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

Version 7

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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 benchmark consultation. Members will contribute their findings and actual 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 organisations engaged in commercial maritime trade, seeking to meet targets related to their carbon footprint and operating efficiency levels. However, whilst vessel owners and

[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

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 described in the Baltic route description, stowage factor or draft b) Fuel consumption rates for laden and ballast legs c) Fuel consumption in port idle and during operations, including heating if required d) 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

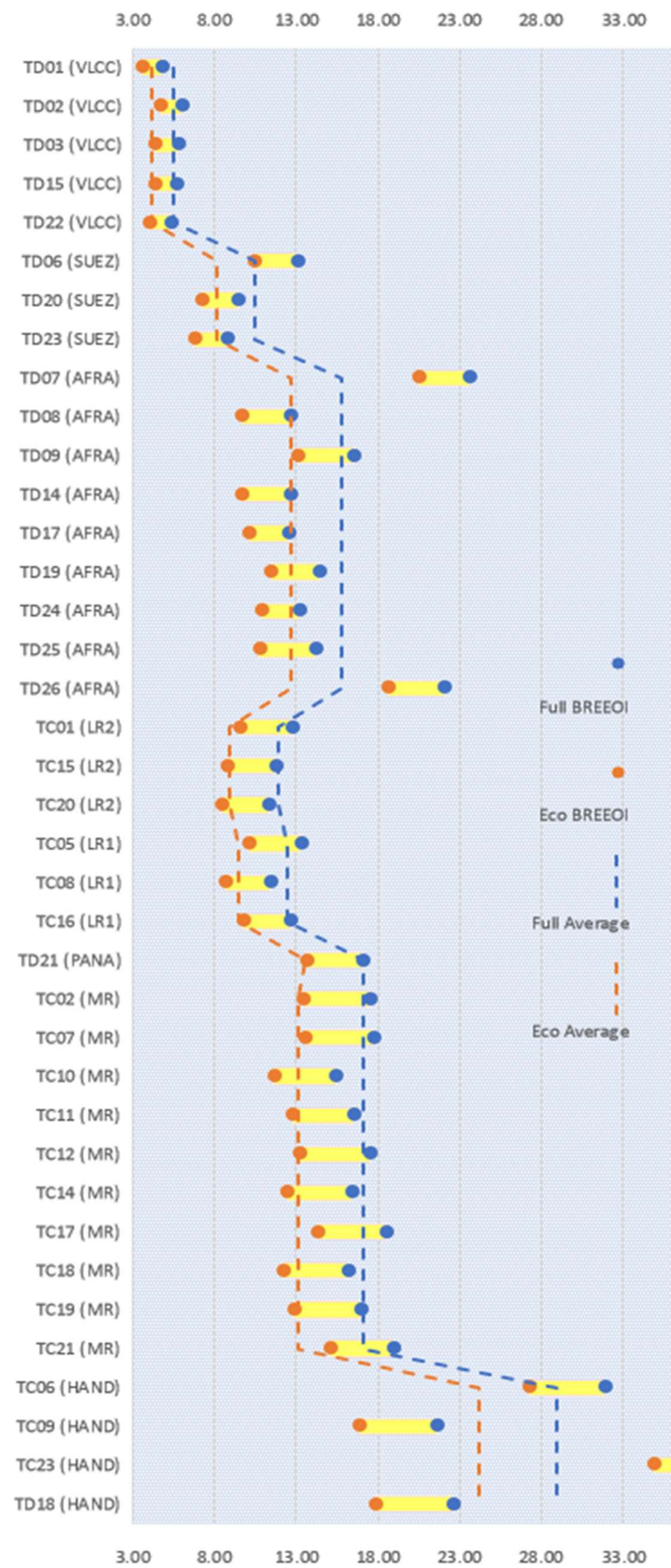
Table 3 shows example calculation values for VLCC Route TD3 (Ras Tanura to Ningbo) using both full and Eco speed steaming regimes.

Parameter	Value at Full Speed	Value at ECO Speed
Cargo carried (tonnes)	270,000	270,000
Laden fuel consumption g/pd	74,500,000	45,000,000
Ballast fuel consumption g/pd	56,500,000	38,500,000
At-port fuel consumption g/pd	70,000,000	70,000,000
Laden leg steaming speed (knots)	13	11
Ballast leg steaming speed (knots)	12.5	11
Laden leg mileage (nm)	5897	5897
Laden ECA mileage (nm)	85	85
Laden non-ECA mileage (nm)	5812	5812
Ballast leg mileage (nm)	5897	5897
Ballast leg ECA mileage (nm)	85	85
Ballast leg non-ECA mileage (nm)	5812	5812
CO_2 emissions produced (g)	9,132,125,154	6,994,032,828
Work done (tnm)	1,592,195,897	1,592,195,897
Reference EEOI value (gCO_2/tnm)	5.74	4.39

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-Full
TD01 (VLCC)	4.82	3.61	-1.20
TD02 (VLCC)	6.01	4.67	-1.34
TD03 (VLCC)	5.74	4.39	-1.34
TD15 (VLCC)	5.70	4.30	-1.39
TD22 (VLCC)	5.39	4.04	-1.34
TD06 (SUEZ)	13.06	10.39	-2.67
TD20 (SUEZ)	9.45	7.24	-2.21
TD23 (SUEZ)	8.78	6.73	-2.05
TD07 (AFRA)	23.56	20.49	-3.08
TD08 (AFRA)	12.61	9.62	-2.99
TD09 (AFRA)	16.49	13.06	-3.43
TD14 (AFRA)	12.63	9.64	-2.99
TD17 (AFRA)	12.54	10.08	-2.46
TD19 (AFRA)	14.36	11.37	-2.99
TD24 (AFRA)	13.20	10.81	-2.40
TD25 (AFRA)	14.12	10.69	-3.43
TD26 (AFRA)	22.04	18.58	-3.45
TC01 (LR2)	12.70	9.51	-3.19
TC15 (LR2)	11.77	8.78	-2.99
TC20 (LR2)	11.32	8.46	-2.86
TC05 (LR1)	13.29	10.13	-3.16
TC08 (LR1)	11.36	8.68	-2.67
TC16 (LR1)	12.60	9.70	-2.91
TD21 (PANA)	17.08	13.58	-3.50
TC02 (MR)	17.48	13.40	-4.08
TC07 (MR)	17.75	13.50	-4.25
TC10 (MR)	15.41	11.68	-3.73
TC11 (MR)	16.46	12.74	-3.72
TC12 (MR)	17.47	13.22	-4.25
TC14 (MR)	16.35	12.40	-3.95
TC17 (MR)	18.49	14.24	-4.25
TC18 (MR)	16.15	12.23	-3.92
TC19 (MR)	16.90	12.87	-4.03
TC21 (MR)	18.96	15.03	-3.93
TC06 (HAND)	31.82	27.18	-4.64
TC09 (HAND)	21.58	16.81	-4.77
TC23 (HAND)	39.59	34.83	-4.76
TD18 (HAND)	22.57	17.80	-4.77

Figure 1



Observations

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

- For voyages with a shorter sailing distances the reduction in CO2 due to sailing slower at Eco speed is less, about 20% saving compared to 33% average for longer voyages.
- Port operations have an impact on shorter voyages. For example TC6 is a cross Mediterranean voyage of about 1.6 laden days. The CO2 emitted for five days of port operations is 40% of the total emissions.

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 represent an annual value the Baltic calculates an implied annual operating efficiency ratio based on the BREEOI calculations for each vessel size, Equation 3. An annual EEOI value reflects the average of the vessel type trading all the routes for one year[3]. To calculate a Baltic Annual EEOI (BAEEOI) the Baltic uses all the routes for a vessel type and applies a Time factor[4]. A vessel operating at Eco speed does less work in a year than at Full speed as it performs fewer voyages, and the *TimeFactor* takes this into account, Equation 2.

$$TimeFactor = \frac{360}{Sum(\sum_{i=1}^{r} VoyageDuration\ i)}$$

Equation 2

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

Equation 3

[3] 360 trading days. Five days are assumed to allowed for off-hire, repairs where the vessel is not available for trading
[4] Total duration of all the routes divided by 360

Figure 2 displays plots indicating the spread and distribution of BAEEOI differences within major size classes found in Table 4. A summary of key calculation information can be found in Table 5.

Table 3

Vessel	Deadweight	Cargo Type
VLCC	300,000	Dirty
SUEZMAX	160,000	Dirty
AFRAMAX	105,000	Dirty
LR2	105,000	Clean
PANAMAX	75,000	Dirty
LR1	75,000	Clean
MR	47,000	Clean
HANDY	37,800	Clean

Vessel Size	BAEEOI Values		
	Full Speed	Eco Speed	Delta
VLCC	5.53	4.20	-1.33
SUEZMAX	10.43	8.12	-2.31
AFRAMAX	15.73	12.70	-3.03
LR2	11.93	8.92	-3.01
PANAMAX	17.08	13.58	-3.50
LR1	12.42	9.50	-2.92
MR	17.14	13.13	-4.01
HANDY	26.30	21.72	-4.58

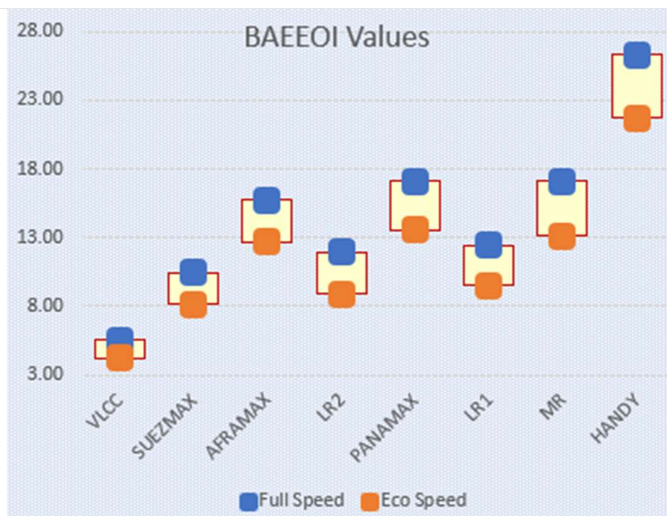


Figure 2

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.

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

Equation 4

Vessel Size	Annualised CO_2			
	(Tonne)		Eco-Full	
	Full	Eco	Delta	%
VLCC	72,420	47,740	-24,680	-34%
SUEZMAX	53,751	36,805	-16,946	-32%
AFRAMAX	44,309	30,864	-13,445	-30%
LR2	45,805	29,937	-15,868	-35%
PANAMAX	30,927	22,182	-8,745	-28%
LR1	33,934	22,798	-11,136	-33%
MR	28,028	18,836	-9,392	-33%
HANDY	23,684	16,506	-7,178	-30%

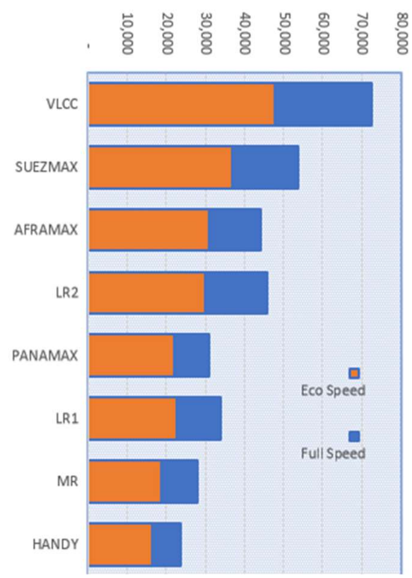


Figure 3

Observations

Figure 3 shows the CO_2 emissions are less when operating at Eco speed and is lower for smaller vessels, which was expected. Only looking at the quantity of CO_2 emitted overlooks that a larger vessel is doing more work also that vessels 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

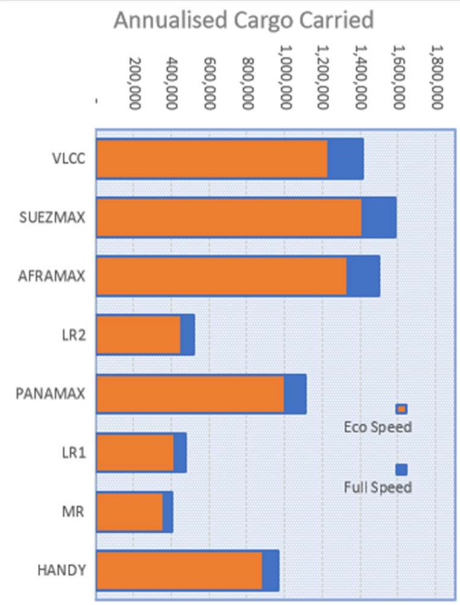
The annual amount of cargo carried can be calculated, Equation 5, using the same routes to calculate the BAEEOI for each vessel size at Full and Eco speed.

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

Equation 5

Vessel Size	Annualised Cargo Carried (Tonne)		Eco - Full	
	Full	Eco	Delta	%
VLCC	1,413,736	1,233,033	-180,703	-13%
SUEZMAX	1,589,447	1,411,833	-177,614	-11%
AFRAMAX	1,499,486	1,336,520	-162,966	-11%
LR2	517,606	452,726	-64,880	-13%
PANAMAX	1,112,485	1,002,786	-109,699	-10%
LR1	476,681	418,605	-58,076	-12%
MR	406,490	358,185	-48,305	-12%
HANDY	965,795	887,793	-78,002	-8%

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 VLCC carries 13% less cargo operating at Eco Speed and emit 35% less CO_2.

This simplistic view would indicate it is better to have more vessels operating at Eco speed. 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. Sea Cargo Charter EEOI values and 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.

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].

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

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	EEOI Values		
	BAEEOI Full	BAEEOI ECO	SCC EEOI
VLCC	5.53	4.20	5.93
SUEZMAX	10.43	8.12	8.40
AFRAMAX	15.73	12.70	10.61
LR2	11.93	8.92	10.61
PANAMAX	17.08	13.58	12.79
LR1	12.42	9.50	12.79
MR	17.14	13.13	16.57
HANDY	26.30	21.72	18.70

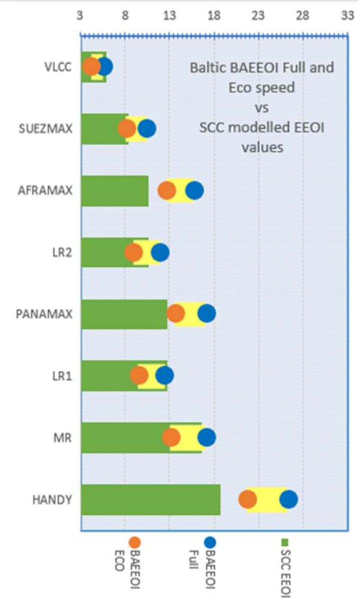


Figure 5

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. There is a difference related to Dirty cargo requiring heating to enable the cargo to be discharged.

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

Route	BREEOI Route Values		
	Full BREEOI	Eco BREEOI	Delta Eco-Full
TD01 (VLCC)	4.82	3.61	-1.20
TD02 (VLCC)	6.01	4.67	-1.34
TD03 (VLCC)	5.74	4.39	-1.34
TD15 (VLCC)	5.70	4.30	-1.39
TD22 (VLCC)	5.39	4.04	-1.34
TD06 (SUEZ)	13.06	10.39	-2.67
TD20 (SUEZ)	9.45	7.24	-2.21
TD23 (SUEZ)	8.78	6.73	-2.05
TD07 (AFRA)	23.56	20.49	-3.08
TD08 (AFRA)	12.61	9.62	-2.99
TD09 (AFRA)	16.49	13.06	-3.43
TD14 (AFRA)	12.63	9.64	-2.99
TD17 (AFRA)	12.54	10.08	-2.46
TD19 (AFRA)	14.36	11.37	-2.99
TD24 (AFRA)	13.20	10.81	-2.40
TD25 (AFRA)	14.12	10.69	-3.43
TD26 (AFRA)	22.04	18.58	-3.45
TC01 (LR2)	12.70	9.51	-3.19
TC15 (LR2)	11.77	8.78	-2.99
TC20 (LR2)	11.32	8.46	-2.86
TC05 (LR1)	13.29	10.13	-3.16
TC08 (LR1)	11.36	8.68	-2.67
TC16 (LR1)	12.60	9.70	-2.91
TD21 (PANA)	17.08	13.58	-3.50
TC02 (MR)	17.48	13.40	-4.08
TC07 (MR)	17.75	13.50	-4.25
TC10 (MR)	15.41	11.68	-3.73
TC11 (MR)	16.46	12.74	-3.72
TC12 (MR)	17.47	13.22	-4.25
TC14 (MR)	16.35	12.40	-3.95
TC17 (MR)	18.49	14.24	-4.25
TC18 (MR)	16.15	12.23	-3.92
TC19 (MR)	16.90	12.87	-4.03
TC21 (MR)	18.96	15.03	-3.93
TC06 (HAND)	31.82	27.18	-4.64
TC09 (HAND)	21.58	16.81	-4.77
TC23 (HAND)	39.59	34.83	-4.76
TD18 (HAND)	22.57	17.80	-4.77

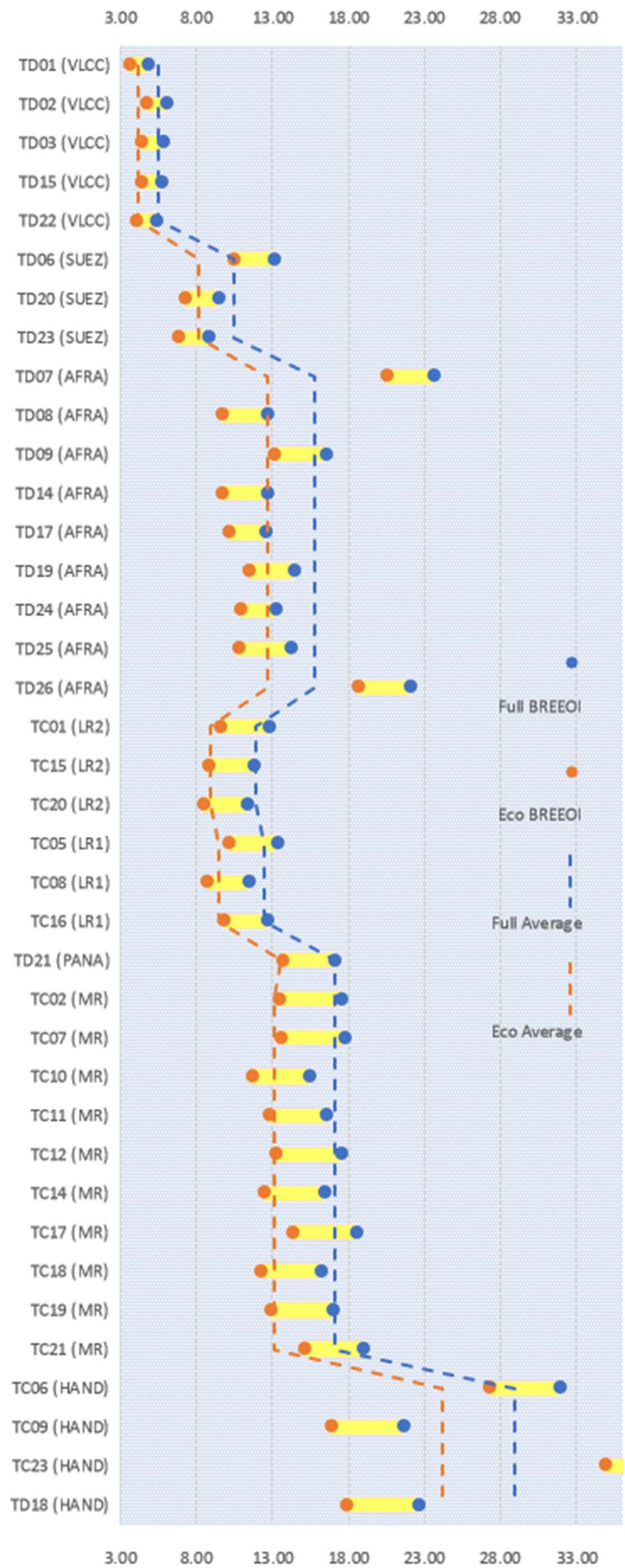


Figure 6

9. Maintaining Values over time

A reliable reference point will be required to measure the outcomes of emission reduction measures in the global fleet on an ongoing basis. This may be a combination of efficiency improvements, alternatives fuels and operational enhancements. Members and ship operators will assist by providing regular feedback through a structured process which will capture relevant changes and advances as these measures are implemented more widely. This will ensure the ongoing accuracy of the route-based market reference points produced. Companies interested in participating in maintaining the relevance of the EEOI values are encouraged to contact - emissions@balticexchange.com.

10. Conclusion

The production of indicative reference based on round voyage EEOI figures by the Baltic Exchange for the common commercial trade routes provides the maritime supply chain with an emissions indicator for market comparison and voyage optimisation. EEOI is a common global standard which will support shipping companies and cargo interests in their decision making processes on their journey to reduce emissions.

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.

Table 5 EEOI calculation data

Tanker Bulk Routes (Load/Discharge)	Ballast starts from	Cargo Carried (tonnes)	Ballast mileage (nm)	Laden mileage (nm)	Ballast Knots	Laden Knots	Sailing CO_2 (tonne)	In Port CO_2 (tonne)	Total CO_2 (tonne)	Total Work done (tnm)	EEOI (gCO_2/tnm) Eco Speed Full Speed
TD01 (VLCC) - Ras Tanura/Louisiana Offshore	**Louisiana**	280,000	9,631	12,338	12.5	13.0	15,757	878	16,635	3,454,640,000	4.82
					11.0	11.0	11,602	877	12,478	3,454,640,000	3.61
TD02 (VLCC) - Ras Tanura/Singapore	**Ningbo**	270,000	3,735	3,734	12.5	13.0	5,216	845	6,061	1,008,180,000	6.01
					11.0	11.0	3,863	845	4,707	1,008,180,000	4.67
TD03C (VLCC) - Ras Tanura/Ningbo	**Singapore**	270,000	5,897	5,897	12.5	13.0	8,240	892	9,132	1,592,190,000	5.74
					11.0	11.0	6,102	892	6,994	1,592,190,000	4.39
TD15 (VLCC) - Serpentina/Ningbo	**Ningbo**	260,000	10,212	10,212	12.5	13.0	14,267	861	15,128	2,655,120,000	5.70
					11.0	11.0	10,565	861	11,426	2,655,120,000	4.30
TD22 (VLCC) - Galveston/Ningbo	**Ningbo**	270,000	15,266	15,265	12.5	13.0	21,333	866	22,199	4,121,550,000	5.39
					11.0	11.0	15,798	866	16,664	4,121,550,000	4.04
TD20 (SUEZ) - Offshore Bonny/Rotterdam	**Rotterdam**	130,000	4,475	4,474	12.5	13.0	4,956	542	5,498	581,620,000	9.45
					11.0	11.0	3,668	542	4,210	581,620,000	7.24
TD23 (SUEZ) - Basrah/Lavera	**Lavera**	140,000	4,851	4,851	12.5	13.0	5,358	604	5,962	679,140,000	8.78
					11.0	11.0	3,966	604	4,570	679,140,000	6.73
TD06 (SUEZ) - Novorossiysk/Augusta	**Augusta**	135,000	1,269	1,268	12.5	13.0	1,694	542	2,236	171,180,000	13.06
					11.0	11.0	1,236	542	1,778	171,180,000	10.39
TD14 (AFRA) - Seria/Brisbane	**Brisbane**	80,000	3,802	3,802	12.5	13.0	3,429	413	3,841	304,160,000	12.63
					11.0	11.0	2,520	413	2,932	304,160,000	9.64
TD17 (AFRA) - Primorsk/Wilhelmshaven	**Wilhelmshaven**	100,000	1,305	1,305	12.5	13.0	1,211	425	1,636	130,500,000	12.54
					11.0	11.0	890	425	1,315	130,500,000	10.08
TD19 (AFRA) - Ceyhan/Lavera	**Lavera**	80,000	1,720	1,719	12.5	13.0	1,551	425	1,975	137,520,000	14.36
					11.0	11.0	1,139	425	1,564	137,520,000	11.37
TD24 (AFRA) - Kozmino/Qingdao	**Qingdao**	100,000	1,015	1,014	12.5	13.0	916	423	1,339	101,400,000	13.20

					11.0	11.0	673	423	1,096	101,400,000	10.81
TD25 (AFRA) - Houston/Rotterdam	**Rotterdam**	70,000	5,113	5,112	12.5	13.0	4,628	425	5,053	357,840,000	14.12
					11.0	11.0	3,401	425	3,826	357,840,000	10.69
TD26 (AFRA) - Dos Bocas/Houston	**Houston**	70,000	670	670	12.5	13.0	611	423	1,034	46,917,500	22.04
					11.0	11.0	449	423	872	46,917,500	18.58
TD07 (AFRA) - Hound Point/Wilhelmshaven	**Wilhelmshave n**	80,000	444	444	12.5	13.0	412	425	837	35,520,000	23.56
					11.0	11.0	303	425	728	35,520,000	20.49
TD08 (AFRA) - Mina Al Ahmadi/Singapore	**Singapore**	80,000	3,861	3,861	12.5	13.0	3,482	1,316	3,895	308,880,000	12.61
					11.0	11.0	2,559	1,316	2,972	308,880,000	9.62
TD09 (AFRA) - Covenas/Corpus Christi	**Corpus Chrisi**	70,000	1,700	1,699	12.5	13.0	1,538	423	1,961	118,930,000	16.49
					11.0	11.0	1,130	423	1,553	118,930,000	13.06
TC01 (LR2) - Ras Tanura/Yokohama	**Yokohama**	75,000	6,638	6,637	12.5	13.0	5,986	335	6,320	497,775,000	12.70
					11.0	11.0	4,399	335	4,733	497,775,000	9.51
TC15 (LR2) - Skikda/Chiba	**Chiba**	80,000	9,269	9,269	12.5	13.0	8,359	366	8,725	741,520,000	11.77
					11.0	11.0	6,143	366	6,508	741,520,000	8.78
TC16 (LR1) - Amsterdam/Lome	**Lome**	60,000	4,182	4,171	12.5	13.0	2,907	247	3,154	250,260,000	12.60
					11.0	11.0	2,180	247	2,427	250,260,000	9.70
TC05 (LR1) - Ras Tanura/Yokohama	**Yokohama**	55,000	6,637	6,637	12.5	13.0	4,605	246	4,851	365,035,000	13.29
					11.0	11.0	3,453	246	3,699	365,035,000	10.13
TC08 (LR1) - Jubail/Rotterdam	**Rotterdam**	65,000	6,507	6,514	12.5	13.0	4,526	283	4,809	423,410,000	11.36
					11.0	11.0	3,394	283	3,677	423,410,000	8.68
TD21 (PANA) - Mamonal/Houston	**Houston**	50,000	1,629	1,628	12.5	13.0	1,138	427	1,390	81,400,000	17.08
					11.0	11.0	853	427	1,106	81,400,000	13.58
TC10 (MR) - Yosu/Los Angeles	**Los Angeles**	40,000	5,375	5,375	12.5	13.0	3,105	208	3,314	215,000,000	15.41
					11.0	11.0	2,304	208	2,512	215,000,000	11.68
TC11 (MR) - Yosu/Singapore	**Singapore**	40,000	2,480	2,480	12.5	13.0	1,429	204	1,632	99,200,000	16.46
					11.0	11.0	1,060	204	1,264	99,200,000	12.74

TC12 (MR) - Jamangar/Chiba	**Chiba**	35,000	5,717	5,716	12.5	13.0	3,293	202	3,495	200,060,000	17.47
					11.0	11.0	2,443	202	2,645	200,060,000	13.22
TC14 (MR) - Houston/Amsterdam	**Amsterdam**	38,000	5,141	5,141	12.5	13.0	2,986	208	3,194	195,358,000	16.35
					11.0	11.0	2,215	208	2,423	195,358,000	12.40
TC17 (MR) - Jubail/Dar-es-Salaam	**Dar-es-Salaam**	35,000	2,855	2,854	12.5	13.0	1,644	202	1,847	99,890,000	18.49
					11.0	11.0	1,220	202	1,422	99,890,000	14.24
TC18 (MR) - Houston/Santos	**Santos**	38,000	5,591	5,590	12.5	13.0	3,227	204	3,431	212,420,000	16.15
					11.0	11.0	2,394	204	2,598	212,420,000	12.23
TC19 (MR) - Lagos/Amsterdam	**Amsterdam**	37,000	4,291	4,291	12.5	13.0	2,479	204	2,683	158,767,000	16.90
					11.0	11.0	1,839	204	2,043	158,767,000	12.87
TC02 (MR) - Rotterdam/New York	**New York**	37,000	3,349	3,348	12.5	13.0	1,957	208	2,165	123,876,000	17.48
					11.0	11.0	1,452	208	1,660	123,876,000	13.40
TC07 (MR) - Singapore/Sydney	**Sydney**	35,000	4,471	4,471	12.5	13.0	2,575	202	2,778	156,485,000	17.75
					11.0	11.0	1,911	202	2,113	156,485,000	13.50
TC06 (HAND) - Skikda/Lavera	**Lavera**	30,000	407	406	12.5	13.0	213	175	388	12,180,000	31.82
					11.0	11.0	156	175	331	12,180,000	27.18
TC09 (HAND) - Primorsk/Le Havre	**Le Havre**	30,000	1,616	1,617	12.5	13.0	870	176	1,047	48,510,000	21.58
					11.0	11.0	639	176	815	48,510,000	16.81
TC20 (LR2) - Jubail/Rotterdam	**Jubail**	90,000	6,507	6,514	12.5	13.0	6,241	394	6,636	586,260,000	11.32
					11.0	11.0	4,566	394	4,960	586,260,000	8.46
TC21 (MR) - US Gulf/Caribbean	**Houston**	38,000	1,638	1,638	12.5	13.0	948	232	1,180	62,244,000	18.96
					11.0	11.0	703	232	935	62,244,000	15.03
TC23 (HAND) - ARA/UK-Cont.	**Amsterdam**	30,000	307	308	12.5	13.0	166	200	366	9,240,000	39.59
					11.0	11.0	122	200	322	9,240,000	34.83
TD18 (HAND) - Baltic/UK-Cont.	**Amsterdam**	30,000	1,272	1,272	12.5	13.0	685	288	861	38,160,000	22.57
					11.0	11.0	503	288	679	38,160,000	17.80