

More on EEDI

With the passage of time, the benchmark is liable to be lowered since, new technology gives the capabilities for more energy efficient ships to be built.

Generically, Energy Efficiency Design Index = Environmental Cost / Benefit for Society, which is equal to, Quantity of CO₂ emission (in grams) / Tonne-mile of the cargo moved

The "Environmental Cost" of shipping shown above is basically the contribution to global warming caused by the emission of CO₂ by the combustion of fossil fuels. Multiplying the "cargo capacity" by the distance that cargo has been carried, is the "performed transport work" and is therefore in effect a "benefit for society". The "Payload" (i.e., Deadweight of the ship) is a true measure of the benefit to society provided by ship types like bulk carriers, tankers, general cargo ships and container carriers. The weight of the crew (with their personal effects), consumables such as fuel, freshwater, bunkers etc. are invariably a negligible percentage of the deadweight, when a vessel is fully loaded. If ships are of the same size and type, this percentage is virtually constant.

Please remember that, the calculation of EEDI is based on a formula, which is fundamentally an integration of certain smaller formulas. These smaller formulas represent the following, respectively: (a) A factor which represents the contributions from a number of correction factors as compounded; (b) CO₂ from propulsion engine(s); (c) CO₂ from auxiliary engines; (d) CO₂ from shaft motor; (e) Emission reduction through the auxiliary power reduction; (f) Emission reduction through the propulsion power reduction; (g) Transportation Work.

Unless one has a special academic interest in undertaking this topic as a material for in-depth study, it is not imperative for us to go into the detailed mathematical study of these formulas, as long as the relevant concepts are understood. In the following paragraphs, therefore, the concepts which are considered relevant to the sailing marine engineer have been dealt with, suitably.

The EEDI, as stated earlier is a measure of the ship's CO₂-efficiency and calculated by the basic formula:

EEDI= CO₂ emission / transportation work; or, = {CO₂ from propulsion + CO₂ from auxiliaries – Energy Efficiency Technologies} ÷ [Transportation Work]

Thus, EEDI (g/tonnes-mile)

= {Engine Power (kW) x SFC (g/kWh) x Conversion factor between fuel consumption in grams and CO₂ emission also measured in grams } ÷ [(DWT) x Speed (kt)]

{This formula helps in identifying the parameters which need to be manipulated for improving the EEDI}

Transportation work = Capacity x V_{ref}