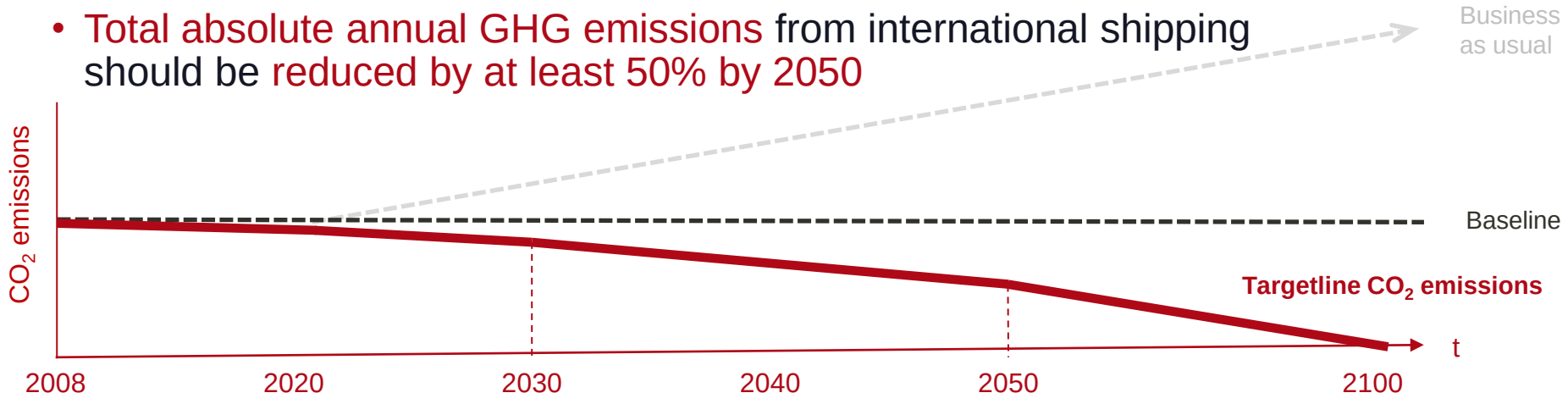
EEXI compliant with MMG

Calculate. Certify. Continue Operation.

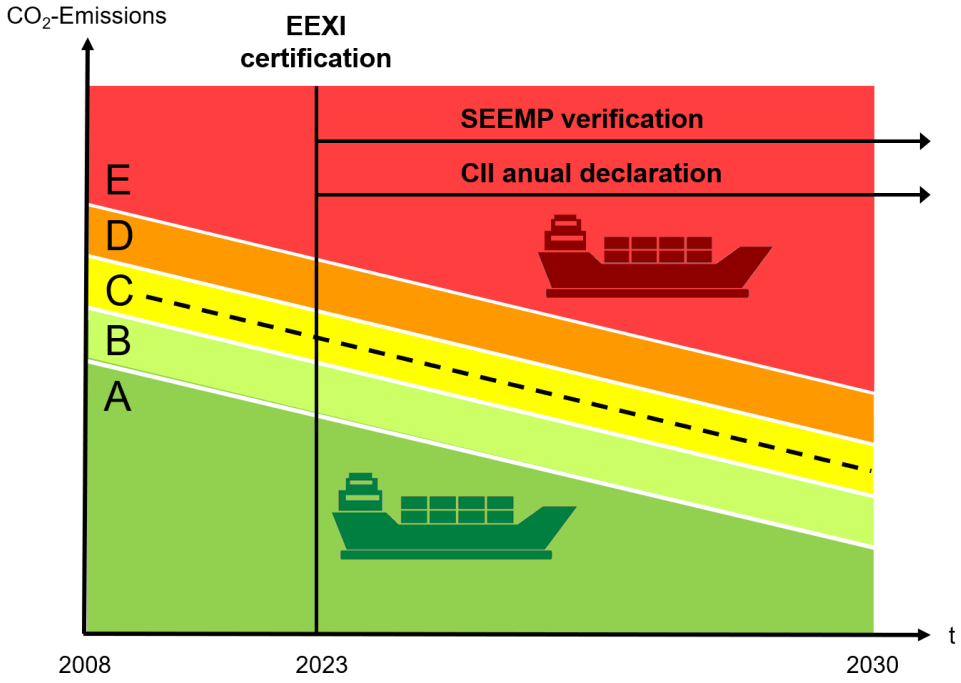
MMG
Mecklenburger Metallguss

Motivation: IMO Greenhouse Gas (GHG) Strategy

- Baseline: Annual Greenhouse Gas emissions in 2008
- Reduce CO_2 emissions per transport work, as an average value across international shipping, by at least 40% by 2030
- Reduce CO_2 emissions per transport work by at least 70% by 2050
- Total absolute annual GHG emissions from international shipping should be reduced by at least 50% by 2050



Outlook for the coming years



- One-time EEXI certification latest at 1st vessel survey after 01.01.2023
- Annual calculation (from 2023 onwards) of the Carbon Intensity Indicator (CII), showing your vessels emissions per transport unit and nautical mile in order to prove the operational transport efficiency of your vessel
- Mandatory Ship Energy Efficiency Management Plan (SEEMP) for all ships above 400GT to monitor the energy efficiency measures in a structured approach

EEXI Calculation Options

	Statistical	Newbuilding Documentation	CFD
Pro	• Lowest amount of time required (**5 working days**) • **Lowest cost** • Minimum data input only	• Medium time consumption (**15 working days**) • **Reasonable price** • **Realistic EEXI value** for the newbuilding configuration of your vessel	• **Best possible EEXI value** due to • **Consideration of efficiency changes/modifications** or ESDs (duct, PBCF, bulbous bow, retrofit propeller…etc.) that were made after entry into service (newbuilding) • **Free of charge with Retrofit-Propeller**
Contra	• **Most conservative EEXI value**	• **No consideration of efficiency changes/modifications** (duct, PBCF, bulbous bow, retrofit propeller…etc.) that were made after entry into service (newbuilding)	• Highest amount of time required due to buildup of digital model of your vessel (**30 working days**) • Detailed data input required
Recommendation	• Select this calculation method if you are lacking newbuilding documentation/data • **If you know from preliminary EEXI evaluation that your vessel will fulfill the required EEXI**, choose this calculation method so that you get the most affordable EEXI calculation/documents	• In general we recommend to choose this calculation method if it is uncertain that your vessel will fulfill the EEXi requirements • This calculation has the **best cost-benefit ratio if you have not applied any energy/efficiency-saving measures to your vessel**	• Select this calculation method **if you have invested into Energy-Saving-Devices or applied any energy/efficiency-saving measures to your vessel** • Only way to consider the efficiency improvement measures and the corresponding investments into your vessel for the EEXI value/certification

What do you get?

1. Calculation of attained EEXI
2. Comparison of attained and required EEXI value
3. Advise and consultancy on possible measures/actions in case your vessel does not meet the EEXI requirements, e.g. determination of EPL
4. In case the EPL is to high for an economical operation of your vessel we can offer you a propeller retrofit with the option of a fin cap to improve your EEXI value and propulsion efficiency by up to 14%
5. Generation and submission of technical file at classification society
6. EEXI certificate

Required data input 1 of 2

		Data [unit]	Remarks	Statistical	Newbuilding	CFD
Ship	Main Dimensions	LPP [m]		X	X	X
		LOS [m]		X	X	X
		B [m]		X	X	X
		Tmax [m]		X	X	X
		DWT		X	X	X
		GT		X	X	X
		Trim&Stability Booklet		X	X	X
		Classification notation/ ice class			X	X
	Hull Lines	3D hull geometry	Either			X
		Offset table	Or			X
		Hull lines/ steel plans	Or			X
	Rudder	Type				X
		Rudder geometry/ offset data				X
	Engine (Main & Auxiliary)	Maker		X	X	X
		Type		X	X	X
		MCR [kW]		X	X	X
		n0 [rpm]		X	X	X
		Shop Test/ Bed Test			X	X

Required data input 2 of 2

	Data [unit]	Remarks	Statistical	Newbuilding	CFD
Propeller	Maker			X	X
	D [mm]			X	X
	z [-]			X	X
	Section Data			X	X
	Profile Data				X
Shafting	Height of shaft a.B. [mm]				X
	Shafting & rudder arrangement				X
Model Test Data / Sea Trials	Resistance			X	X
	Propulsion			X	X
	Propeller open water			X	X
	Sea trial results			X	X

Calculation example – Sample Report (extract)

EEXI_Technical-File_Sample

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4. Calculation of the attained EEXI

4.1. Overview of Input for EEXI Calculation

Basic Data	
Type of Ship	Container Vessel
Capacity	37330.16 t
Reference Speed V_{ref}	22.574 kts
Main Engine	
Maximum Continuous Rating MCR_{ME}	51394.0 kW
Limited Maximum Continuous Rating $MCR_{ME,Lim}$	24000.0 kW
Reference Main Engine Power P_{ME}	19920.0 kW
Type of Fuel	Diesel Oil / HFO
CO2 Conversion Factor C_{FME}	3.114 $\frac{t\ CO2}{t\ Fuel}$
Specific Fuel Oil Consumption SFC_{ME}	171 $\frac{g}{kWh}$
Auxiliary Engines	
Reference Auxiliary Engine Power P_{AE}	850.0 kW
Type of Fuel	Diesel Oil / HFO
CO2 Conversion Factor C_{FAE}	3.114 $\frac{t\ CO2}{t\ Fuel}$
Specific Fuel Oil Consumption SFC_{AE}	200 $\frac{g}{kWh}$

5. Determination of EEXI Reference Speed

The reference speed is determined by conducting numerical flow simulations of the same kind as for design draught. The EEXI relevant draught is calculated to be $xx.x$ m on even keel, which corresponds to a capacity of 37330.16 t. This value is 70 % of the maximum capacity of this vessel class, which is 53328.8 t.

Powering Prediction		
V_S (kts)	N_S (min^{-1})	P_B (kW)
14.00	47.83	3586.6
16.00	55.69	6045.8
18.00	62.82	8968.9
21.00	74.24	15472.8
24.00	85.71	23858.6

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5.1. Additional Features to be considered

Feature		relevant variable
Shaft Motor / Power Take In	None	$P_{PTI} = 0$
Innovative mechanical EET for main engine	None	$P_{eff} = 0$
Innovative mechanical EET for auxiliary engine	None	$P_{AEeff} = 0$
Technical/ Regulatory Limitation of Capacity	None	$f_i = 1$
Ice Class	DNV-E	$f_i = 1$
Cubic Capacity Correction	None	$f_c = 1$
Correction for Cranes	None	$f_i = 1$

5.2. Calculation of the attained EEXI

$$EEXI = \frac{\left(\prod_{j=1}^{n} f_j\right) \cdot \left(\sum_{i=1}^{nME} P_{ME(i)} \cdot C_{FME(i)} \cdot SFC_{ME(i)}\right) + (P_{AE} \cdot C_{FAE} \cdot SFC_{AE})}{f_i \cdot f_c \cdot f_i \cdot Capacity \cdot f_w \cdot V_{ref} \cdot f_m} \quad (1)$$

$$= \frac{1 \cdot 19920\ kW \cdot 3.114 \frac{t\ CO2}{t\ Fuel} \cdot 171 \frac{g}{kWh} + 850.0\ kW \cdot 3.114 \frac{t\ CO2}{t\ Fuel} \cdot 200 \frac{g}{kWh}}{1 \cdot 1 \cdot 1 \cdot 37330.16\ t \cdot 1 \cdot 22.574\ kts \cdot 1} \quad (2)$$

$$= 13.216 \frac{g}{t\ CO2 \cdot nm} \quad (3)$$

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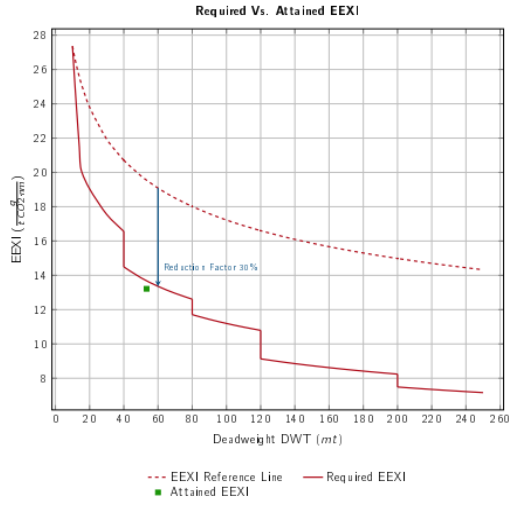
5.3. Comparison with required EEXI



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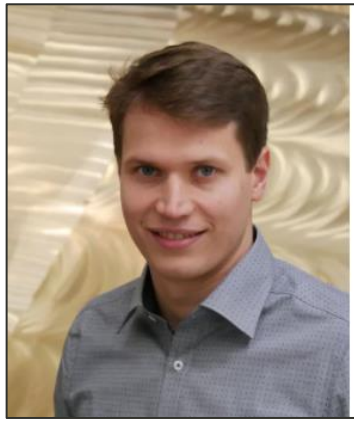
Contact

- Please get in touch with us to plan your personal web meeting
- Together we will set up the plan to EEXI compliance of your fleet

Steven Berger
(Project Manager)
Propeller

+49 (0)3991 736-188
s.berger@mmg-propeller.de



Georg Meidow
(Project Manager)
Propeller

+49 (0)3991 736-189
meidow@mmg-propeller.de

- For further information visit our dedicated EEXI website: https://mecklenburger-metallguss.com/en/services-support/engineering-service/eexi-energy-efficiency-existing-ship-index