

Carbon Intensity Indicator (CII) – A port and terminal perspective

IMO adopted amendments to the International Convention for the Prevention of Pollution from Ships (MARPOL) Annex VI that will require ships to reduce their greenhouse gas emissions. These amendments combine technical and operational approaches to improving the energy efficiency of ships, thereby providing important building blocks for future GHG reduction measures. The new short-term measures introduced the:

- Energy Efficiency Existing Ship Index (EEXI) addressing the technical / design energy efficiency of existing ships.
- Operational carbon intensity indicator (CII) addressing actual emissions of ships in operation and rating system.
- Enhanced Ship Energy Efficiency Management Plan (SEEMP).

What is the CII?

The Carbon Intensity Indicator (CII) is a measure of how efficiently a ship transports goods or passengers in a year and is expressed in grams of CO₂ emitted per cargo-carrying capacity and nautical mile.

$$\text{CII} = \frac{\text{Annual CO}_2 \text{ emissions}}{\text{Deadweight} * \text{Distance sailed}}$$

The CII measure is applicable to all internationally trading cargo, RoPax and cruise ships of 5,000 GT and above, and will take effect from 2023 on.

The yearly CII is calculated based on data reported to IMO DCS (ship particulars, capacity, fuel consumption and distance travelled) and subsequently translated into a rating from A to E (A=best, E=poor), where the required CII will get more stringent towards 2030, as shown in Figure 1. If a ship scores a rating D (3 consecutive years) or E (1 year), the ship has to develop and implement an approved corrective action plan in the ship's Ship Energy Efficiency Management Plan (SEEMP) demonstrating how the ship will achieve a rating C or better.

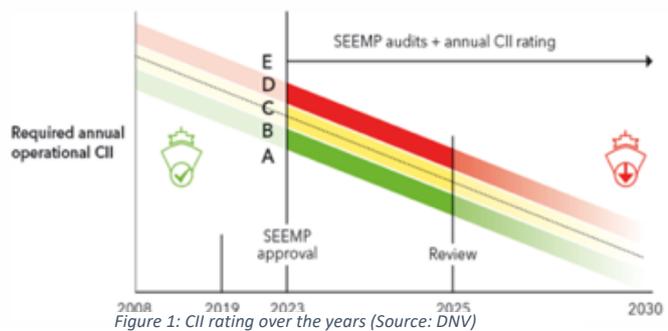


Figure 1: CII rating over the years (Source: DNV)

What are the potential additional impacts of a “poor” rating beyond the corrective action plan?

- Reputational damage to the ship owner and/or operator of poorly rated ships;
- Reduced charter rates and resale values for poorly rated ships;
- Poorly rated ships may be excluded from carrying some cargoes;
- Higher finance costs as financial institutions use CII ratings as part of their lending criteria;
- An increase in insurance premiums of poorly rated ships.

How can ship owners ensure CII compliance?

As shown in Figure 2, 35% of all ships would have a D or E rating based on 2019 data. If no action is taken, it is expected that 70% of all ships will have a D or E rating by 2030.

Compliance with CII can be achieved through the uptake of alternative fuels, machinery configuration and hydrodynamics but also operational efficiency can greatly contribute to CII improvements.

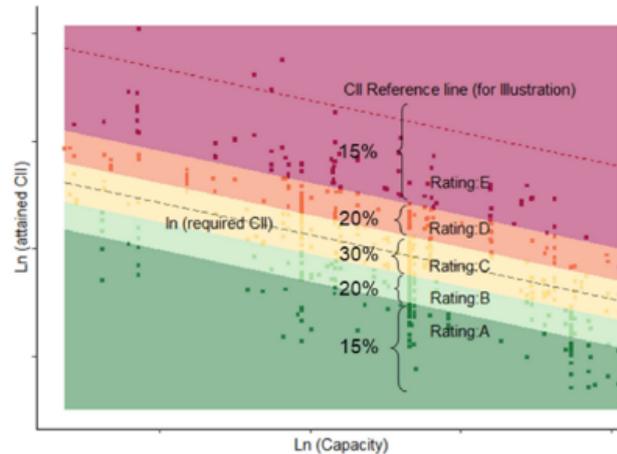


Figure 2: Operational energy efficiency performance rating scale (Source: CII Rating Guidelines, G4, Resolution MEPC.339(76))

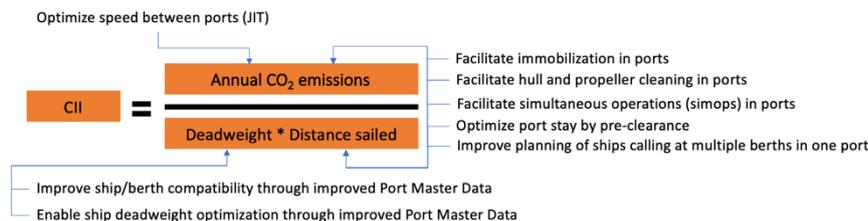
How do the emissions at anchorage or at berth affect the CII?

Currently, the CII does not attribute fuel consumption to specific stages of a voyage or operations, including anchoring. Consumption during anchoring (e.g. for generation of auxiliary power) is simply considered as consumption without distance travelled, and hence has an adverse impact on the ship’s CII rating. As a result, long waiting times to enter the port, and long port stays (which are often outside of the control of the ship operator) will negatively impact the CII rating.

How can ports and terminals contribute to improving a ship’s CII?

Where ships are in control over the efficiency of a ship while sailing, ports and terminals can play an important role in the efficiency of the ship from approaching the port until departing the port. There are several factors where ports and terminals can support improving the energy efficiency and CII of a ship:

- A “first come, first serve” port entry frequently translates into long anchoring and maneuvering times. Implementation of virtual arrivals/Just in Time arrivals can have a huge impact on operational ship efficiency and hence CII ratings, leading to a reduction of up to 14.6% CO₂ emissions for container ships on a voyage basis according to a recent Low Carbon GIA [study](#). Ports are in the lead regarding implementation of virtual arrivals/Just in Time arrivals and cooperation with terminals is essential to succeed;
- Increasing port efficiency and reducing delays has a direct impact on the efficiency of ships and thus the CII;
- The Low Carbon GIA’s [Ship Port Interface Guide](#) suggests eight measures that can be implemented through a collaboration between ports, terminals and ships to optimize operations, and hence improve the CII.
- As encouraged by IMO, ports and terminals can provide incentives to ships rated with an “A” or “B”,



How could the CII potentially impact on ports, terminals and trading pattern?

To ensure CII compliance ships could potentially:

- Avoid certain ports with poor port efficiency, high port congestion, long turnaround times and chose to, where possible, discharge at another local port – where efficiency is higher and waiting time lower.
- Avoid / withdraw certain routes that are associated with inferior CII ratings, which could in turn have an impact of wider connectivity or modal shift.