DECARBONISING SHIPPING

IS IT ONLY ABOUT ALTERNATIVE FUELS?

JOINT WÄRTSILÄ - DNV GL WEBINAR
NOVEMBER 3, 2020

AGENDA:

- GHG Status and Updates
- Propulsion Energy Saving Technologies
- Complying regulations with operational efficiency systems
- Q & A Session
- Panel Discussion

PRESENTED BY:

Eirik Nyhus
Director, Environment, DNV GL – Maritime

Piet van Mierlo
Team Leader, Product Team Propellers Wärtsilä

Matt Johnston
Manager, Environmental Standards, Australian Maritime Safety Authority (AMSA)

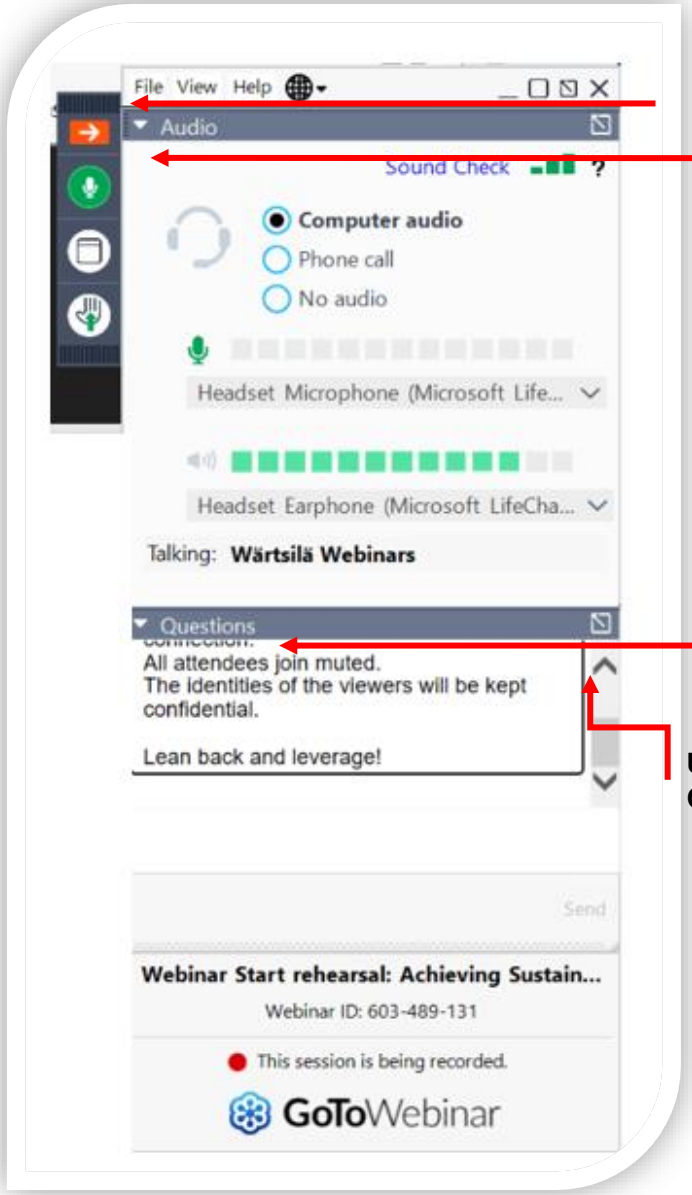
Jonathan Abrahams
Head of Maritime Advisory, ANZ, Advisory Australia, DNV GL – Maritime

Sanjay Verma
General Manager, Market Innovation Wärtsilä

WEBINAR PRACTICALITIES

The webinar is *45 min + up to 15 min Q&A*

- High bandwidth Wi-Fi or hardwire is better
- You will be muted when you join
- Questions can be sent with the *questions widget* in the control panel
- The recording will be shared after the webinar
- Local telephone numbers at own cost (in case audio by telephone)
- Sit back and gain insight!



Test audio if needed
File>Preferences>Audio

Hide control panel

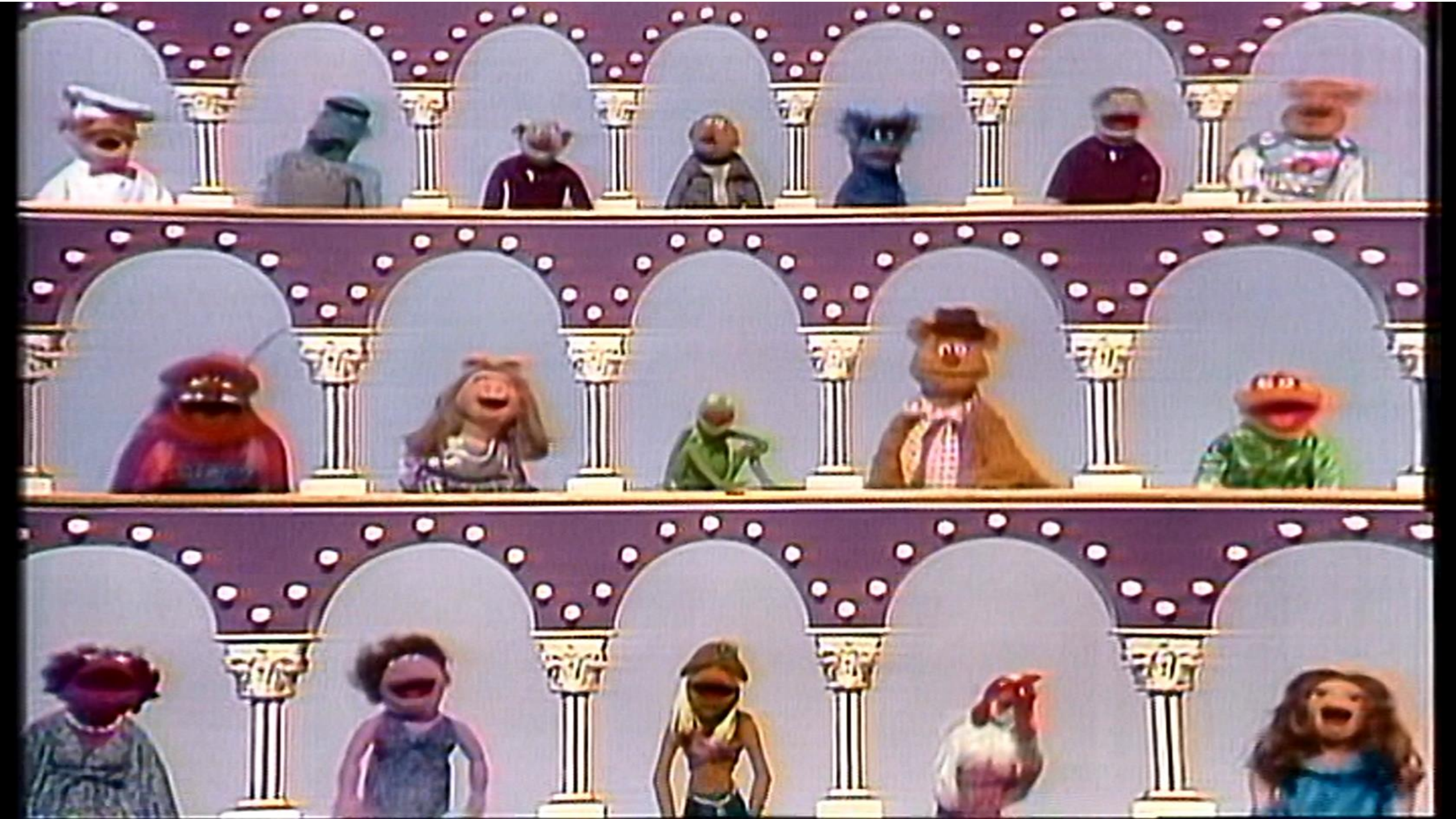
Ask a question using the widget

Use this to undock the Questions widget

POLL #1

Greenhouse gas regulations – status and update November '20


RLD SAILING



IMO GHG Strategy

2018 (MEPC 73) - IMO strategy on GHG reductions – vision and ambitions

- Vision:

"IMO remains committed to reducing GHG emissions from international shipping and, as a matter of urgency, aims to phase them out as soon as possible in this century"

- Ambitions:
  - review EEDI with the aim to strengthen requirements
  - **reduce the average carbon intensity (CO2 emissions per transport work) by 40% in 2030 and 70% in 2050 compared to 2008**
  - reduce total GHG emissions from shipping by at least **50% in 2050** compared to 2008

Focus on finalizing short-term measures, proposals for medium-term measure materializing

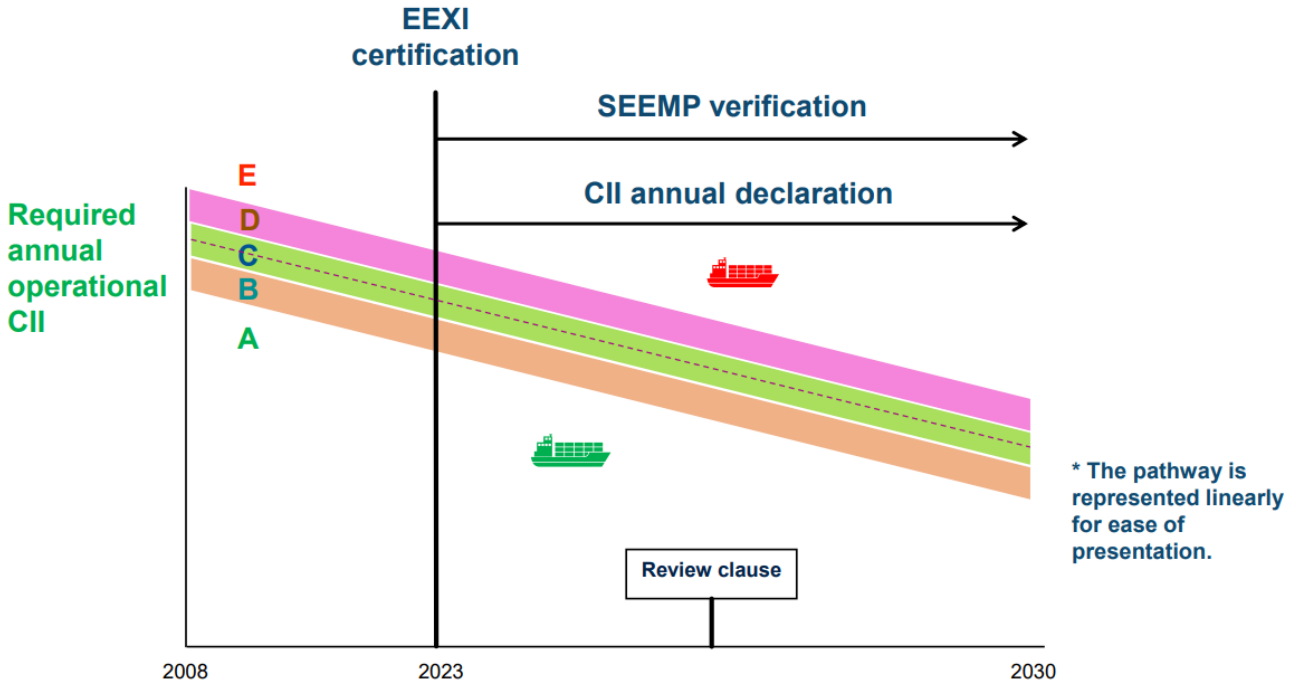
- **Two short-term approaches under consideration**
  - **"Technical"**: **EEDI for Existing Ships (EEXI)** – retroactive requirements applied to existing ships
  - **"Operational"**: **Enhanced SEEMP** - mandatory reduction targets for operational emissions

- **Medium-term proposals (entry into force after 2023)**
  - International Maritime Research and Development Board (IMRB)
  - GHG and carbon factors for fuels, LCA guidelines
  - Methane emission
  - Energy Efficiency Design Index (EEDI) Phase 4

GHG Status November 2020

Outcome of ISWG-GHG 7 (October 2020) - short-term measures

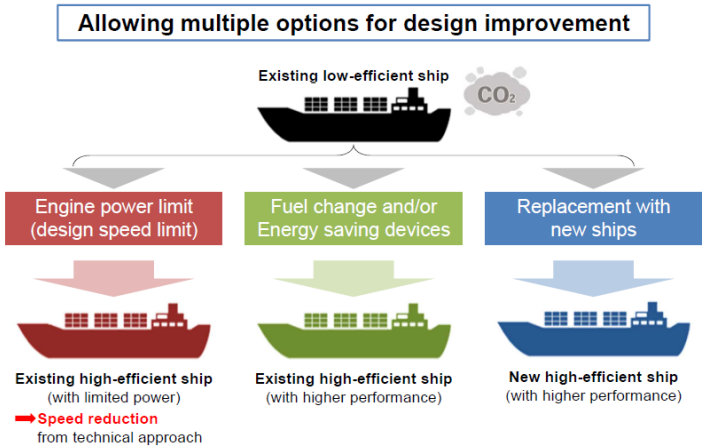
- Technical (i.e. design): **Energy Efficiency for Existing Ships** (EEXI) - EEDI applied to existing ships
- Operational: **Enhanced SEEMP** with mandatory **Carbon Intensity Indicator** (CII) **rating scheme** (A-E)
- Measures consolidated into a single package; the outcome is a finely balanced **political compromise**
- If approved at MEPC 75 in November 2020: **Entry into force expected on 1 January 2023**



Source: GHG-INF.2/1/1

Technical measure: Energy Efficiency Existing Ship Index (EEXI)

- **Requirements**
  - **All cargo and cruise ships above size thresholds on first annual survey after 1 January 2023** (same ship types and sizes as for EEDI): attained EEXI to be below required EEXI
  - Required EEXI is equivalent to **EEDI requirements** early 2022 (Phase 2 / Phase 3) – with some adjustments
- **Calculating EEXI**
  - Existing ships determine their EEXI using the **same method as for EEDI**, with further options available for determining speed
  - Goal-based: **Operators decide** how to achieve target (Engine Power Limit, fuel change, energy saving devices, retrofitting and/or any other options)
  - Engine Power Limit can be overridden: allows for **extra power in an emergency**



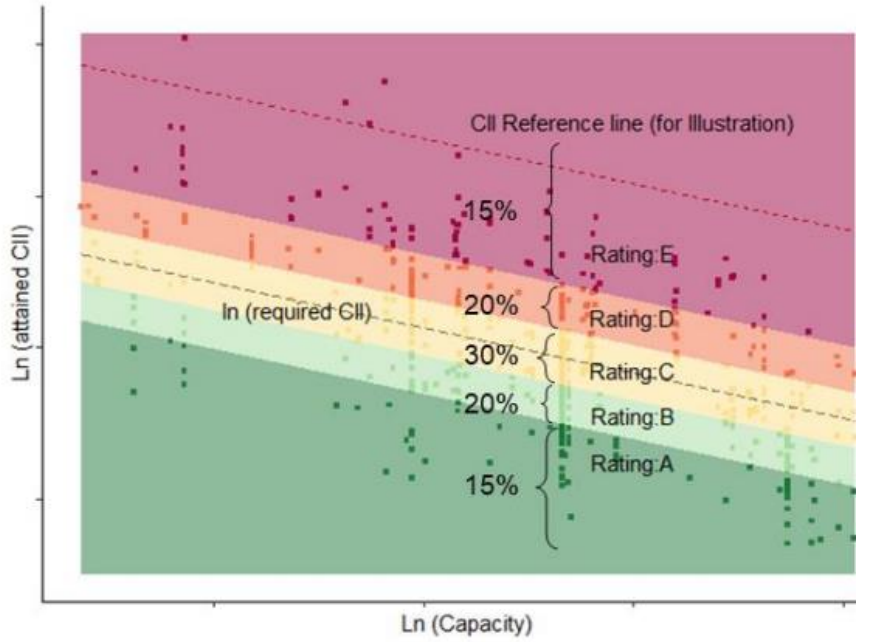
Ship type	Required EEXI*
Bulk carrier	Δ15-20% by size
Tanker	Δ15-20% by size
Container	Δ20-50% by size
General cargo	Δ30%
Gas carrier	Δ20-30% by size
LNG carrier	Δ30%
Reefer	Δ15%
Combo	Δ20%
Ro-ro/ro-pax	Δ5%
Ro-ro (vehicle)	Δ15%
Cruise ship	Δ30%

**) Reduction from EEDI reference line*

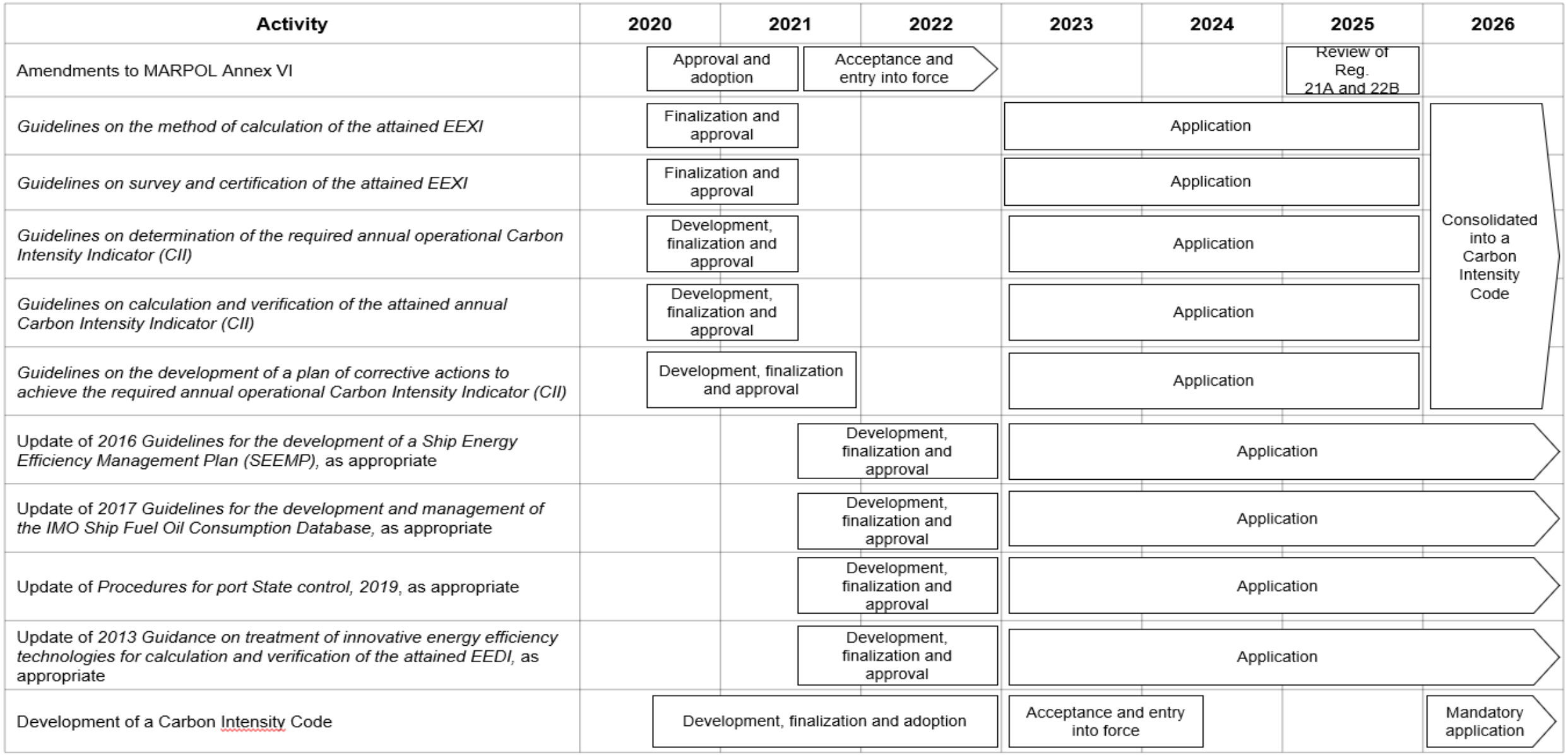
Ship and company actions	Verification	Surveys and audits
EEXI calculation and technical file	→ EEXI technical file verification	→ First annual survey – new IEEC issued

Operational measure: Enhanced SEEMP and Carbon Intensity Indicator rating

- **Requirements:**
  - **All ships above 400 GT - by 1 January 2023:** Develop an approved energy efficiency improvement and decarbonisation plan as part of the SEEMP
  - **Cargo and cruise ships above 5000 GT – every year from 2023:** Calculate a Carbon Intensity Indicator (e.g. AER) and a rating A-E based on thresholds. Each ship will be required to meet the CII target: rating C or better. Rating thresholds will gradually become more stringent, and in line with 40% reduction target in 2030. Will be differentiated based on ship type and size.
- **Enforcement:**
  - If rating D for three consecutive years or rating E: develop and implement an approved plan for achieving rating C or better
  - The SEEMP is subject to verification and company audits (to be defined)
- **Other elements:**
  - Review to be conducted by 1 January 2026 – will particularly look at
    - strengthened corrective actions
    - need for enhancement of the enforcement mechanism
  - Carbon Intensity Code to be developed to ensure mandatory application



Indicative workplan on amendments to MARPOL Annex VI and the development of associated guidelines and a Carbon Intensity Code



International Maritime Research and Development Board (IMRB)

- **Accelerate the development** of low-carbon and zero-carbon emission technologies
- Funded by a **mandatory payment per tonne of fuel oil** purchased (2 USD/tonne for all ships > 5000 gt)
- Approximately **five billion US dollars** over the life of the programme
- Cross-checking of payments against emissions reported in DCS
- Likely to trigger a more general debate on **Market Based Measures**

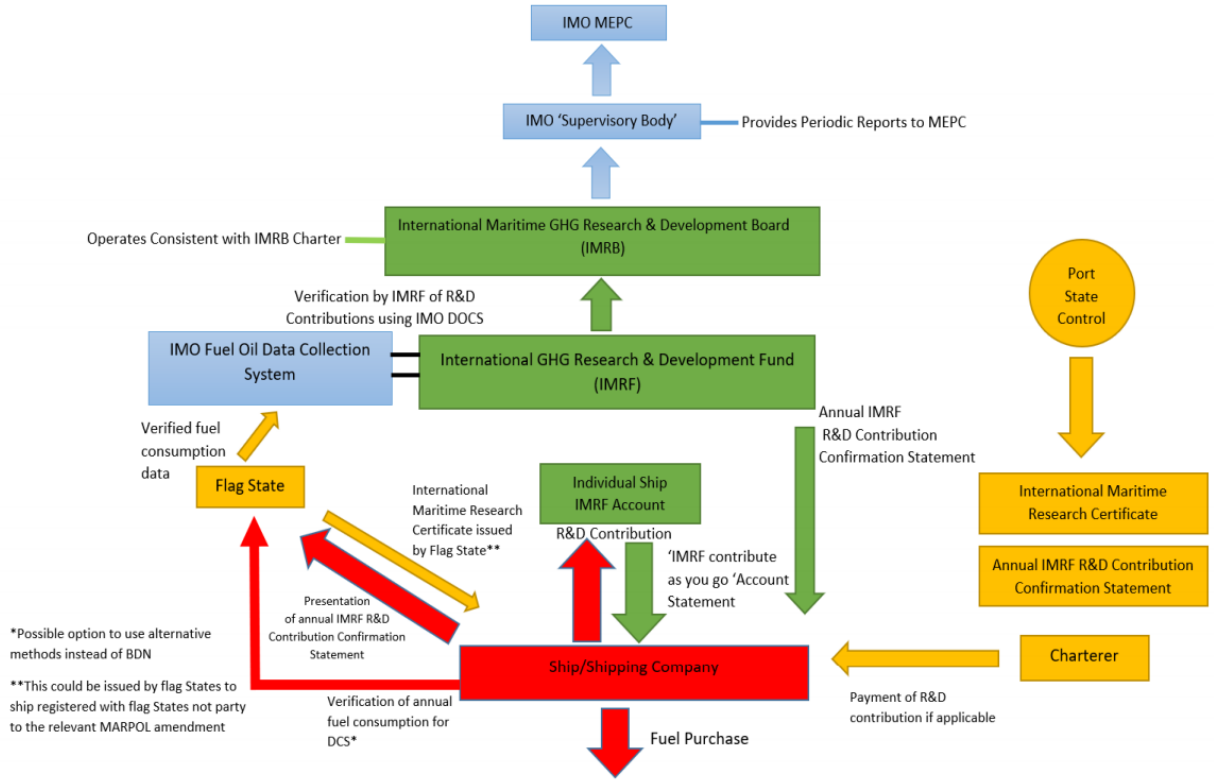


Figure 1 Graphic illustration of how the IMRB and IMRF contribution system would work

European Union

EU developments – new Commission, new MEPs… new policies

- The "**European Green Deal**"
  - Climate neutral Europe by 2050, **incl. shipping** (90%)
  - New EC 2030 **EU target**; 40% → 55% / 60% reduction (1990 baseline)
  - Strong push from EP and EC to include **shipping in ETS**, but proposed timing and scope differs
  - **European Climate Law** (mid-2021) key vehicle for future actions

- **MRV / DCS alignment**
  - Only partial alignment expected, EU "trialogue" commencing late 2020, **finalisation Q1/Q2 '21**
  - MRV and DCS will remain as distinct systems with separate reporting obligations

EP-proposed amendments to MRV regulation, highlights

- EC by end-2022 to consider expanding MRV to ships **400 – 5000 GT**
- **ETS for shipping** in 2022
- **"Ocean Fund"**, financed by at least 50% of ETS revenues
- **40% efficiency improvements** by 2030 (2018/2019 baseline)
- **Performance labelling** system for ships – EC to propose by July 1 2021
- EC to provide assessment report on the **impact of GHG emissions other than CO2 and CH4**
- EC proposal for regulation **of air pollutants and the discharge of waste-water**, including from scrubbers, required no later than end-2022

- **Only some** elements expected to become part of MRV
- Others (e.g. ETS) will progress under the **Climate Law** and the **Zero pollution action plan for water, air and soil,** to be agreed next year
- Negotiations between EP, EC and council **will continue well into '21**

The future?

Regulations on the horizon - not only IMO, and not only greenhouse gases

- **Invasive species / Hull bio-fouling**
  - Increasing focus on biofouling
- **Particulate matter (PM) & NOx**
  - EU focus on NOx & PM2.5 emissions in own coastal areas
- **Underwater noise**
  - Draft IMO guideline remain under continuous review
- **Ship recycling**
  - EU regulation in force, Hong Kong Convention moving slowly
- **Plastics from ships**
  - Work started, completion towards 2025

- Expect an increasing number of **domestic / port / local** regulations

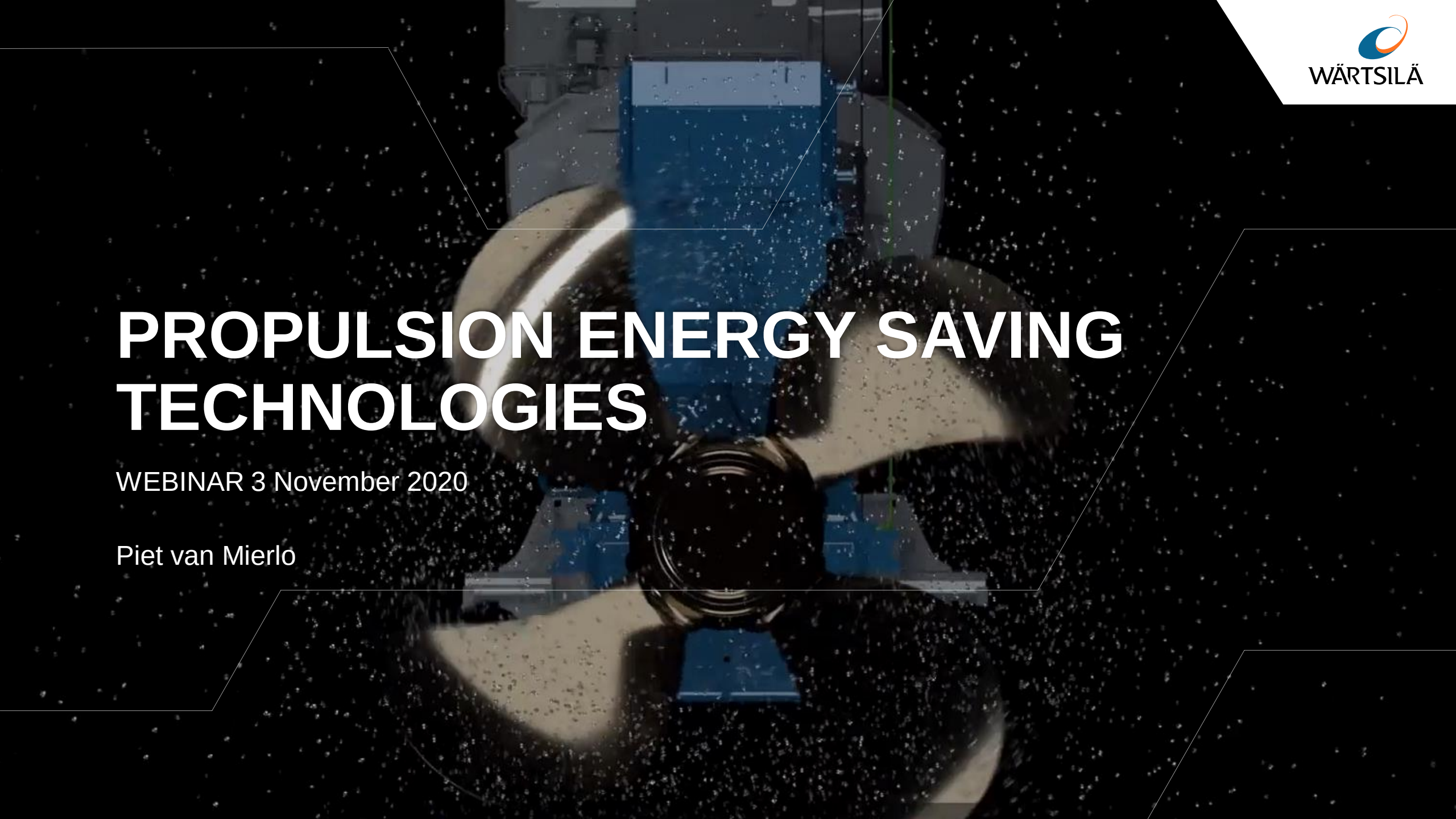

SPILL
TRUTH
NOT OIL
STOP
SHIPPING
POLLUTION

Thank you!

Eirik Nyhus – Director, Environment
eirik.nyhus@dnvgl.com

www.dnvgl.com

SAFER, SMARTER, GREENER

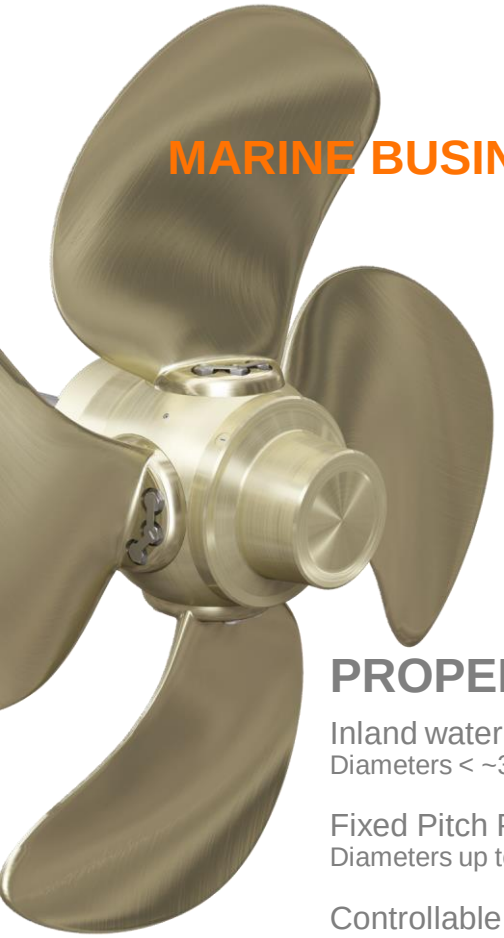


PROPULSION ENERGY SAVING TECHNOLOGIES

WEBINAR 3 November 2020

Piet van Mierlo

MARINE BUSINESS – PROPULSION PORTFOLIO



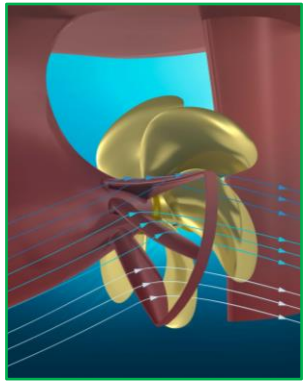
PROPELLERS

Inland water ways
Diameters < ~3 m

Fixed Pitch Propellers
Diameters up to 12 m

Controllable Pitch Propellers
Power up to 60 MW

Energy Saving Technologies
New scope!



THRUSTERS

Offshore thrusters
Power up to 6.5 MW

Steerable thrusters
Power up to 3.2 MW

Tunnel thrusters
Power up to 5.5 MW

Retractable units
Power up to 6.5 MW

MARINE GEAR BOXES

Marine gears

PROPULSION CONTROLS

Wärtsilä ProTouch

WATERJETS

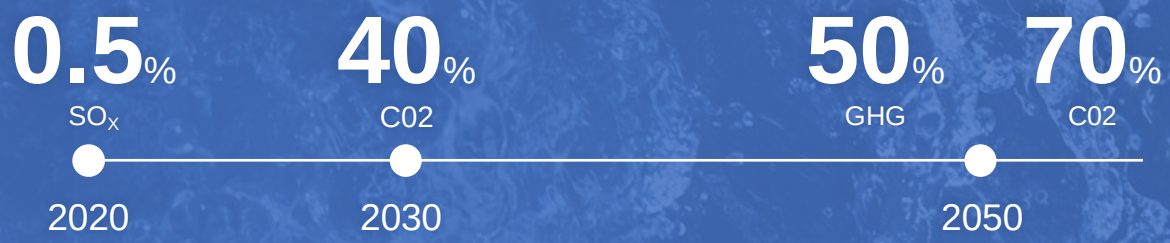
Power up to 33 MW

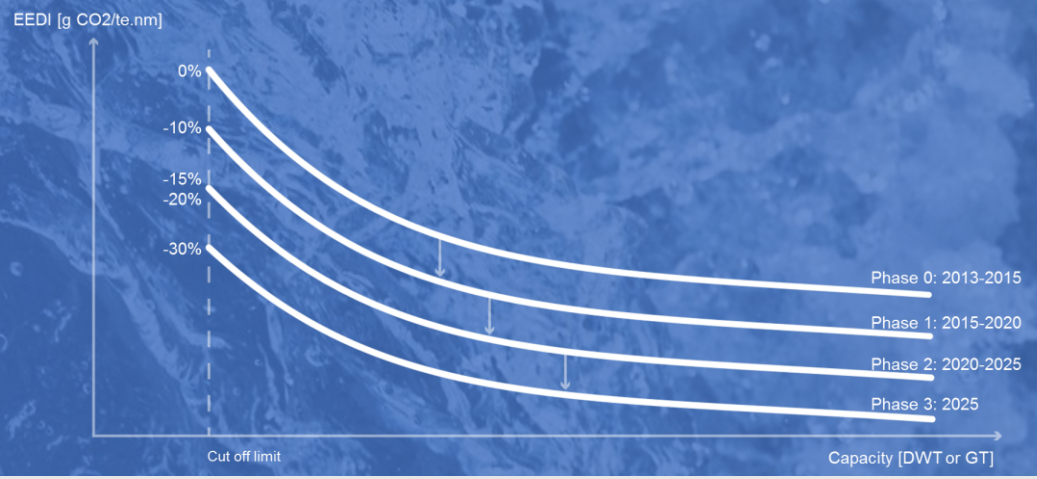
WHY FOCUS ON PROPULSION ENERGY SAVING?

Reduce fuel consumption → Improve our customer businesses, by lower operational expenses

Reduce exhaust emissions → Prepare for environmental regulations / local incentives

Aids compliance to: → Vessel meeting the global regulations
- Energy Efficiency Design Index (EEDI/EEXI)
- Ship Energy Efficiency Management Plan (SEEMP)

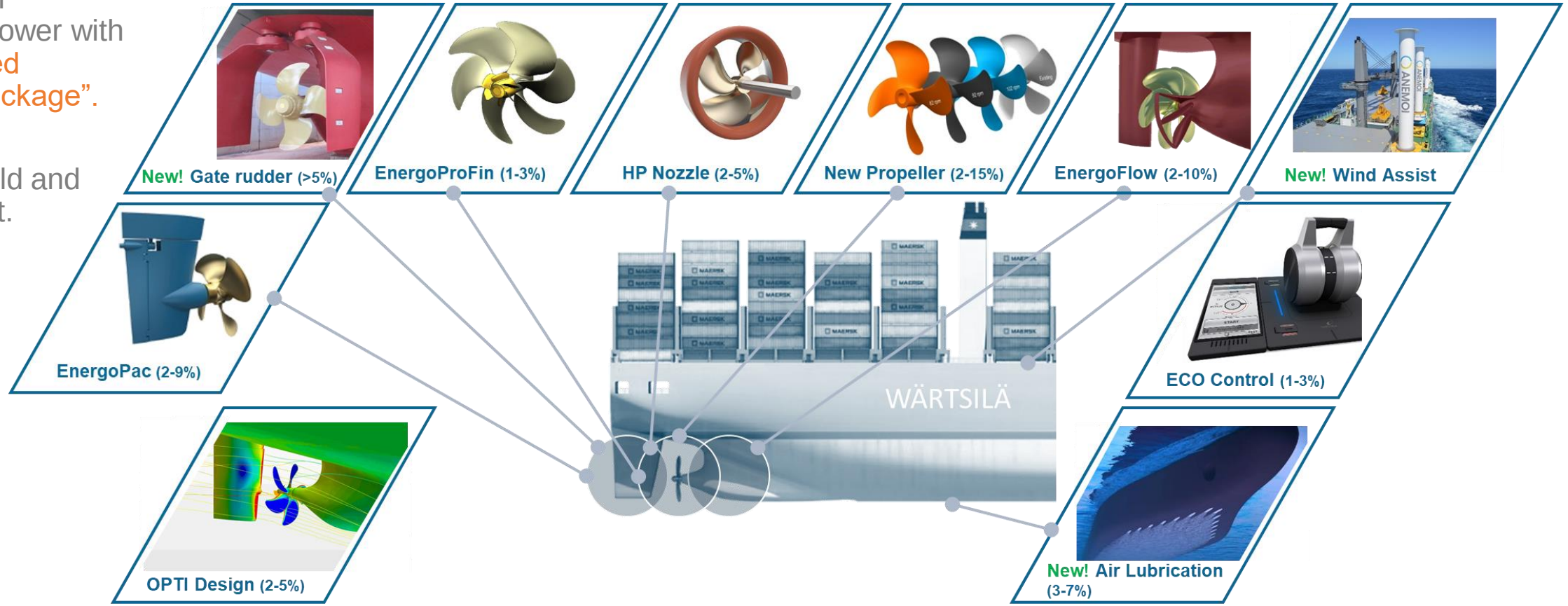




EFFICIENCY IMPROVEMENT WITH WÄRTSILÄ PROPULSION TECHNOLOGIES

Wärtsilä offers the market significant reductions in propulsion power with "an integrated efficiency package".

For New Build and Existing fleet.



WÄRTSILÄ ENERGOPROFIN

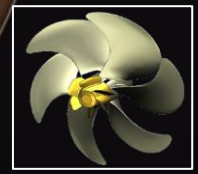
- For FPP and CPP applications
- Reduction of underwater noise
- Incentives on harbour fees (Vancouver, Prince Rupert)
- Cost attractive, easy to integrate in Wärtsilä delivery

>400

UNITS SOLD

ENERGOPROFIN

Fuel efficiency gain average 2%

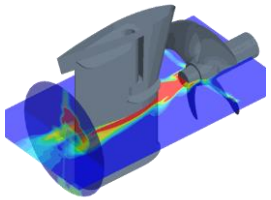


WÄRTSILÄ ENERGOPAC – PROPULSION AND MANEUVERING SOLUTION

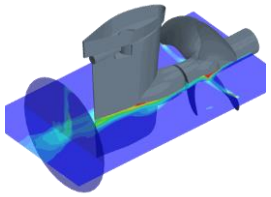
EnergoPac design is based on optimization of the combined propeller, rudder and bulb design

An integrated design with following key benefits

- Reduced fuel consumption up to 6%
- Excellent noise and vibration behavior
- Superior maneuverability



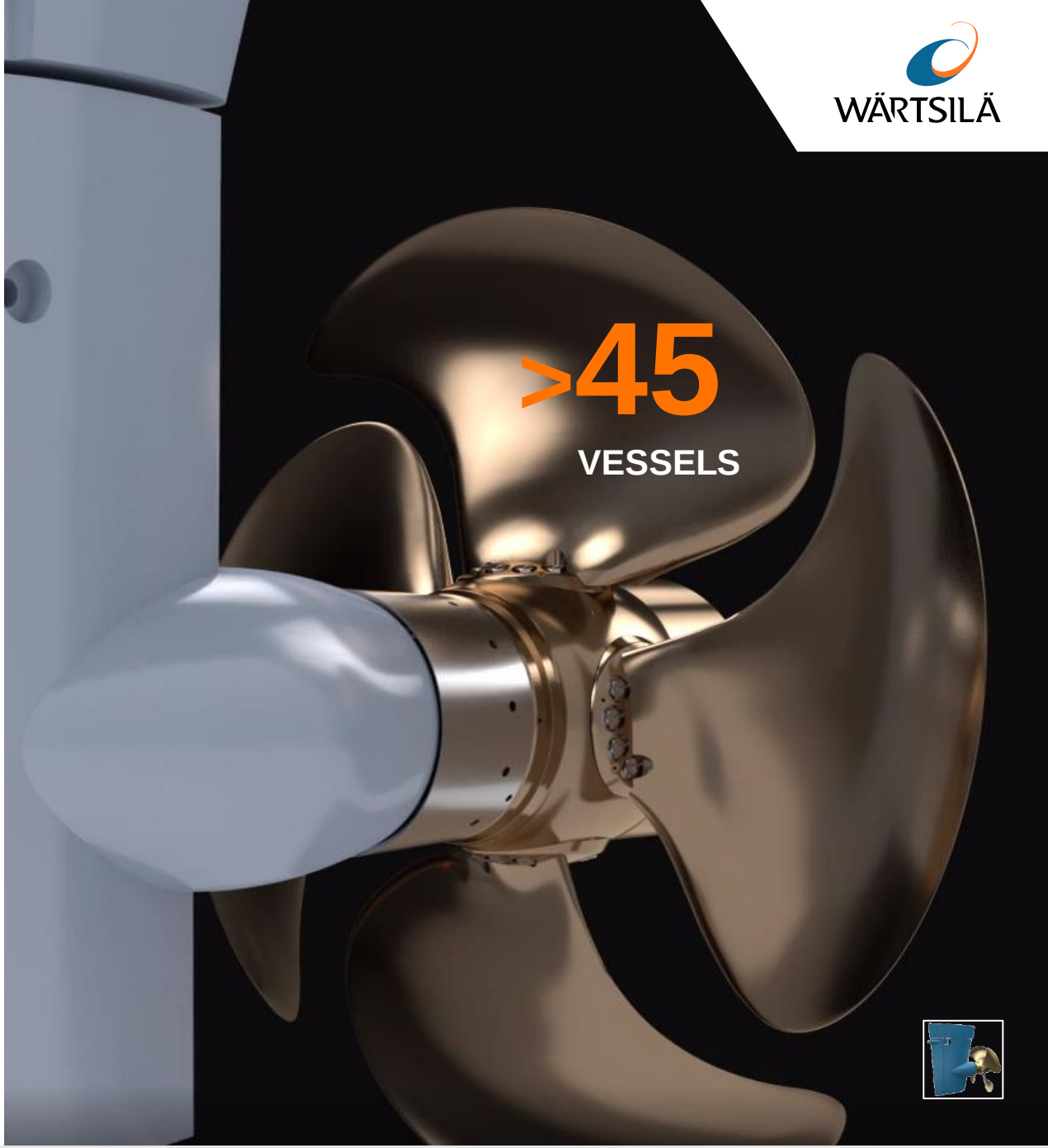
Traditional system



EnergoPac

becker marine systems

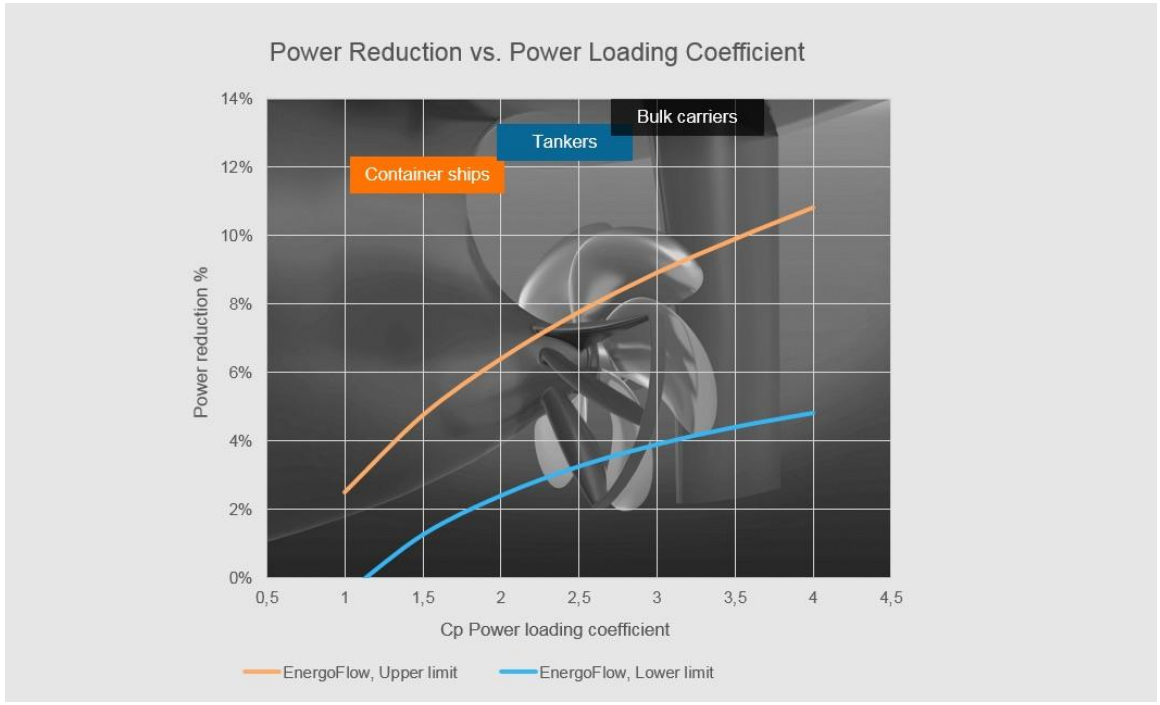
WÄRTSILÄ

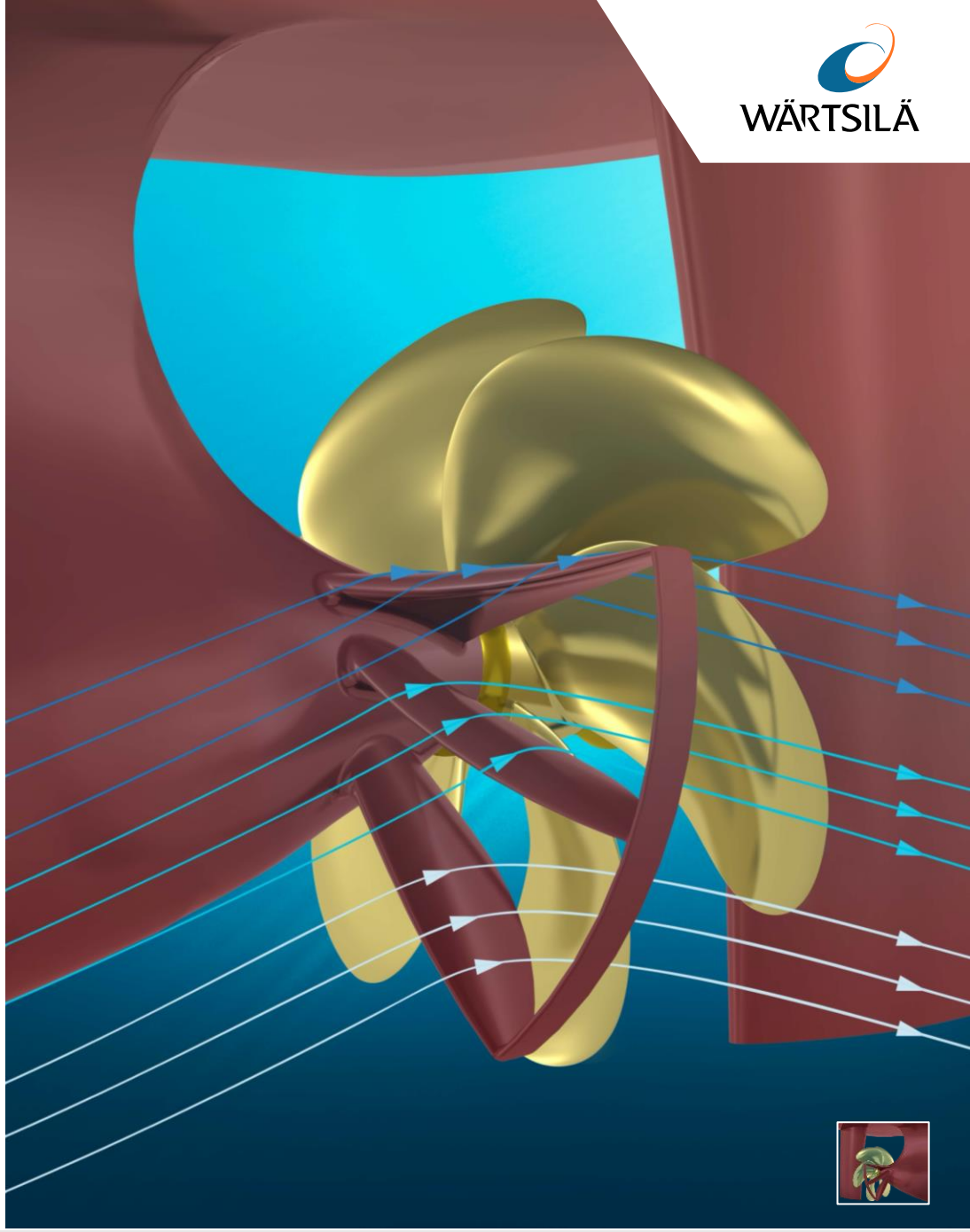


WÄRTSILÄ

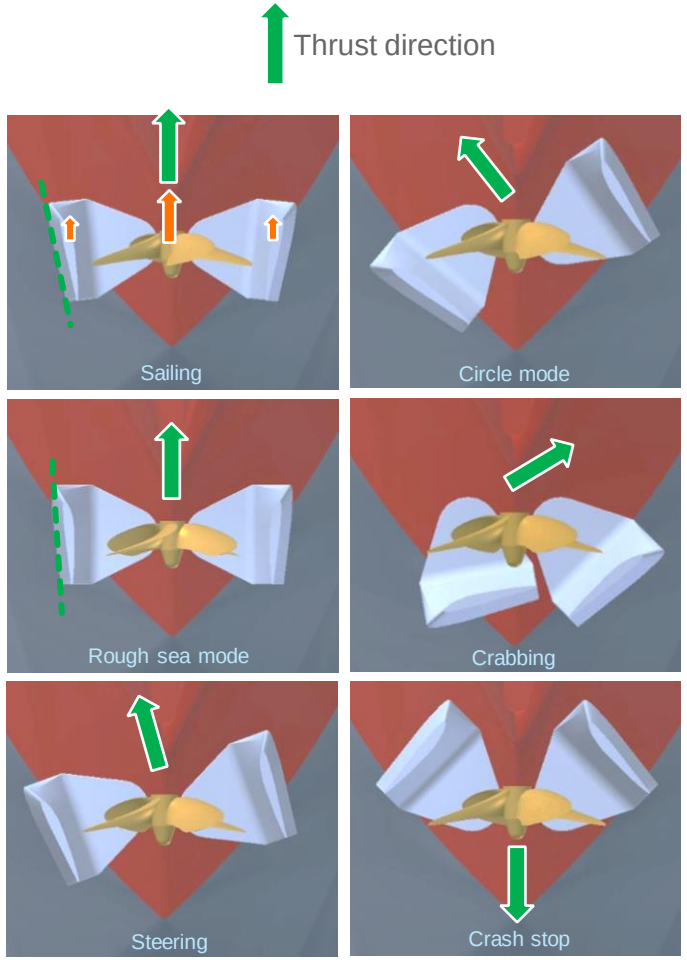
WÄRTSILÄ ENERGOFLOW

- An innovative, robust and cost-effective pre-swirl stator that increases fuel efficiency upto 10%
- Typical payback period is between 1-2 year
- Wärtsilä favors an unique position as EnergoFlow and Propeller are designed together





GATE RUDDER – AN INNOVATIVE INDUSTRY CHANGING RUDDER ARRANGEMENT



WÄRTSILÄ

Japanese
Patent holders

GATE RUDDER PROVEN IN PILOT

- Fuel efficiency improvement average 14%
- Manoeuvrability & course keeping stability
  - Turning with higher speed (20-30%)
  - Smaller turning circle
  - Better course keeping stability
  - Faster (crash) stop
  - Excellent crabbing performance

Other advantages

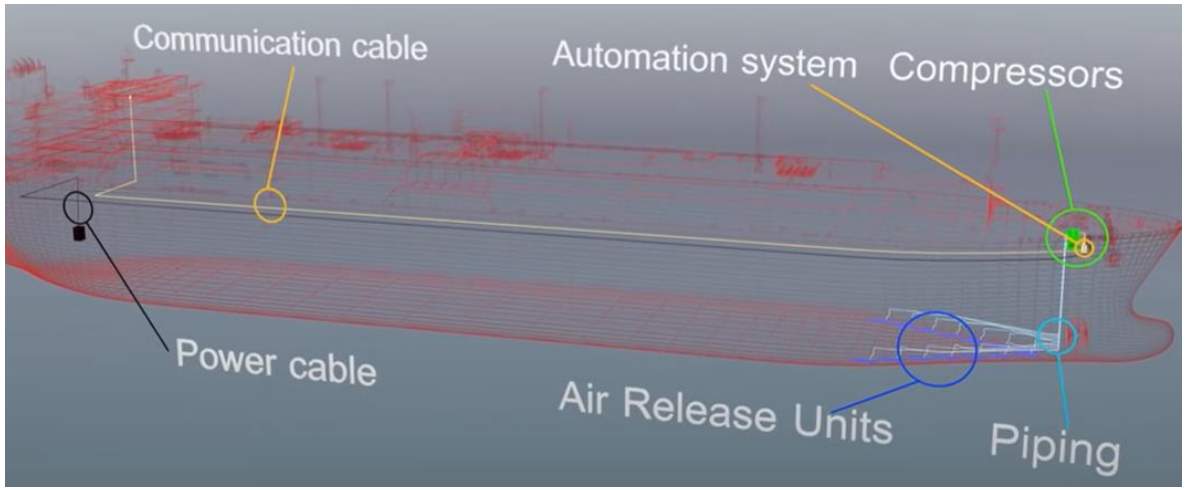
- Propeller can be moved afterwards, increased cargo space
- Noise & vibrations reduction

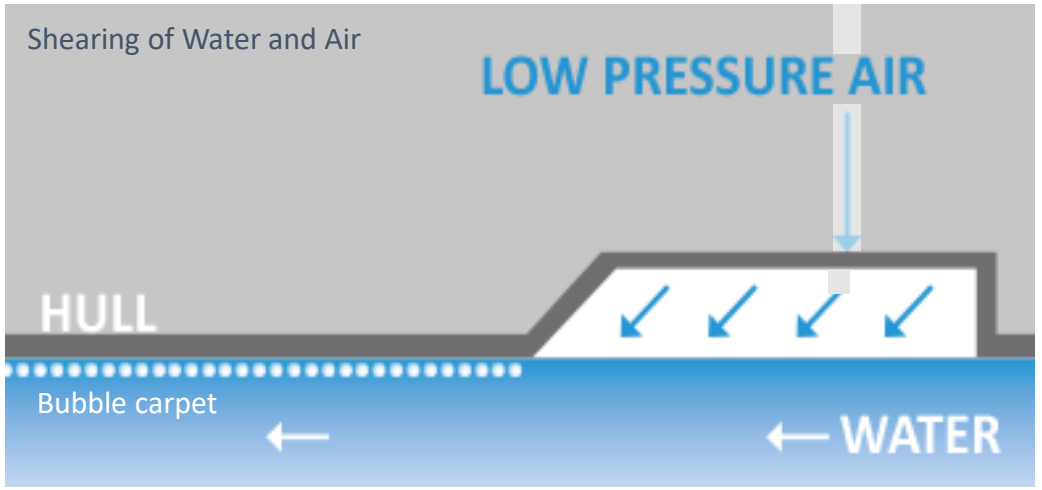
AIR LUBRICATION SYSTEM

- Wärtsilä signed a cooperation and license agreement with the UK based company Silverstream Technology
- Air Lubrication Technology branded as Silverstream® System
- The agreement designates Wärtsilä as an authorized seller and servicing partner of the Silverstream® System

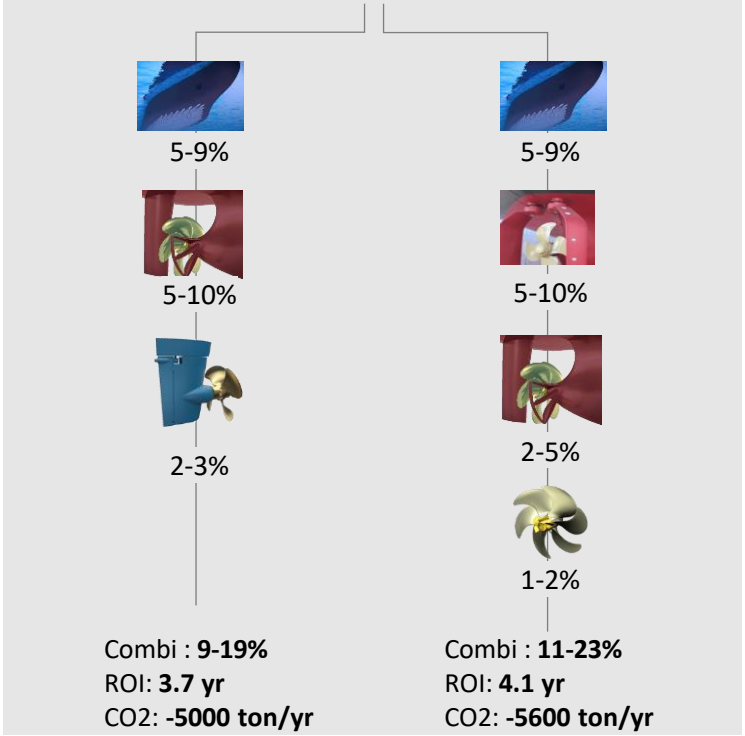
THE SILVERSTREAM® SYSTEM

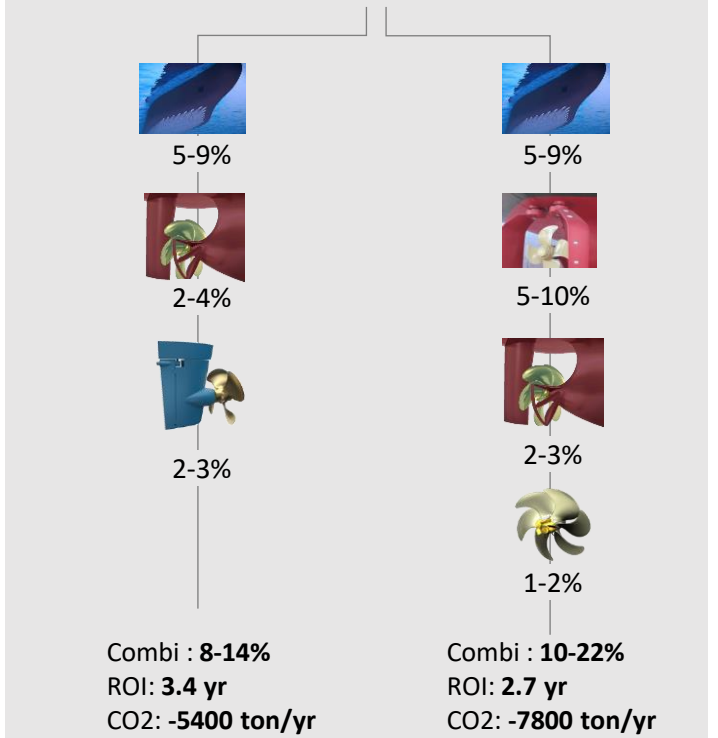
- Reduced frictional resistance of the vessel
- The energy balance attractive due to energy friendly screw compressors
- Nett efficiency improvements 5-10%
- Air lubrication system can be switched ON/OFF





INTEGRATED EFFICIENCY (UNDERWATER) PACKAGE



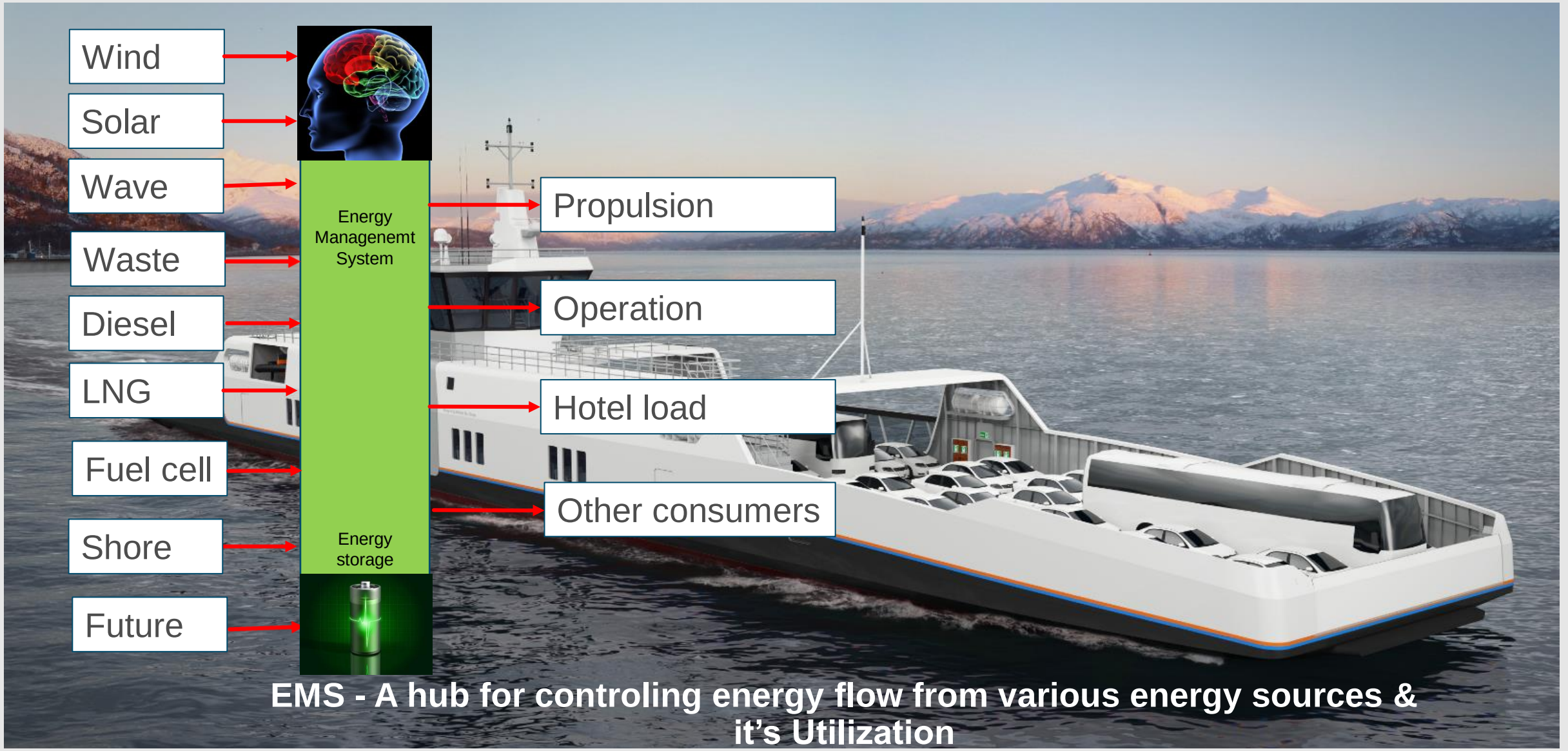


* Indicative values. Actuals are case depended. ROI and CO_2 based on averaged improvement. Based on bunker HFO 350$/ton and LNG 400$/ton. Incl yard installation cost for New Build

BENEFITS FOR PARTNERING WITH WÄRTSILÄ

- Propulsion efficiency package: integration and optimization of Energy Saving Technologies – offers our customers a highly attractive efficiency improvement realised by a single party
- Integration: synergies in delivery process (design, project management, commissioning, warranty)
- Machinery room and propulsion sizing: embed efficiency impact Energy Saving Technologies
- Machinery room layout integration: conditions based optimization (shaft generators, hybrids > machinery comparisons)
- Life-cycle support: the operator makes use of Wärtsilä's global service network
- Integration of automation: system integration with ship navigation and automation system. Possibility to validate and optimise with Wärtsilä's digital capabilities

HYBRID - WHAT IS IT?



EMS - A hub for controling energy flow from various energy sources & it's Utilization

WHY HYBRID POWER?

COST EFFICIENCY

Lower operating and maintenance costs

FLEXIBILITY

Energy flexibility – now and tomorrow

ENVIRONMENTAL REGULATIONS

Reduced emissions – future environmental compliance

FLEET OPERATIONS SOLUTION (FOS)

WÄRTSILÄ

Connecting the Ship Navigation System to the Cloud

Working across ship and shore

- Voyage Optimization
- Fuel Optimization
- **Just-in-time Operations**

More Information:
Ricardo Puig
Sales Director APAC
ricardo.puig@wartsila.com

JUST-IN-TIME ARRIVAL

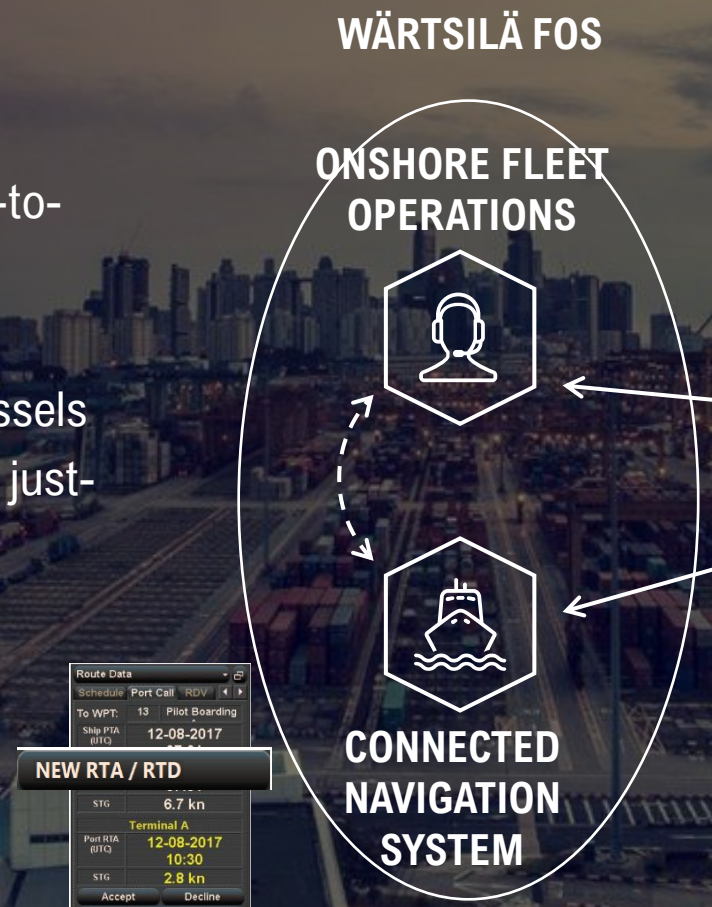
Unlocking benefits for the Maritime Industry

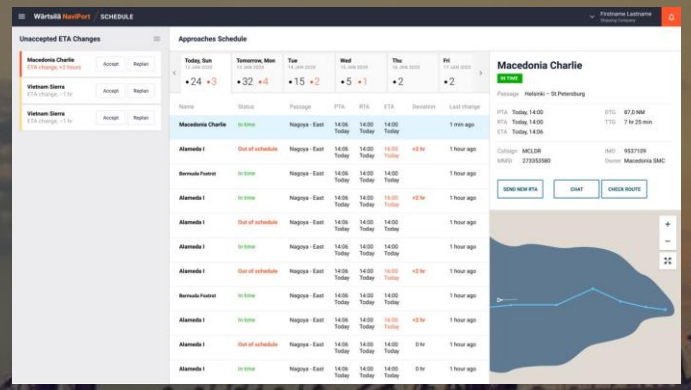
BEFORE	ADOPTION OF JUST-IN-TIME
High fuel consumption to reach destination	Reduce significantly fuel burn during the voyage by optimising the vessel's speed
High GHG emissions during voyage and at anchor	Global GHG emissions reduction and elimination at anchor
Elevated risk levels when entering / leaving port as a result of congestion	Increased safety because of fewer vessels around the port area
Poor coordination of ALL the stakeholders	Better visibility to plan for operations
High volume of telephone and email comms. between vessels, fleet operations and ports	Increased efficiency by reducing the manual workload

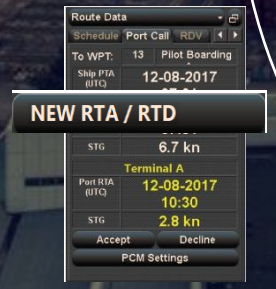
Direct communication between Vessels and Ports

NAVI-PORT

- First commercially available ship-to-port communication platform, connected to Wärtsilä's Fleet Operations Solution, enabling vessels to automatically adjust speed for just-in-time arrival







More Information:
Ricardo Puig
Sales Director APAC
ricardo.puig@wartsila.com

JUST-IN-TIME ARRIVAL

WÄRTSILÄ

SIMULATION OF SAVINGS PER VOYAGE

74.5 TONS OF FUEL*

22,200 EUR**

CASE: 5,500 TEU Containership Distance: 1,150 Nautical Miles
* Assuming average SFOC : 230 g/kwh** Assuming fuel price: 300 EUR/t

964 MWh actually consumed –
640 MWh simulated consumption

324 MWh potential savings

SIMULATION OF POTENTIAL IN THE PORT OF **SINGAPORE***

*Optimization of the last 72 hours voyage of 50% containerships

1 600 000 T
CO_2 emissions cut

540 000 T
fuel reduction

160 000 000 €
fuel bill savings

SAFETY
thanks to reduced congestion

Successful JIT pilot in Hamburg

Carnival *(Ship Owner)*

One critical ship arrival to port

- ↗ 4 440 people in / 4 440 people out
- ↗ Hundreds of cars, buses, trains, flights as connected transport

HVCC *(Port Operator)*

Streamlining shore-to-vessel communication by integrating Navi-Port to HVCC software solution

POLL #2

THANK YOU!

PANEL DISCUSSION

Jonathan Abrahams
Head of Maritime Advisory, ANZ, Advisory Australia, DNV GL – Maritime

Moderator

Eirik Nyhus
Director, Environment, DNV GL – Maritime

Piet van Mierlo
Team Leader, Product Team Propellers Wärtsilä

Matt Johnston
Manager, Environmental Standards, Australian Maritime Safety Authority (AMSA)

Sanjay Verma
General Manager, Market Innovation Wärtsilä

POLL #3


WÄRTSILÄ


DNV·GL