



# »» Ship Efficiency from the Viewpoint of a Financing Bank

Dr. Carsten Wiebers

Bank aus Verantwortung

**KFW** IPEX-Bank

# Employment

# Global Integration

cruise

European  
investments

oil&gas

European  
exports

Mittelstand

German yards

European offshore  
components

ballast water treatment

global trade

SECA

# Environment

bulk

tankers

LNG carriers

EEDI

container ships

energy efficient ships

offshore wind vessels

LNG fuel



## »» KfW IPEX-Bank

“Green Shipping”: Why a relevant issue for us?



- »» Sustainability: KfW is Germany's leading financial institution for climate protection and renewable energy technologies
- »» Fulfillment of Corporate Social Responsibility reporting duties
- »» Anticipation of regulatory requirements (e.g. air-/water-emissions) and market demands (bunker efficiency)
- »» Identification / selection of „state of the art“ maritime assets with high initial asset values and long depreciation periods



# »» Environmental Dimensions of Shipping

Identification of a practicable and meaningful Green Shipping Indicator



**Energy Efficiency as central „Green Shipping“ Indicator**



## »» From energy efficiency to credit risk

What are banks looking for?



### May lead to...

Higher initial asset values of energy efficient vessels

Longer economic depreciation periods

How energy efficient are “our” financing assets on a portfolio and project level?

**KFW** IPEX-Bank

+

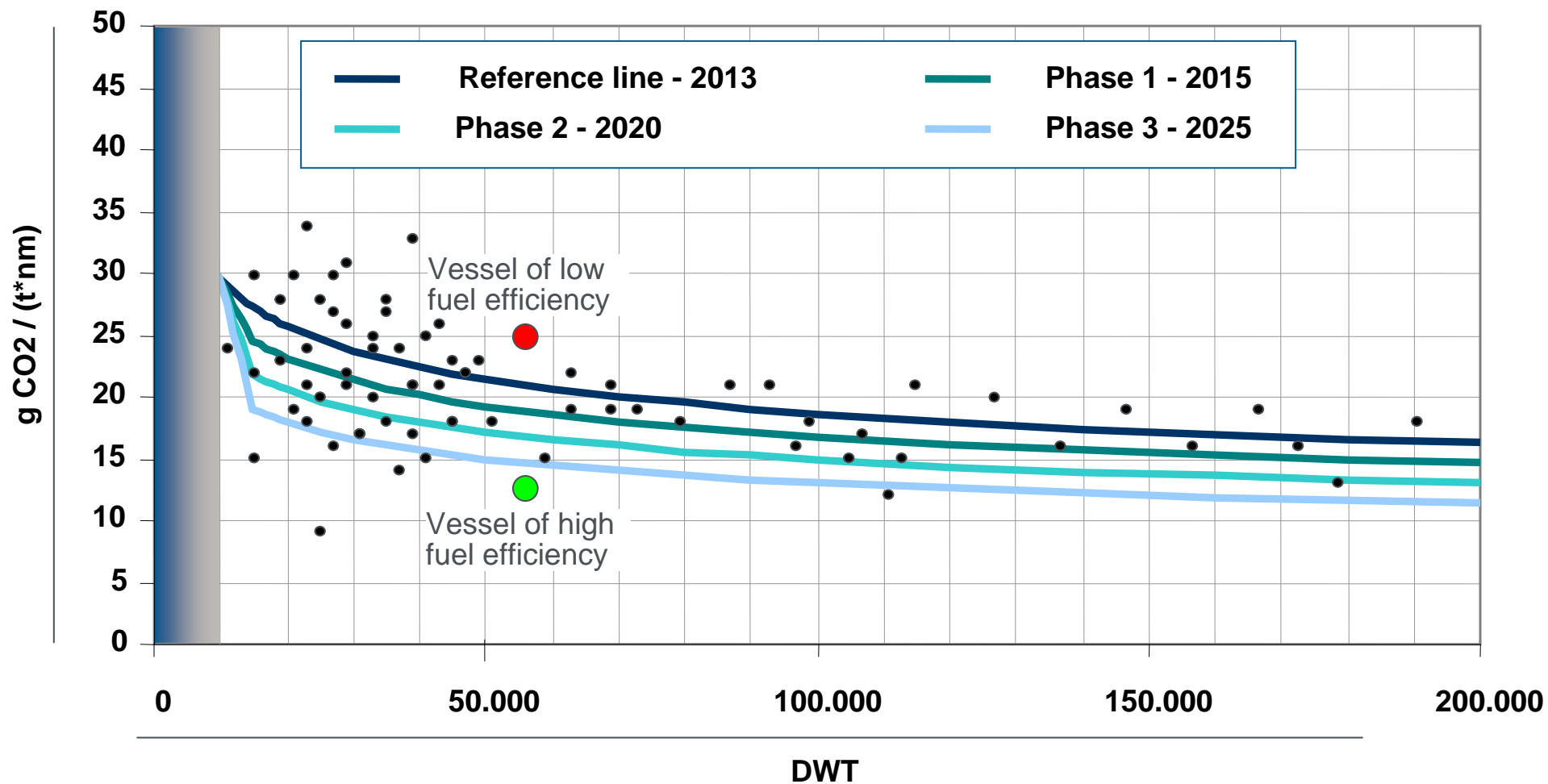






# ››› Energy Efficiency Design Index (EEDI) / CLIA approach (1)

Methodology

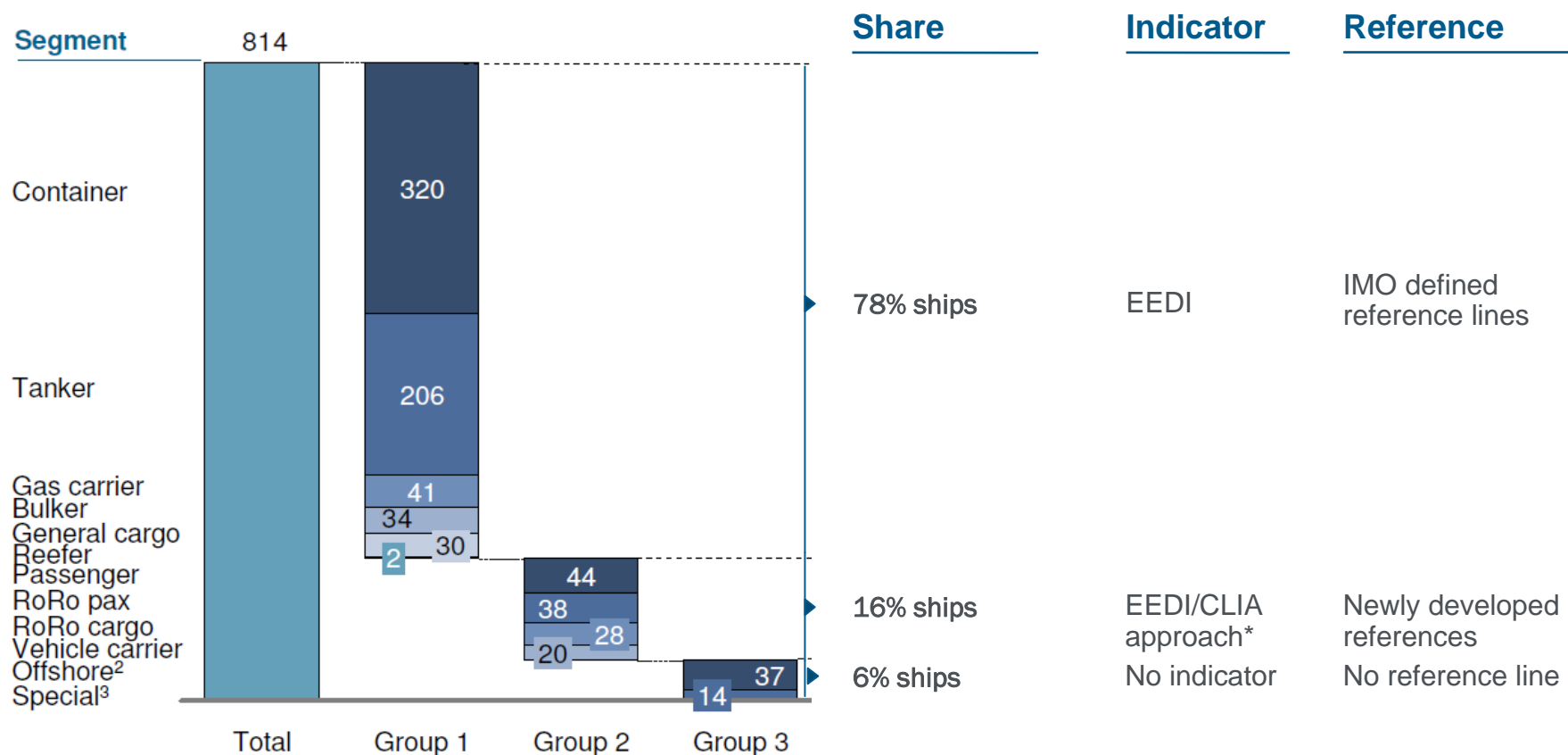




# »» Energy Efficiency Design Index (EEDI) / CLIA approach (2)

Methodology based regulatory approaches

For over 90% (by number of vessels) of the IPEX fleet EEDI/CLIA\* approach can be used as indicator for fuel efficiency



\* Under preparation for cruise vessels



# »» Energy Efficiency Design Index (EEDI)

From EEDI to emission values

## Example: Vessel details



### MS "Example"

- 3.600 TEU
- 45.000 dwt
- 24,0 knots service speed
- Built 1995

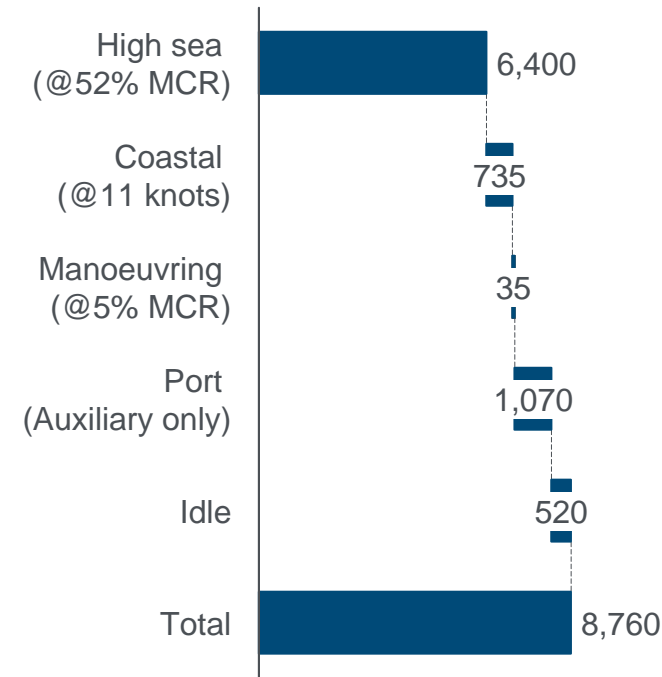
### Engine

- 32 MW (MCR)
- Sulzer 8RTA84C<
- Motor Diesel
- 2 stroke slow speed



## Example: Operating profile

e.g. Panamax container vessel  
in hours/year



## Fuel and emission savings

### HFO savings<sup>1,2</sup>:

- › 429 t/a

### Bunker cost savings<sup>1,2</sup>:

- › 290.000 USD/a

### CO<sub>2</sub>-emission savings<sup>1,2</sup>:

- › 1.335 t/a

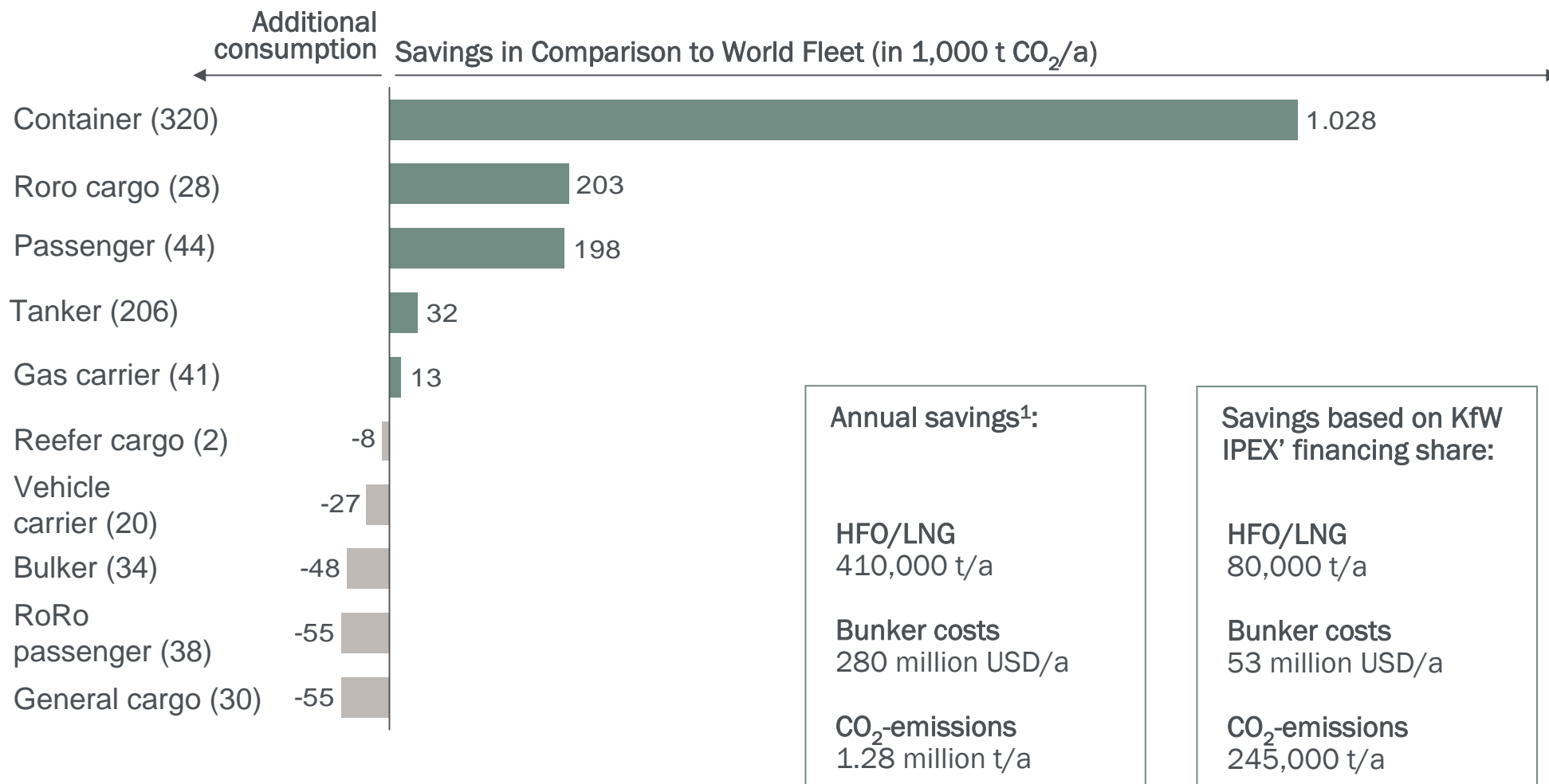
1 In comparison with the average ship of the world fleet given by the EEDI reference vessels. For RoPax and Roro cargo, the comparison is towards vessels with same speed

2 Considering the reference vessel operating with the same engine load (% MCR)





## »» Emission savings



<sup>1</sup> In comparison with the average ship of the world fleet given by the EEDI reference vessels. For RoPax and Roro cargo, the comparison is towards vessels with same speed



# »» Project Evaluation in reality

Evaluation of a financing request for one LNG Carrier

Select vessel		
IMO number		
Vessel type	Gas carrier	
Engine type	Diesel-Electric	
Dead weight ton		70.000
Built [year]		2013
Power (main engine) [kW]		27.667
Design speed [knots]	19,5	
EEDI quick check		6,09
EEDI attained from certificate		-
Vessel EEDI value [g CO <sub>2</sub> / ton*NM]		6,09

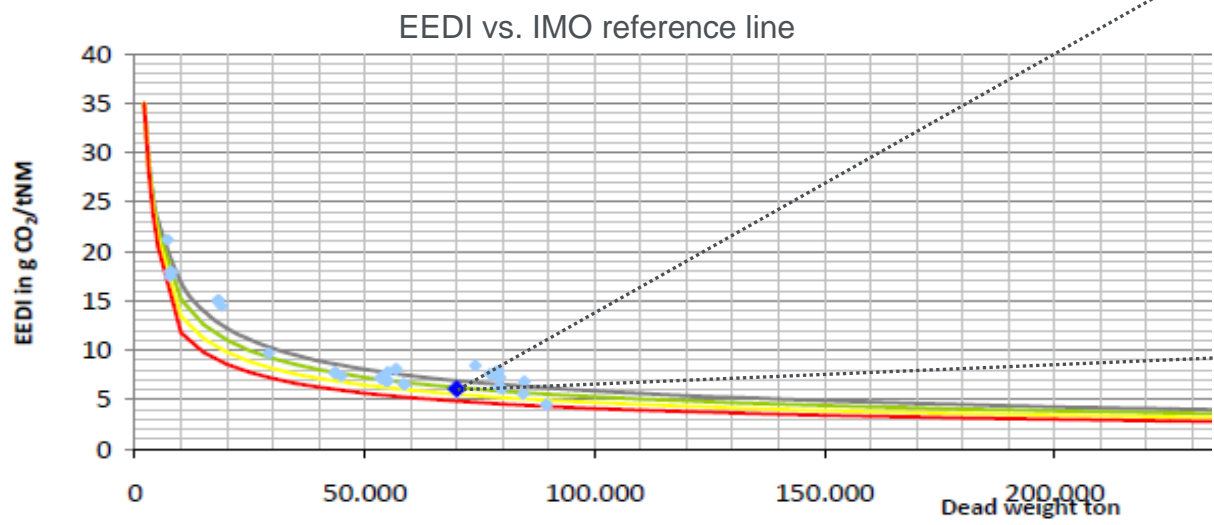
IHM certificate present?		
Ballast water treatment installed?		

Compared to EEDI 2013 reference line	Vessel	KfW IPEX 60% share
Fuel consumption difference [ton/year]	3.337	2.002
Fuel cost difference [USD/year]	-\$2.268.832	-\$1.361.299
CO <sub>2</sub> emission difference [ton/year]	9.175	5.505

12.0% better EEDI value than current IMO reference

10.5% better EEDI value than current KfW IPEX LNG portfolio average (-1,7% compared to IMO reference)





## »» Example: Container Vessel

Beneficial impact on credit conditions (e.g. Margin, Tenor)

### Example:

Vessel value: EUR 125m

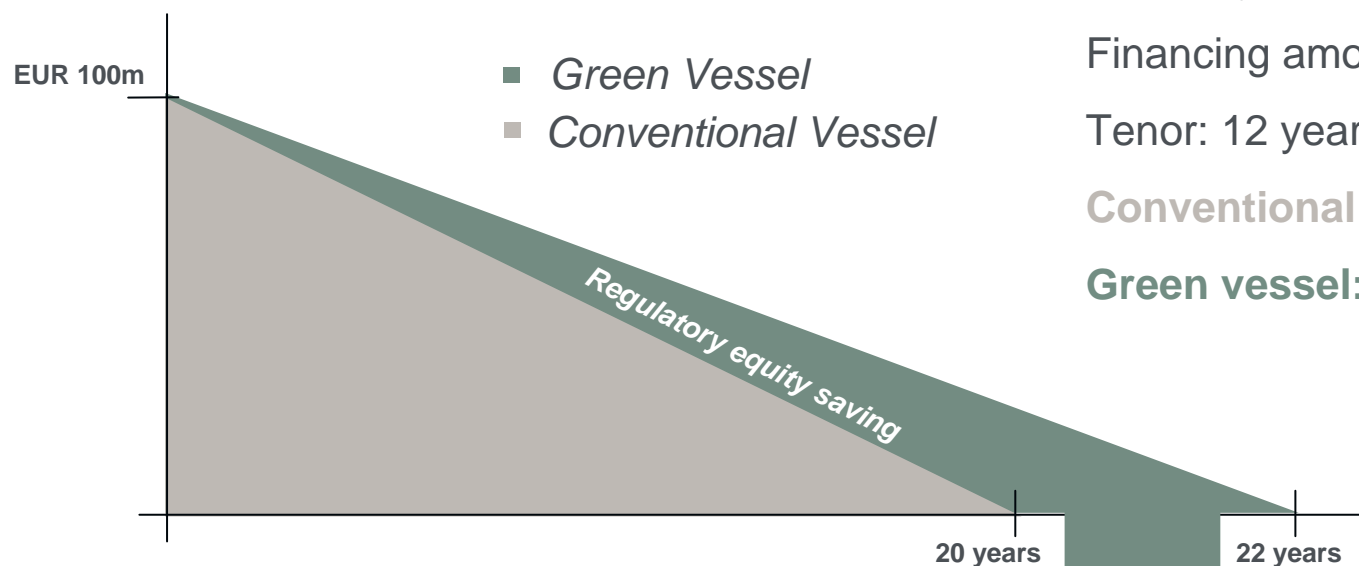
Vessel type: Container vessel 13.000 TEU

Financing amount: EUR 100m

Tenor: 12 years

Conventional vessel: 20 years depreciation

Green vessel: 22 years depreciation



**Credit Margin Saving: 8bps p.a. or EUR 480.000**





## »» Funding for energy efficient technology

Alternative financing through KfW promotional programs

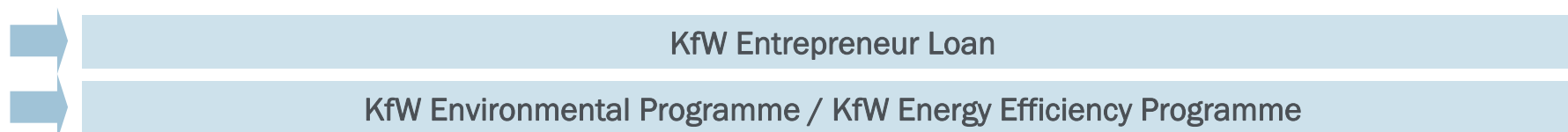
### Expected Costs and Benefits for Green Shipping Retrofits (per vessel)

• Waste Heat Recovery System	EUR 9.0 m	Energy Efficiency
• LNG Propulsion System	EUR 13.0 m	Energy Efficiency, Employability
• Scrubber	EUR 5.0 m	Worldwide Employability
• Ballast Water Treatment System	EUR 0.4 m	Worldwide Employability

Debt financing of up to 100% for retrofits may be provided by promotional banks such as KfW

Any KfW accredited bank may apply for funds under this program for German ship owners

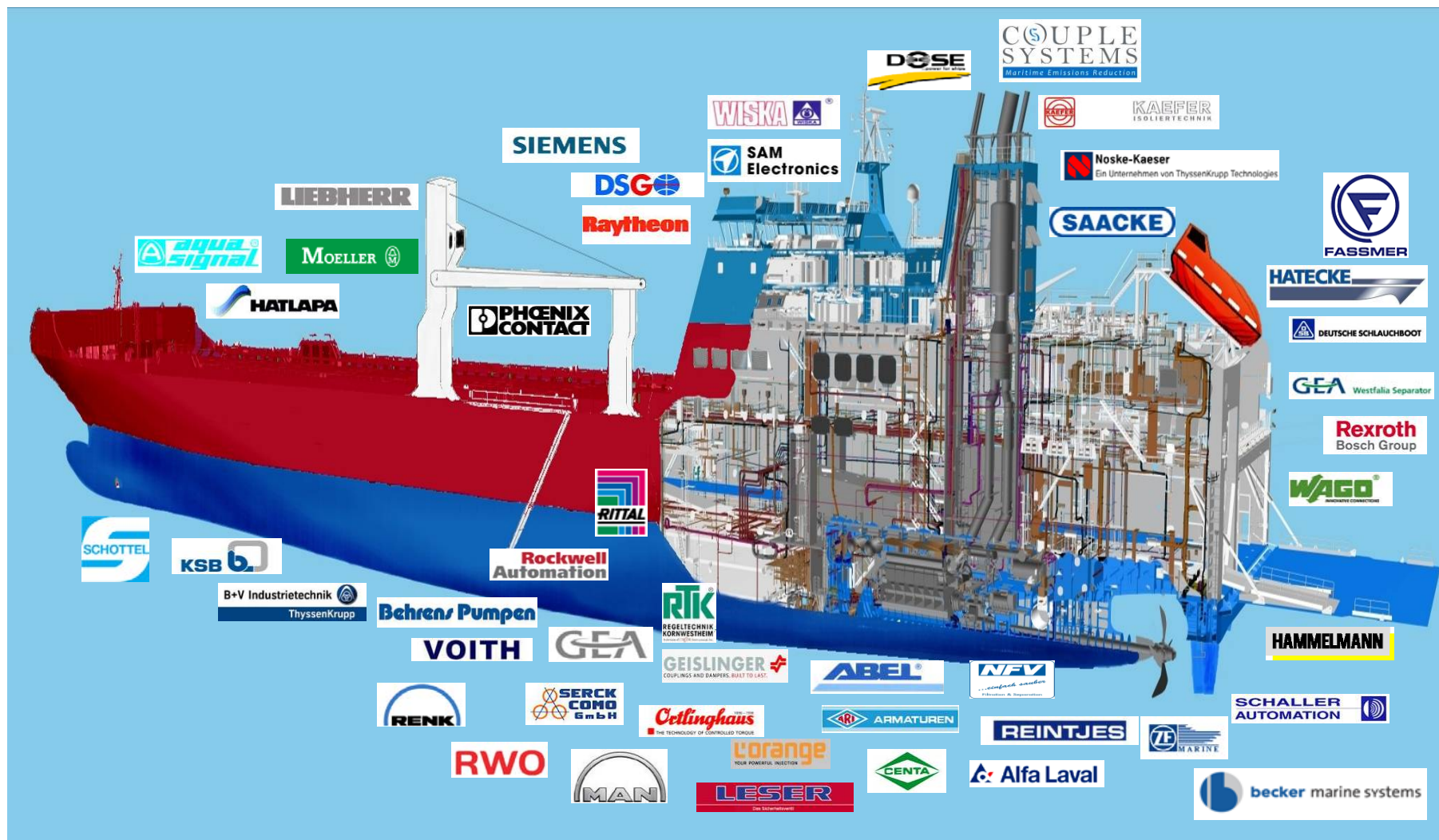
Shared financing risk: KfW (parent) may take up to 50% of the credit risk (entrepreneur loan)



Source: Germanischer Lloyd 9.000 TEU Container Vessel



# »» German maritime equipment on board



Source: VDMA

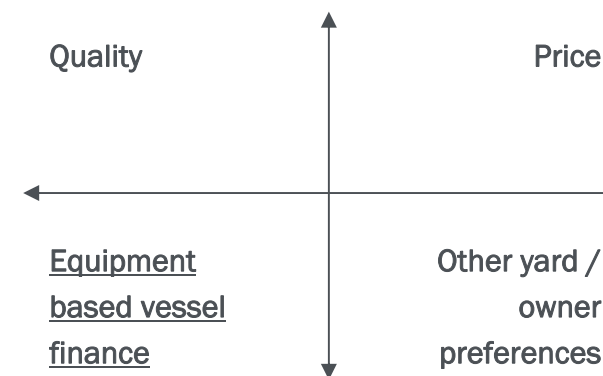


# »» How to secure Equipment based Vessel Finance

## Exemplary Makers List

EQUIPMENT	MAKER	MAKER'S COUNTRY
MAIN ENGINE	MAN DIESEL & TURBO SE	GERMANY
AUXILIARY ENGINE	HYUNDAI HIMSSEN	KOREA
	DAIHATSU	JAPAN
	MAN DIESEL & TURBO SE	GERMANY
EMERGENCY DIESEL ENGINE	GPC-DOOSAN	KOREA
	STX-CUMMINS	USA
AIR COMPRESSOR	DONGHWA-PNEUTEC	KOREA
	BUMHAN	KOREA
	SPERRE	NORWAY
	J.P. SAUER & SOHN	GERMANY
OIL PURIFIER	SAMGONG-MITSUBISHI	KOREA
	GEA WESTFALIA	GERMANY
	ALFA LAVAL	SWEDEN
STEAM GENERATING PLANT	KANGRIM	KOREA
	AALBORG	DENMARK
	SAACKE	GERMANY

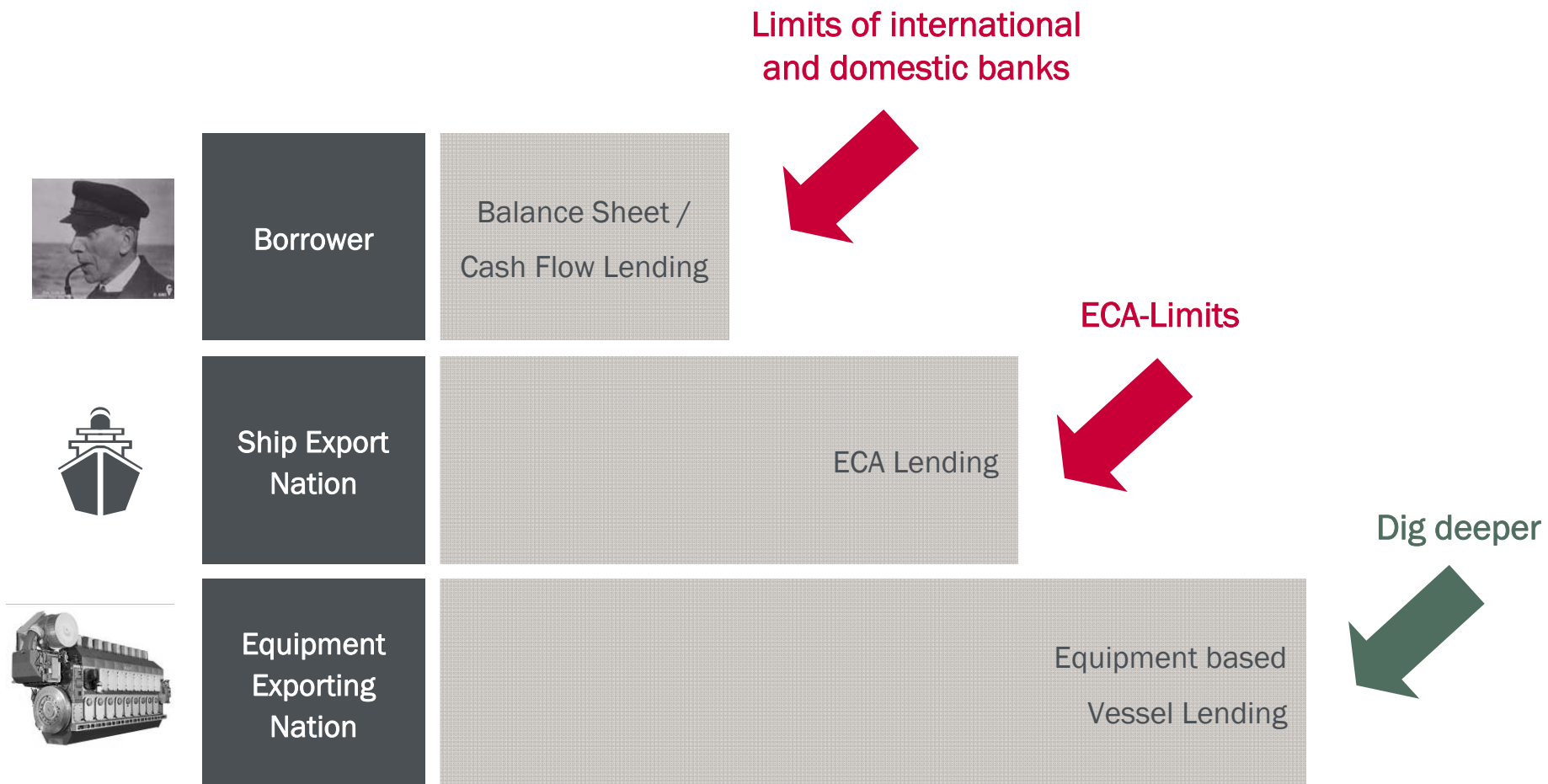
### Key factors for buying decision







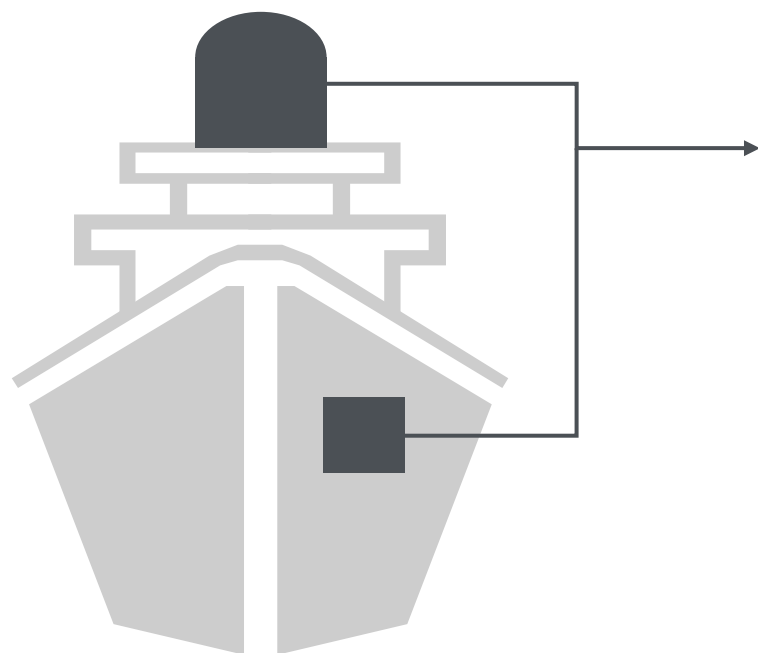
# »» Looking for further Risk Participants who benefit from the Deal





## »» Maritime Equipment Finance

New financing source for owners/buyers of offshore vessels



Equipment Finance  
with ECA (Hermes) Cover  
(min. USD 25m)

+

=

Post-Delivery Financing  
(12 Years from Delivery)

Commercial Post Delivery  
Financing of the  
“remaining“ Vessel

Pre-Delivery

Delivery

Post-Delivery (Equipment) finance for up to 12 Years

Beneficiary

German / European Suppliers: Sales Argument

Owner/Buyer: Access to new Financing Sources

Ship Yards



# »» Maritime Equipment Finance

## Example

### Semi-Submersible Drilling Rig for Grupor

(Yard: Daewoo Shipbuilding & Marine Engineering Co., Ltd., Korea)

- German Equipment: ~USD 40m (Aker Wirth, Converteam, Flowserve, GEA Westfalia, Liebherr, MAN)
- Financing commitment by KfW IPEX-Bank: USD 75m
- Increasing awareness that German supplies are financeable. Incentive for owners and yards to order German equipment



*Converteam – Braking Resistor*



*Liebherr – Deck Cranes*



*Aker Wirth – Mud Pump*



*Flowserve – Azimuth Thrusters*



*GEA Westfalia – Fuel Oil Separator*



*MAN – Dead Ship Generator*



## »» Contact Details



KfW IPEX-Bank GmbH

Postal Address

Palmengartenstraße 5-9  
D-60325 Frankfurt am Main

Visitor Address

Zeppelinallee 8  
D-60325 Frankfurt am Main

Phone: +49 69 7431 - 3300

Fax: +49 69 7431 - 2944

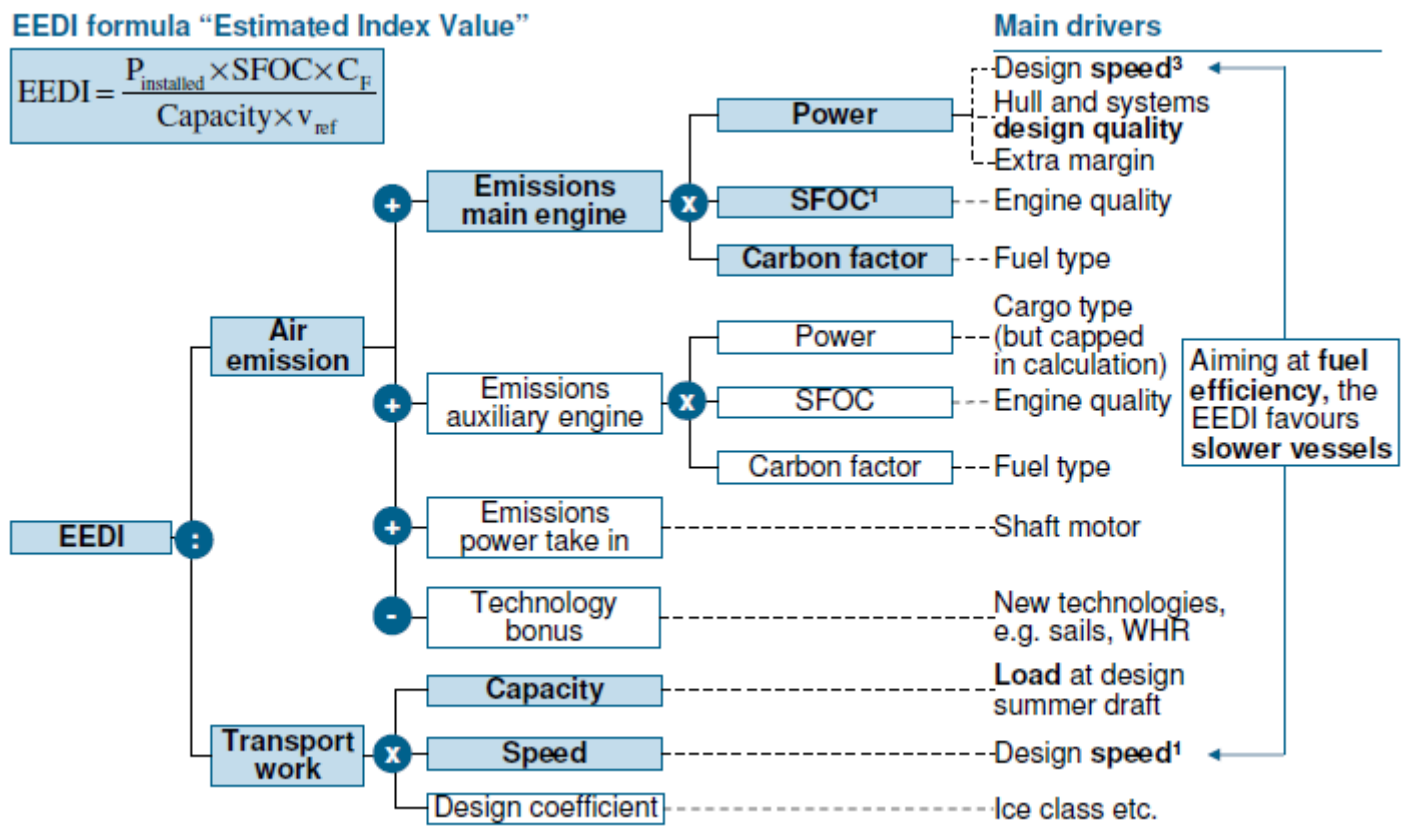
S.W.I.F.T.: KFWIDEFF

e-Mail: [firstname.surname@kfw.de](mailto:firstname.surname@kfw.de)

[www.kfw-ipex-bank.de](http://www.kfw-ipex-bank.de)



# »» Backup (1): EEDI Calculation



<sup>1</sup> SFOC – Specific Fuel Oil Consumption, i.e. fuel consumed per kilowatt-hour generated





## »» Backup (2): EEDI Calculation

### EEDI formula (MEPC.1/Circ.681)

Main engine emissions                      Aux. engine emissions                      Emission reduction through innovative technologies (e.g. kites, sails, etc.)

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

Transport work