



# WALLENIUS MARINE

Clean and Efficient Power Production and Propulsion  
What is the Future?





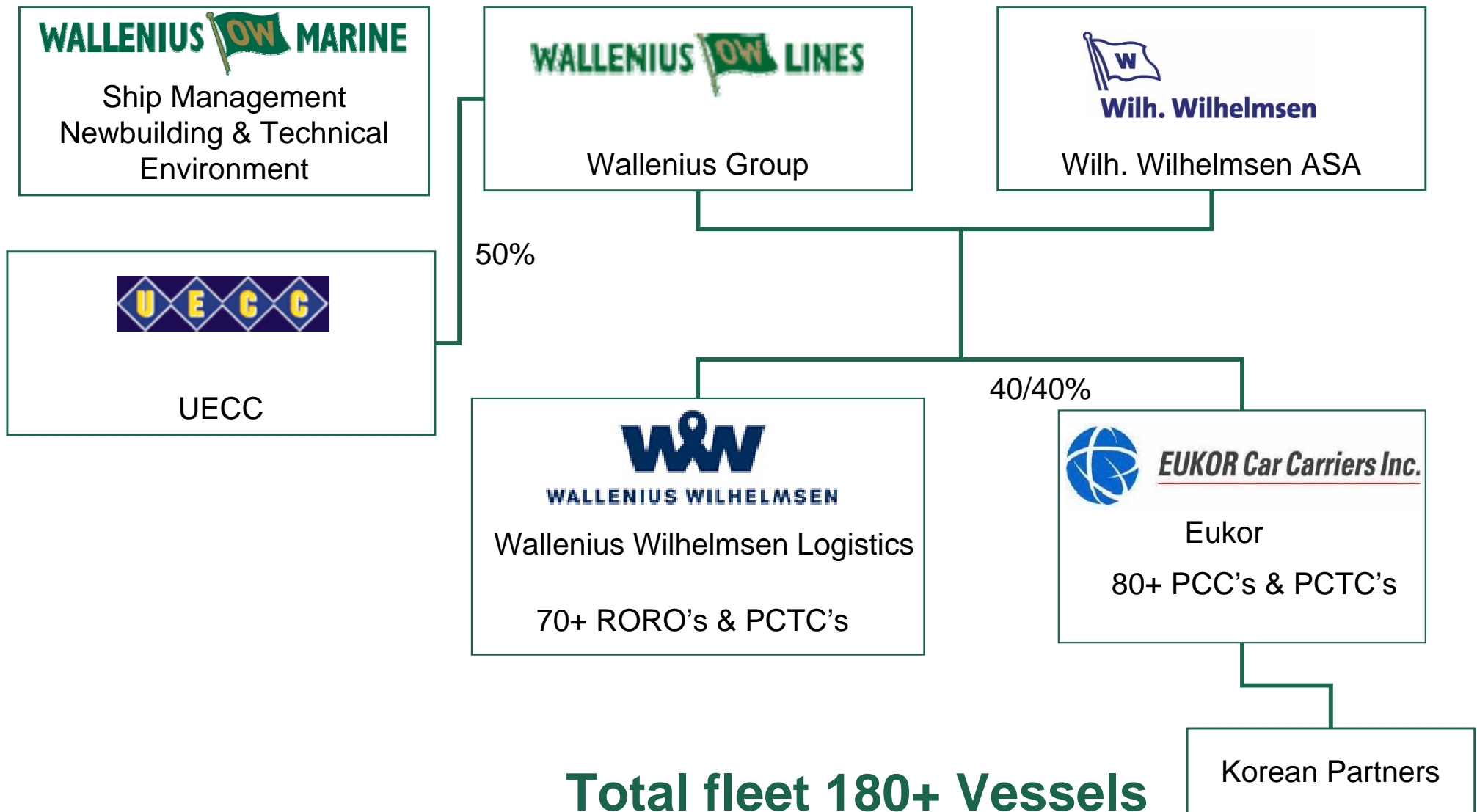
# Content

- Company Information
- PCTC/LCTC design
  - Particulars and design factors
- Environmental work within Wallenius Marine
  - NO<sub>x</sub>, SO<sub>x</sub>, FO consumption (CO<sub>2</sub>), BW treatment...
- Improving the propulsion efficiency
  - Pre-swirl stator
  - Optitrim
  - Optimized propeller-rudder interaction
  - Waste heat recovery





# GROUP STRUCTURE





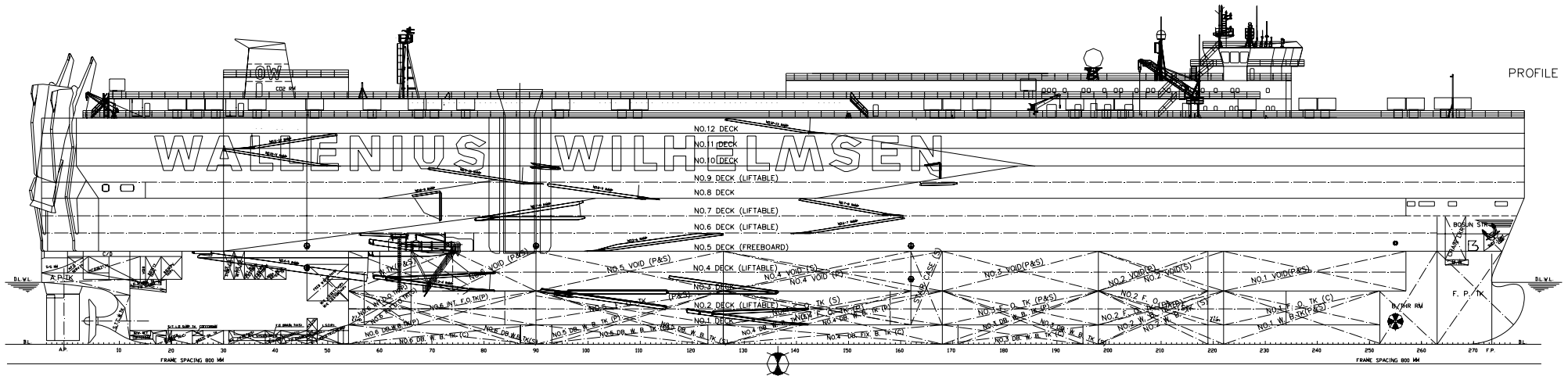
# Modern PCTC / LCTC, Pure / Large Car and Truck Carrier

- Length: 227,8 m
- Beam: 32,26 m, Panamax
- Design Draft: 9,5 m
- ME Power: 18 060 kW @ MCR
- Speed: 20,8 knots @ 80% MCR
- Number of Cargo Decks: 13
- Cargo capacity: 8 000 cars





# Machinery and Propulsion



- MAN B&W 8S60ME-C, 18 060 kW @ 105rpm
- 6.9 m 5-bladed fixed pitch propeller
- Bowthruster, 2000 kW
- Shaft generator, 1100 kW
- 2 Aux dieselgenerators, STX 9L21/31, 1800 kW each,
- Flap Rudder with Twisted Leading Edge



# Design Targets

- Increased capacity
- Reduced fuel consumption
- Increased safety
- Improved working conditions
- Minimised environmental impact





# Increased Cargo Capacity + 13%, 800 cars

- **Changing from two to one pillar row**
  - Improved cargo stowage factor , 8.8 m<sup>2</sup> till 8.4 m<sup>2</sup> per car  
+ 300 cars
- **New Deck configuration**
  - One deck moved to above freeboard deck
  - Increased deck area by 4000 m<sup>2</sup>  
+ 500 cars





# Fuel consumption reduced by app. 4% corresponding to about 15% reduction per transported unit

- New hull lines (+-0%)
  - Slender forebody, wider aftbody - stability
- Spade (fish tail) rudder replaced with a flap type rudder ~3-5%
  - Twisted leading edge => less cavitation erosion







# Environmental Programme

- **NOx, reduce 25% in 10 years from 1998**
- **SOx, LS HFO (< 1.5% S) from 2004**
- **Antifouling Paint, TBT free since 1997**
- **Ballast Water Treatment, Prototype installed on DON QUIJOTE since 2003, IMO approval July 2007 with unit installed on AIDA since 2006**
- **Fuel and CO2, 10% reduction in 5 yrs from 2007**
- Chemicals and Detergents
- Clean Bilge Water
- Garbage Treatment
- Cooling agents





# Environmental Achievements of newbuildings

- Increased capacity, 15% reduced emissions per transported unit
- Ballast Water treatment system installed
- Green Passport
- Low NOx engines by improved combustion, ME 11 g/kWH  
AE 7.3g/kWh
- Minimised use of Chemicals, e.g. electrolytic treatment of cooling water.
- Biodegradable oil in all hydraulic systems
- Garbage treatment
- Effective Bilge Water cleaning system 0-5 ppm, w. White Box





# Experience of operation on low sulphur fuel

- **MDO – TURANDOT, 1998-2001**
  - Savings from maintenance work, cleaning work onboard, spare parts, cylinder oil consumption but too high cost for sustainable solution.
- **MDO/MGO – All auxiliary engines since 2001**
  - **< 0.2 % S**
- **LS HFO – OTELLO, since 2002**
  - Good Experience, "No Technical Problem" but risk with blended products since availability is poor.
- **LS HFO – All swe flag ships since 2003**
  - On average **< 1.5 % S**
- **LS HFO – All WWL ships since 2004**
  - On average **< 1.5 % S**



# Pre-Swirl Stator

Improving the working environment for the propeller and thus increasing the efficiency

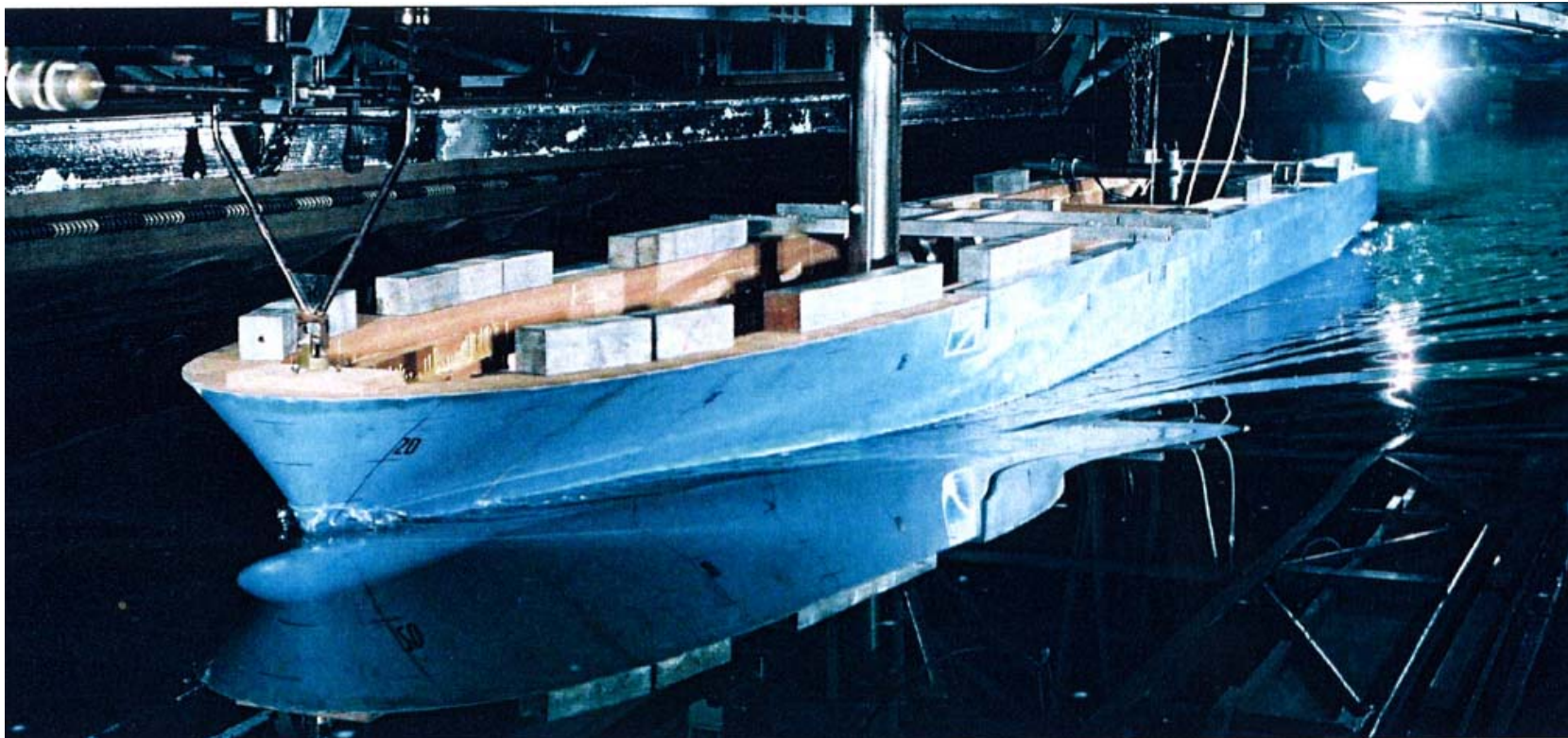
- Reduce the kinetic losses
- Good potential
- Extensive test program





# Optitrim - Support for operation at optimum trim

- Extensive test program during 2007 for our existing vessels
  - Large impact on propulsive power
  - Positive with trim on the bow
- Development of a tool by integrating results from other projects





# Optimized Propeller-Rudder Interaction

Study to find a more efficient propulsive installation

- Pre-study to define/evaluate:
  - Efficiency gain
  - Possibility to retrofit existing vessels
- Next step would be a test program to validate the pre-study before final decision



Source: Wärtsilä



# Waste Heat Recovery

Reducing the total fuel consumption of the ship and the CO<sub>2</sub> emissions

- Pre-study started for the existing fleet and future vessels
- Different solutions could be applied depending on if it is a newbuilding or a retrofit
  - Steam turbine
  - Power turbine
  - A combination of both
- Goal: An overall reduction of at least 5%





# Can the answer for the future be Fuel Cells?

Methanol pilot installation on board on vessel by the end of 2006 (20 kW).

- High efficiency
  - ~ 50% electric
  - ~ 80% with co-generation
- Low emissions
  - No CO, SOx
  - Low CO<sub>2</sub>, NOx
- Low Noise and Vibration levels

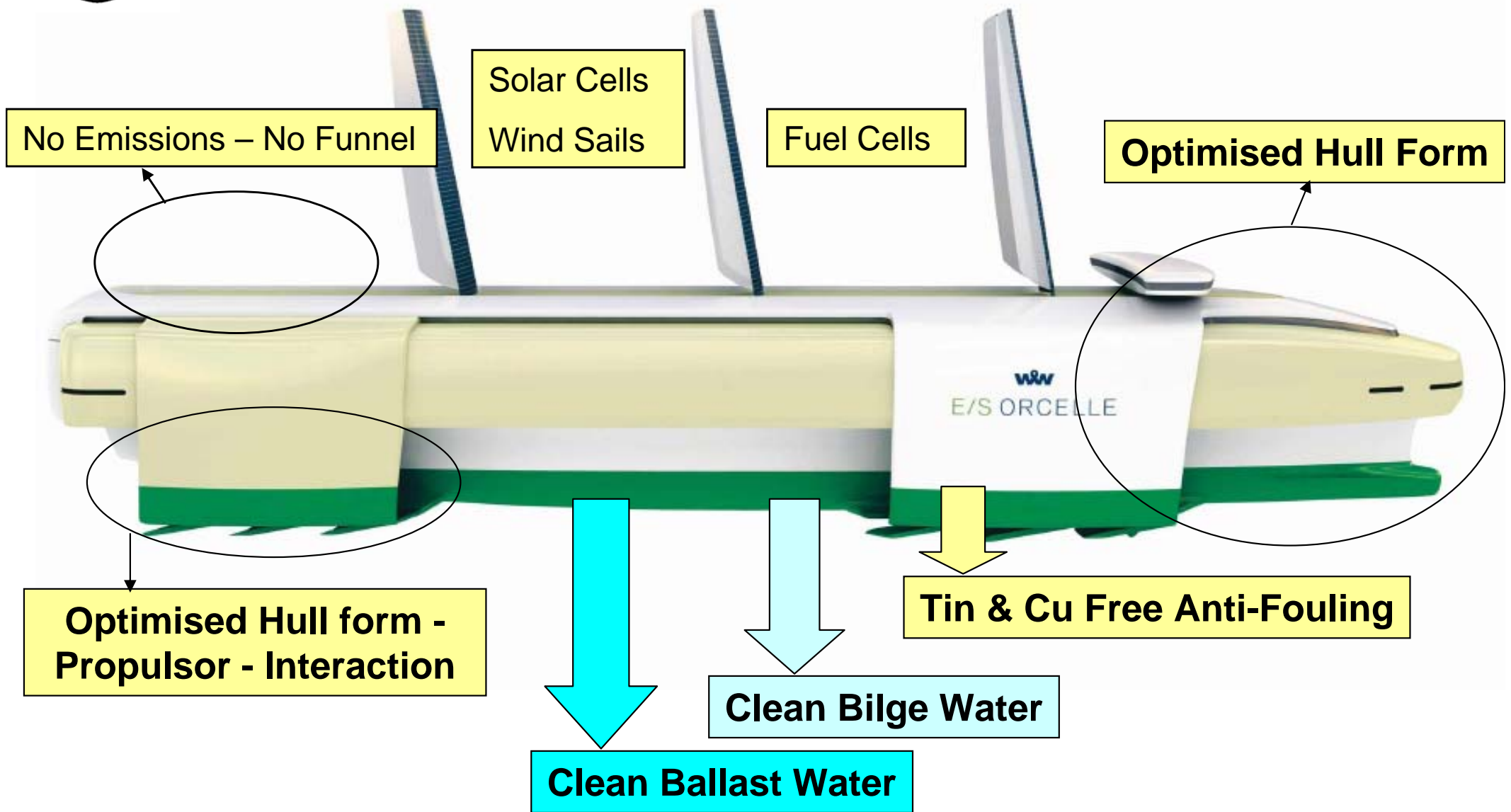


*Source: Wärtsilä*





# E/S ORCELLE, our vision for the future





# The End, Thank You for listening !



[www.walleniusmarine.com](http://www.walleniusmarine.com)



# SHIP EFFICIENCY

by STG

