



E.R. SCHIFFAHT

E.R. Schiffahrt`s Energy Efficiency

- Operation profile trends leading to fuel savings
- Efficiency adjustments vs. operational requirements
- Initial point for efficiency conversions
- Vessel size matters



presented by Jürgen Kudritzki
Hamburg, 24 September 2013



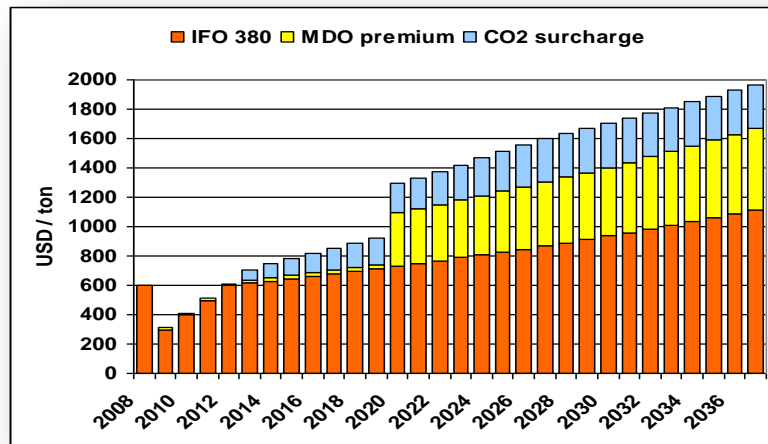
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Fuel price development – past and future

- » continuously increasing bunker prices since 2005, today abt. USD 700 per mt
- » increase of price by 400% since 2004
- » further increase of costs expected



Source: Alphaliner Monthly Monitor, März 2012



Source: GL research. The analysis excludes inflation effects.



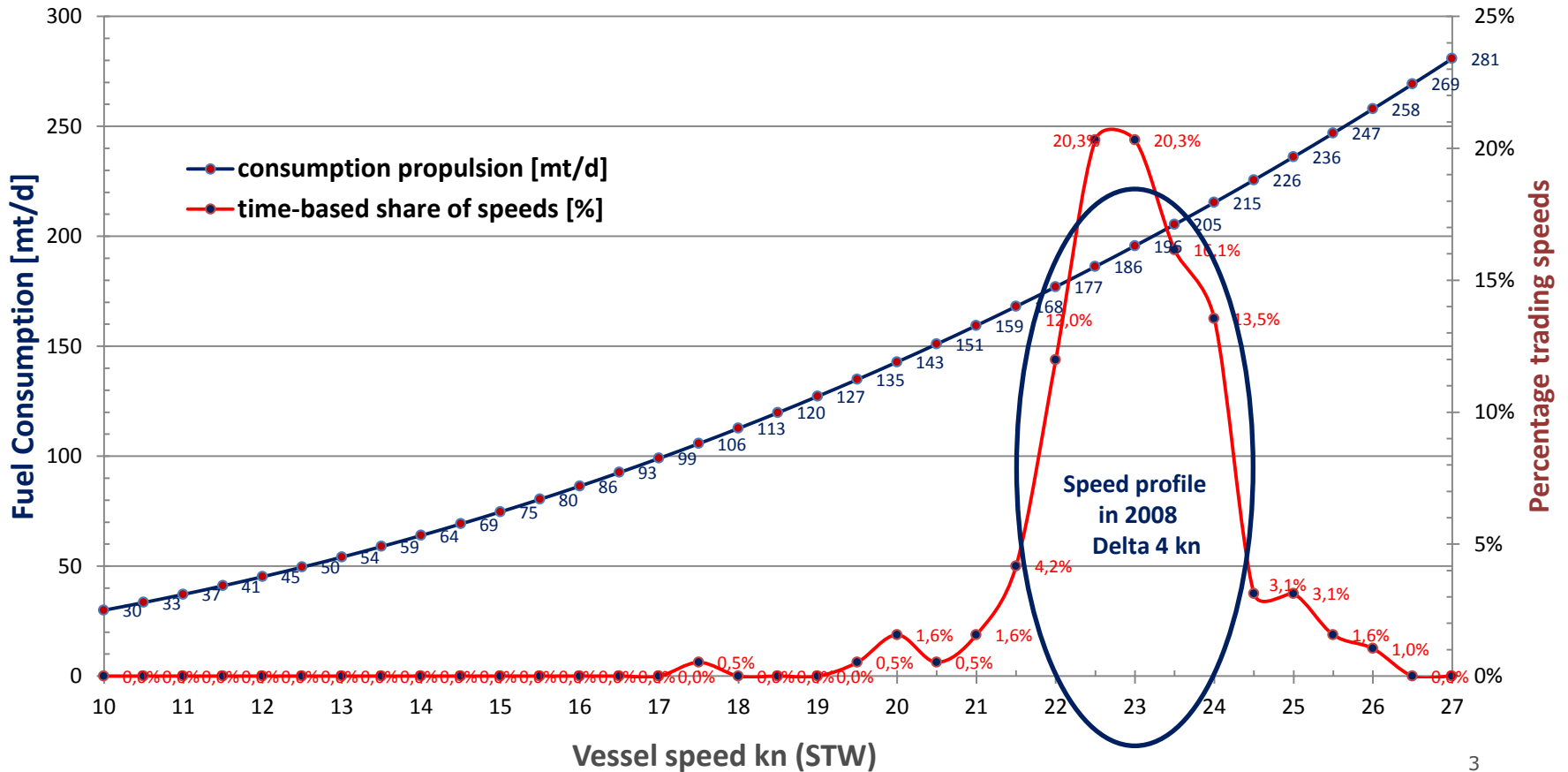
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Operational profile trends leading to fuel saving

Weighted mean speed 23 kn / weighted mean consumption 196 mt/day



Consumption (Propulsion) [mt/d] acc. to 7.500- 8.500 TEU fleet in 2008





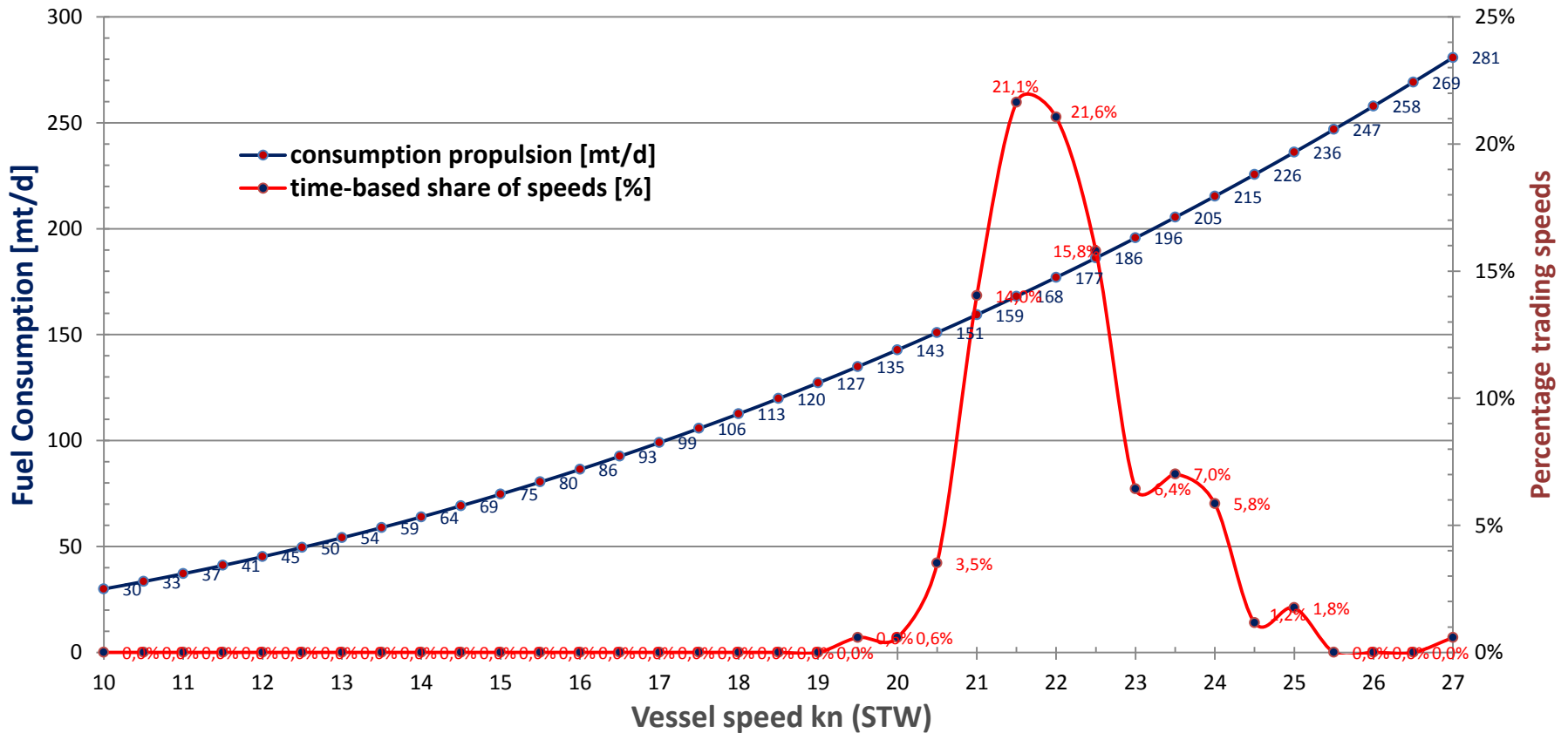
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Operational profile trends leading to fuel saving

Weighted mean speed 22 kn / weighted mean consumption 177 mt/day



Consumption (Propulsion) [mt/d] acc. to 7.500- 8.500 TEU fleet in 2009





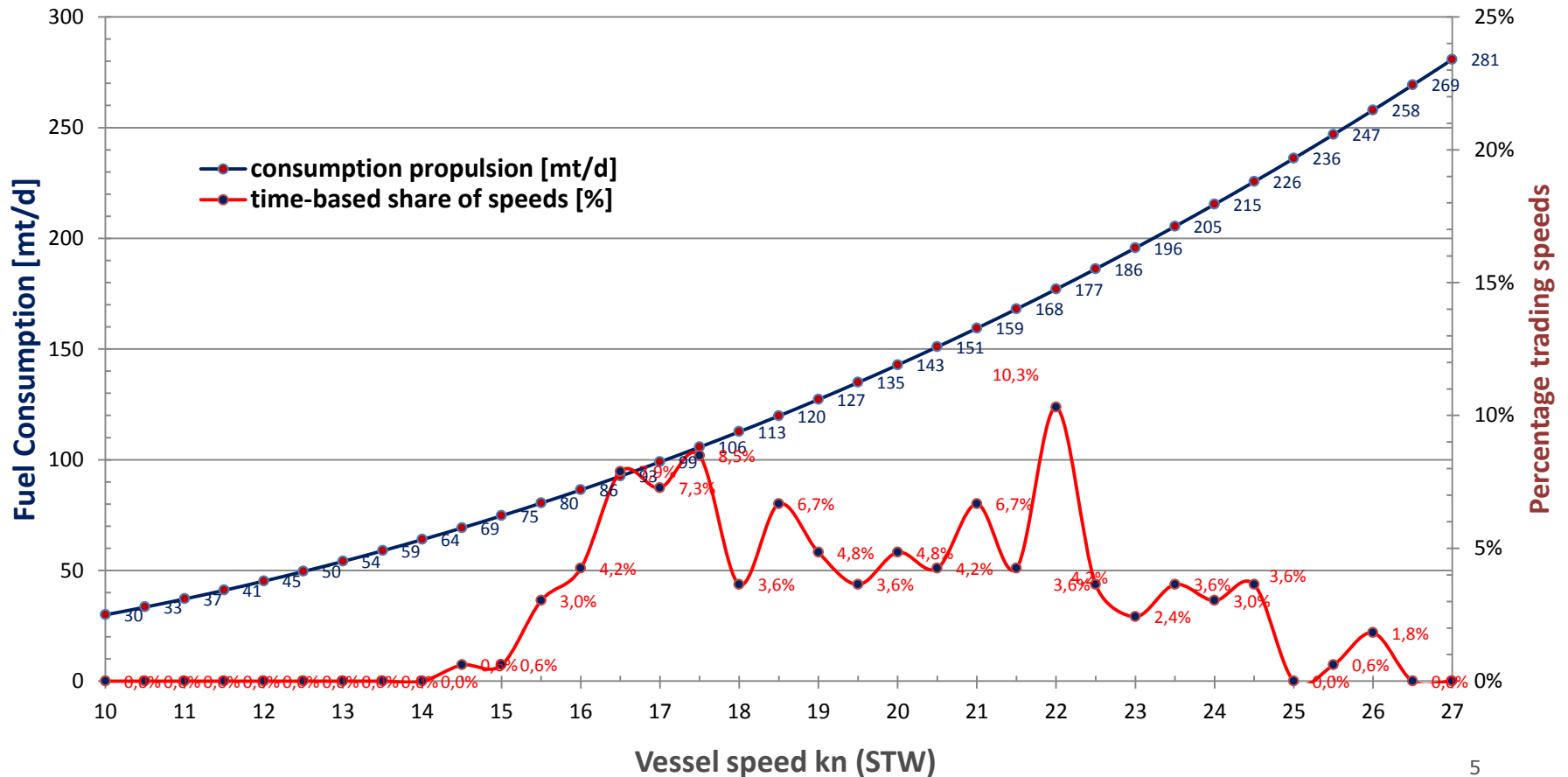
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Operational profile trends leading to fuel saving

Weighted mean speed 20 kn / weighted mean consumption 143 mt/day



Consumption (Propulsion) [mt/d] acc. to 7.500- 8.500 TEU fleet in 2010





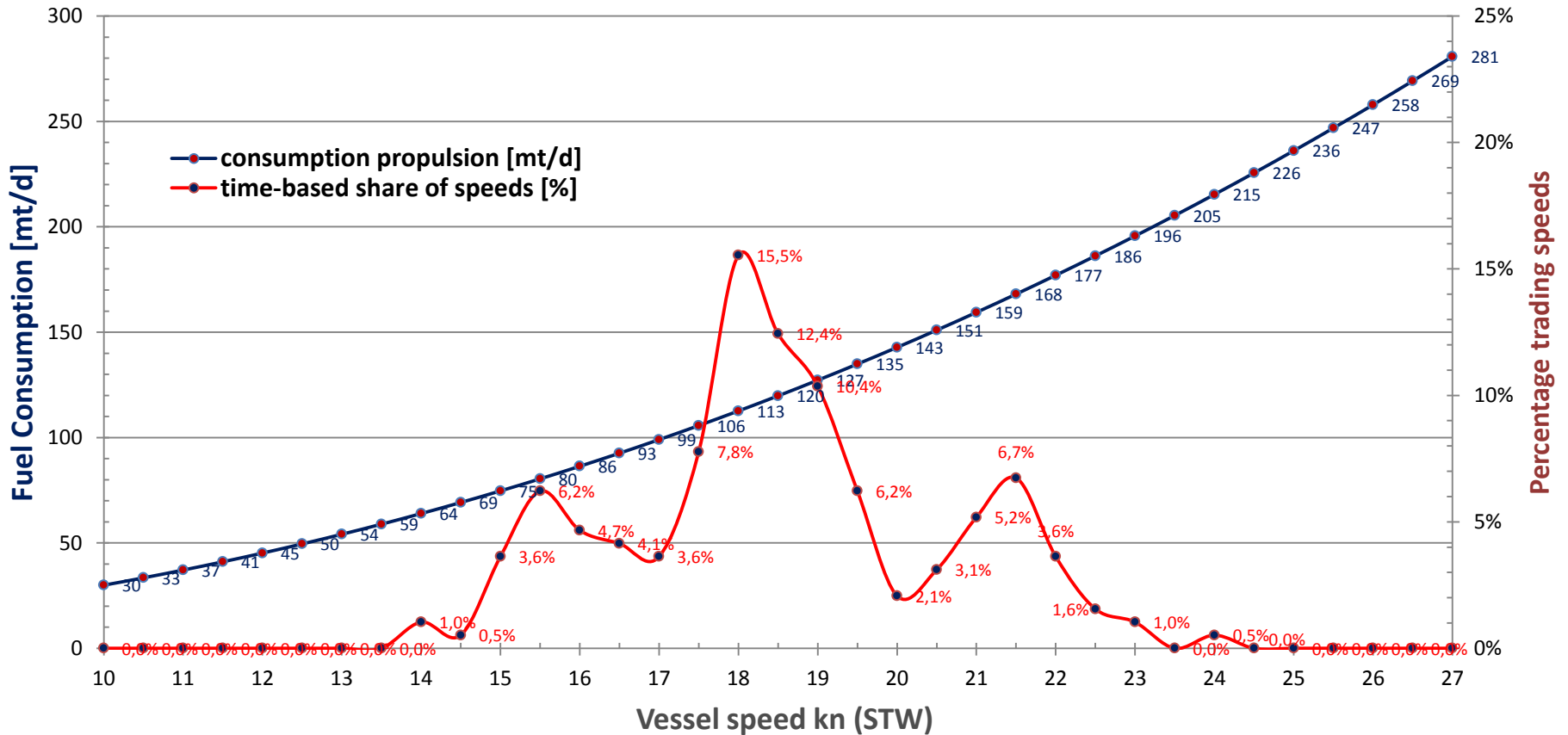
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Operational profile trends leading to fuel saving

Weighted mean speed 18,5 kn / weighted mean consumption 120 mt/day



Consumption (Propulsion) [mt/d] acc. to 7.500- 8.500 TEU fleet in 2011





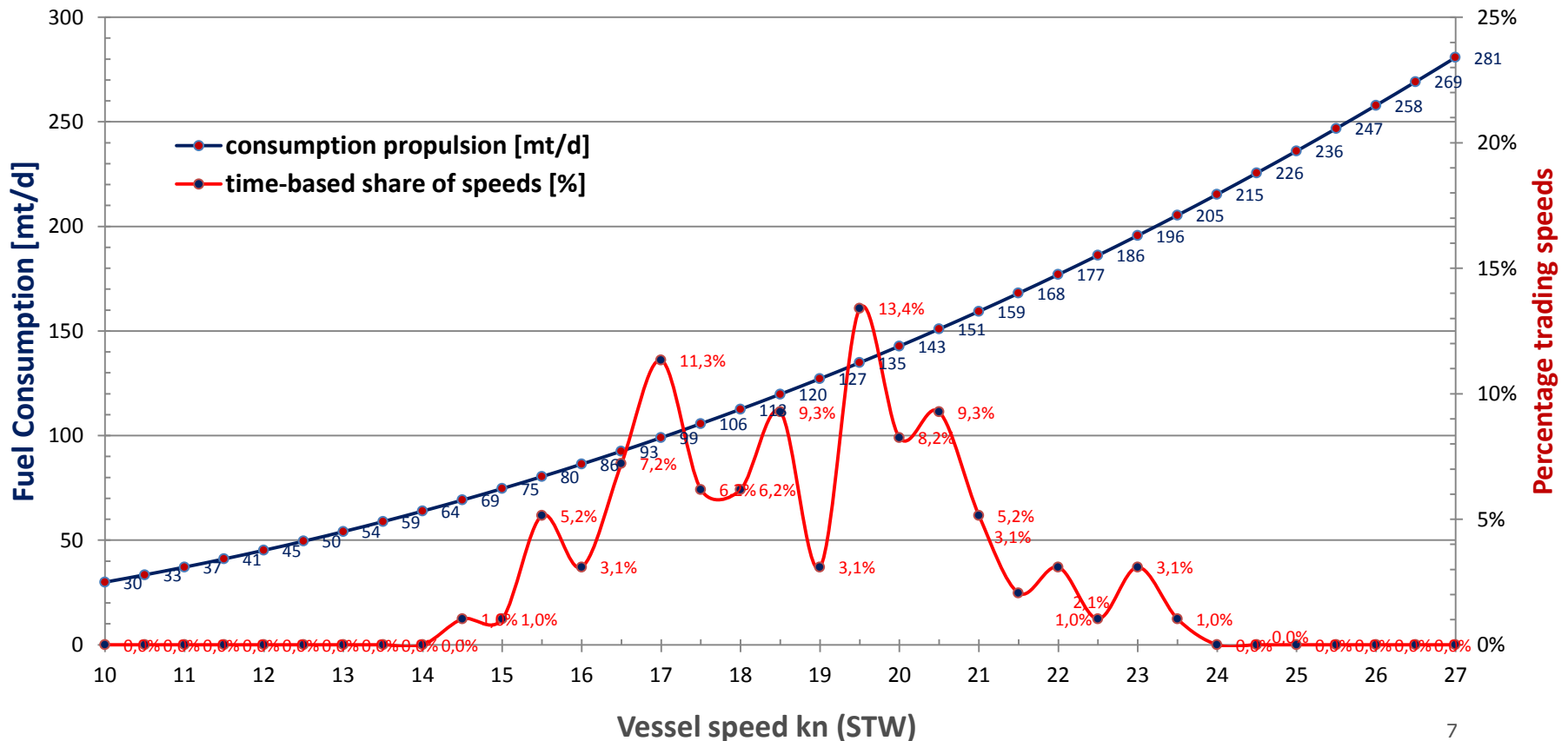
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Operational profile trends leading to fuel saving

Weighted mean speed 19 kn / weighted mean consumption 127 mt/day



Consumption (Propulsion) [mt/d] acc. to 7.500 – 8.500 TEU fleet in 2012





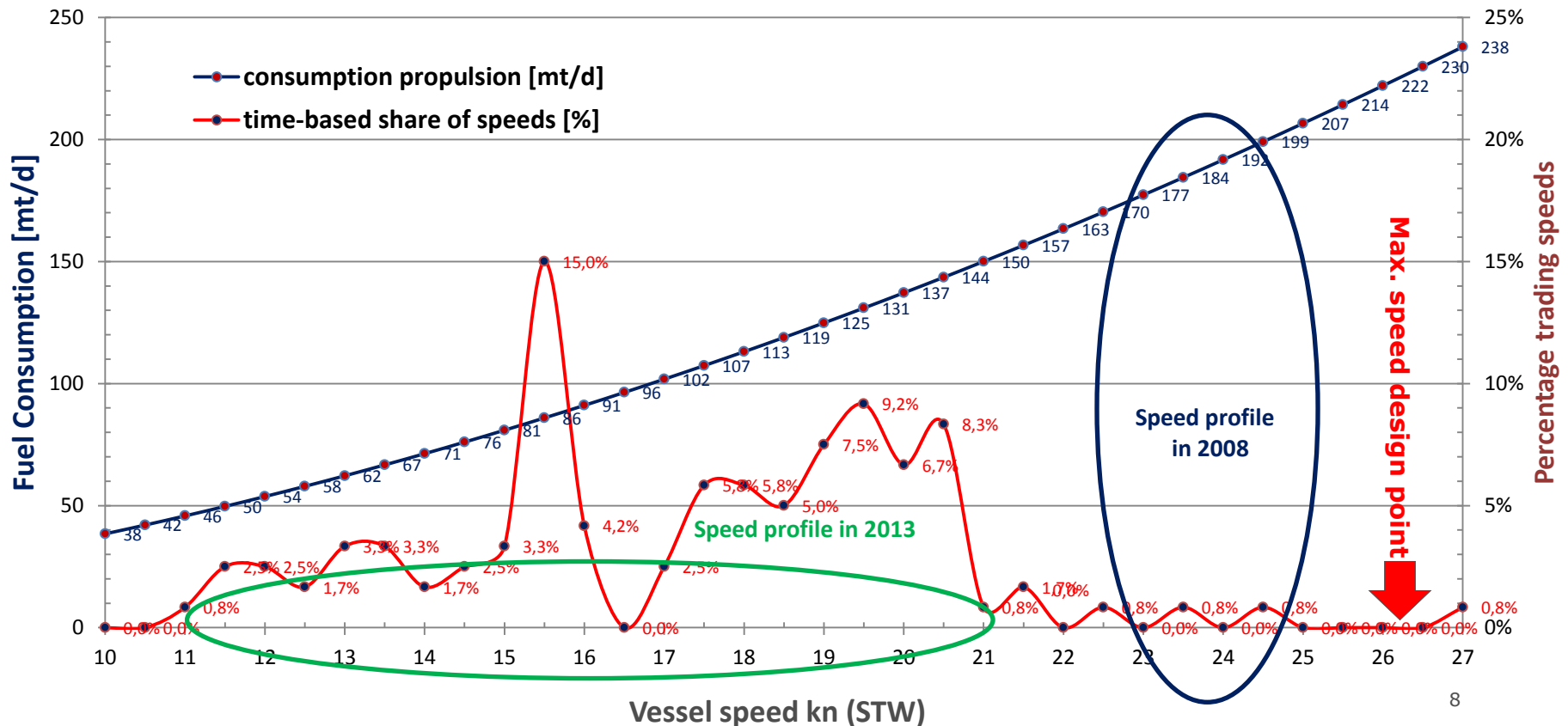
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Operational profile trends leading to fuel saving Efficiency adjustments vs. operational requirements

Weighted mean speed 16,5 kn / weighted mean consumption 98 mt/day



Consumption [mt/d] acc. to 7.500 -8.500 TEU fleet in **2013** vs. speed range in 2008





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Efficiency adjustments vs. operational requirements lifting of vessels and main propulsion systems- identification of consumption

Before improvements can be implemented, sources of consumption need to be identified.

Consumption

Design Reasons

Non-optimized machinery design

Non-optimized hull design

Operational Reasons

Reasons related to charterers (e.g. scheduling, waiting times at terminals etc.)

Reasons related to owner (e.g. voyage execution, trim, maintenance)





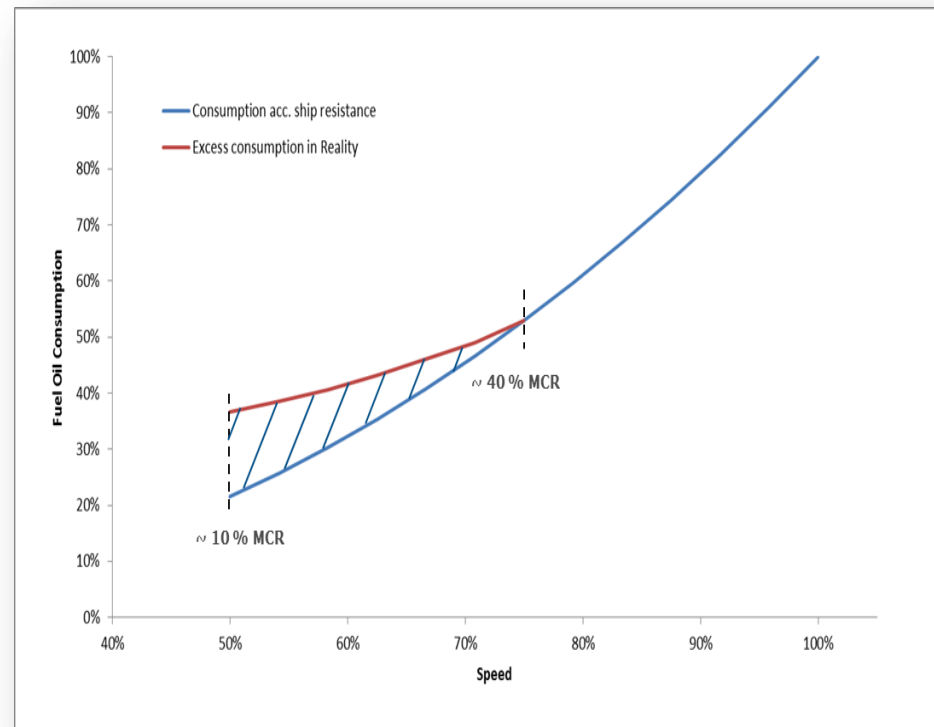
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Efficiency adjustments vs. operational requirements

Reduction of additional consumption at slow- and super slow steaming

Optimisation of the following points are essential for further slow steaming savings:

- » Autopilot steering frequency to be minimised
- » Rudder angle to be minimised by foresight calculating of vessels drift
- » The engine has to be optimized for low load operations
- » Reconsider the anti fouling paint type according to vessel's speed profile
- » Use less ballast as possible
- » Adjust vessel's trim by consideration of the lowest shaft power
- » Calculate the minimum constant propulsion power required for ETA





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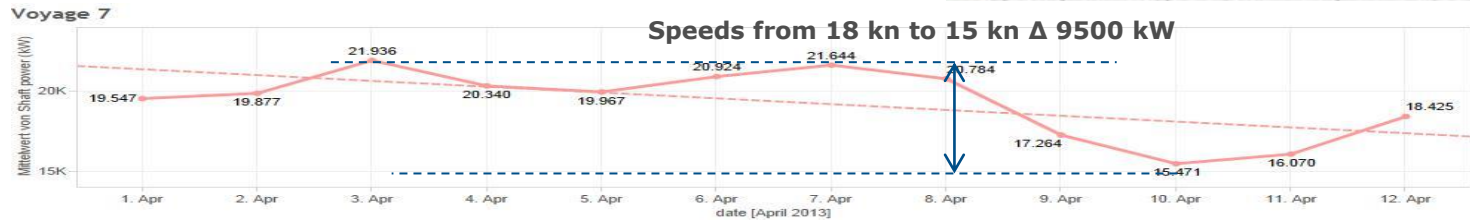
Operational requirements On-shore

- Tracing of voyage execution

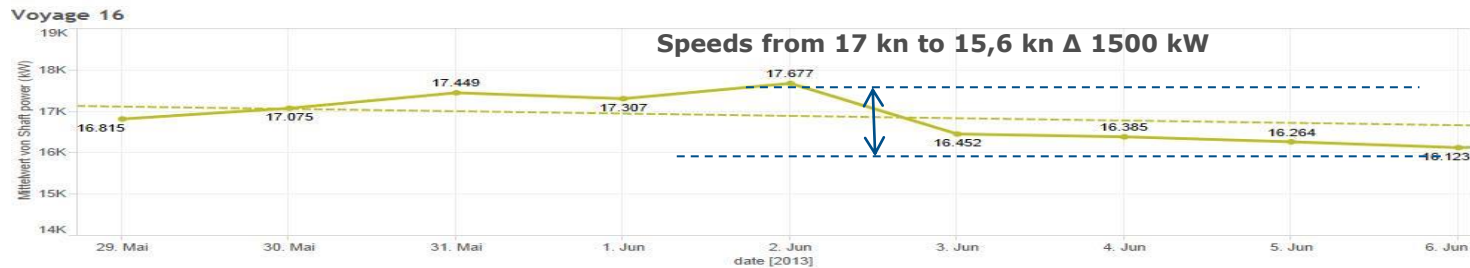
- Voyage record
- Nordamerika-China



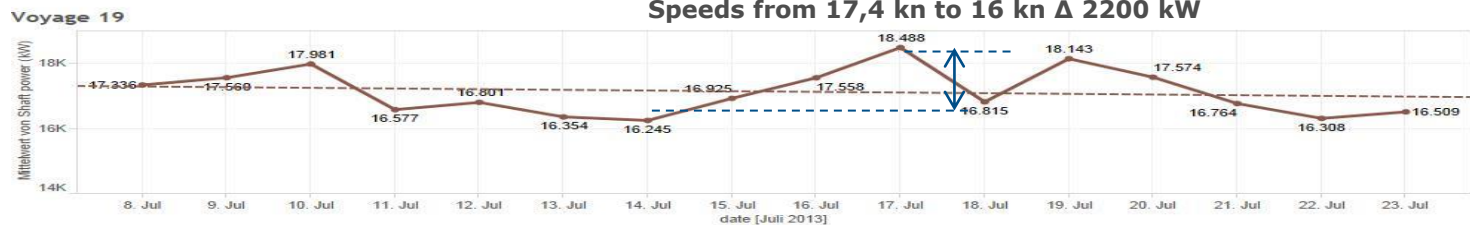
„unsteady“



„steady“

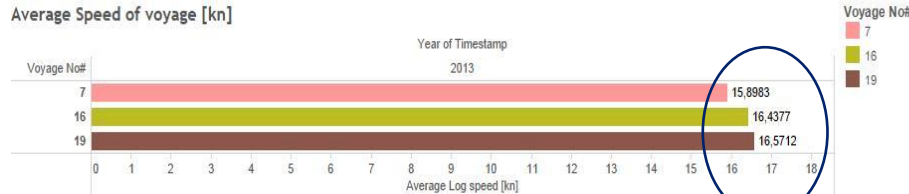


„steady“



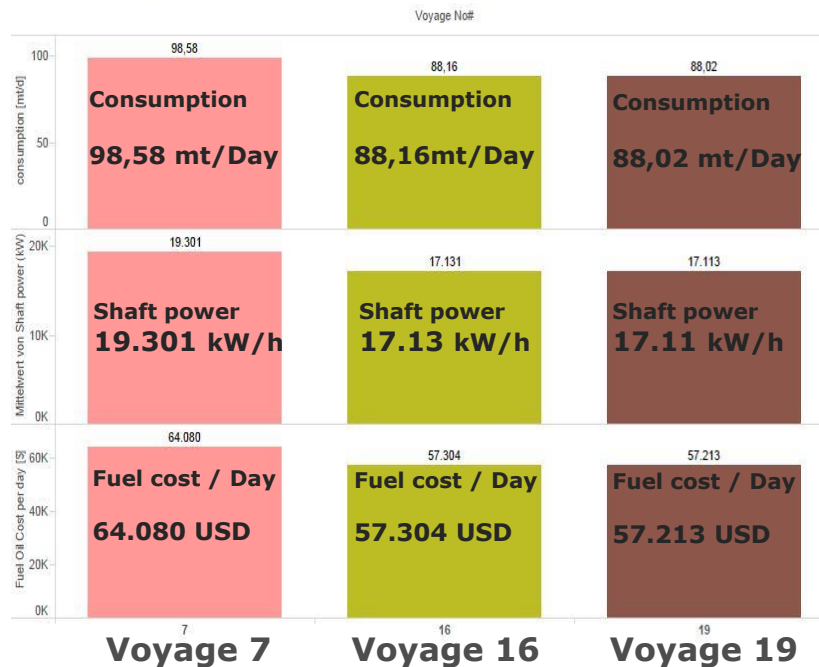


Operational requirements On-shore - Tracing of voyage execution



≈ average Speeds 16 kn

Averages of voyage



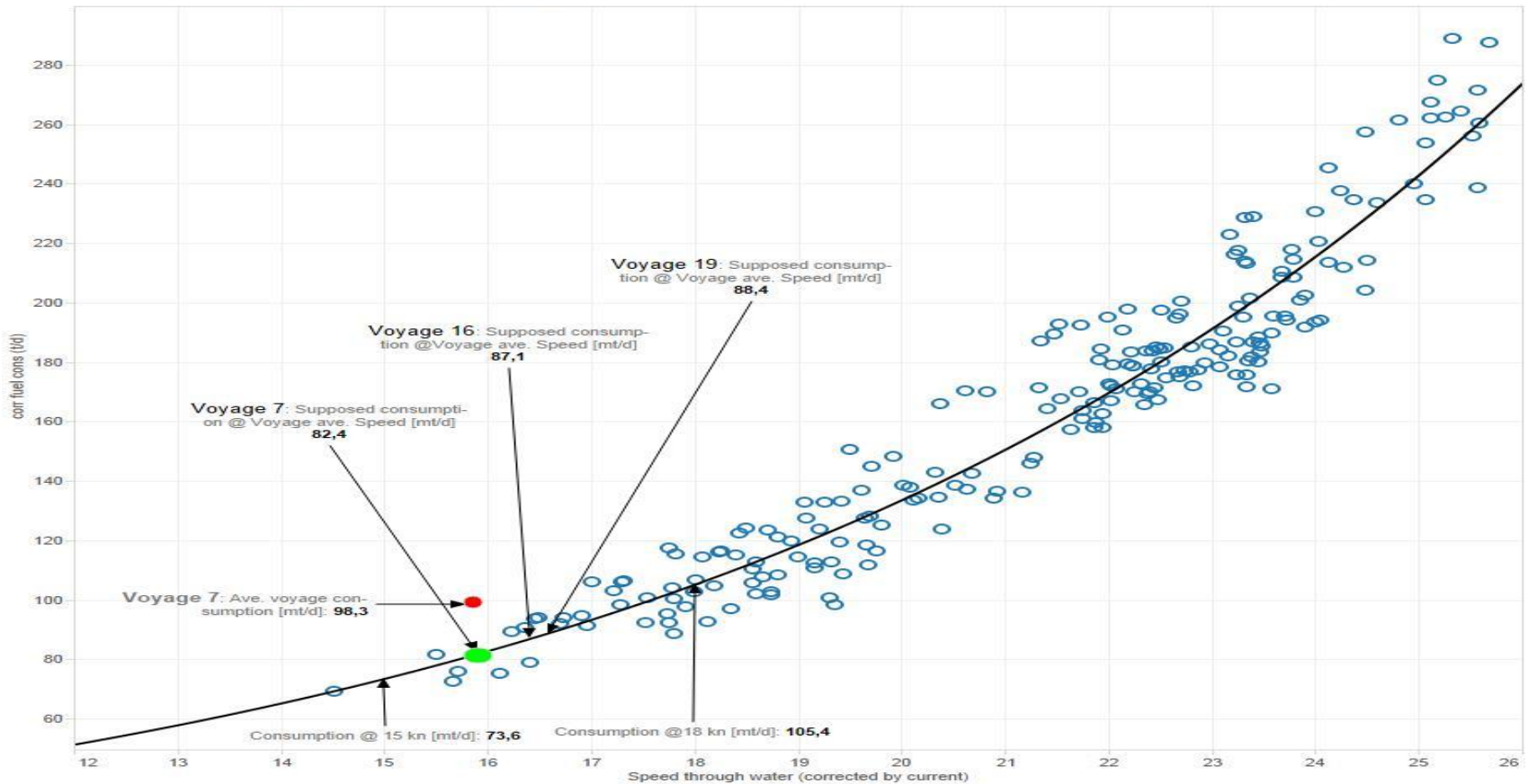
Excess consumption

Voyage 7 = **6.867** USD /Day
Voyage 19 = Baseline



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Operational requirements - Speed & Consumption comparison

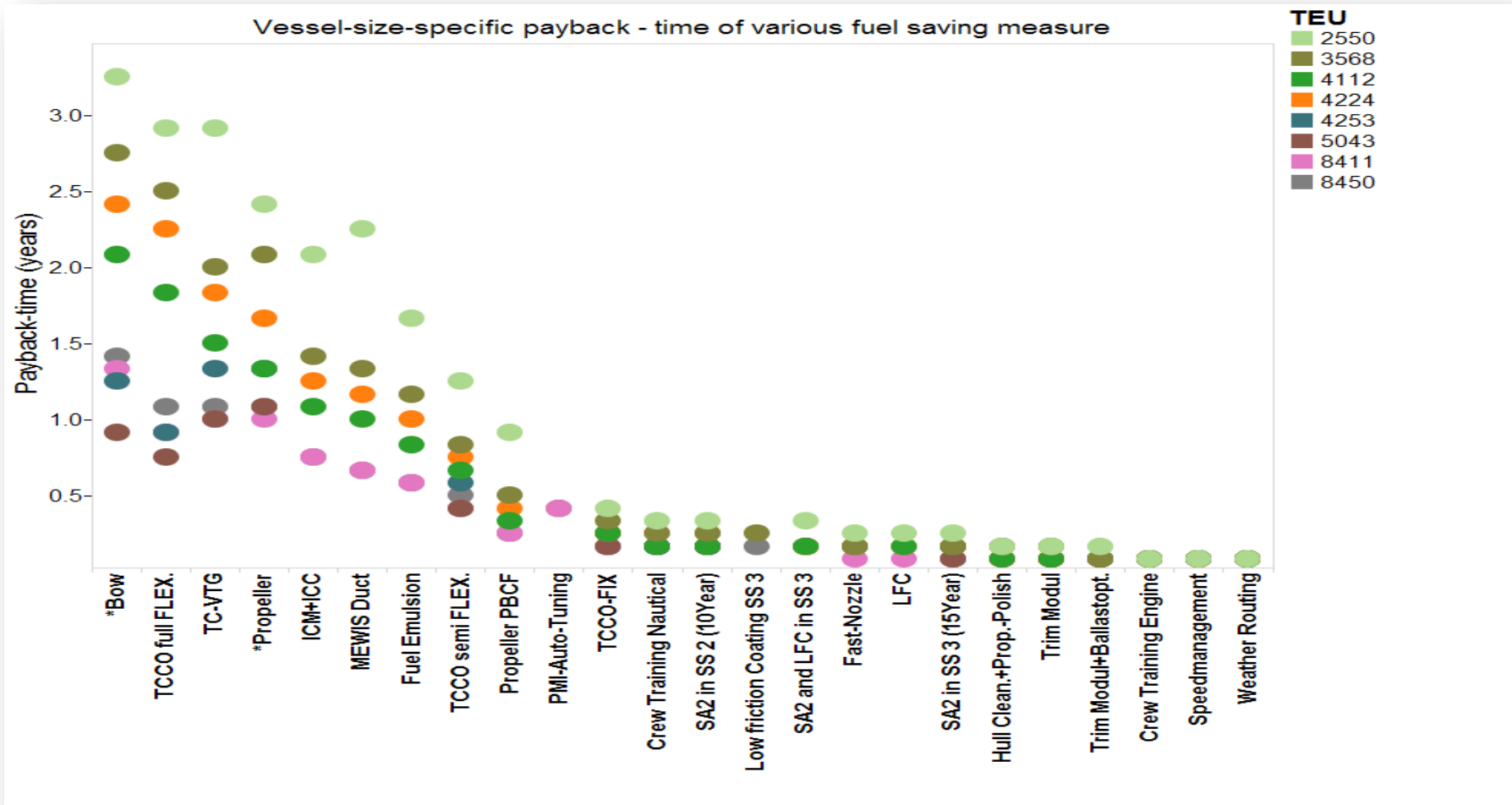


Speed through water (corrected by current) vs. corr fuel cons (t/d). The data is filtered on Ship, Wind force (Bft), Exclusions (mean draft (m) (bin), corr fuel cons (t/d), Speed through water (corrected by current)), mean draft (m) (bin) 2, trim (m) and trim (m) (bin). The Ship filter keeps 91. The Wind force (Bft) filter ranges from 1 to 5. The Exclusions (mean draft (m) (bin), corr fuel cons (t/d), Speed through water (corrected by current)) filter keeps 41.824 members. The mean draft (m) (bin) 2 filter keeps 34 of 34 members. The trim (m) filter ranges from 0 to 2. The trim (m) (bin) filter keeps 0.0, 0.5 and 1.5. The view is filtered on Exclusions (corr fuel cons (t/d), Speed through water (corrected by current)), which keeps 41.767 members.



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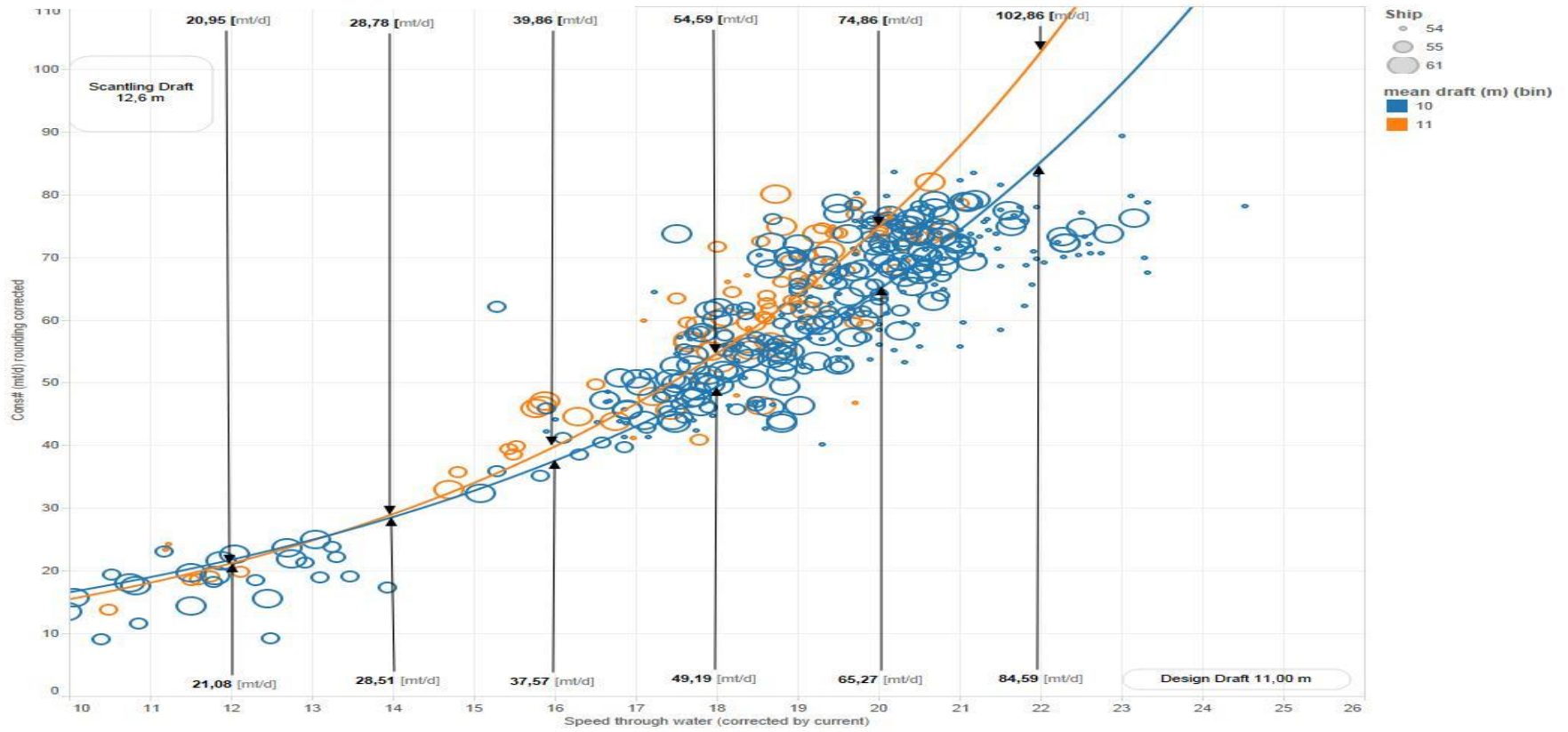
Vessel size matters (2.500-8.500 TEU), measures & payback times





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- Speed & consumption comparison of different drafts



Speed through water (corrected by current) vs. Cons# (mt/d) rounding corrected. Color shows details about mean draft (m) (bin). Size shows details about Ship. The data is filtered on Seastate and swellheight (m). The Seastate filter ranges from 0 to 5. The swellheight (m) filter ranges from 0 to 1,5. The view is filtered on mean draft (m) (bin), Cons# (mt/d) rounding corrected, Exclusions (mean draft (m) (bin), Cons# (mt/d) rounding corrected, Speed through water (corrected by current)) and Ship. The mean draft (m) (bin) filter keeps 10 and 11. The Cons# (mt/d) rounding corrected filter keeps non-Null values only. The Exclusions (mean draft (m) (bin), Cons# (mt/d) rounding corrected, Speed through water (corrected by current)) filter keeps 41.846 members. The Ship filter keeps 54, 55 and 61.

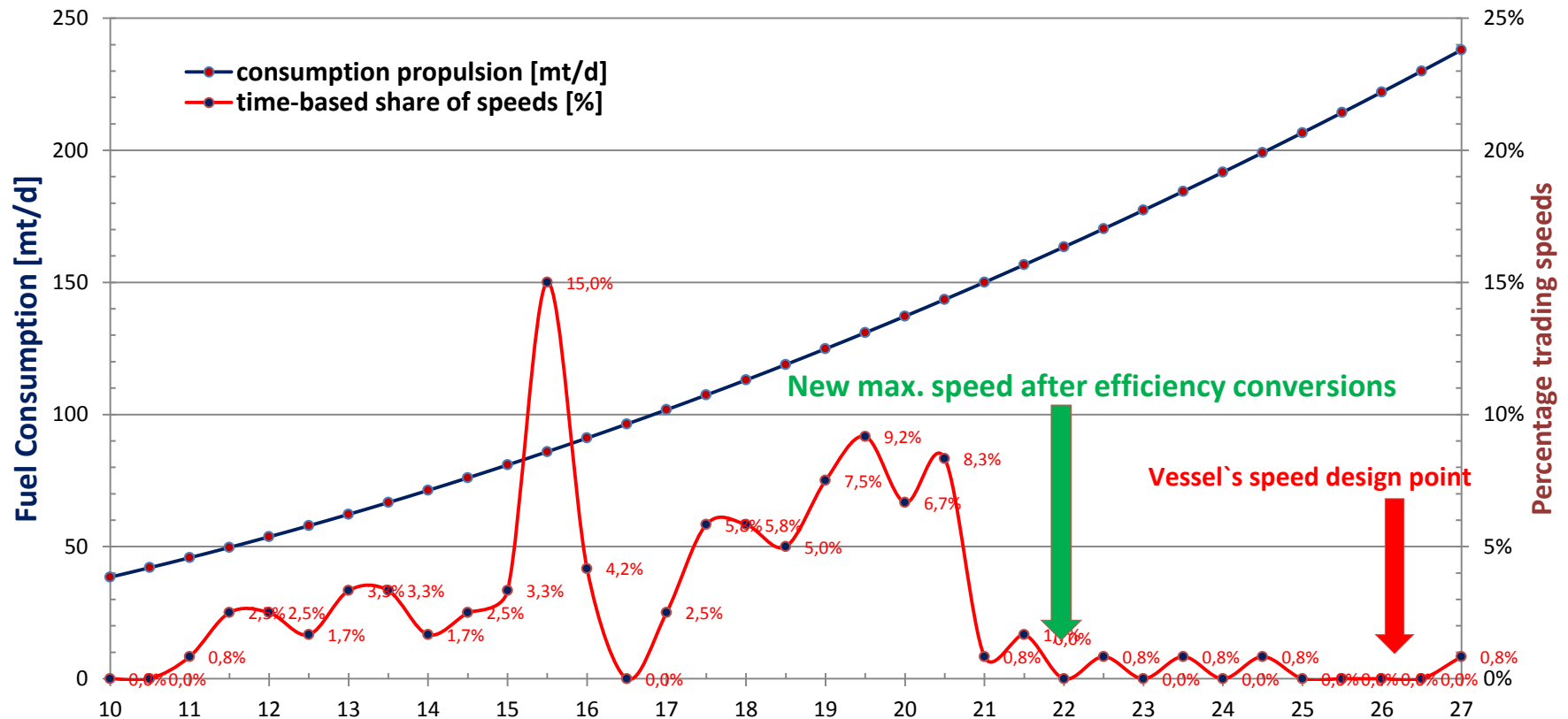


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Operational profile trends leading to fuel saving Efficiency adjustments vs. operational requirements

Weighted mean speed 16.5 kn / mean consumption 98 mt/day

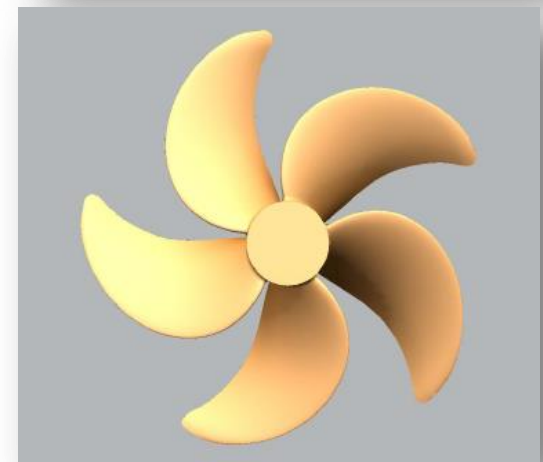
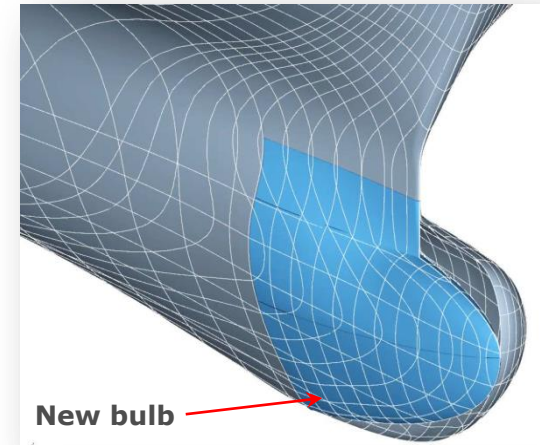
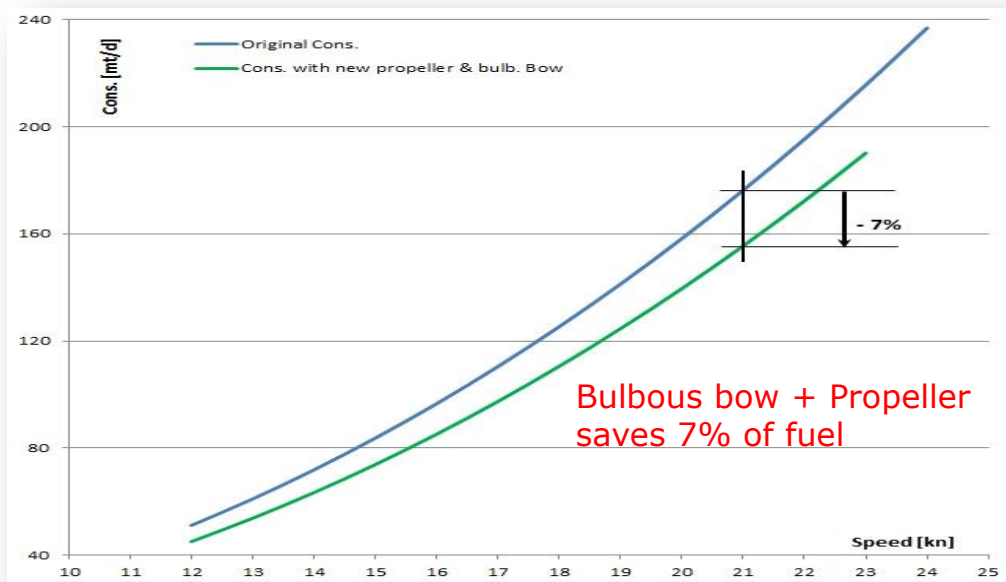
Consumption (Propulsion) [mt/d] acc. to average "ERS" 7.500-8.500 TEU fleet in 2013





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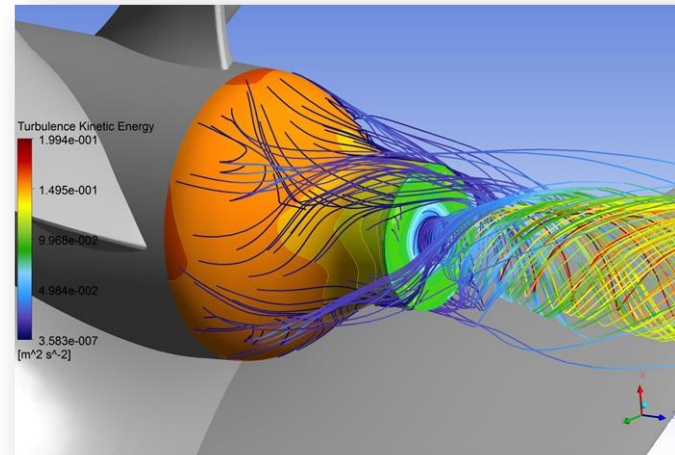
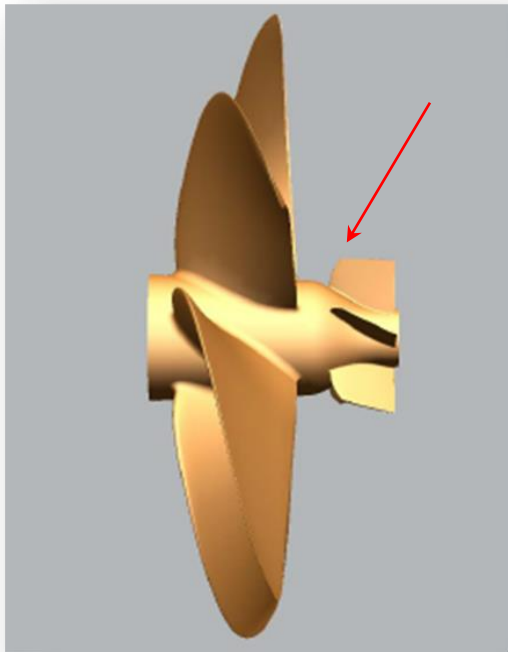
Efficiency adjustments vs. operational requirements Propeller and bulbous bow optimisation



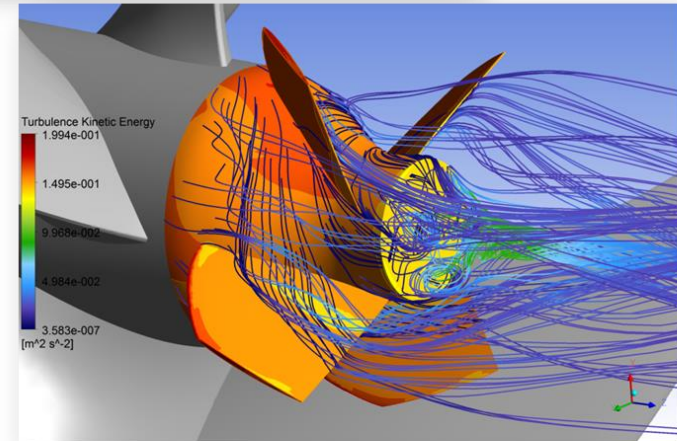
- » The new bulbous bow design reduce the form resistance and optimise the wave resistance for the new operation profile.
- » The second benefit of the new bulbous bow installation is a reduced total resistance of the vessel which enable additional optimisation and saving potential in way of the propeller design.

Vessel optimization measures based on actual operational profiles Propeller design with ESCAP

- » The propeller ESCAP is installed directly at the end of the propeller on the propeller shaft. The conventional propeller cap is replaced by the new design.



- » Direct comparison of the streamlines and pressure distributions in way of the propeller hub shows significant pressure reductions and optimised water flow with the ESCAP design.

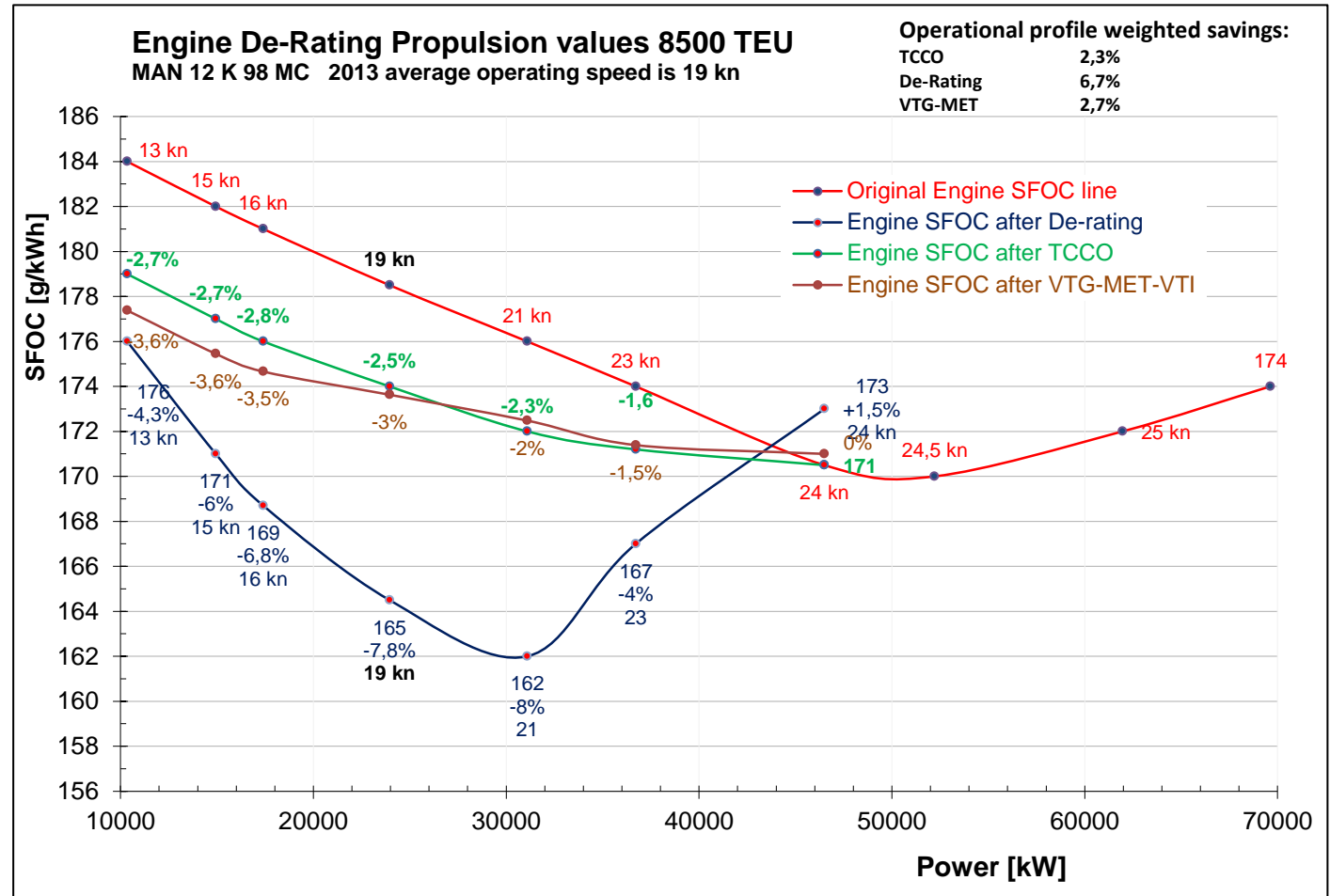




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Vessel optimization measures based on actual operational profiles De-rating - TCCO - VTG -

- » **De-rating engine scope:**
- » Reprogramming engine control
- » Changing governor setting
- » Installing of shims and carry out liner modification
- » Installing new fuel nozzles and adjust retiming
- » Installation of EGB
- » **De-rating turbocharger scope:**
- » Exchange the compression wheel
- » Exchange of the nozzle ring
- » Exchange the diffuser ring
- » Turbocharger fix cut out (TCCO)
- » **De-rating files:**
- » New technical file
- » On board Nox measurement
- » (first vessel only)





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Thank you for
your attention.

