

RINA-IMO TECHNICAL CONFERENCE: MANAGING CII AND ASSOCIATED CHALLENGES- JANUARY 2024

Under Conference Topic: Monitoring issues, better predictions related to CII

Paper Title:

Improvement to CII metric based on Equivalent Transport Work Principle

Prior history and Introduction:

CII metric is an important formula to achieve Net Zero goal of IMO on Individual Ship basis. But due to drawbacks in the basic CII formula given in G1 guidelines, interim CII formula is adopted via G5 guidelines. This formula is based on correction factors (CF) and voyage exclusions (VE) i.e., principle of deduction for factors where Ship has no control. Wherever VE & CF are made the record keeping and verification is cumbersome to crew & flag.

Still interim G5 formula lacks correction for multiple factors such as Port stays, weather losses, Short Voyages, Bulk carrier Self-loading-unloading, Boil of gas and many more which needs due consideration. Issue of actual cargo carrying capacity in relation to Partial Laden and Ballast voyages is still pending which has highest variation in CII values.

250 words Abstract :

As a solution; Author suggests an improved new CII formula in which for all the fuels consumed due to factors beyond Ship's control; an Equivalent transport work is added to denominator of basic CII formula based on following thought processes.

What equivalent distance; fully laden (EEDI draft) ship would have travelled?

- at normal sea; with fuel used during rough sea
- with the fuel used for ballast/partial laden voyage
- with the fuel used for Auxiliary/other Activities

Accordingly, GPS Distance travelled ' D_t ' in main AER formula denominator is divided into two Equivalent distance categories, i.e., Direct Transport work (D_{dt} related to Propulsion/GPS distance) and Indirect Transport Work (D_{it} related to auxiliary/non-propulsive/Non transport activities). Total fuel is retained as it is in the numerator.

New Improved CII Metric

$$= \frac{(\text{Total Fuel} = \text{Propulsion or Direct fuel} + \text{Auxiliary or Indirect fuel}) * \text{Carbon Factor} - \text{Emergency Fuel emission} - \text{Captured Carbon emission}}{\text{DWT Capacity} * (\mathbf{D_{dt}} \text{ for Direct or Propulsive Fuel} + \mathbf{D_{it}} \text{ for Indirect/Auxiliary Fuel})}$$

D_{dt} Direct Transport Work = [GPS distance] x [Environmental loss correction factor using Engine Slip] x [Laden correction factor using Draft-Resistance ratios]

D_{it} Indirect Transport Work = Auxiliary/Indirect transport fuel x Laden Mileage of ship

Presentation will provide details of new CII formula along with real world data of a VLCC to compare metrics from G1, Interim G5 guidelines and New Proposed CII metric. Finally, it throws light over definition of Transport work and need of change in it.

New Improved CII formula is proposed to be adopted for wide scale data analysis as per Review Plan of the Short term GHG Reduction measures adopted during MEPC 80.

Credentials to Note:

Till today the Research work received positive feedback from international shipping entities such as INTERCARGO, IPTA, Greek Ship Owners Association, Members of Greek, Argentina, and Chile Flags, MMMCZCS- Maersk centre for Maritime Decarbonization. We are looking for Industry collaboration on this work through this conference.