

Carbon Intensity Indicator (CII) Impacts on Shipping Markets

[xclusiv]
shipbrokers



CO2 emissions

- IMO has come up with its ambitious goal of achieving a 40% reduction in CO2 emission from the 2008 level by 2030 and a massive 70% reduction by 2050.
- Pursuing its goal, IMO introduced mechanisms such as:
- EEDI (Energy Efficiency Design Index),
- EEXI (Efficiency Existing Ship Index) and now the latest is the
- Carbon Intensity Indicator (CII)

CII – Carbon Intensity Indicator

- Measures how efficiently a ship transports its goods or passengers
- In terms of grams of CO2 emitted per ton of cargo transported across every nautical mile
- Annual rating ranging from A to E
- If the vessel maintains the same emission score, the rating will be slightly worse year by year.
- CII will take effect from 1st Jan 2023
- The reference year for CII is 2019 because this is the first year with verified DCS data reported to the IMO
- For the start in 2023, the reference line will be set at 5% emission reduction concerning the 2019 level and then gradually move up to 11% reduction by 2027

CII – Carbon Intensity Indicator

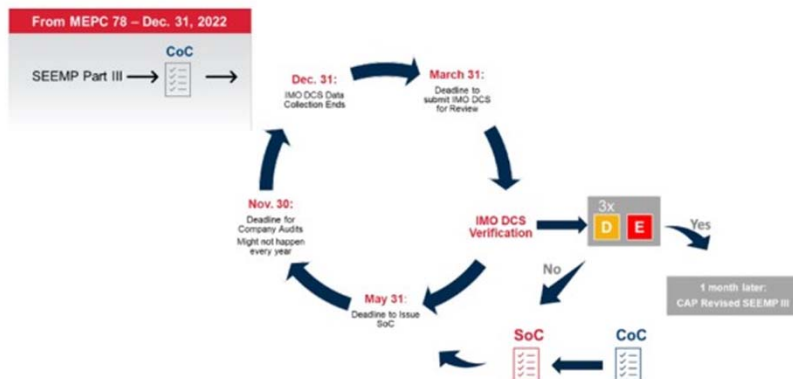
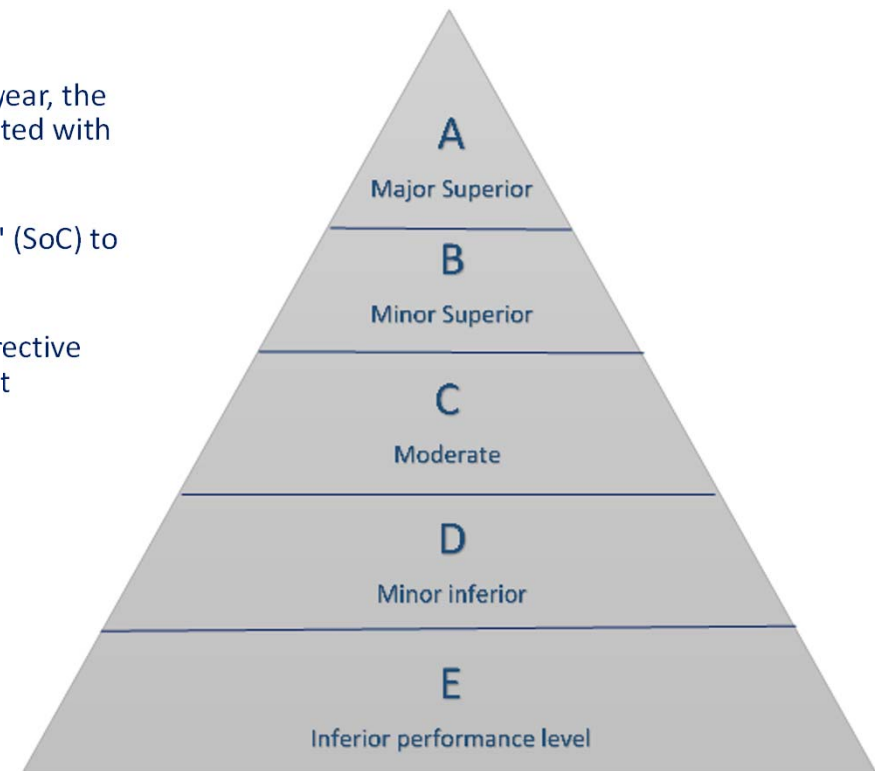
CII applies to all ships above 5,000 GT of the following types:

- Bulk Carriers
- General Cargo
- Tankers
- Containers
- Gas & LNG Carriers
- Refrigerated Cargo
- Combination Carriers
- Vehicle Carriers
- Ro-Ro Cargo
- Cruise Ships



CII – Ratings

- On the top of the pyramid is the best rating (A), while E is the worst, and is considered as inferior performance.
- In case of a D rating for three consecutive years or E rating for a single year, the SEEMP (Ship Energy Efficiency Management Plan) Part III must be updated with a corrective action plan and verified before the SoC can be issued.
- The performance level will be recorded in a "Statement of Compliance" (SoC) to be further elaborated in the ship's SEEMP.
- The deadline for the SoC issuance remains the same (31 May). The corrective action plan should consist of an analysis of why the required CII was not achieved and include a revised implementation plan.



CII – Calculation

For the calculation of CII, the reference year is 2019 as this is the first year that the IMO has received verified DCS data.

If not, the reference line would be based on highly uncertain AIS data. Based on improvements between 2008 and 2019, the reduction factors are adjusted relative to 2019.

CII calculation formula: $CII\ Rating = \frac{AttainedCII}{RequiredCII}$

Attained CII: the attained annual operational CII of individual ships $Attained\ Cii = \frac{M}{W}$

- M: Mass of CO2 emissions / Mass of CO2 emissions: $M = \sum FC_j * C_{Fj}$
 - FC_j : is the total mass (in grams) of consumed fuel oil of type j resulted in the calendar year, as reported under IMO DCS.
 - C_{Fj} : represents the fuel oil mass to CO2 conversion factor for fuel in line with those specified in the 2018 Guidelines on the method of calculation of the attained Energy Efficiency Design Index (EEOI) for new ships
- W: Transport Work / Transport Work: $W = Capacity * Distance$
 - Capacity: the deadweight tonnage (DWT) of the vessel. For cruise passenger ships, ro-ro cargo ships (vehicle carriers), & Ro-Ro passenger ships, we use gross tonnage (GT) instead.
 - Distance: the travelled nautical miles (NM) as reported under IMO DCS.

CII – Calculation

Required CII: the required annual operational CII for a ship $Required\ Cii = \left(1 - \frac{Z}{100}\right) * CII_{Ref}$

- Z: General reference to the reduction factors for the required annual operational CII of ship types from year 2023 to 2030, as specified in Table 1 of Guidelines.
- CII_{Ref} : the operational carbon intensity performance of ship types in year 2019 is taken as the reference
 $CII_{Ref} = a * Capacity^{-c}$
 - a, -c: parameters, estimated through median regression fits, taking the attained CII and the Capacity of individual ships collected through IMO DCS in year 2019.
 - Capacity: the capacity of ship

CII – Calculation

Imagine buying the most energy-efficient gasoline car in the world.

Sure, you would be ticking the EEXI compliance box.

But suppose you drive that car extremely inefficiently, braking and accelerating a lot, leaving gear shifts until the last minute, speeding, the engine idling when parked and letting the tires deflate.

That same “energy-efficient” car would end up with a poor CII rating because of how you used it.

CII is an operational index based on another measure, the Annual Efficiency Ratio (AER), which measures all the carbon emissions from all ballast and laden voyages, anchorage, port stays, all divided by the deadweight and distance sailed in a year (grams of CO₂ per DWT mile).

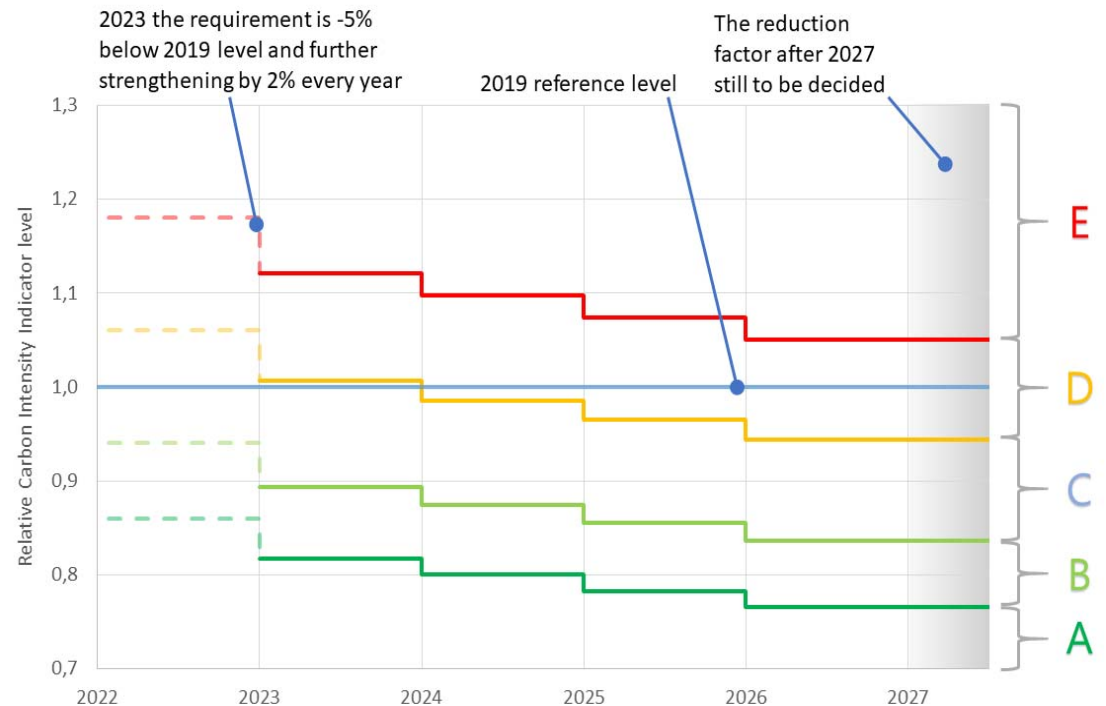
$$AER = \frac{\text{Annual } CO_2 \text{ emissions}}{\text{Deadweight} \times \text{Distance sailed}} = \frac{\sum_j FC_j \times C_{Fj}}{DWT \times D} = \frac{g_{CO_2}}{DWT \text{ mile}}$$

The CII rating is derived from the Annual Efficiency Ratio, which measures the carbon emissions of a ship's operations over the course of a year.

CII – Calculation

From 2023 onwards, if a ship is rated D or E, the owner of that ship will be seen as not doing enough to comply, and therefore not doing enough to fight climate change. The only direct impact is that those shipowners will need to update their Ship Energy Efficiency Management Plan (SEEMP) with how to improve their rating.

Since EEXI regulation demands technical improvements from shipowners, being more EEXI compliant, in general, also works towards better CII, there is a list of actions you can take to comply with EEXI.



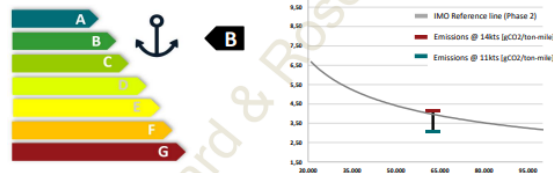
EEXI – CII - GHG

Vessel details:

World Trader (IMO No. 9894374)

Built: 2020
Yard: Oshima Shipbuilding
Deadweight: 62.569 mt

VESSELINDEX GHG-rating

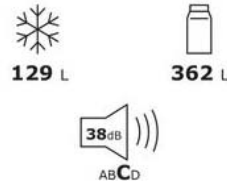
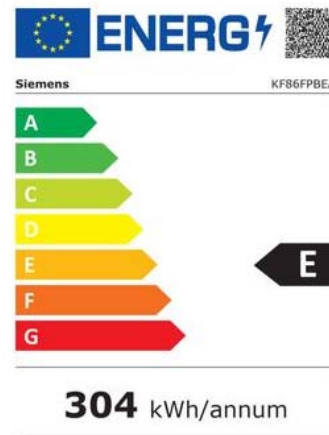


The VESSELINDEX® GHG rating reflects to what extent the normal operational span* of the vessel is within the current IMO compliance limit (For vessels in service)

Operational span = { I } 18% of the operational span is ABOVE the IMO compliance limit
82% of the operational span is BELOW the IMO compliance limit

Green-speed® limit: 13,7 knots

At this speed and below the vessel is compliant with IMO Phase 2 targets.



- EEXI and GHG vessel ratings are vital part of an asset assessment prior a Buyers expressing his purchase interest. Therefore, these ratings are necessary for shortlisting or not and this is a new trend for our Sale and Purchase broking.
- The solutions to successfully complying with EEXI and CII are complex but ultimately come back to the same conclusion; the sooner fleets can begin using the tools currently available to save fuel and operate more efficiently, the easier the transitions over the next few years will be.
- With less than 2 months to go, it is vital that the shipping industry gets up to speed with EEXI/CII and that owners/charterers devise and invest in appropriate strategies to ensure they are prepared for implementation in January 2023.
- Together, CII and EEXI will significantly incentivize shipping to find and fight inefficiencies.

$$EEXI = \frac{CO_2 \text{ emissions}}{\text{Transportation work}}$$

$$EEXI = \frac{\text{Main engine emissions} + \text{Auxiliary engine emissions} + (PTI - \text{Innovative electrical energy technologies}) - \text{Innovative propulsion energy technologies}}{\text{Capacity} * \text{Reference speed} * \text{Reduction factors}}$$

$$EEXI = \frac{(\prod_{j=1}^n f_j) (\sum_{m=1}^{ME} P_{ME(i)} C_{ME(i)} SFC_{ME(i)}) + (P_{AE} C_{AE} SFC_{AE}) + ((\prod_{j=1}^n f_j) \sum_{k=1}^{PTI} P_{PTI(i)} - \sum_{k=1}^{n_{eff}} f_{eff(i)} P_{AEff(i)}) C_{FAE} SFC_{FAE}) - (\sum_{k=1}^{n_{eff}} f_{eff(i)} P_{eff(i)} C_{FME} SFC_{FME})}{\text{Capacity} V_{ref} f_i f_e f_l f_w f_m}$$

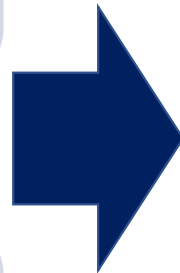
CII – Impacts

Factors affecting the CII:

- Fuel type
- Fuel consumption
- Technical Efficiency
- Operational Parameters (vessel speed, cargo transported, weather conditions)

How can owners control the CII:

- Optimizing the vessel's operation
- Ensuring that the vessel is in good condition
- Investing in energy saving technologies/devices
- Investing in alternative fuels



Impacts on the shipping market:

- Slow steaming – longer travel times, increased vsI utilisation
- High demand for vessels with higher CII grade
- Low demand for vessels with lower CII grade
- Lower vessel supply as inefficient vessels can have inoperable CII grades
- Higher freight rates
- High-cost maintenance for older ships to achieve good CII grade
- Lots of millions will be spent in new technologies until the optimum technology is found
- Many years will pass until new fleet demand/supply balance point
- Older ships will go to scrap yards
- With CII, the problems for ship owners would range from securing finance to finding business.

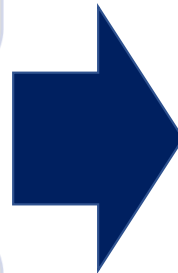
CII – Impacts

Some Interesting Facts:

- Owners may restrict vessel operations in order to maintain high IMO Carbon Intensity Indicator (CII) rating
- Create commercial demand for vessels that can demonstrate their green carbon credentials
- Companies that have a high profile ESG reporting will include in their charter contracts clauses that require use of vessels with better CII ratings.

Is it a fair calculation?

- Some demanding routes are predisposed in lowering the vessel rating.
- Since CII is an operational measure, it is not within the control of the owner at all, but more by the operator or charterer.
- Long Port time negatively affects CII.
- Owners planning to refinance or sell their vessels are also likely to place caveats in their operations since lower ratings will limit financial value



Impacts on the shipping market:

- There are concerns that these restrictive factors may limit vessel availability, particularly in the spot market
- Boost market demand for vessels with lower CII ratings to cater to more challenging routes – particularly since there is no requirement for vessels to implement their approved Ship Energy Efficiency Management Plan (SEEMP)
- Vessel routing may also change in response to CII ratings, particularly if fuel prices drop, as longer routes can improve the ship rating.
- Increasing the length of ballast voyages will yield a better grade even if it increases net emissions.
- MSC Cruises has already warned ports that, without a correction factor to reduce the penalty for port stays in CII, it will need to “fundamentally alter its itineraries”, potentially depriving ports and local communities of cruise-related revenues.
- Risk of losing CII grade(s) after a charter as voyage conditions and operating style will affect the annual rating. Possibility for new clauses in charter contracts in order to bind the charterer for the preservation of CII grade.

CII – Concerns

Shiptype	No of Vessels	>15y	>10y
Bulkers	13,072 Vessels	2,701 ships (21%)	6,646 ships (51%)
General Cargo	12,556 Vessels	9,488 ships (75%)	10,992ships (88%)
Tanker	7,402 Vessels	2,117 ships (29%)	4,481 ships (61%)
Container	5,764 Vessels	2,220 ships (39%)	3,819 ships (66%)
Gas	2,298 Vessels	765 ships (33%)	1,260 ships (55%)

- 71% of World fleet is older than 10years.
- Up to 2030 around 66% of the Bulker Fleet, 70% of the Tanker fleet, 62% of the Container fleet and 54% of the Gas Carrier fleet will be OVER 13 years old.
- There is not enough newbuilding capacity, time and finance in order to build enough ships with high CII grades until 2030
- Possibility that owners operating older vessels with low CII grades at discounted freight rate, in order to “attract” charterers from high CII grade vessels.
- Possibility of great fleet reduction if older ships can’t achieve grade higher of D.
- Variety in alternative fuels technology is not economically feasible. Shipping market must decide to invest to one specific technology which must be in line with “land” industries also.

CII – Concerns

- An analysis conducted by ABS using EU-MRV 2019 data suggests:
 - 92% of the current container ship fleet,
 - 86% of bulk carriers,
 - 74% of tankers,
 - 80% of gas carriers, and
 - 59% of LNG carriers
 - would require modification and operational changes of some kind to achieve A, B or C energy efficiency rating. It is obvious that a vast number of ships would require retrofitting to achieve favorable CII ratings.
- Securing finance for such retrofitting will be a challenge for small shipowners who often have older ships as ship finance is rapidly moving towards Environment, Sustainability, and Governance (ESG) goals.
- Financing a poorly CII rated ship would increase the risk of the financier as a D-rated vessel today might slip to an E rating tomorrow when CII becomes stringent in coming years

CII – BIMCO Clause

CII OPERATIONS CLAUSE FOR TIME CHARTER PARTIES 2022

- Agreed CII” means the values in $\text{gCO}_2/(\text{dwt.nmile})^*$ set out in subclause (d).
- “CII” means Carbon Intensity Indicator, as provided for in the MARPOL Carbon Intensity Regulations.
- “CII Rating” means the Vessel’s attained operational carbon intensity rating, expressed as a rating from A-E, in a calendar year, as calculated in accordance with the MARPOL Carbon Intensity Regulations.
- “C/P Attained CII” means the CII value in $\text{gCO}_2/(\text{dwt.nmile})^*$ attained by the Vessel, applying any regulatory correction factors and voyage adjustments applicable to the Vessel and excluding fuel consumed and distance travelled during off-hire periods in excess of [____] accumulated days (if left blank, zero (0) days shall apply), measured in the relevant calendar year from the start of the calendar year to date or, if the Charter Party begins during a calendar year, from date of the Vessel's delivery under the Charter Party to date.
- "Delivery Attained CII" means the CII value in $\text{gCO}_2/(\text{dwt.nmile})^*$ attained by the Vessel for the calendar year to date as calculated at the time of delivery into the Charter Party.
- “Effective Date” means 1 January 2023.

CII OPERATIONS CLAUSE FOR TIME CHARTER PARTIES 2022

- “MARPOL Carbon Intensity Regulations” means the regulations contained in Chapters 1, 2 and 4 of Revised MARPOL Annex VI which relate to “Regulations on the Carbon Intensity of International Shipping” and Resolution MEPC.328(76) implementing the CII and any associated guidelines and/or subsequent amendments, including the Ship Energy Efficiency Management Plan (SEEMP).
- "Projected Attained CII" means the C/P Attained CII extrapolated over the remainder of the relevant calendar year (or the charter period should redelivery be sooner than the end of the calendar year) and used to demonstrate the trajectory of the Vessel's C/P Attained CII.
- “Required CII” means, for each relevant calendar year of the charter period, the middle point of CII Rating level C equivalent to the required annual operational CII set out in Regulation 28.6 of the MARPOL Carbon Intensity Regulations or as otherwise specified in the Guidelines for the MARPOL Carbon Intensity Regulations.

CII – BIMCO Clause

CII OPERATIONS CLAUSE FOR TIME CHARTER PARTIES 2022

- The Parties acknowledge and accept that as from the Effective Date the Vessel is required to comply with the MARPOL Carbon Intensity Regulations and that this Clause shall govern the relationship between the Parties and their obligations relating to those regulations
- During the Charter Party, the Parties shall cooperate and work together in good faith in optimising vessel energy efficiency. Operate in manner according to MARPOL CIR and subclause (c)(i)(2) meaning C/P Attained CII not to exceed the Agreed CII by the end of each calendar year.
- D. (i) The Agreed CII by calendar year shall be as follows:

Year	Agreed CII values*	Corresponding to a predicted CII Rating
2023		
2024		
2025		
2026		

BIMCO recommends that Parties agree that the Agreed CII values should be the Required CII or better, consistent with the MARPOL Carbon Intensity Regulations.



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