2	8.82	7.16	9.44	**-0.62**	**-2.27**
HS3	8.58	6.96	9.44	**-0.86**	**-2.48**
HS4	8.56	6.94	9.44	**-0.88**	**-2.50**
HS5	13.16	10.75	9.44	**3.73**	**1.31**
HS6	15.11	12.36	9.44	**5.68**	**2.92**
HS7	10.75	8.77	9.44	**1.32**	**-0.67**

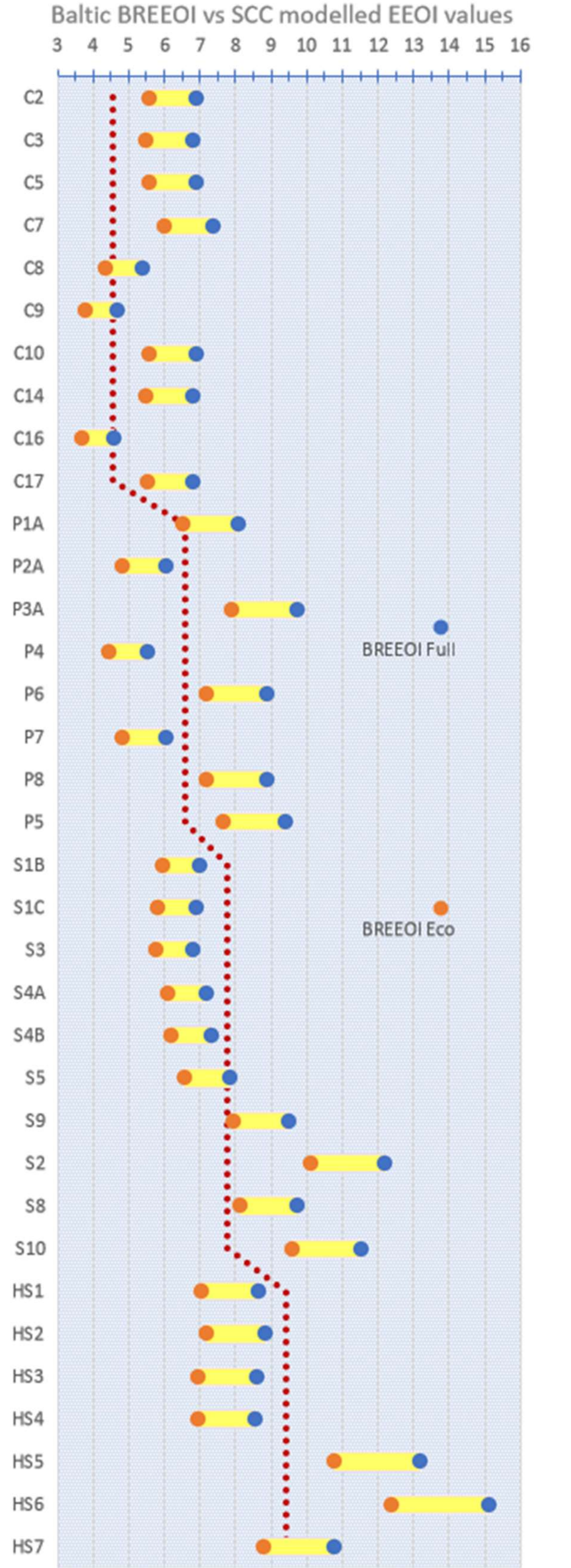

Figure 6

10. Maintaining Values over time

As the profile of the global fleet evolves, so the reference EEOI values will need to change too. To ensure that the Baltic Exchange's EEOI postings remain a valid market reference point, the Baltic proposes following a similar approach to that employed in its day-to-day publishing of maritime market information. Members (or a panel thereof) provide the Baltic with periodic figures relating to EEOI (or its calculation constituents) for each of the assessed routes, which the Baltic can then use to maintain, and where necessary update, the benchmark reference value.

11. Conclusion

The production of indicative reference EEOI figures by the Baltic Exchange for common commercial trade routes provides maritime organisations with a novel operational sustainability indicator for market comparison and benchmarking.

The Baltic has an established process for managing changes to benchmarks and for working with members to ensure that they are relevant to the underlying market and ensure that the references figures published back to the market remain reflective of changes in the operating profile of the global fleet over time.

Feedback on this paper is welcomed from members and non-members alike, any questions or interest in participating in this study please contact emissions@balticexchange.com.

Table 4 EEOI calculation data

Dry Bulk Routes (Load/Discharge)	Ballast starts from	Cargo Carried (tonnes)	Ballast mileage (nm)	Laden mileage (nm)	Ballast Knots	Laden Knots	Total CO_2 (tonne)	Total Work done (tnm)	EEOI (gCO_2/tnm) Eco Speed Full Speed
C2 - Tubarao/Rotterdam	**Rotterdam**	175000	5003	5003	13.0	12.0	4889	875.5	5.58
					15.0	14.0	6052		6.91
C3 - Tubarao/Qingdao	**Qingdao**	177000	11339	11339	13.0	12.0	10981	2007.0	5.47
					15.0	14.0	13612		6.78
C5 - Port Hedland/Qingdao	**Qingdao**	178000	3612	3612	13.0	12.0	3587	642.9	5.58
					15.0	14.0	4426		6.88
C7 - Bolivar/Rotterdam	**Rotterdam**	166000	4376	4376	13.0	12.0	4342	726.4	5.98
					15.0	14.0	5361		7.38
C8 - Bolivar/Turkey	**Rotterdam**	176500	4376	7968	13.0	12.0	6123	1406.4	4.35
					15.0	14.0	7562		5.38
C9 - Kamsar/Qingdao	**Passero**	166000	2953	11435	13.0	12.0	7177	1898.2	3.78
					15.0	14.0	8858		4.67
C10 - Port Hedland/Qingdao	**Qingdao**	178000	3612	3612	13.0	12.0	3587	642.9	5.58
					15.0	14.0	4426		6.88
C14 - Tubarao/Qingdao	**Qingdao**	177000	11339	11339	13.0	12.0	10981	2007.0	5.47
					15.0	14.0	13612		6.78
C16 - Indonesia/Mediterranean	**Qingdao**	178000	2488	7899	13.0	12.0	5202	1406.0	3.70
					15.0	14.0	6415		4.56
C17 - Saldanha Bay/Qingdao	**Qingdao**	177000	8251	8251	13.0	12.0	8041	1460.4	5.51
					15.0	14.0	9956		6.82
P1A - New Orleans/Rotterdam	**Bilbao**	80000	4657	4924	12.5	11.5	2572	393.9	6.53
					14.0	13.5	3181		8.07

P2A - New Orleans/Qingdao	**Bilbao**	72000	4657	15552	12.5	11.5	5390	1119.7	4.81
					14.0	13.5	6783		6.06
P3A - Vancouver/Qingdao	**Qingdao**	68000	5146	5146	12.5	11.5	2751	349.9	7.86
					14.0	13.5	3401		9.72
P4 - Indonesia/Mediterranean	**Qingdao**	80000	2488	7899	12.5	11.5	2792	631.9	4.42
					14.0	13.5	3504		5.55
P6 - Santos/Qingdao	**Hong Kong**	70000	10461	11543	12.5	11.5	5797	808.0	7.17
					14.0	13.5	7193		8.90
P7 - New Orleans/Qingdao	**Bilbao**	72000	4657	15552	12.5	11.5	5390	1119.7	4.81
					14.0	13.5	6783		6.06
P8 - Santos/Qingdao	**Hong Kong**	70000	10461	11543	12.5	11.5	5797	808.0	7.17
					14.0	13.5	7193		8.90
P5 - Balikpapan/Fangcheng	**Fuzhou**	70000	1820	1940	12.5	11.5	1039	135.8	7.65
					14.0	13.5	1277		9.41
S1B - Yuzhny/Shanghai	**Canakkale**	50000	495	8439	12.5	12.0	2504	422.0	5.94
					14.0	14.0	2954		7.00
S1C - Houston/Shanghai	**SW Pass**	50000	389	10259	12.5	12.0	2992	513.0	5.83
					14.0	14.0	3526		6.87
S3 - Rizhao/Abidjan	**Dalian**	50000	343	10853	12.5	12.0	3137	542.7	5.78
					14.0	14.0	3696		6.81
S4A - Houston/Algiers	**SW Pass**	50000	389	5264	12.5	12.0	1605	263.2	6.10
					14.0	14.0	1892		7.19
S4B - Hamburg/Mississippi River	**Skaw**	50000	451	5198	12.5	12.0	1608	259.9	6.19
					14.0	14.0	1896		7.30
S5 - Rio Grande/Shanghai	**Abidjan**	55000	3566	11291	12.5	12.0	4081	621.0	6.57
					14.0	14.0	4862		7.83
S9 - Rio Grande/Amsterdam	**Abidjan**	55000	3566	6013	12.5	12.0	2618	330.7	7.92
					14.0	14.0	3138		9.49

S2 - Newcastle/Shanghai	**Rizhao**	55000	4805	4538	12.5	12.0	2523	249.6	10.11
					14.0	14.0	3045		12.20
S8 - Balikpapan/Visag	**Fuzhou**	55000	1820	2947	12.5	12.0	1318	162.1	8.13
					14.0	14.0	1577		9.73
S10 - Balikpapan/Fangcheng	**Fuzhou**	55000	1820	1940	12.5	12.0	1021	106.7	9.57
					14.0	14.0	1230		11.53
HS1 - Amsterdam/Rio Grande	**Skaw**	32500	501	6012	12.0	12.0	1372	195.4	7.02
					14.0	14.0	1693		8.66
HS2 - Amsterdam/Key West	**Skaw**	33000	501	4344	12.0	12.0	1027	143.4	7.16
					14.0	14.0	1264		8.82
HS3 - Rio Grande/Amsterdam	**Necochea**	33000	554	6013	12.0	12.0	1380	198.4	6.96
					14.0	14.0	1702		8.58
HS4 - Brownsville/Annaba	**SW Pass**	33000	478	5535	12.0	12.0	1268	182.7	6.94
					14.0	14.0	1563		8.56
HS5 - Geelong/Dalian	**Singapore**	33000	4035	5535	12.0	12.0	1963	182.7	10.75
					14.0	14.0	2404		13.16
HS6 - Vancouver/CJK	**Inchon**	33000	5073	5126	12.0	12.0	2090	169.2	12.36
					14.0	14.0	2556		15.11
HS7 - Tokyo/Ko Sichang	**Dalian**	33000	1197	3101	12.0	12.0	897	102.3	8.77
					14.0	14.0	1101		10.75

Footnote Table 5

Ballast Starts from ports are correlated to the route description. Where the route sets out a delivery range guidance was provided by the panellists reporting on that route for the most common port. P6 has a named delivery of Singapore however the ballast starting port is Hong Kong. In the route consultation process for the parameters of P6 Singapore was selected as it is a good benchmark for vessels ballasting to South America starting from China, Arabian Gulf and India. In practice most vessels come from China and Hong Kong represents the range of starting points.