

Energy Management – Maximising Benefits



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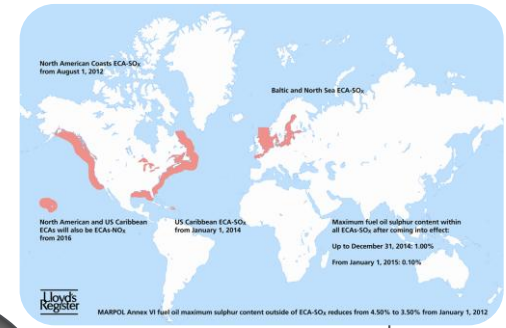
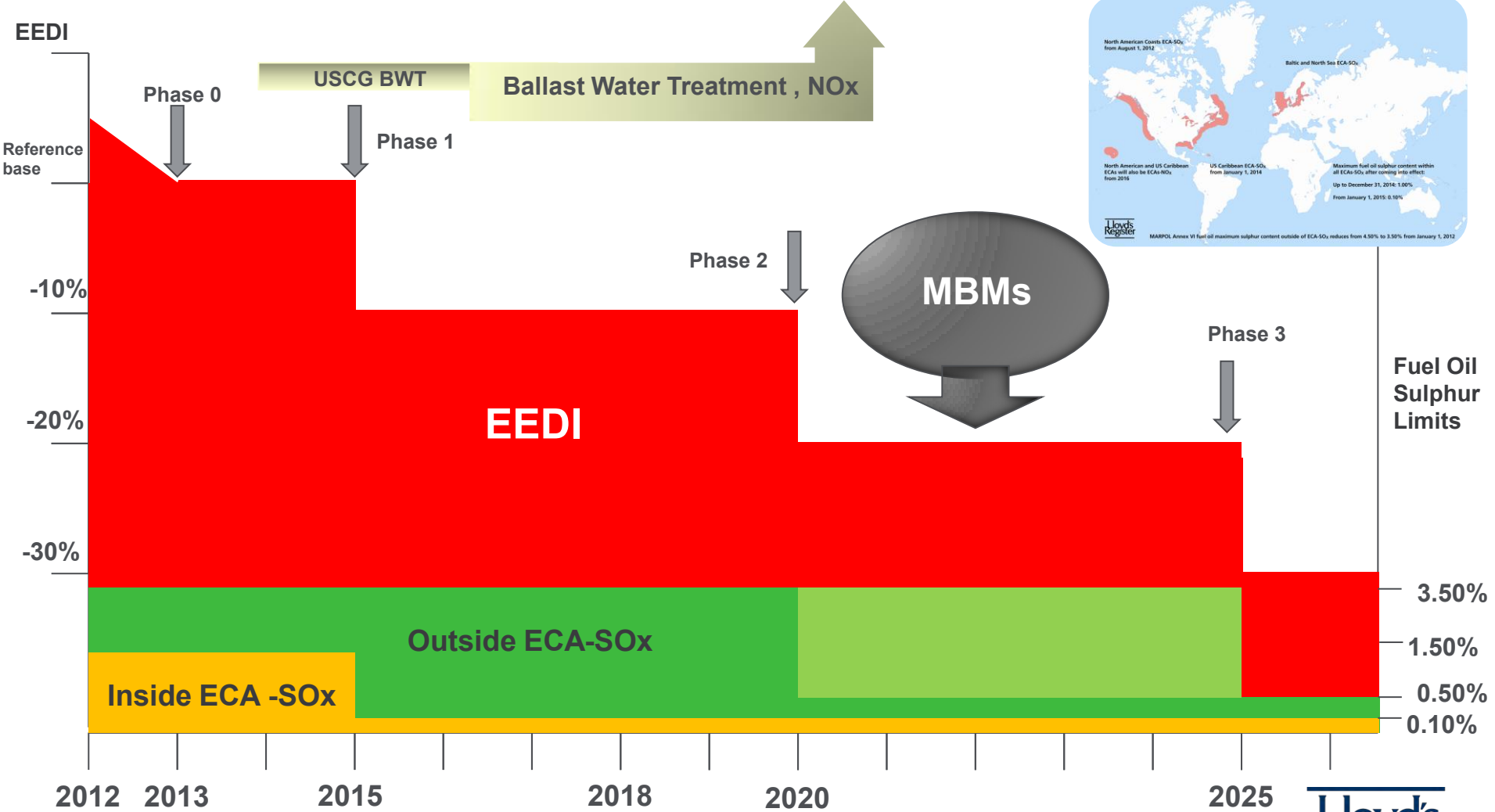
**“Energy and Shipping” Seminar IENE
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Strategic landscape as it relates to energy

- **Increasingly demanding environmental regulations**
- **Decisions not always supported by strong technical / scientific evidence**
- **Continued pressure on fuel price and emissions reduction**
- **Range of innovative environmental solutions**



Looking at the Future



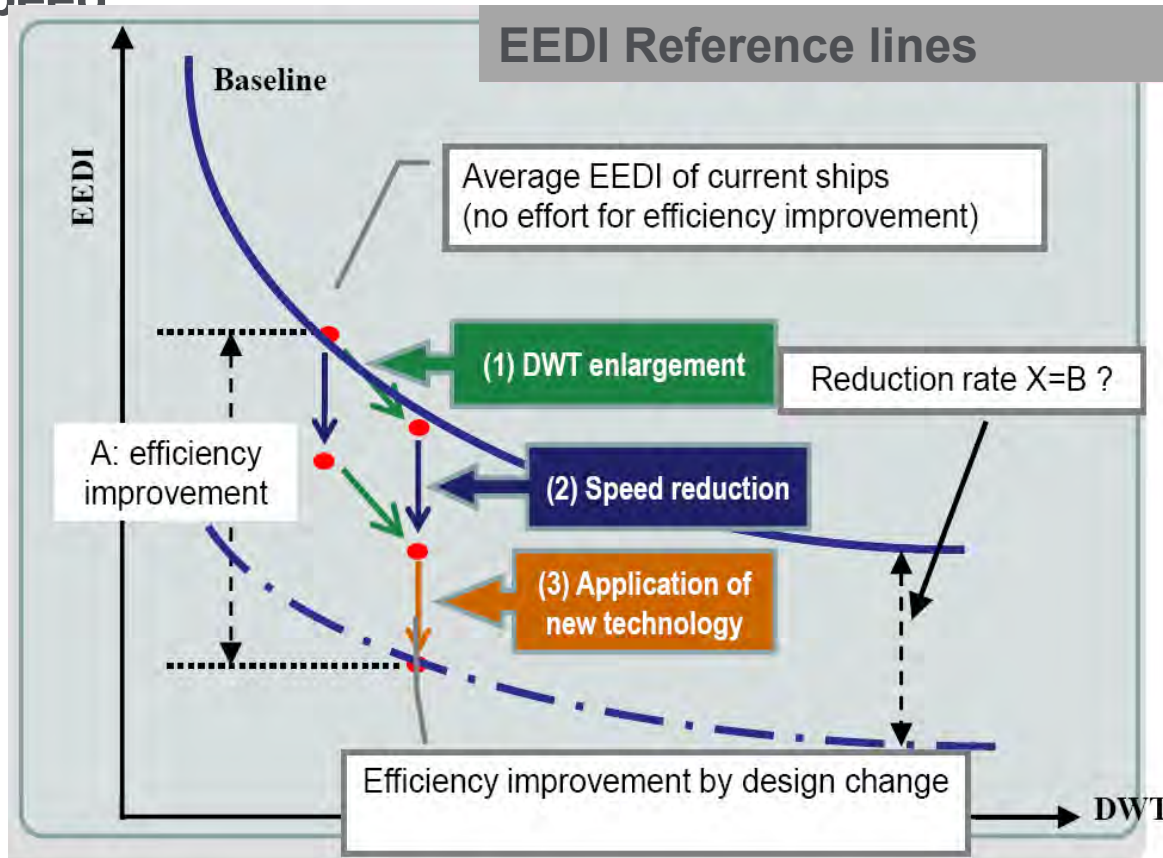
EEDI – What is this?

$$\text{EEDI} = \frac{\text{g of CO}_2 \text{ emitted (based on SFC)}}{\text{Design Cargo Capacity} \times \text{Design Speed}}$$

1. Deadweight Enlargement

2. Speed reduction

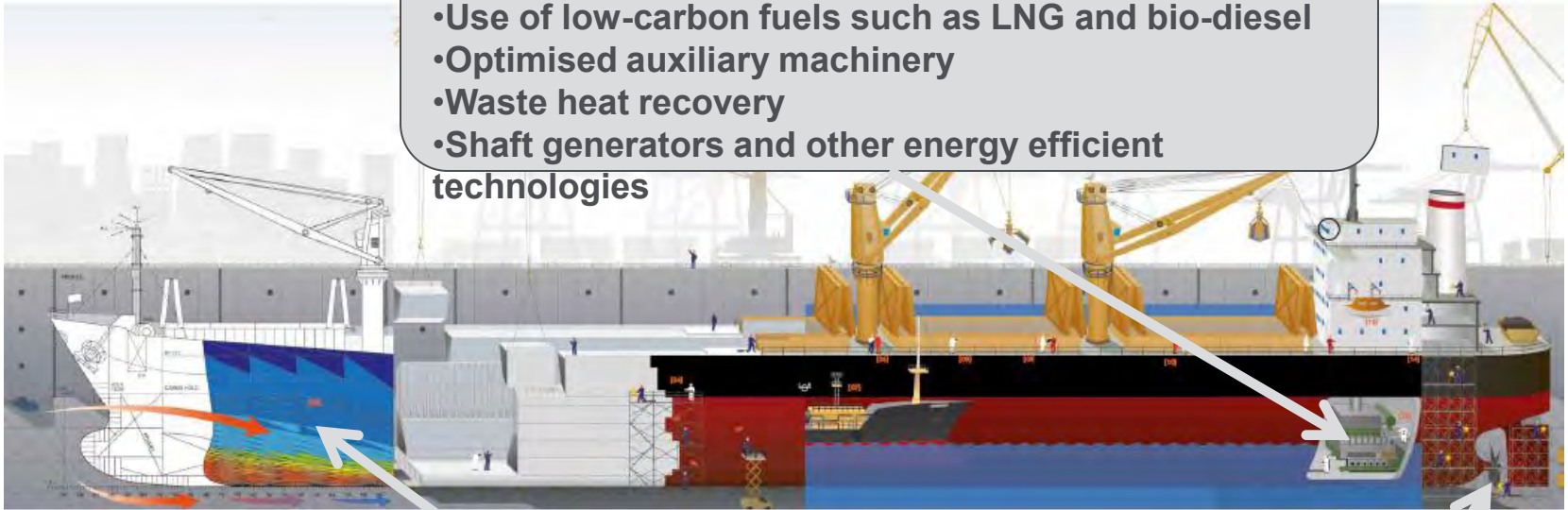
3. New technology



EEDI – What can we do?

Machinery

- More efficient engines (ME/AE)
- Use of low-carbon fuels such as LNG and bio-diesel
- Optimised auxiliary machinery
- Waste heat recovery
- Shaft generators and other energy efficient technologies



Hull

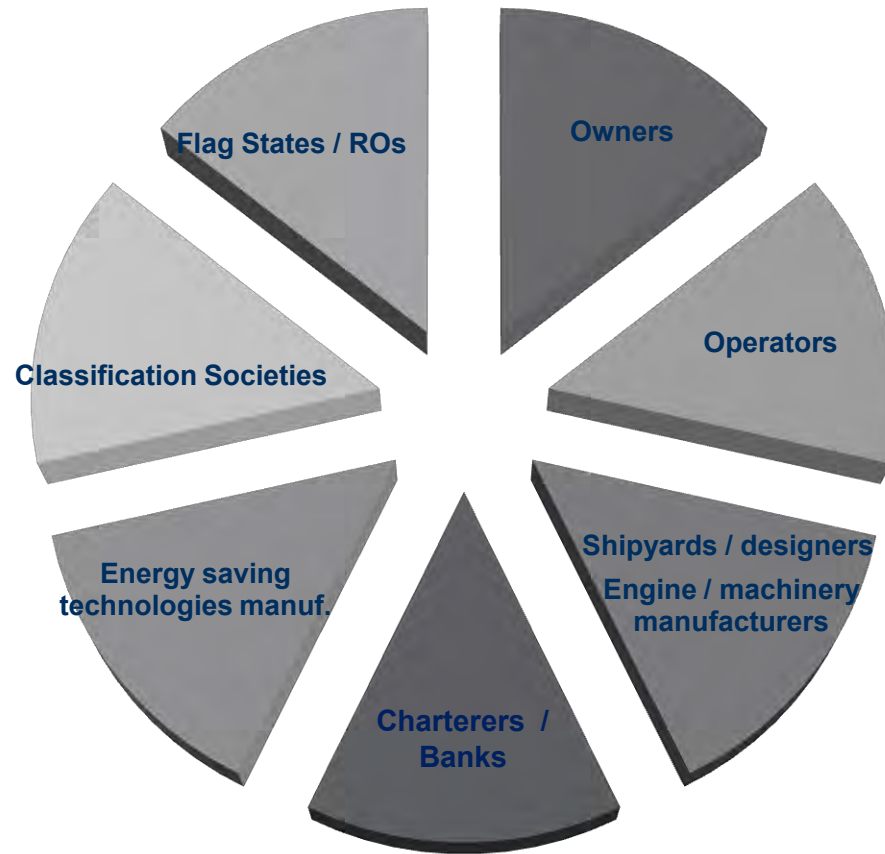
- Optimised hull form for reduced resistance
- Appendages optimisation
- Advanced hull coatings
- Increased capacity?
- Reduced lightweight?

Propulsion

- Propeller optimisation
- Variable speed drives
- Electric propulsion
- Podded propulsion
- Boss cap fins

Commercial impact of the EEDI

Who is affected by the EEDI?



Ship Energy Efficiency Management Plan (SEEMP)

SEEMP Facts

- Mandatory for ships >400 GT
- No requirement to have SEEMP approved
- MARPOL Annex VI will require SEEMP to be onboard
- May form part of SMS



SEEMP Aspects

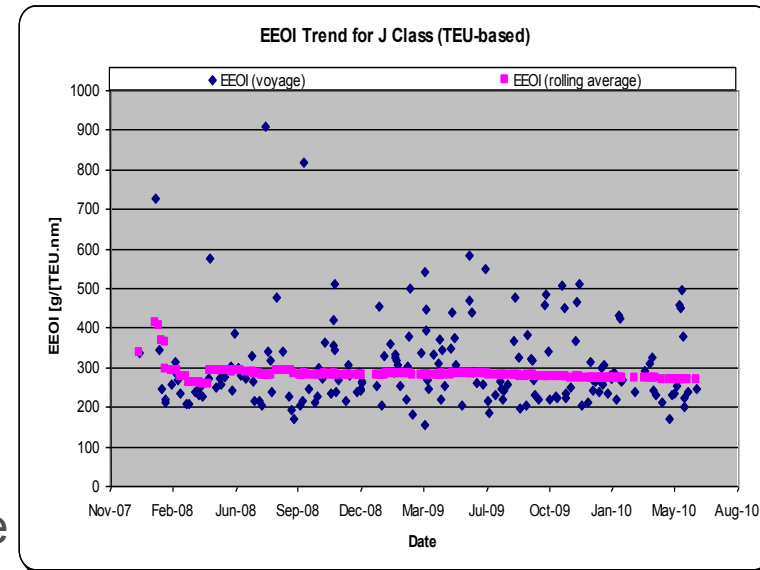
- Mini-management system (based on the continuous improvement principle)
- Elements missing: mandatory goal setting and performance auditing
- SEEMP requirements - industry driven

Monitoring – Operational Energy Efficiency

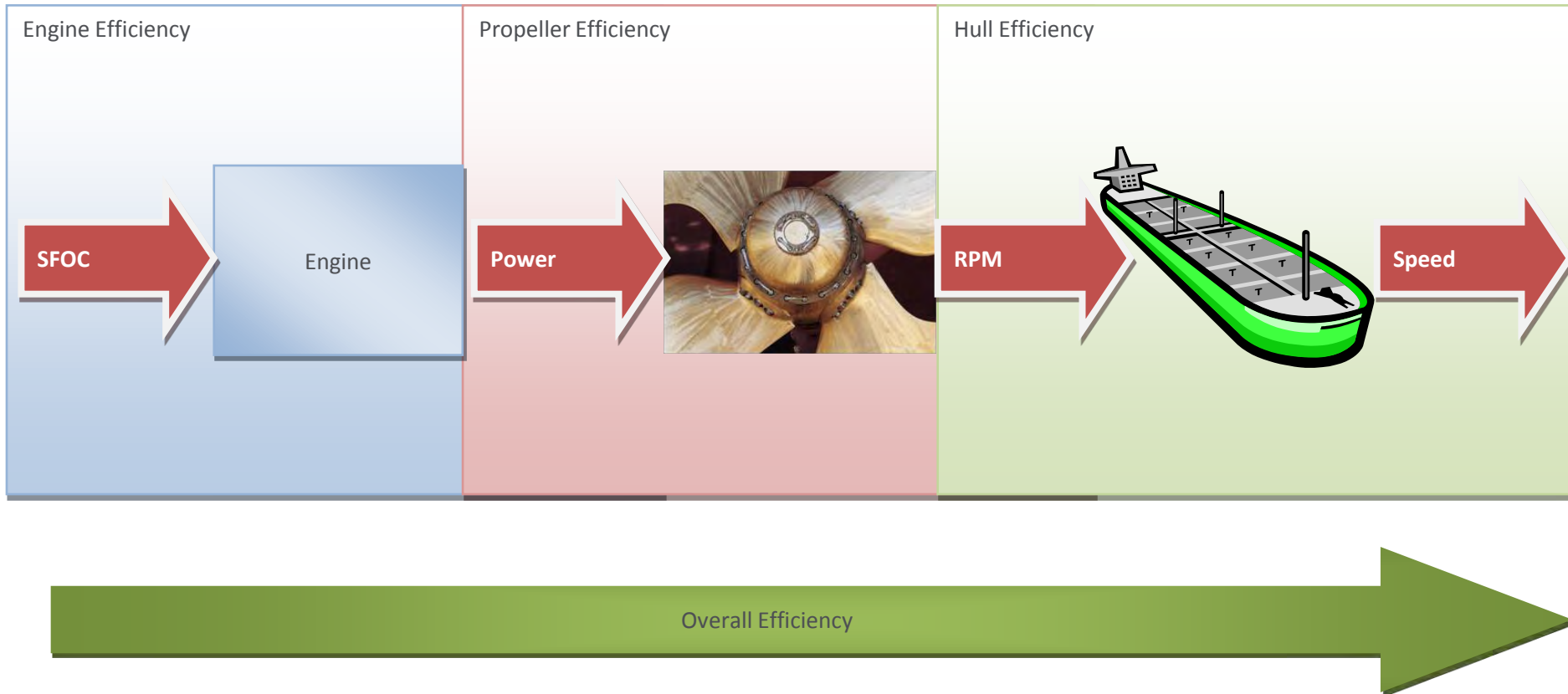
The Energy Efficiency Operational Indicator (EEOI)

- A tool proposed by the IMO to assist with the “monitoring” aspect of the SEEMP
- Generally expressed as tonnes CO₂ per tonne-nm
- Measure of overall efficiency, easy to calculate based on readily available data
- Challenging to isolate areas of bad performance unless EEOI is broken down into components and filtered

$$EEOI = \frac{\sum_j FC_j \times C_{Fj}}{m_{cargo} \times D}$$

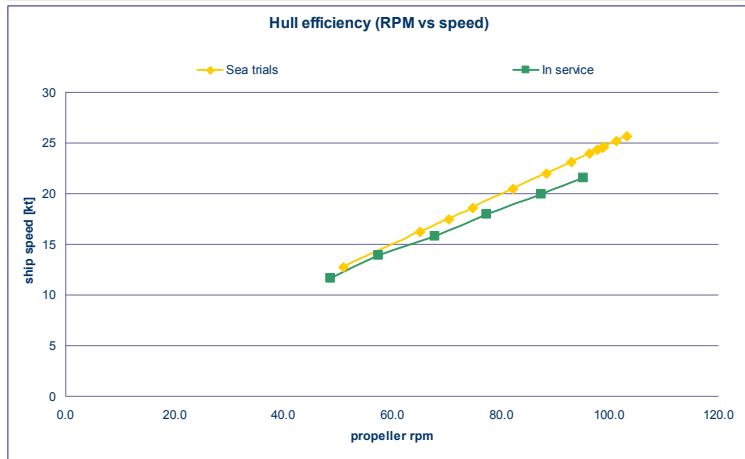
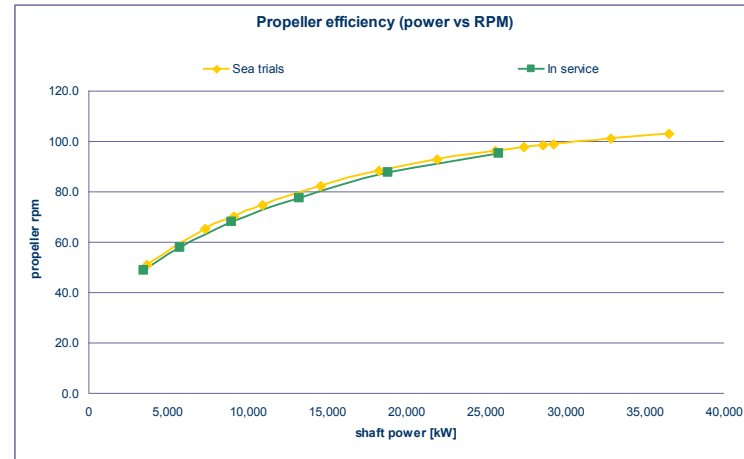
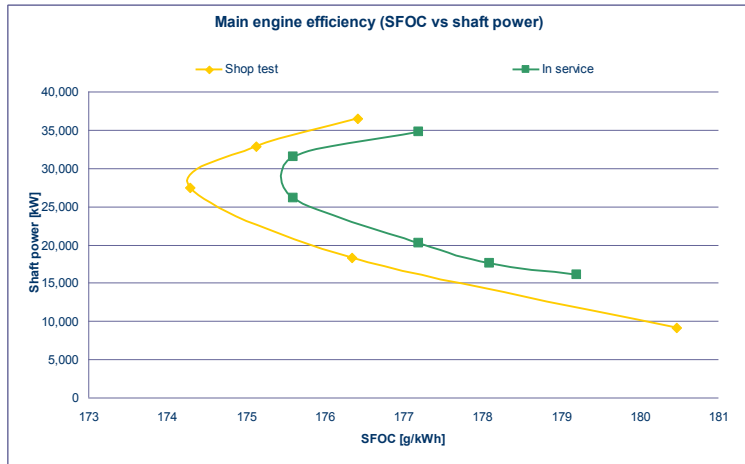


Splitting up vessel performance

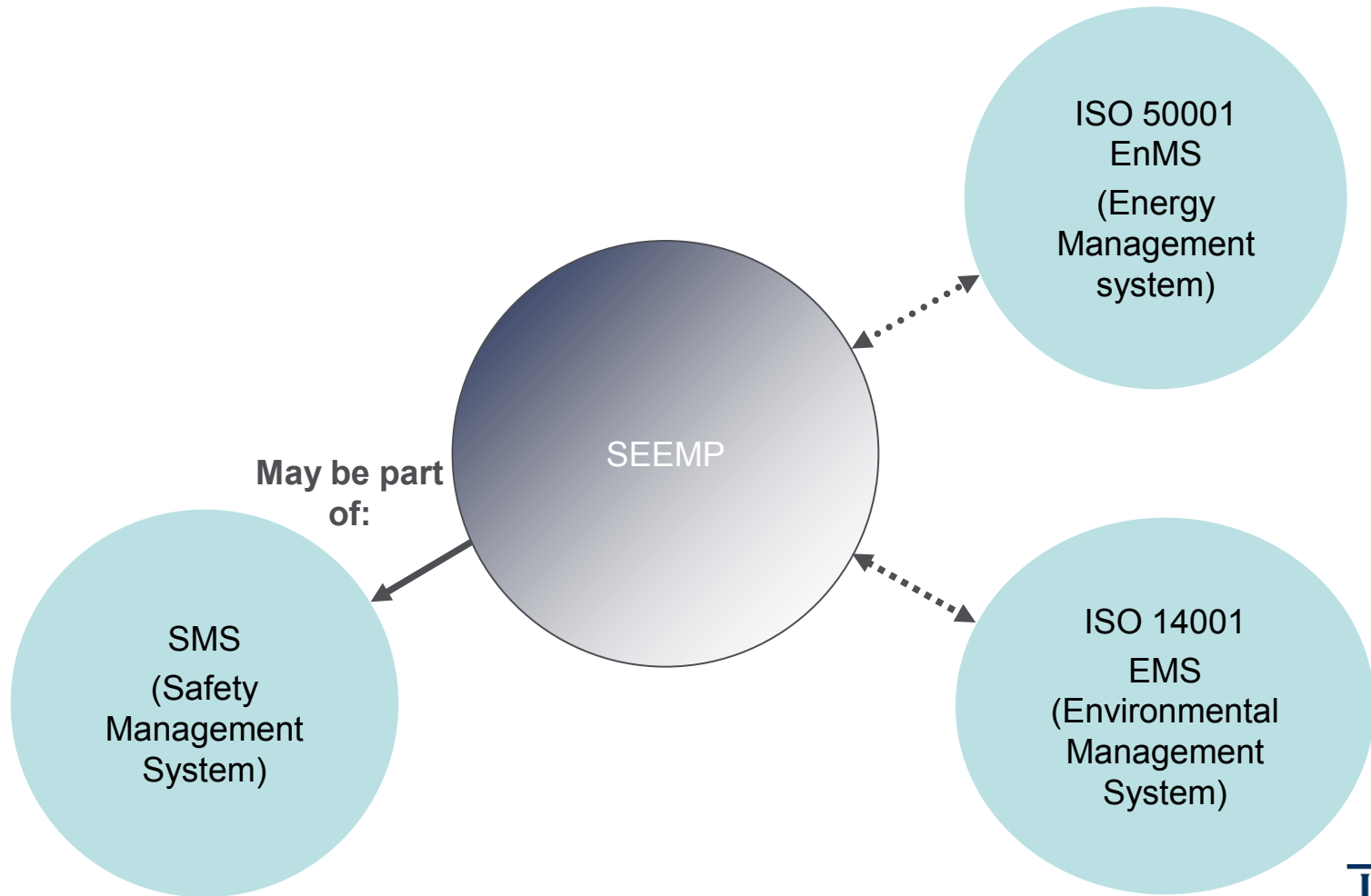


How do you split performance up ?

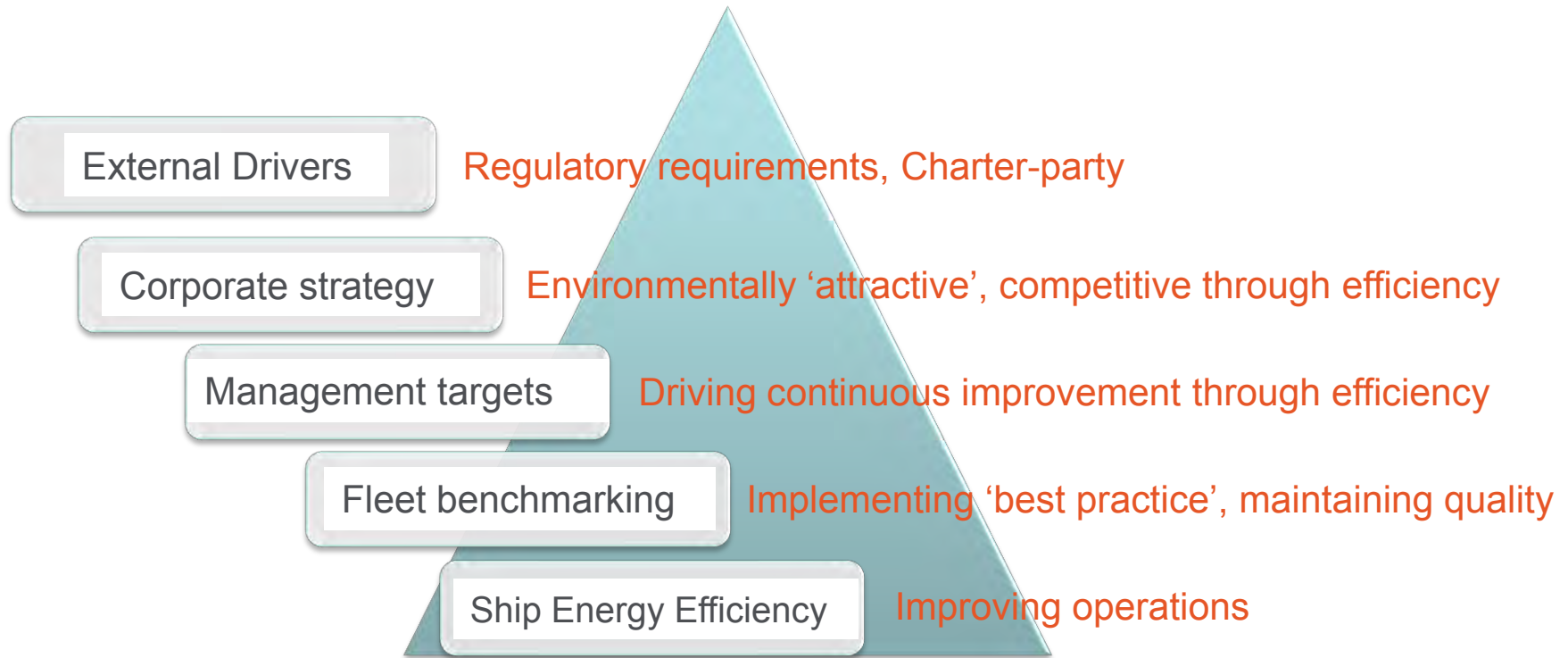
➤ Energy efficiency may also mean efficient solutions



Management System Synergies



Energy Management – How to tackle the problem?

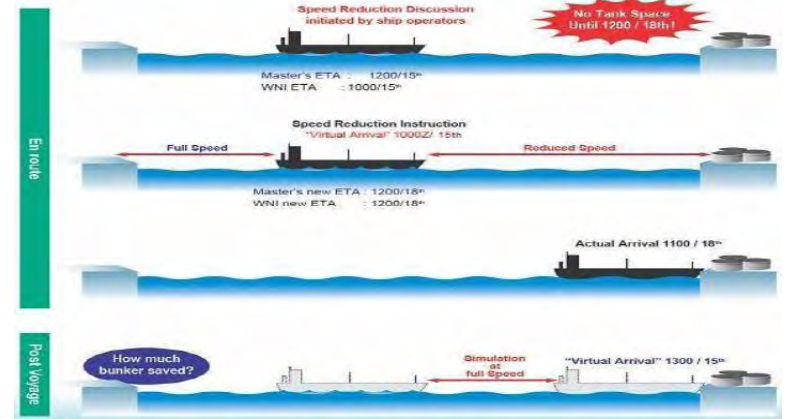
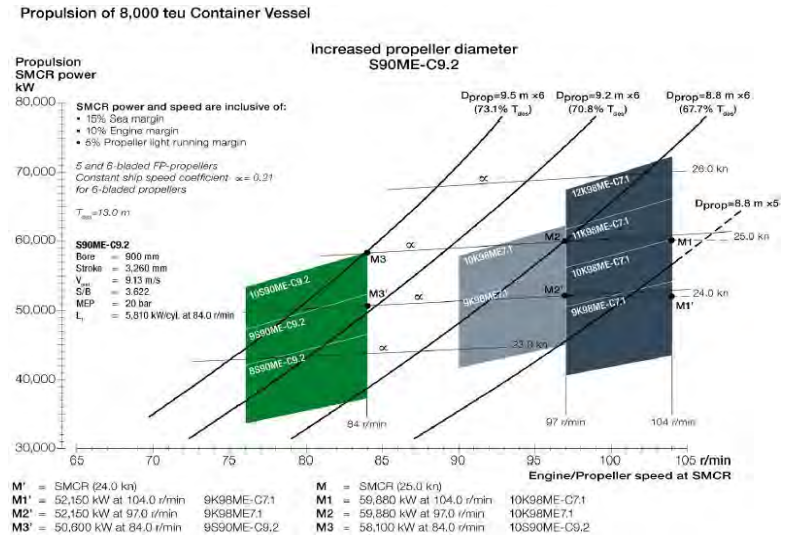


Energy Management – Building the right strategy

- Awareness of drivers and ownership of the effort
- Identify the risks, monitor the threats
- Evaluate your assets
- Develop a robust energy management system
- Identify and adopt profitable solutions

Operational challenges

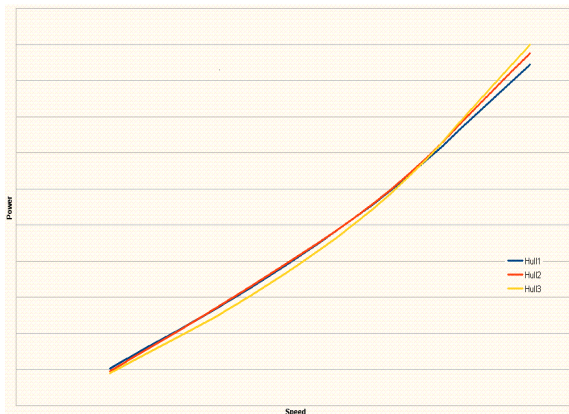
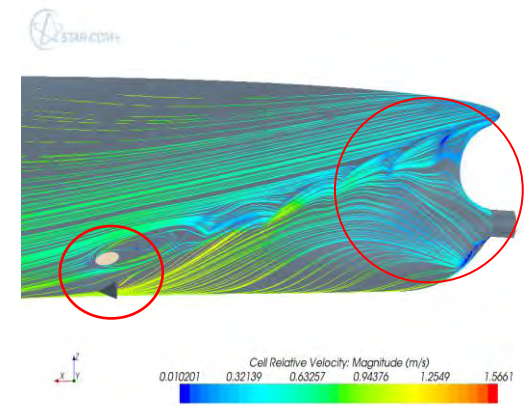
- **The Speed Factor**
 - Selecting the right design speed
 - Optimizing the slow steaming profile
- **Route Optimisation – Virtual Arrival**
 - Charterers role in Energy Efficiency
- **Port operations**
 - Efficient networks and operations
 - The importance of research
 - Cold Ironing
 - Ship to Ship



What comes after monitoring ?

Performance Optimization

Integrated solutions to meet target performance

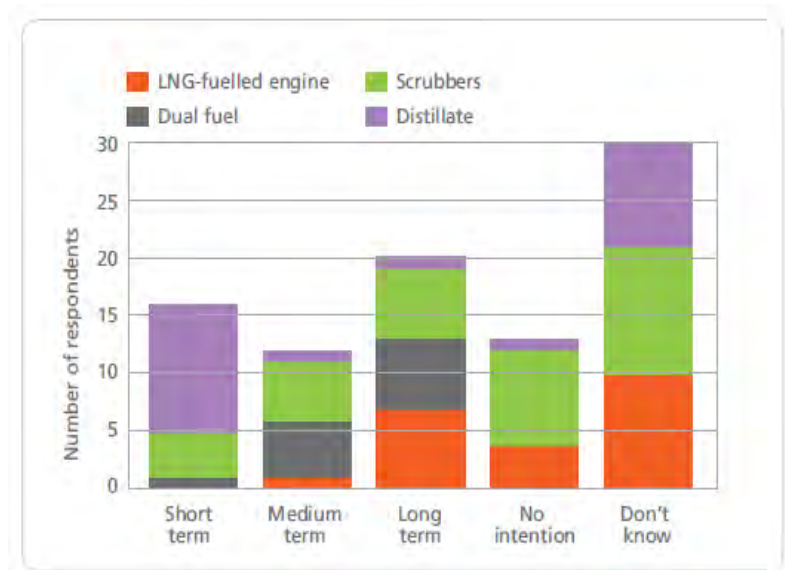


- Propeller designs
- Rudder design and bulb
- Appendages design, location
- Energy saving devices
- Hull interactions underwater
- Hull Lines (Fore, Mid and Aft Bodies)
- Aerodynamic drag optimization
- Cavitation / erosion performance

Going a step further...

- Renewable energy sources , Biofuel, Methanol, Nuclear
- LNG as fuel
 - Shipowners see LNG-fuelled engines as a viable option in the long term (10+ years), particularly for ships on liner trades
 - Low-sulphur distillate fuel is seen as a short-term solution (within the next five years)
 - Exhaust gas scrubbing is seen as a medium-term option (five to ten years)

Source: LR LNG study



Concluding Remarks

- Ship performance and efficiency is affected by many different factors, detail requires an extra amount of effort. Focussing on a few key performance parameters usually proves efficient
- EEOI can be considered as an 'overall' energy efficiency indicator but is 'crude' as a detailed measure
- It is difficult to determine the effectiveness of any efficiency measure without first setting a breakdown of the vessel's energy efficiency into individual aspects
- National or international legislative action, technology development, fuel scarcity and prices all create a very unstable environment
- Investment must be technically and financially substantiated. Beware of substitutes. Evaluation techniques can offer valuable assistance.
- Assume ownership , seek advice

What is Lloyd's Register doing?

- Continue to monitor and actively influence developments
- Communicate and provide leadership
- Help our clients to:
 - understand emerging and existing requirements
 - comply with environmental requirements
 - demonstrate their environmental credentials to stakeholders
 - Add value at all levels, strategic , tactical and operational
- Continue to work with research institutes, regulators and clients, in numerous Joint Industry Projects to develop solutions



Thank you !

For more information, please contact:

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