IDWAL INSIGHTS

ACCURATE EEXI CALCULATIONS AND THE EFFECT OF ERRORS

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QUICK REMINDER

A calculated score to measure the overall energy efficiency of a vessel's design.

Calculation factors for ship design and features.

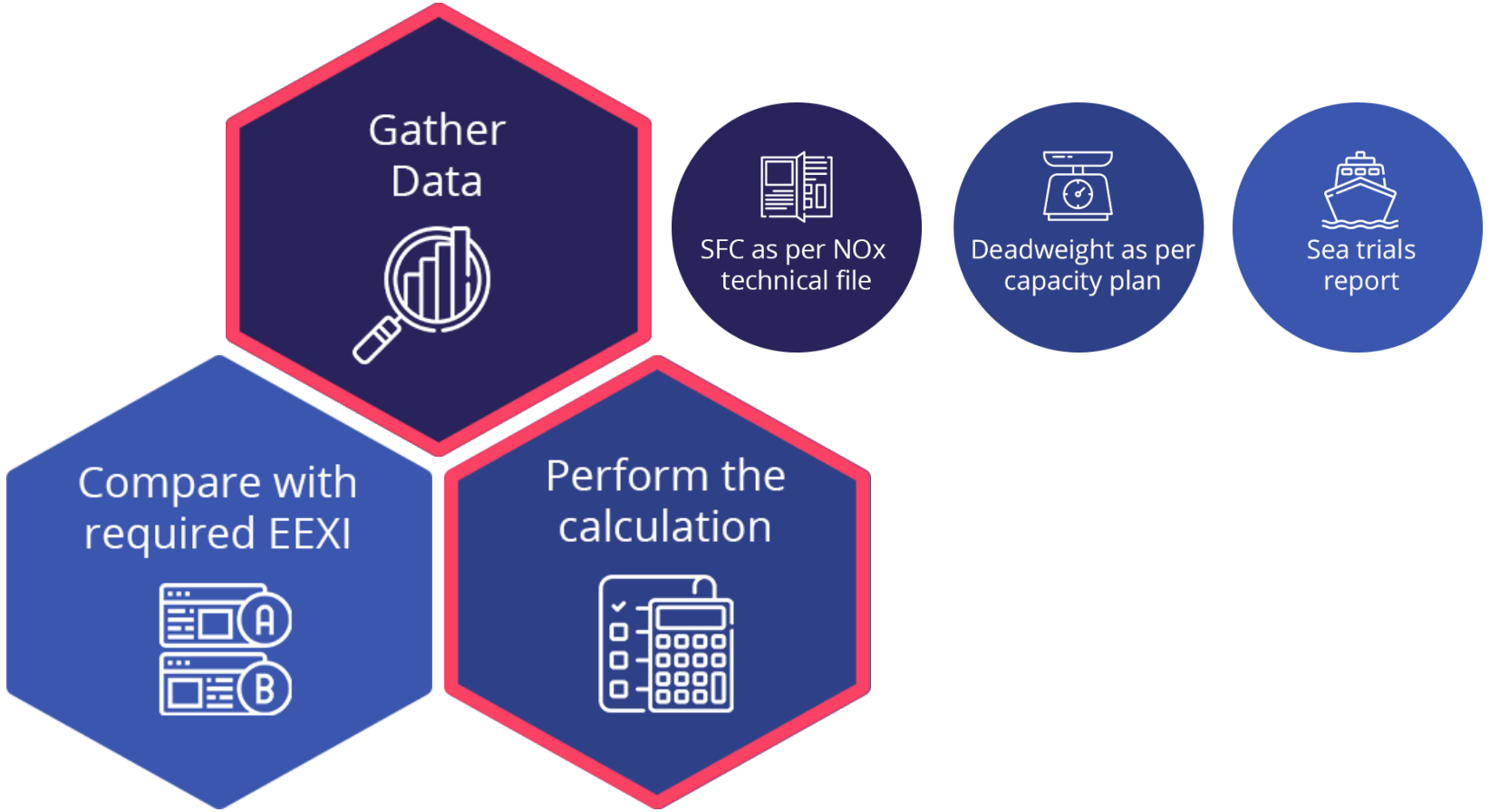
Grams CO_2 per tonne-Nautical mile (gCO_2/t.Nm).

The smaller the EEXI, the more energy efficient the design of the vessel.

From 2023, all vessels over 400GT compliant by the end of 2023.

$$\frac{\left(\prod_{j=1}^{n} f_j\right)\left(\sum_{i=1}^{nME} P_{ME(i)} \cdot C_{FME(i)} \cdot SFC_{ME(i)}\right) + \left(P_{AE} \cdot C_{FAE} \cdot SFC_{AE}*\right) + \left(\left(\prod_{j=1}^{n} f_j \cdot \sum_{i=1}^{nPTI} P_{PTI(i)} - \sum_{i=1}^{neff} f_{eff(i)} \cdot P_{AEeff(i)}\right) C_{FAE} \cdot SFC_{AE}\right) - \left(\sum_{i=1}^{neff} f_{eff(i)} \cdot P_{eff(i)} \cdot C_{FME} \cdot SFC_{ME}**\right)}{f_i \cdot f_c \cdot f_l \cdot Capacity \cdot f_w \cdot V_{ref} \cdot f_m}$$

CALCULATING THE ATTAINED EEXI

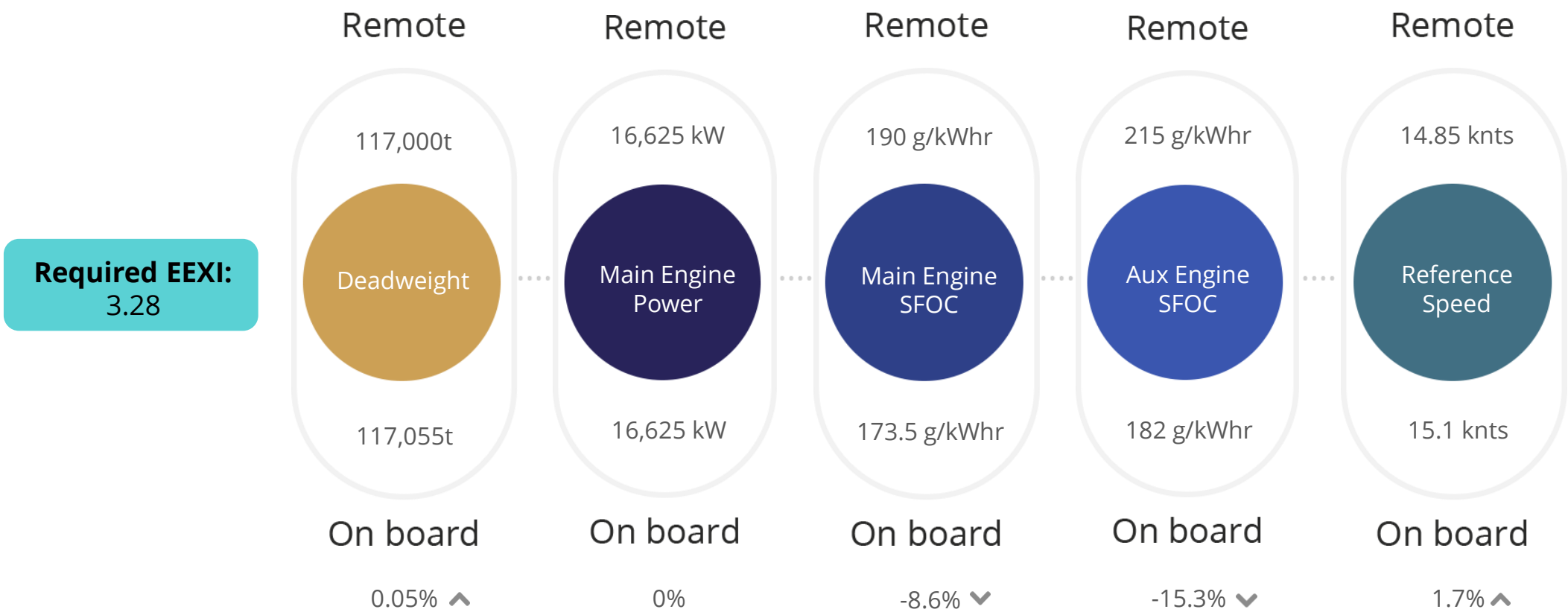


Potential source of error

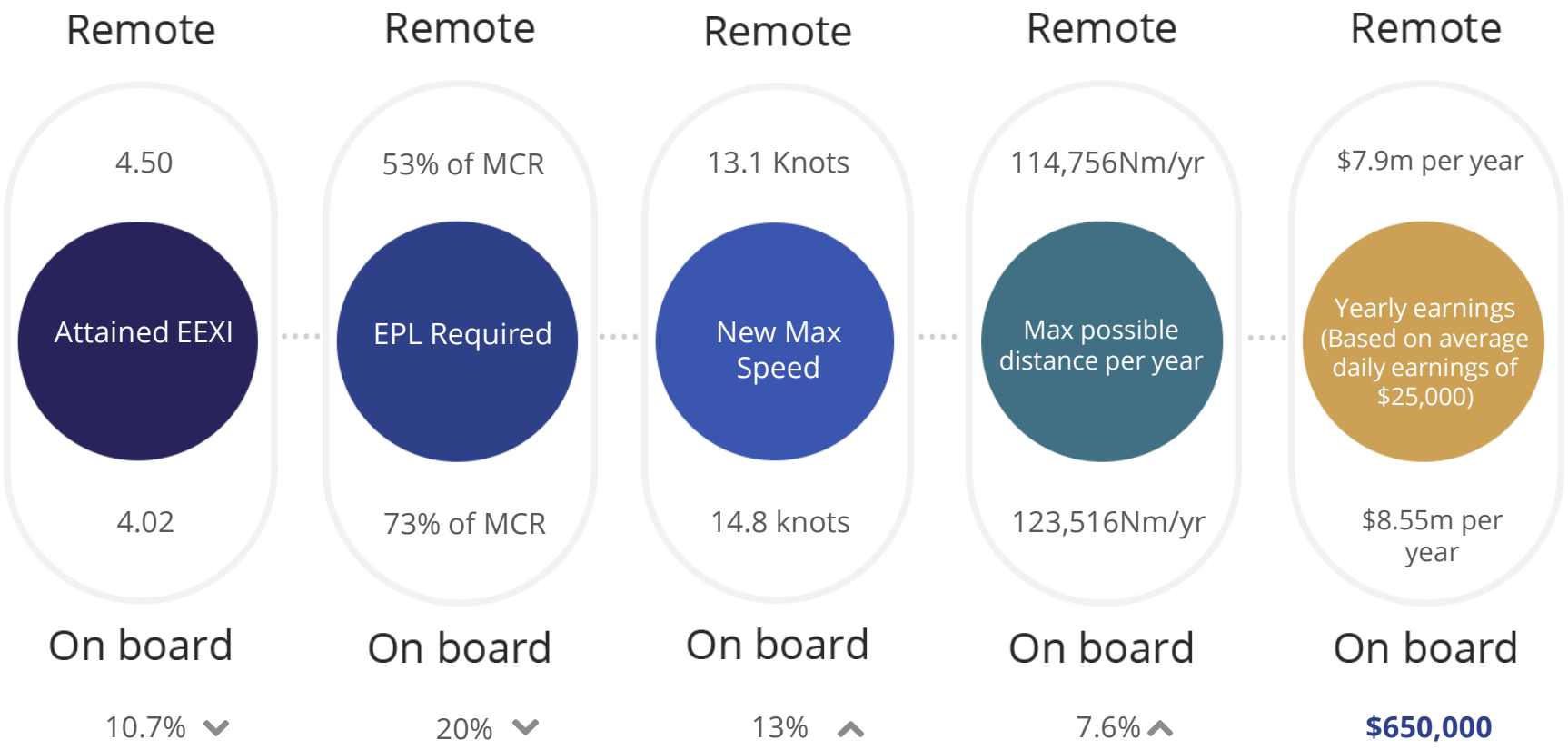
DATA GATHERING

On Board		Remote
Deadweight as per Capacity Plan		Deadweight from 3rd party source
Main Engine power as per shop tests		Main Engine reported power
Main Engine SFOC as per Nox File		IMO Default Main Engine SFOC
Aux Engine SFOC as per Nox File		IMO Default Aux Engine SFOC
Reference speed from Sea Trials Speed-Power Curve		Reference speed from statistical analysis method

EXAMPLE – AFRAMAX OIL TANKER STATS



EXAMPLE – AFRAMAX OIL TANKER RESULTS



SPECIFIC FUEL CONSUMPTION

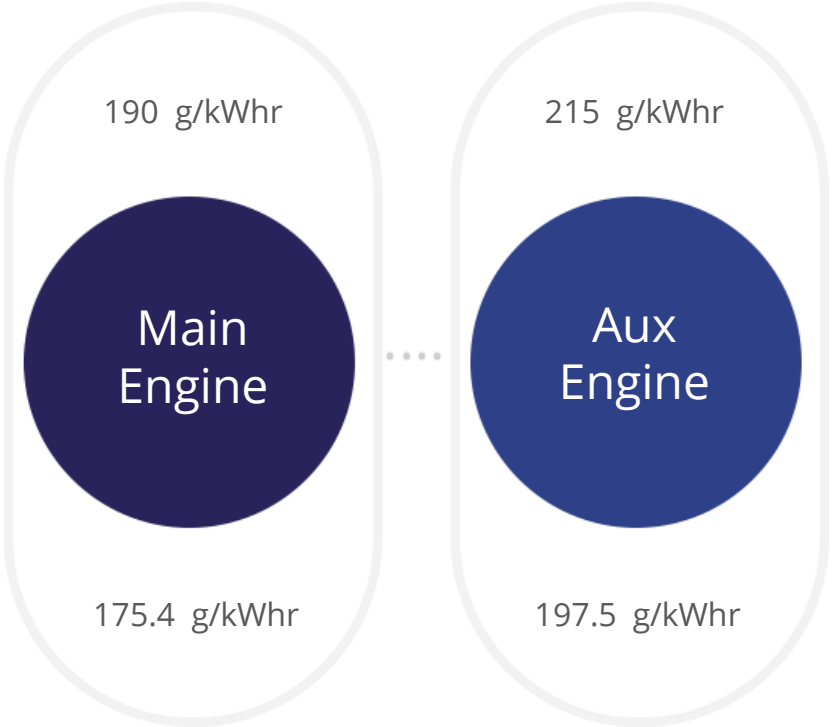
Specific Fuel Consumption
A Measure of the Efficiency of an Engine, How many grams of fuel required to produce one Kilowatt-hour of energy

Important factor in the EEXI Calculation:

$$\left(\sum_{i=1}^{nME} P_{ME(i)} \cdot C_{FME(i)} \cdot SFC_{ME(i)}\right) + \left(P_{AE} \cdot C_{FAE} \cdot SFC_{AE}\right)$$

Range for Main Engines = 160 to 180 g/kWhr; Range for smaller, Auxiliary Engines = 170 to 200 g/kWhr

IMO Default values as per MEPC.333(76)



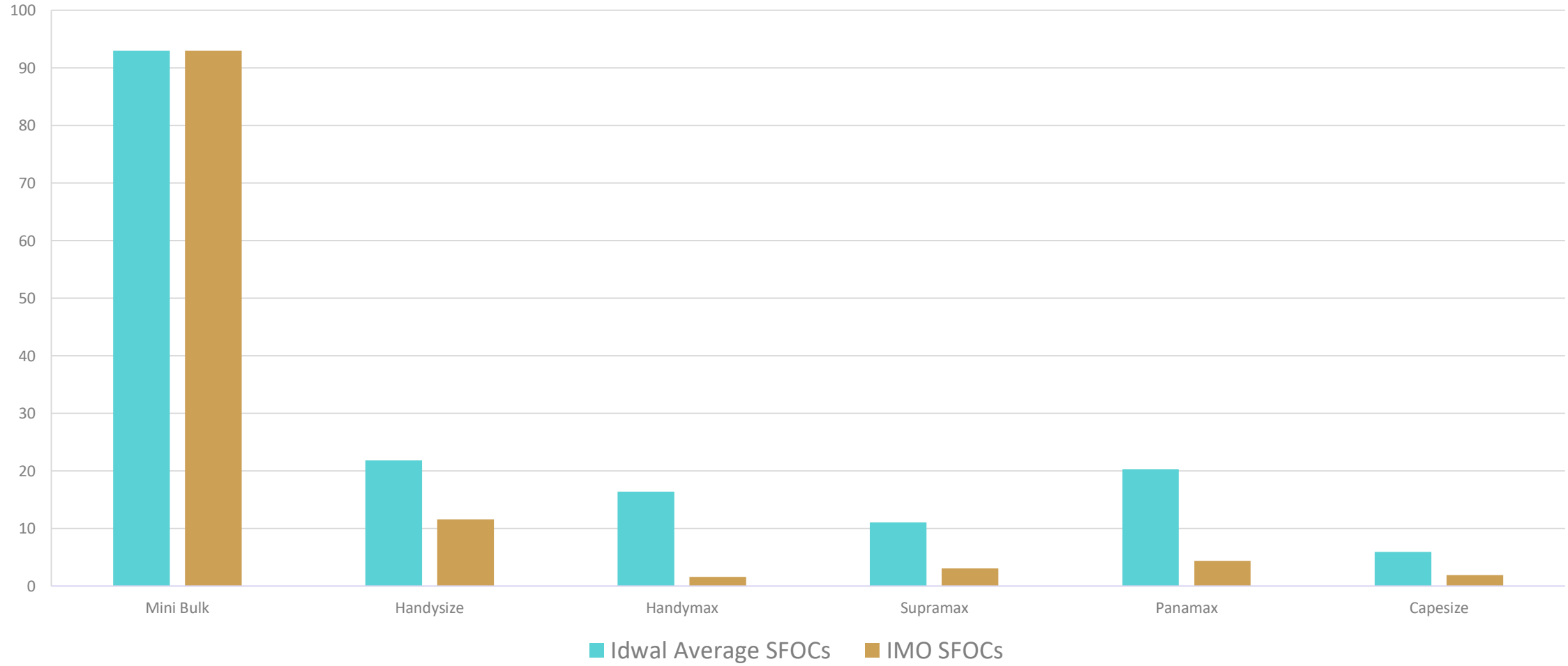
Idwal Averages (Data from Inspections)

10.1% more efficient

8.1% more efficient

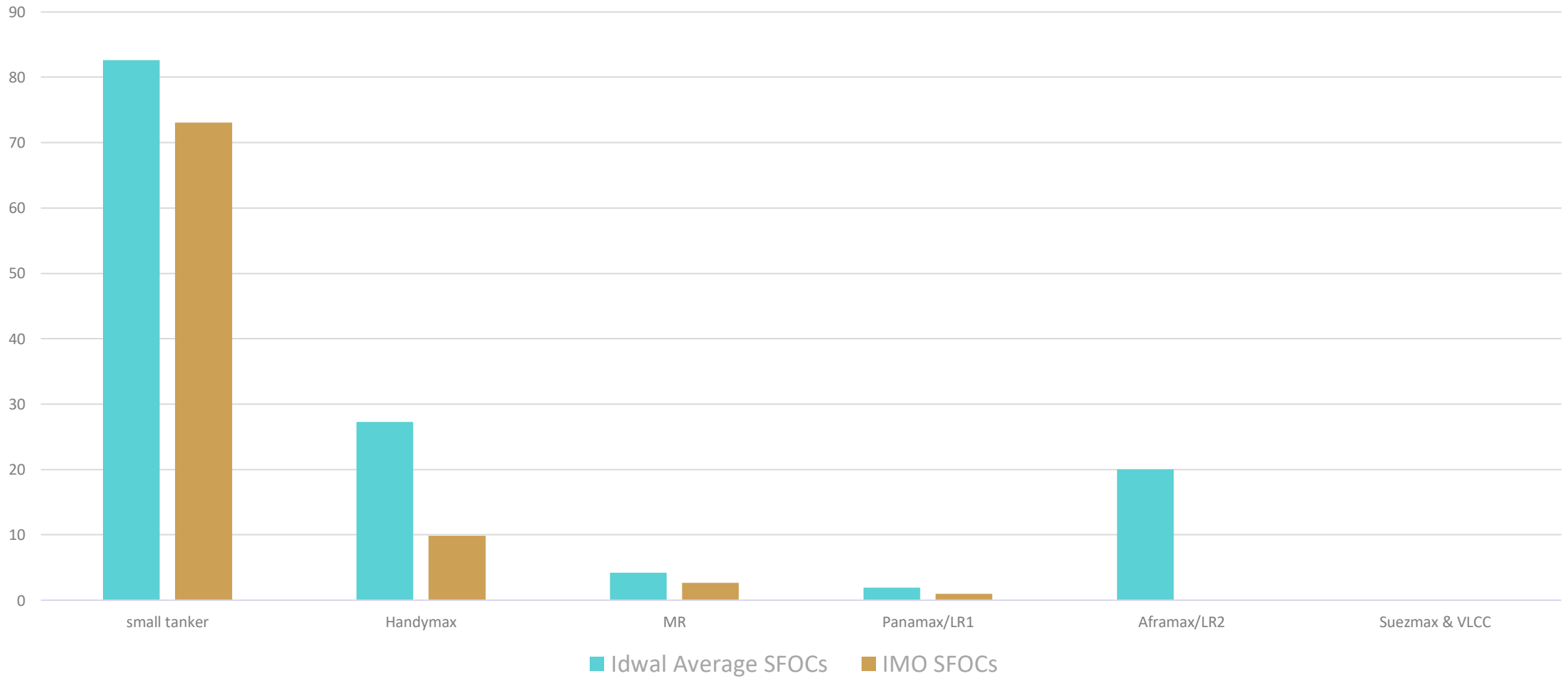
EFFECT OF SFC ON BULK CARRIERS

Bulk Carriers % compliant with Average vs IMO Default SFC



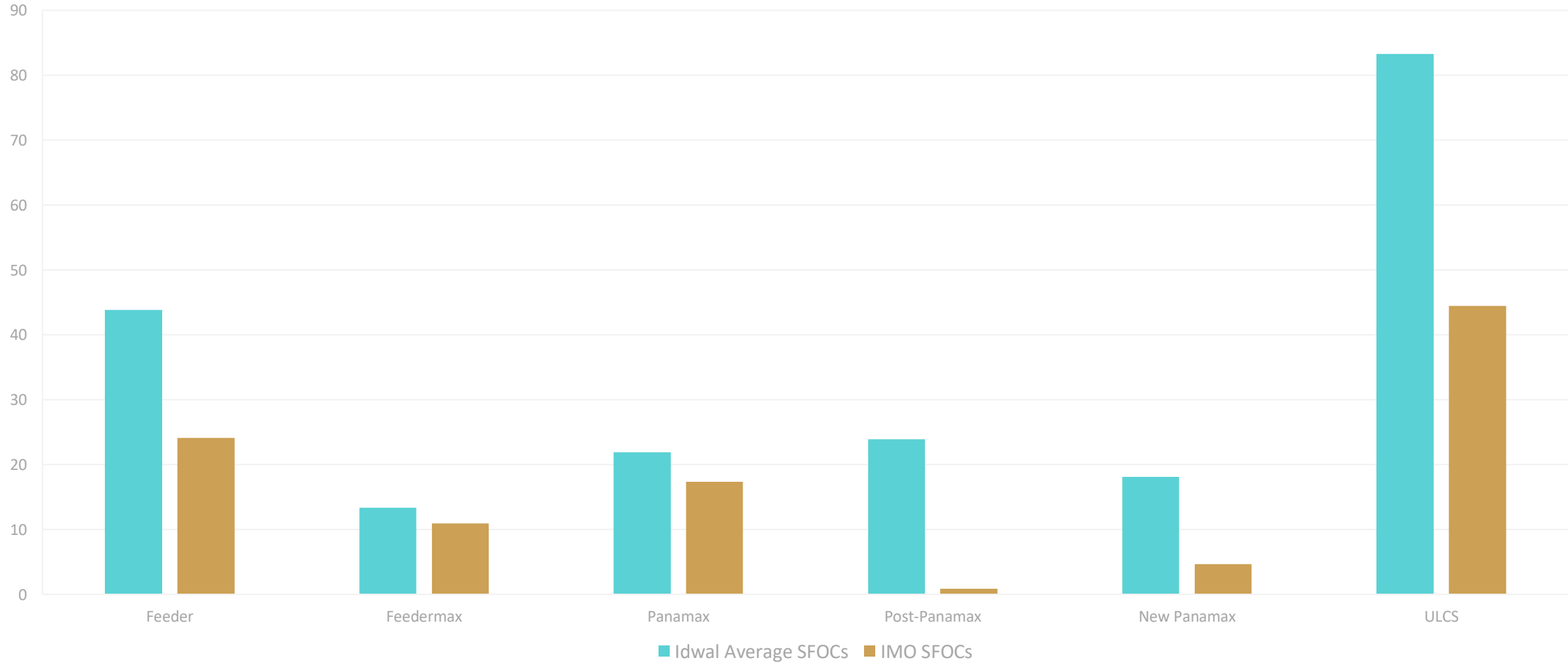
EFFECT OF SFC ON TANKERS

Tankers % compliant with Average vs IMO Default SFC



EFFECT OF SFC ON CONTAINERSHIPS

Containerships % compliant with Average vs IMO Default SFC



CALCULATION ERRORS

Incorrect Interpretation of Guidelines (MEPC 333, 334, 335 & 308)

Unaware of the amendment to the guidelines due to MEPC 322, affecting Ice-Class vessels

Incorrect Interpretation of Reference Speed guidelines

Failure to apply factors such as cranes, ice-class, shuttle tanker etc.

Inaccurate calculation of Capacity for Containerships, Ro-Ros etc.

EXAMPLE – INCORRECT CALCULATION

63,517 DWT Geared Bulk Carrier

- Main Engine MCR = 8,050 Kw
- Main Engine SFC = 163 g/kWhr
- Main Engine SFC = 205.3 g/kWhr
- No Ice Class
- 4 Cranes
- Built to Common Structural Rules (CSR)
- Length = 194.5m
- Breadth = 32.26m
- Summer Draft = 13.3 m
- Sea Trials Draft = 11.3 m
- Sea Trials Speed = 14.32 kW
- Sea Trials Power = 5891 kW

Attained EEXI as calculated by Reputable IACS Class Society:

$$Attained\ EEXI = \frac{(1\times6037.5\times3.114\times160.3)+(402.5\times3.114\times205.3)}{1\times1\times1\times63517\times14.32} = \mathbf{3.65\ gCO_2/t.Nm}$$

CALCULATION ERRORS

$$Attained\ EEXI = \frac{(1 \times 6037.5 \times 3.114 \times 160.3) + (402.5 \times 3.114 \times 205.3)}{1 \times 1 \times 1 \times 63517 \times 14.32}$$

f_i	f_l	V_{ref}
Capacity Factor for Common Structural Rules not accounted for, figure should be 1.015	Correction Factor for Cranes not accounted for, figure should be 1.004	Reference speed taken from Sea Trials, but Sea Trials were not conducted at scantling draft, correct reference speed is 13.64 knots

Attained EEXI as calculated correctly:

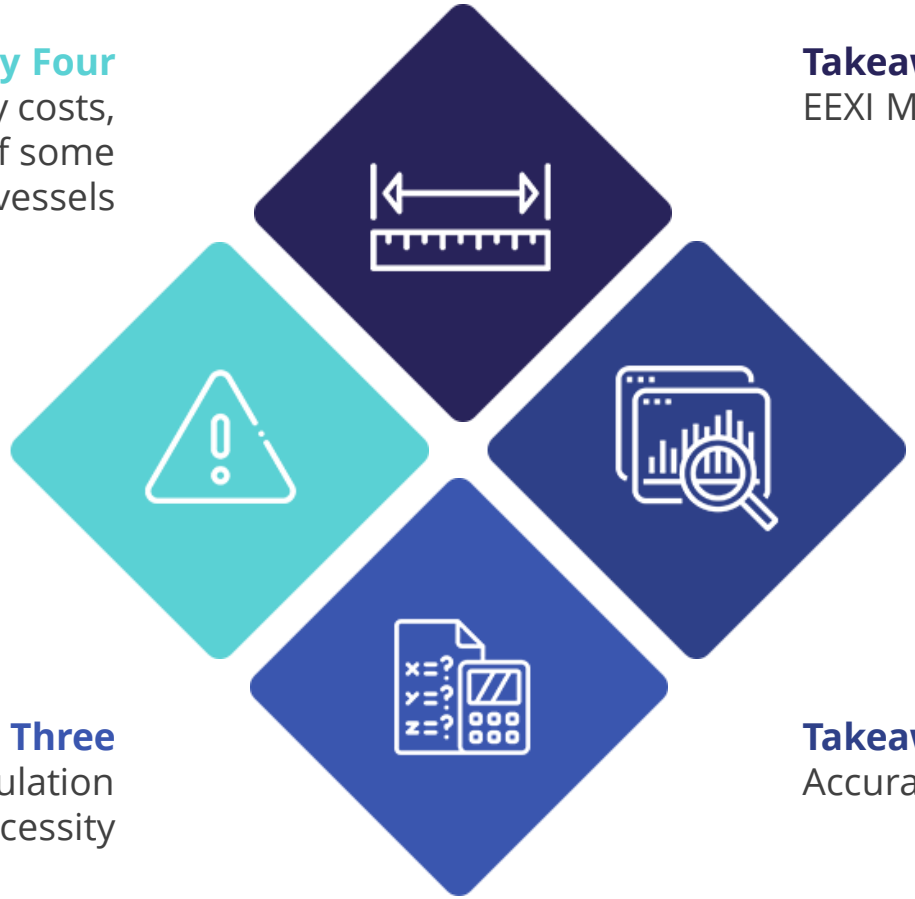
$$Attained\ EEXI = \frac{(1\times6037.5\times3.114\times160.3)+(402.5\times3.114\times205.3)}{1\times1.015\times1.004\times63517\times13.64} = \mathbf{3.76\ gCO_2/t.Nm}$$

CONSEQUENCES

EEXI Calculated too high	Potentially unnecessary speed reduction
EEXI Calculated too high	Unnecessary CAPEX expenditure on energy efficiency technologies
EEXI Calculated too low	Technical file and calculation was submitted for verification and rejected due to inaccuracies
EEXI Calculated too low	Inaccurate reporting of attained EEXI to potential buyer
EEXI Calculated too low	Recalculation required, potentially at cost

CONCLUSION

Takeaway Four
Errors can lead to unnecessary costs, administrative work, and slowdown of some vessels



Takeaway One
EEXI Measure of technical efficiency

Takeaway Three
A full understanding of the calculation methods is a necessity

Takeaway Two
Accurate data gathering is essential

THANKS FOR LISTENING!

Speak to a member of the Idwal team today for more information or visit:

www.idwalmarine.com/decarbonisation

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