

LNG SHIPPING & TERMINALS WEBINAR WEEK

WEBINAR

TUESDAY 15 JULY
09:00-10:00 BST

Advancements in LNG fleet efficiency and performance optimisation

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Gavin Stevens

Head of Asset Management – Gas Shipping
MOL (Europe Africa) Ltd

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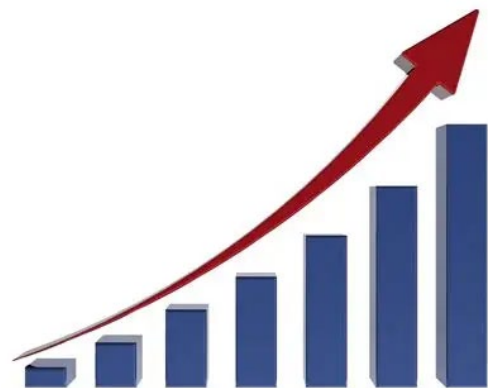
Contents

- 1. The Big Picture**
- 2. Technology Driving The Shift**
- 3. Operational Optimisation**
- 4. Conclusion**



1

THE BIG PICTURE!



LNG DEMAND IS GROWING



EU ETS / FUEL EU



MARKET COMPETITION

HOW DO LNG SHIPOWNERS DELIVER MORE WITH LESS – WHILE STAYING COMPETITIVE?

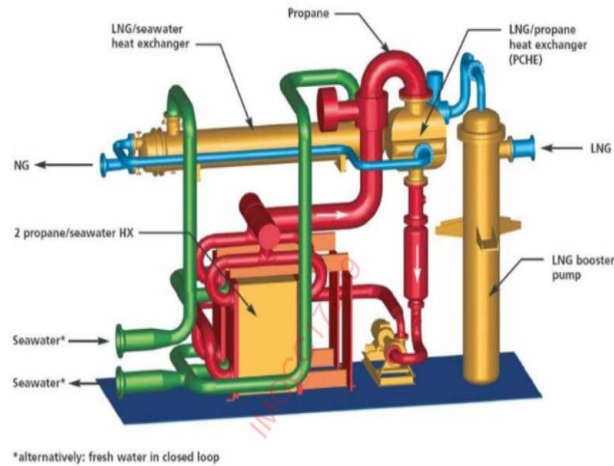
(LESS FUEL, LESS CARBON, LESS DOWNTIME)

2 TECHNOLOGY DRIVING THE SHIFT



ENGINE TECHNOLOGY

(DUAL FUEL)



BOIL OFF MANAGEMENT

(CARGO TANK INSULATION)
(RELIQ PLANTS)



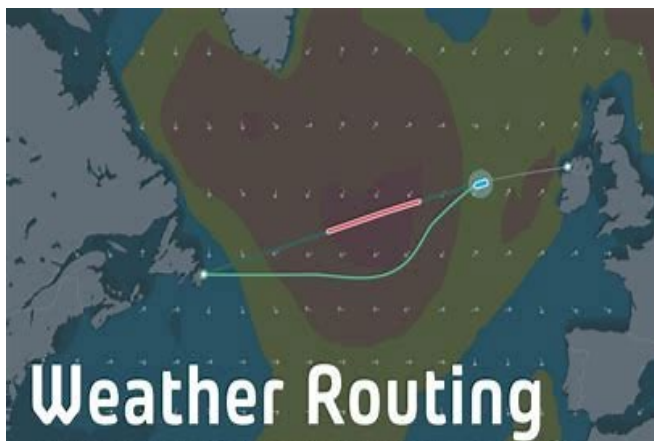
DIGITALISATION

(PERFORMANCE)
(DIAGNOSTICS)
(BIG DATA)



ENERGY SAVING DEVICES

(WIND SAILS)
(HULL COATINGS)
(AIR LUBRICATION)
(PBCF)
(LED LIGHTING)



- 1. EFFICIENCY IS THE 'NEW FUEL' – THIS WILL SEPARATE THE LEADERS FROM THE LAGGARDS IN LNG SHIPPING.**
- 2. THE 'WINNING FORMULA' IS SIMPLE:**
 - i. LEVERAGE THE RIGHT TECHNOLOGIES
 - ii. OPTIMISE OPERATIONS WITH DATA
 - iii. EMPOWER PEOPLE TO ACT ON INSIGHTS
- 3. START SMALL – PILOT A SYSTEM, TEST A ROUTE, RETROFIT A VESSEL
(OR INSTALL ON NEW BUILDS)**
- 4. THEN SCALE WHAT WORKS.**

THANK YOU FOR LISTENING



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LNGCs – holistic design for operational efficiency

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FORCE Technology

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LNG
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SAFINAH
Protection is in our Nature

LNGCs – holistic design for operational efficiency – 15th July 2025, KW Hutchinson, Safinah

Advancements in LNG Fleet Efficiency & Performance Optimisation – LNG Shipping & Terminals Webinar Week, Riviera Marine Media, Online (RMM Webinar), United Kingdom, 15th to 17th July 2025

Presentation Agenda

Introduction

1. Traditional ship design 'exam question'
2. Ship life cycle – extent, modelling, environmental, costing
3. Ship operation – drivers
4. Ship design – criteria and approach
5. Ship powering – attributes/options, fuels
6. Ship realisation – *optimalish* and robust

.... and following the presentations, questions ... and maybe a few answers?



1. Traditional ship design ‘exam question’

- Ocean-going commercial ships (deadweight or capacity carriers) are still designed primarily to provide specified:

- transportation capability - **namely cargo carrying capability**
- service speed and range

minimum cost (CAPEX)

- Shipbuilders need to provide a design (answer!) considering:

- low risk compliant technical responses
- low margins and fluctuating demand
- commercial advantage / production processes
- evolution of standard of ship types / sizes
- often limited / no concept design capability
- little appreciation of operational aspects
- designs to suit shipyard not the shipowner

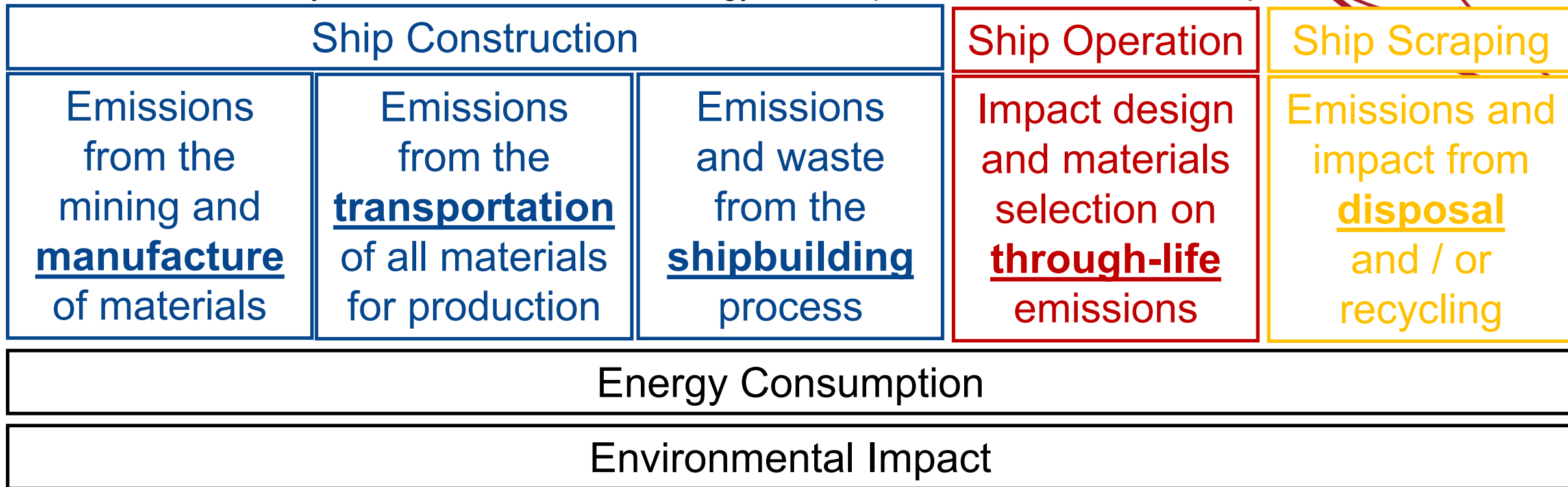
transpose operationally effective design



2. Ship life cycle - extent

○ Life Cycle Analysis / Assessment

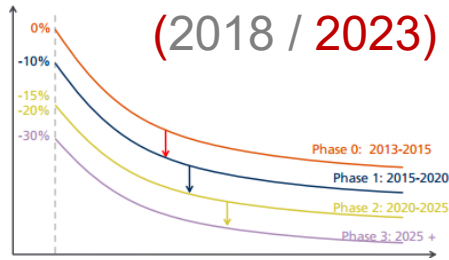
- Awareness is leading to the implementation of improvement in production processes
- Recycling is a means of reducing waste streams, and reducing the demand for waste treatment
- Objective to minimise resource utilisation and associated emissions of all streams of materials
- Used to identify, evaluate and minimise energy consumption and environmental impacts



3. Ship operation - drivers

Regulatory drivers include:

- EU MRV – designed to measure and reduce CO₂ emissions (1st January 2018)
- IMO MARPOL Annex VI - 0.5% global sulphur cap (1st January 2020)
- IMO GHG Strategy - reduction carbon intensity : 40%/40% 2030, (2018 / 2023) - red. greenhouse gas (GHG): 20%(30%) 2030, 70%(80%) 2040, 50%/100% 2050
- EEDI, efficiency criteria for new-build ships (2013 to 2025) – innovative technology?
- EEXI, efficiency criteria for existing ships (1st January 2023)
- CII (operational efficiency) and SEEMP (management systems) (1st January 2023)

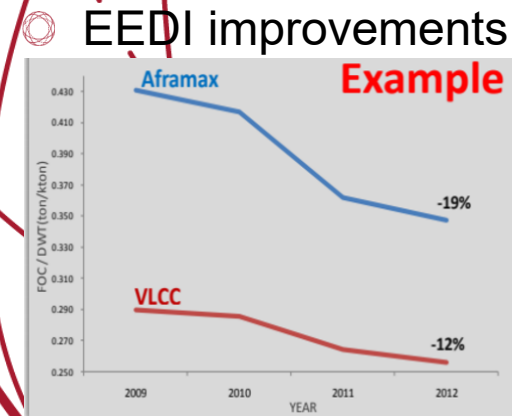


Other drivers include:

- Clean port operations - cold ironing, clean fuels
- Focus carbon footprint throughout supply chain
- Pressure clean / zero carbon fuels - CH₄, N₂O slip

Possible 'plus points':

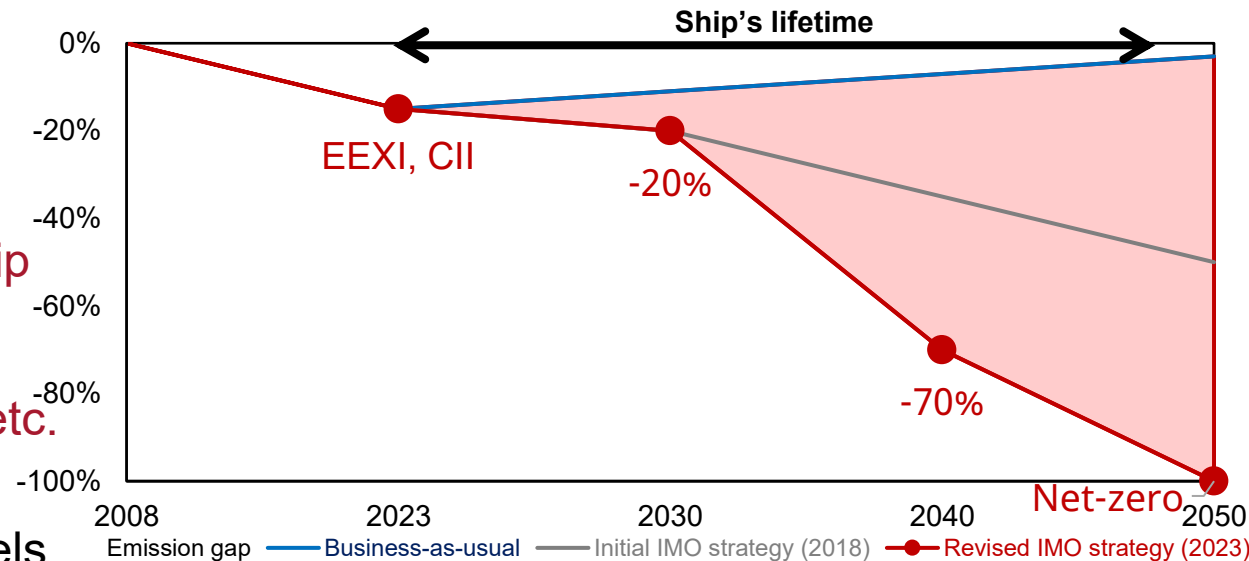
- Red. fuel cost, emissions, markets – levys, tax, etc.
- Red. first and through-life (maintenance) costs
- Reputational advantage inc. efficiency / clean fuels



E Pang (2022)

70%/Net-zero 2050

50%/100% 2050



LNGCs – holistic design for operational efficiency – 15th July 2025, KW Hutchinson, Safinah

Adapted from J Grant, Wartsila Marine Power (2022/4)

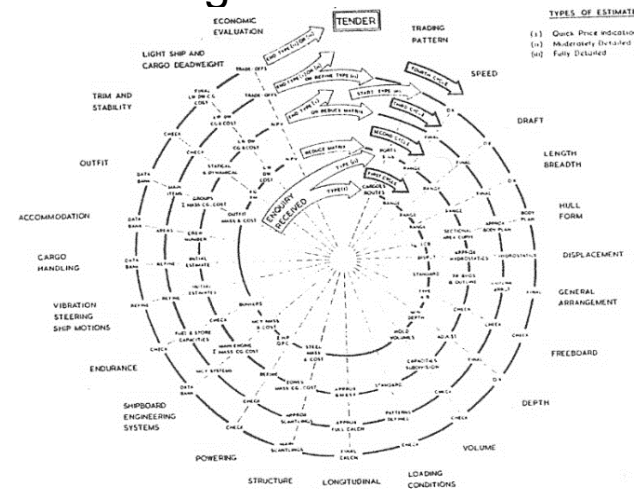
4. Ship design - criteria and approach

- Specification – Transportation capability and Service speed, range, etc.
- Multiple, often conflicting, operational performance criteria:

- Dimensional Constraints
- Cargo Storage / Handling Requirements / Offloading
- Arrangement – Operations / Maintenance
- Stability and Seakeeping / Operability
- Manoeuvring / Positioning
- Structural, Engineering systems
- Statutory requirements, etc.

- Phases - sequential / concurrent:

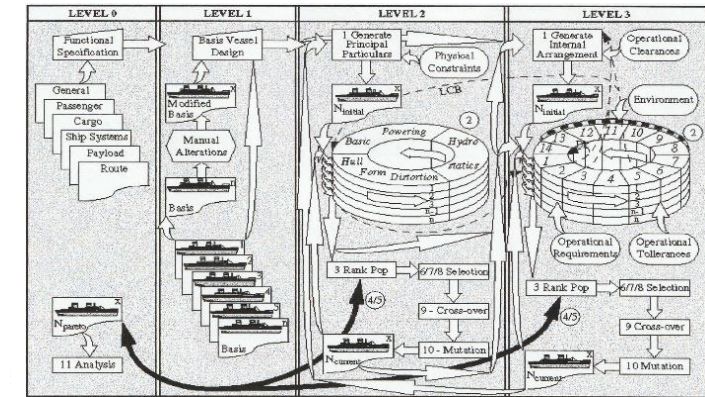
- Feasibility Studies
- Concept Design
- Basic Design (Pre-FEED)
- Design to Class (FEED)
- Detailed Design
- Tests and Trials / Forensic Analyses / Redeployment / Upgrade / Recycle



Evolution

Strategic model for ship design
'Design Spiral' (IL Buxton 1971)

Multiple Criteria Decision Making (MCDM)



Synthesis (MODM) Selection (MADM)

Global information, optimisation (Shell),
evaluation (Engine) and selection (Methodology)
ship design model (KW Hutchinson 1998)

5. Ship powering - attributes and options

○ Ship resistance elements:

- Hull - form, bow, stern, lubrication
- Appendages - keels, rudders, fins
- Deductions - chests, tunnels - doors
- Weather - waves, wind - route(s)
- Fouling, etc. - coating, UV, ultrasonic



○ Ship propulsion elements:

- Hull efficiencies etc. - stern, ESDs
- Propulsor(s) - type, no, size, location
- Transmission - shafting, gearing, PTO
- Prime-movers - engines, gens/motors



○ Ship operation, bunker requirements and greenhouse gas (GHG) emissions:

- Operational Profile(s) - draughts / trims, activity / speeds, routes / ports, weather, in-service / cleaning
- Fuel(s) - HFO, MDO, LNG, CH₃OH, NH₃, H₂, Batteries, Hybrid, etc. ... and there production / generation!
- Main and Auxiliary machinery - Engine type, scrubbers, SCRs, CO₂ capture, etc.
- Enhancements / retrofits

○ Approach:

- Empirical
- Methodical / Statistical
- CFD codes
- *Numerical Model Tank?*
- Physical Model Tests



6. Ship realisation – optimal~~ish~~ and robust

○ Principal dimensions / particulars - evolution or revolution:

- Paramount driver on efficiency (**resistance and propulsion**), fuel costs (**OPEX**)
- Often prematurely frozen too early in the design process
- Influence previous designs, perceived drivers of existing designs
- Influence of shipyard production processes, infrastructure constraints, etc.
- Dimensions and form ratios / coefficients optimised for minimum OPEX seldom coincide with those for minimum lightship / CAPEX - “**steel is cheap and air is free**”!

○ Trade-off, developed solution(s) must:

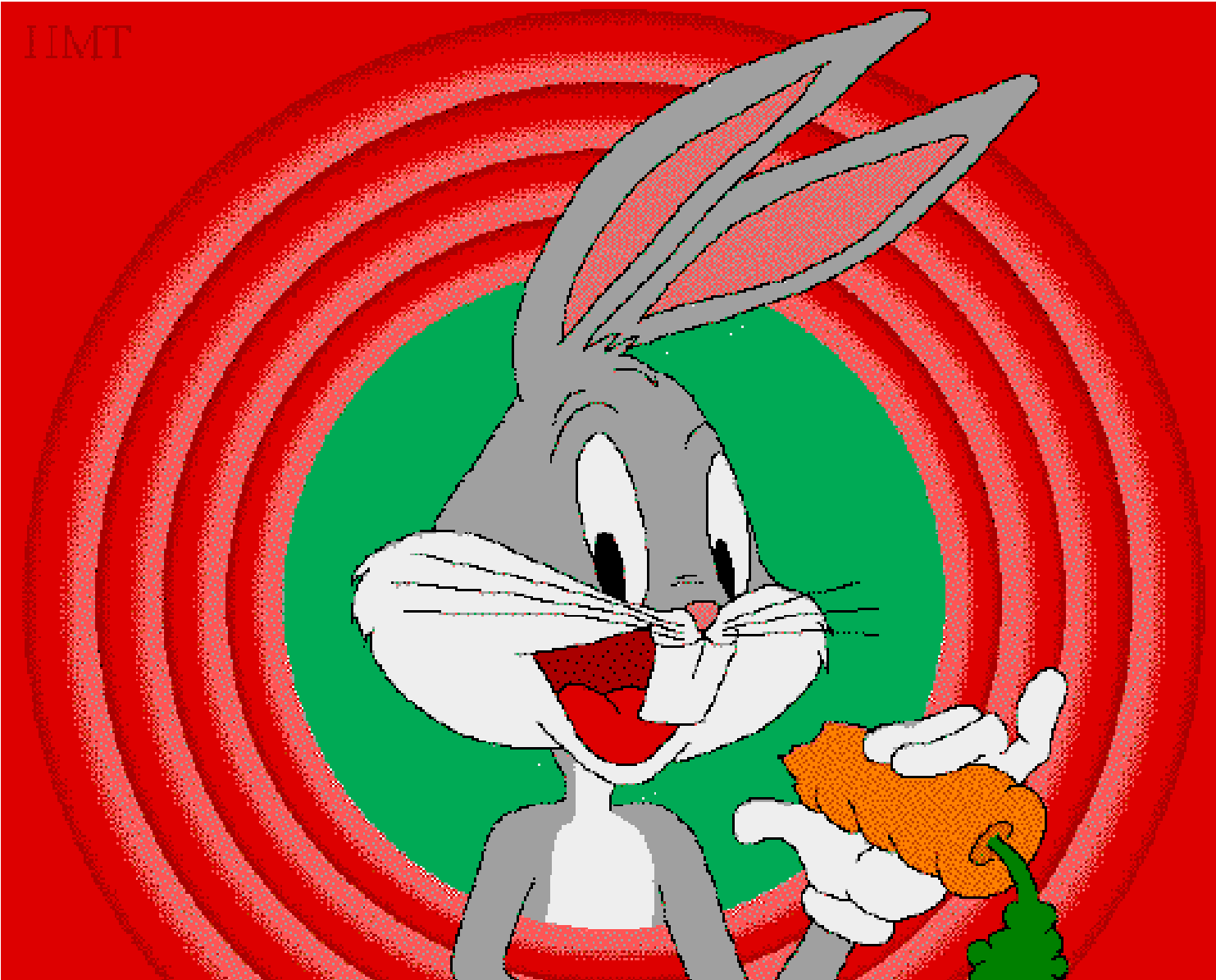
- concurrently satisfy / optimise compliance
- maximum operational efficiency / min. installed power (SMCR)
- minimising cost (CAPEX and OPEX)



○ Iterative by nature of ship design, including design of propellers / engine selection:

- Production of highly efficient ship designs = **holistic, cohesive, coordinated optimisation of design criteria**
- Optimal resistance / propulsion efficiency = **ship designer + propulsor manufacturer + engine manufacturer**
- Key to robust and efficient ship designs = **close, creative, collaborative relationships ... “the three Cs”**

IIMT



**That's
all
folks!**

**... well, from
me for now anyway
until the Q&A.
Thank you for you
attention**

Back to you Edwin

UPCOMING EVENTS

8 SEPTEMBER 2025 • MILAN

CO2 SHIPPING,
TERMINALS & CCS
CONFERENCE EUROPE

An industrial facility with large storage tanks and complex piping, likely a CO2 capture plant.

CO2 Capture,
Transport & Storage

21-22 OCTOBER 2025

LNG SHIPPING
& TERMINALS
CONFERENCE

An aerial view of an LNG ship at a terminal, with large storage tanks and infrastructure visible in the background.

LNG SHIPPING &
TERMINALS

24 NOVEMBER 2025

TANKER
SHIPPING & TRADE
CONFERENCE

A large oil tanker ship sailing on the ocean.

TANKER
SHIPPING & TRADE

Scan here to see the full events schedule



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