



Energy Efficiency Existing Ship Index (EEXI)

EEXI calculation and consulting

➤ Summary of options for the EEXI calculation

1.

CFD based approach

- Detailed vessel data needed
- Realistic result based on actual vessel condition
- Any efficiency improving devices are taken into account



2.

Calculation based on new building documentation

- Reasonable data input
- Realistic result based on new build vessel configuration
- Efficiency improvement during lifetime not included

3.

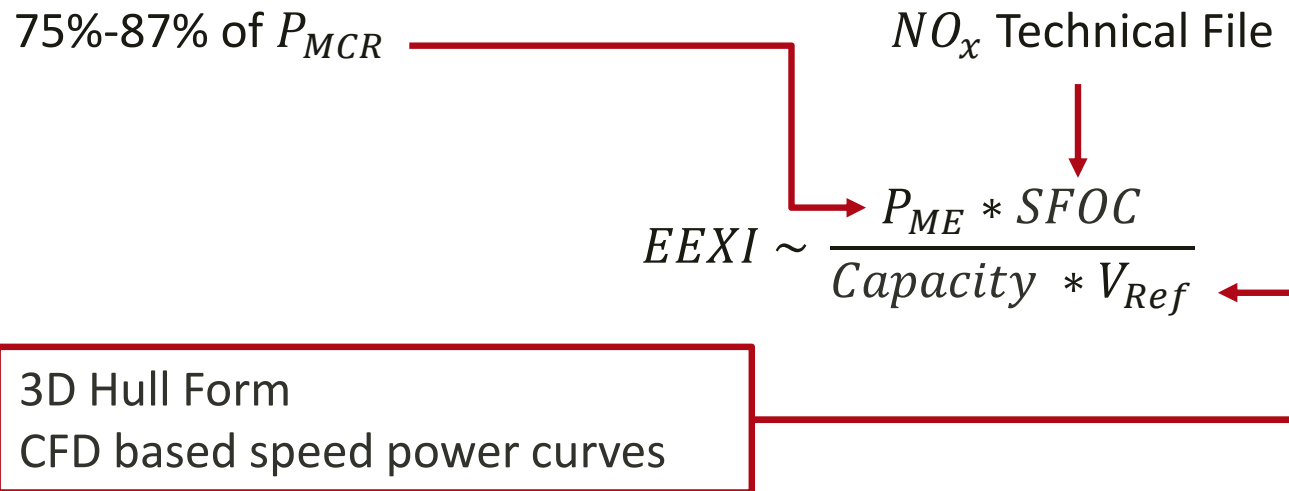
Fully statistical approach

- Smallest input
- Most conservative result
- Efficiency improvement during lifetime not included

➤ EEXI Calculation Options



1. Calculation of EEXI based on CFD flow simulations



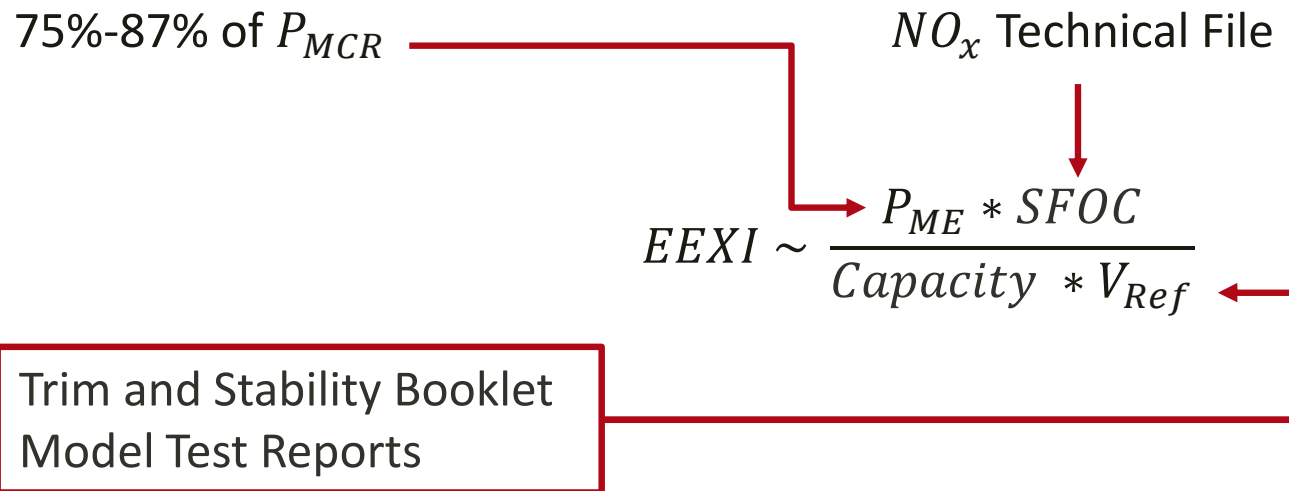
Data Requirements:

- Main Particulars
- Engine Rating ME/AE
- Model Test Reports
- NO_x Technical File
- Trim and Stability Booklet
- Hull Form (Drawings/IGES)
- Propeller Description (Manual)
- Geometry of ESD's

Most precise calculation, less assumptions, no interpolation
Possibility to take into account ESD's

➤ EEXI Calculation Options

2. Calculation of EEXI from existing new building model tests



Data Requirements:

- Main Particulars
- Engine Rating ME/AE
- Model Test Reports
- NO_x Technical File
- Trim and Stability Booklet

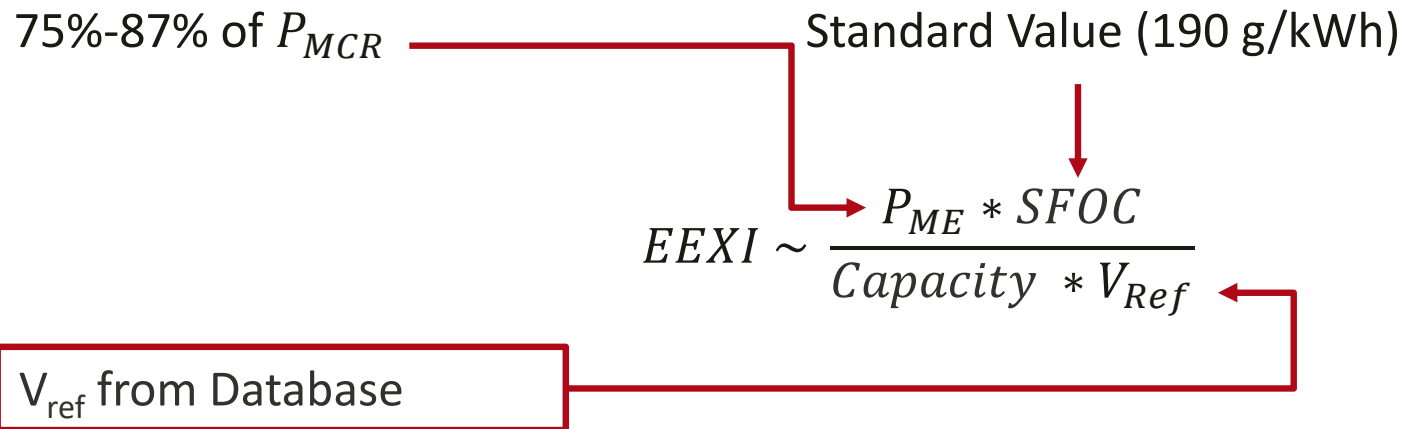
EEXI Draft and Reference Speed is interpolated

EEXI is realistic but only based theoretical new building data and not real operating data

Energy Efficiency Existing Ship Index (EEXI)

➤ EEXI Calculation Options

3. Calculation of EEXI from *IHS Fairplay Database*



Data Requirements:

- Main Particulars
- Engine Rating ME/AE

Most conservative determination of EEXI

Energy Efficiency Existing Ship Index (EEXI)

➤ MMG contribution to EEXI



Hydrodynamic Core Expertise

- Analysis of given documentation for specific vessels
- Case study calculations on EEXI readiness

Numerical towing tank

- RANSE CFD analysis including all appendages
- Arbitrary floating/operation conditions



Propeller Redesign

- Application of propeller Redesign
- Increase propulsion efficiency
- Improve EEXI
- Or attain higher top speed

Interaction between Engine Power Limitation (EPL) and Propeller Retrofit

Showcase: Mid Size Container Vessel

$$EEXI \sim \frac{P_{ME} * SFOC}{Capacity * V_{Ref}}$$

Original Engine: 60237 kW@140rpm

Top Speed: 23,82 kts at Scantling Draft with 15% Sea Margin

Applied Measures:

1. Engine Power Limitation:

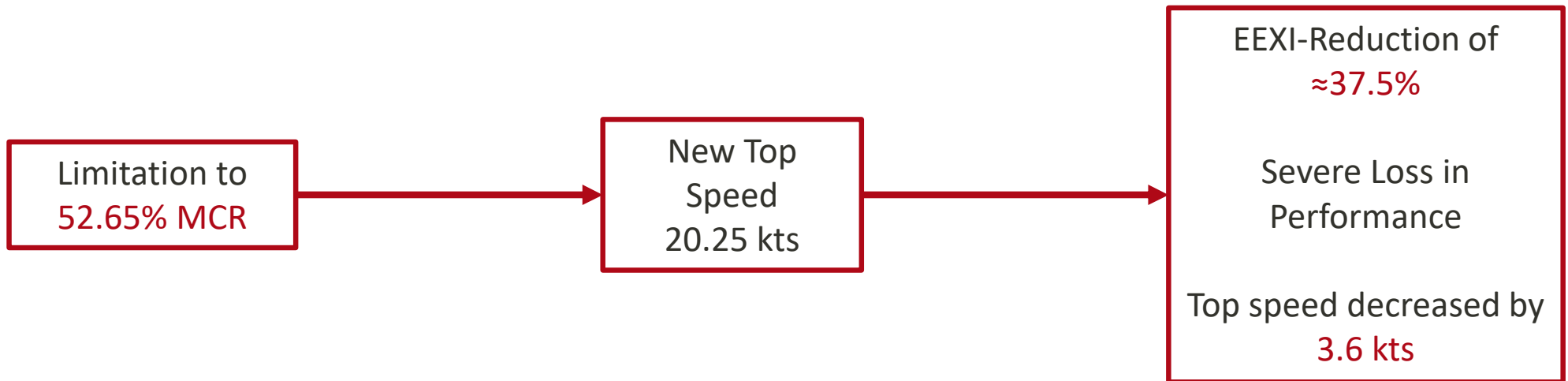
- High potential of EEXI reduction → unavoidable measure
- Large decrease of top speed

2. MMG Retrofit (Propeller + ESCAP):

- Increase of reference speed → helps to reduce impact of EPL

Interaction between Engine Power Limitation (EPL) and Propeller Retrofit

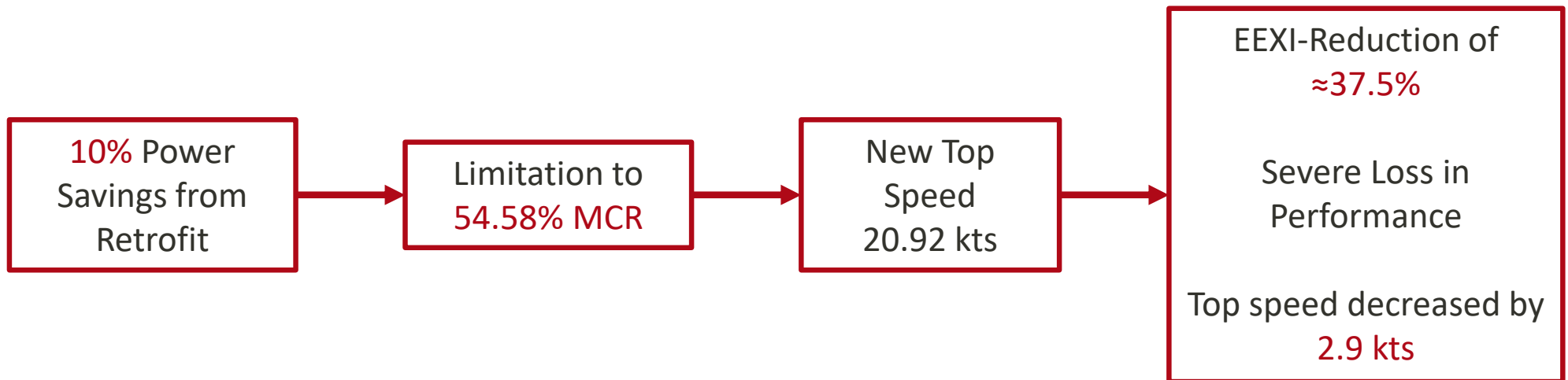
Case 1 – Only Engine Power Limitation (EPL):



Required EEXI could be fulfilled.

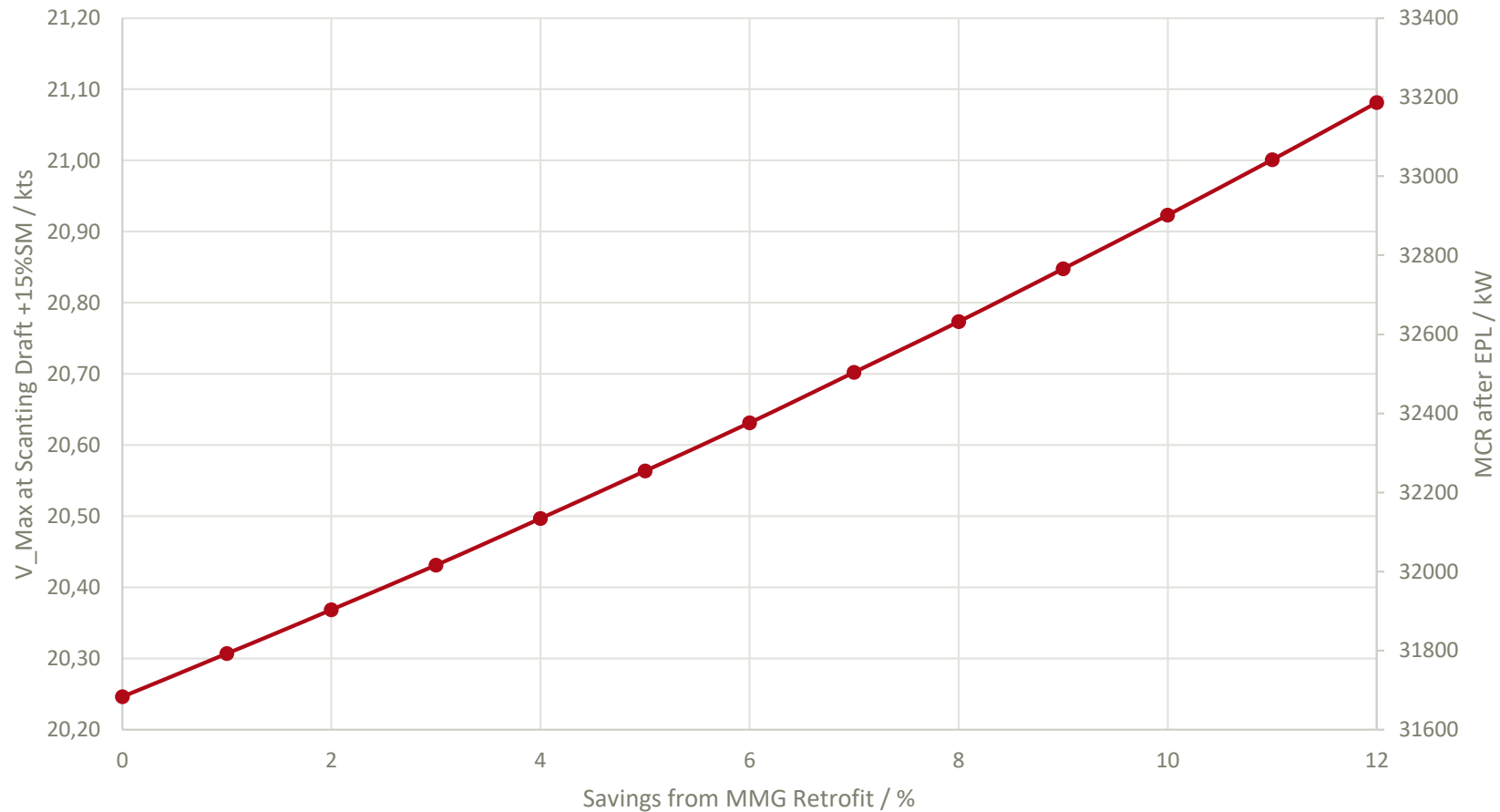
Interaction between Engine Power Limitation (EPL) and Propeller Retrofit

Case 2 – Combined Analysis of EPL and MMG Retrofit:



Required EEXI could be fulfilled but with better Top-Speed and reduced engine power limitation (or better EEXI-value for similar engine limitation)

Interaction between Engine Power Limitation (EPL) and Propeller Retrofit



MMG redesign

redesign programme

Optimising your
operational fleet.
**Up to 14% fuel
saving.**

