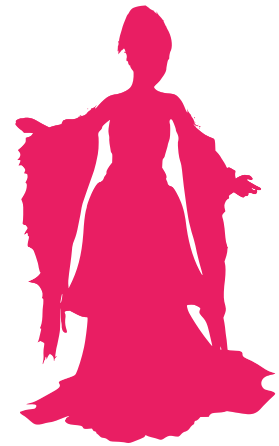
WHEN TRUST MATTERS



Energy Saving Fairy

VOLKER BERTRAM (DNV)

Energy Efficiency Options – Some Fairy Tales

Navigator

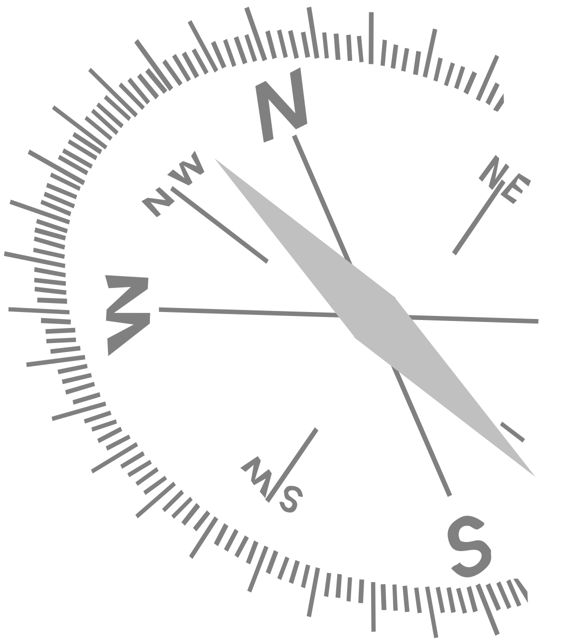
Very promising

Frequent & occasional errors

Some post-heretic thoughts

My take on energy saving options

Conclusions



My magic potion will save 10% of your fuel bill…

Really?

But the experts say so...

(IMO, University of …, a website, a high-gloss journal, …)

Generally no first-hand experience & not peer-reviewed

We quote someone who reported…

(If you say it three times, it's true.)

Navigator

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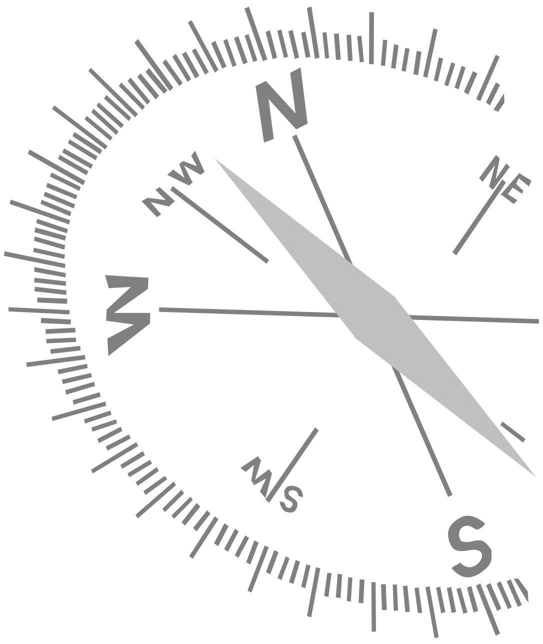
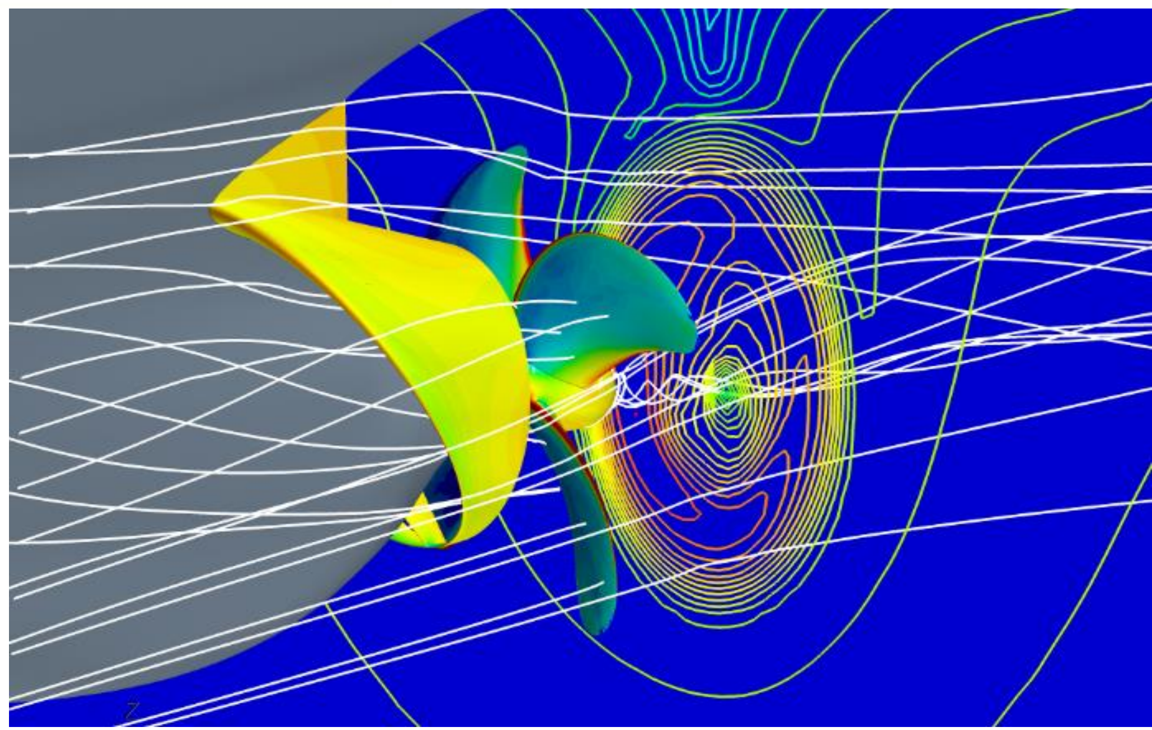


How much does it save? – Hm, …

Ideally look at each case…



But that costs money in itself…

… who has money for that?

Can’t we just take
a publication?

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True Lies - Or common tricks (or traps) of the trade

True Lie #1:	"Up to…" (20% = 5% typically)
True Lie #2:	8% better (than the worst)
True Lie #3:	5% (@ design point, 1% across the operational profile)
True Lie #4:	5% (for a bulk carrier, 0% for a containership)
True Lie #5:	20% (of the wind resistance = <1% of total fuel bill)
True Lie #6:	10% after conversion (where 8% are due to hull & prop cleaning)
True Lie #7:	5% (as proven in model tests; 1% at full scale)

Never let truth get in the way of a good sales story

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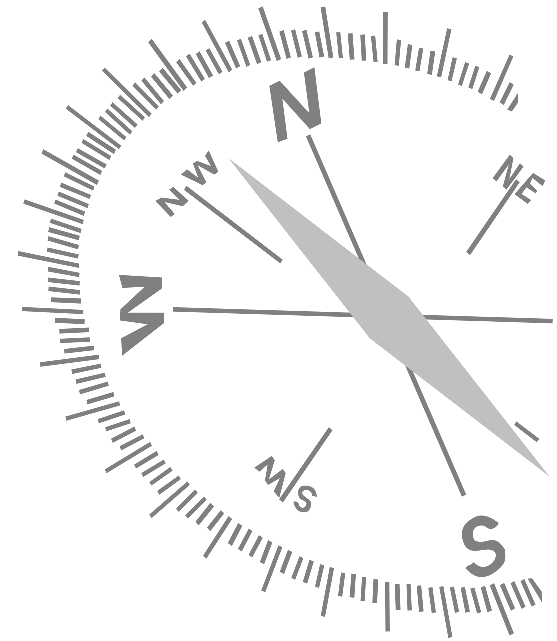

Colleague bashing is great fun. I had my fun.

What do we do now?

Some thoughts for a better world

Thought #1:	Give savings for MS **Mustership**
Thought #2:	Give **min/max, typical** values
Thought #3:	For **PID**s: CFD or **performance monitoring** only
Thought #4:	Discuss savings also for **off-design** conditions
Thought #5:	Consider / estimate **take-up** of measure
Thought #6:	Be **realistic in payback** expectations
Thought #7:	Make **performance-based contracts**

PID = Propulsion Improving Devices

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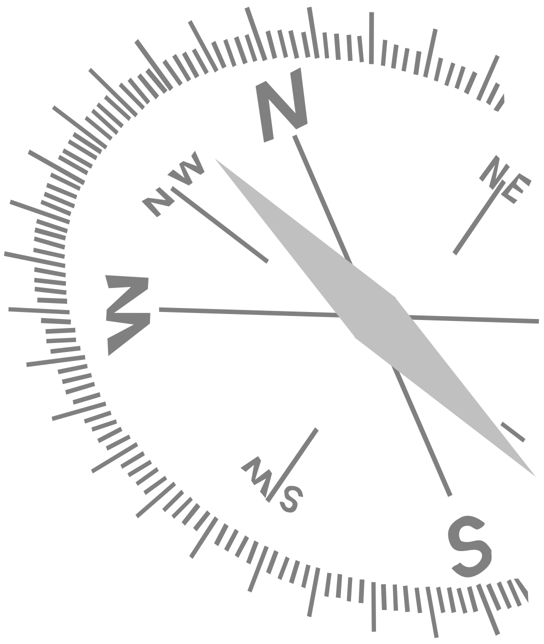

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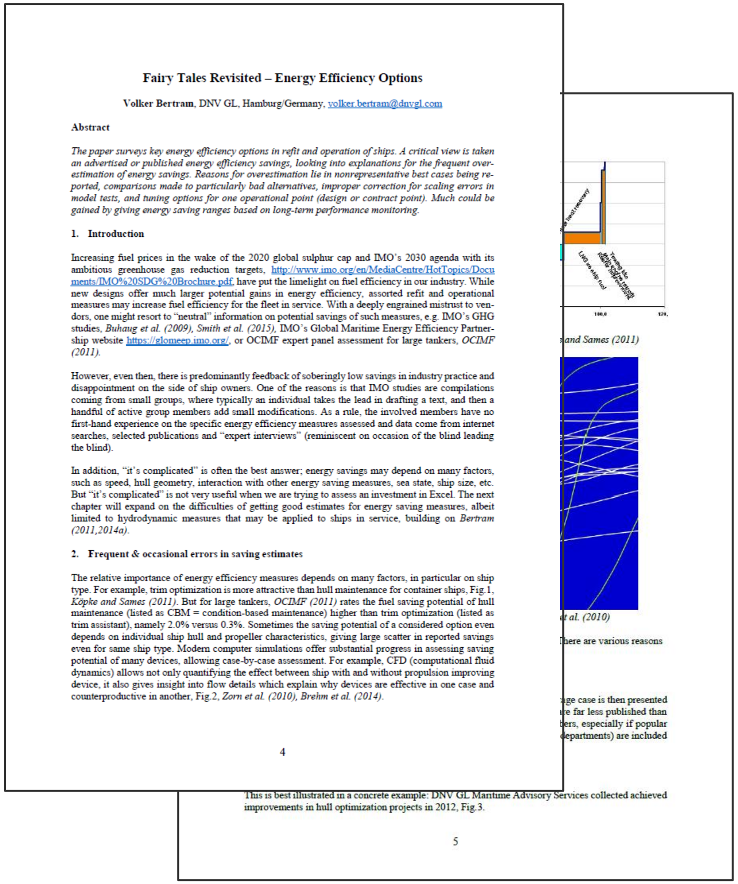
7 discussed in HullPIC paper – hopefully realistically

7 options discussed in HullPIC 2020 paper (hullpic.info, then downloads)

- propeller cleaning, trim opt., performance monitoring, PIDs, air lubrication, WAPS, speed reduction



Fairy Tales Revisited – Energy Efficiency Options

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Abstract

The paper surveys key energy efficiency options in refit and operation of ships. A critical view is taken an advertised or published energy efficiency savings, looking into explanations for the frequent over-estimation of energy savings. Reasons for overestimation lie in nonrepresentative best cases being reported, comparisons made to particularly bad alternatives, improper correction for scaling errors in model tests, and tuning options for one operational point (design or contract point). Much could be gained by giving energy saving ranges based on long-term performance monitoring.

1. Introduction

Increasing fuel prices in the wake of the 2020 global sulphur cap and IMO's 2030 agenda with its ambitious greenhouse gas reduction targets, http://www.imo.org/en/MediaCentre/HotTopics/Documents/IMO%20SDG%20Brochure.pdf, have put the limelight on fuel efficiency in our industry. While new designs offer much larger potential gains in energy efficiency, assorted refit and operational measures may increase fuel efficiency for the fleet in service. With a deeply engrained mistrust to vendors, one might resort to "neutral" information on potential savings of such measures, e.g. IMO's GHG studies, *Buhaug et al. (2009), Smith et al. (2015),* IMO's Global Maritime Energy Efficiency Partnership website https://glomeep.imo.org/, or OCIMF expert panel assessment for large tankers, *OCIMF (2011).*

However, even then, there is predominantly feedback of soberingly low savings in industry practice and disappointment on the side of ship owners. One of the reasons is that IMO studies are compilations coming from small groups, where typically an individual takes the lead in drafting a text, and then a handful of active group members add small modifications. As a rule, the involved members have no first-hand experience on the specific energy efficiency measures assessed and data come from internet searches, selected publications and "expert interviews" (reminiscent on occasion of the blind leading the blind).

In addition, "it's complicated" is often the best answer; energy savings may depend on many factors, such as speed, hull geometry, interaction with other energy saving measures, sea state, ship size, etc. But "it's complicated" is not very useful when we are trying to assess an investment in Excel. The next chapter will expand on the difficulties of getting good estimates for energy saving measures, albeit limited to hydrodynamic measures that may be applied to ships in service, building on *Bertram (2011,2014a).*

2. Frequent & occasional errors in saving estimates

The relative importance of energy efficiency measures depends on many factors, in particular on ship type. For example, trim optimization is more attractive than hull maintenance for container ships, Fig.1, *Köpke and Sames (2011).* But for large tankers, *OCIMF (2011)* rates the fuel saving potential of hull maintenance (listed as CBM = condition-based maintenance) higher than trim optimization (listed as trim assistant), namely 2.0% versus 0.3%. Sometimes the saving potential of a considered option even depends on individual ship hull and propeller characteristics, giving large scatter in reported savings even for same ship type. Modern computer simulations offer substantial progress in assessing saving potential of many devices, allowing case-by-case assessment. For example, CFD (computational fluid dynamics) allows not only quantifying the effect between ship with and without propulsion improving device, it also gives insight into flow details which explain why devices are effective in one case and counterproductive in another, Fig.2, *Zorn et al. (2010), Brehm et al. (2014).*

4

This is best illustrated in a concrete example: DNV GL Maritime Advisory Services collected achieved improvements in hull optimization projects in 2012, Fig.3.

5

PID = propulsion improving device
WAPS = wind assisted propulsion systems

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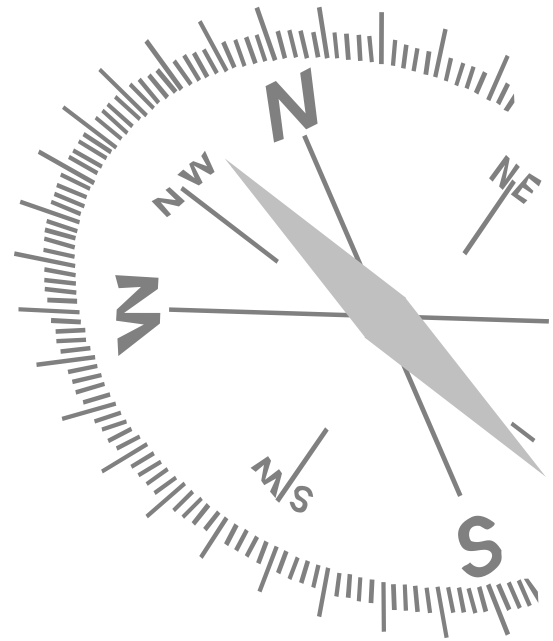

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Conclusion 1/3: The numbers are too high, generally

- deliberately
- unintentionally

“true lies”

Conclusion 2/3: Base figures on performance monitoring

… rather than spot checks from model tests or sea trials

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Conclusion 3/3: Healthy mistrust, but adopt fuel saving measures

Accept uncertainty as part of (business) life

Doing nothing is not the best option!

Truth (and age) gets better with wine

Thank you!

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