

LNG and AG “EMS”

Lessons Learned



Co-financed by the European Union
Trans-European Transport Network (TEN-T)

Table of Content

- The AG EMS – Introduction of the company
- Technical implementation in the case of „MV Ostfriesland“
(Project studies, technique and implementation)
- Projected and achieved goals
- Still to do



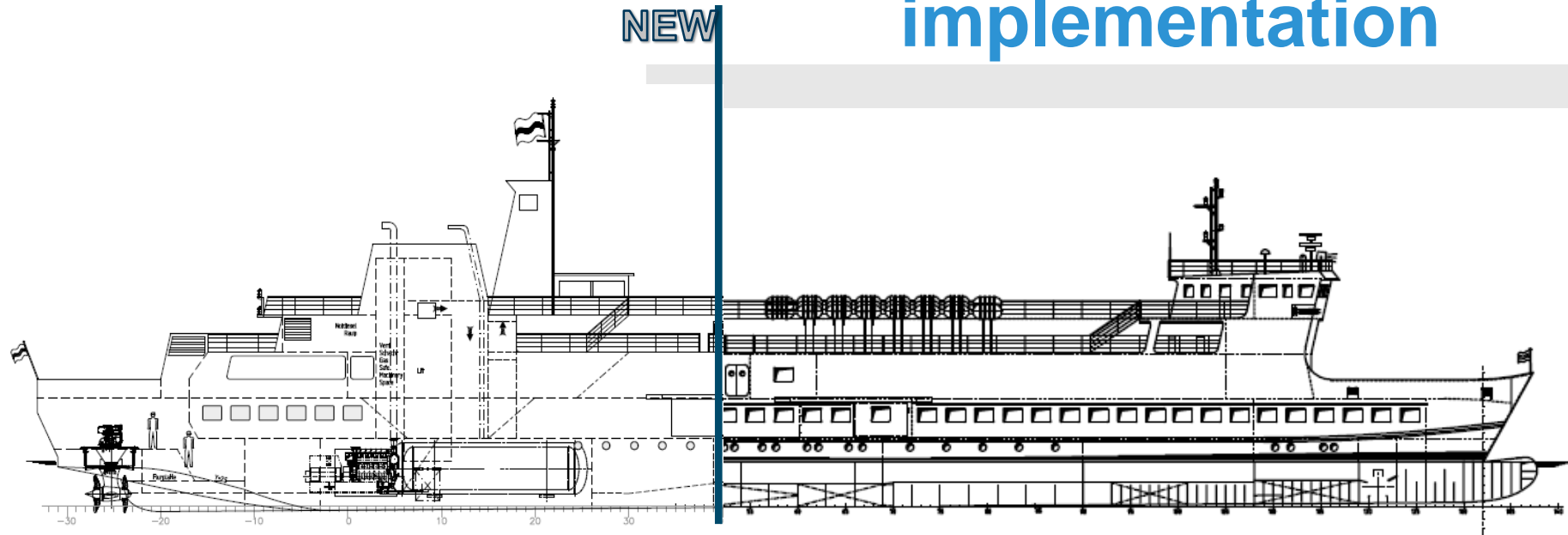




AG EMS

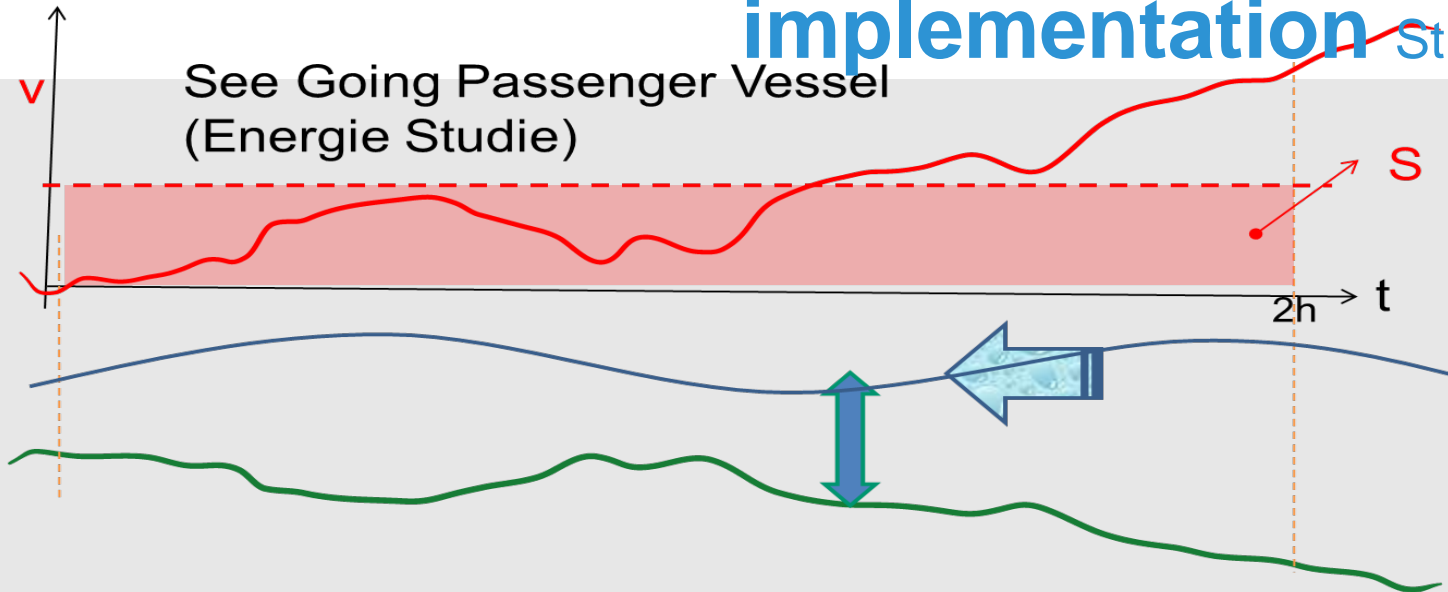


Technical implementation

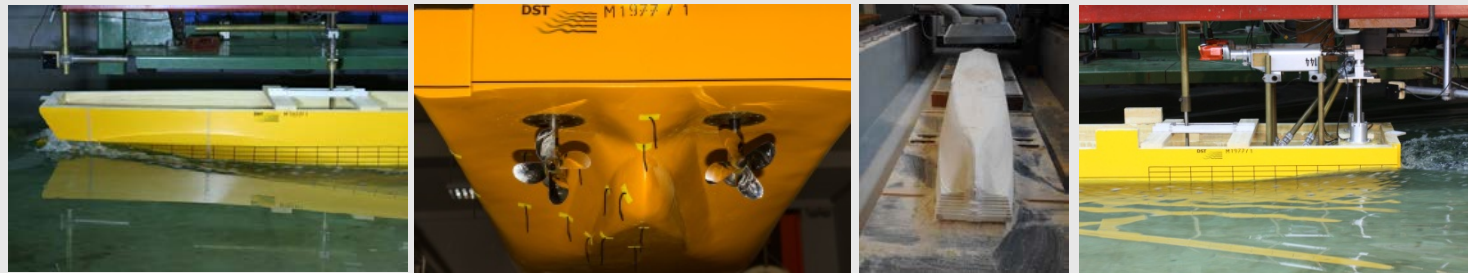


- Stern of the vessel will be completely new constructed
- Startup tests will be finalized before combination

Technical implementation Studies



Investigation of the local tide and current influence



Technical implementation

Overview

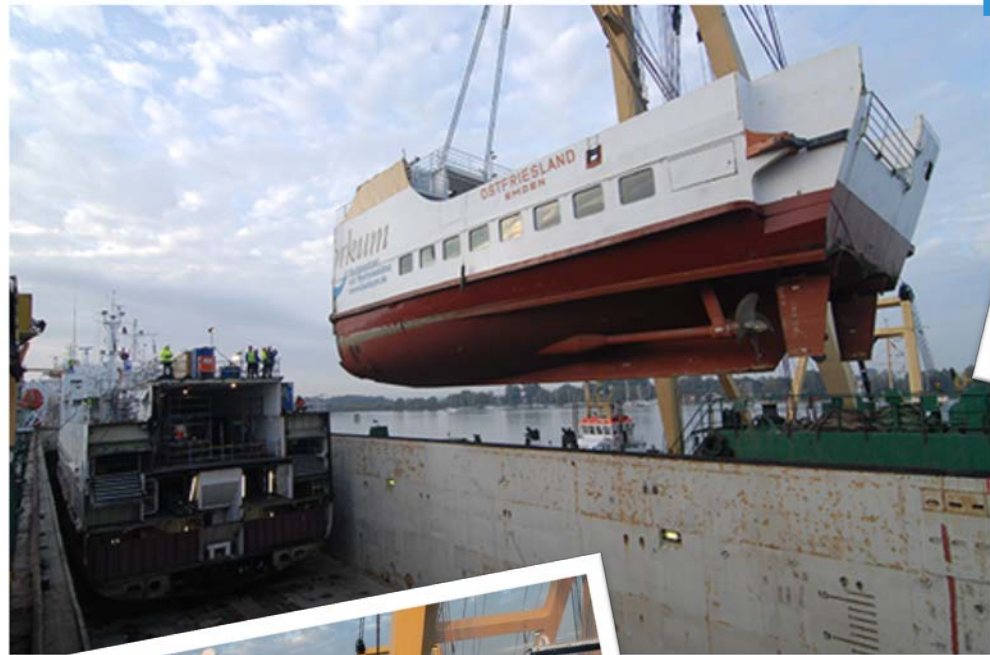


+ 15,30 m

	Old	New
Length	78,70 m	94,00 m
Breadth	12,60 m	12,60 m
Depth	2,56 m	2,40 m
Pax:	1.200	1.200

Technical implementation

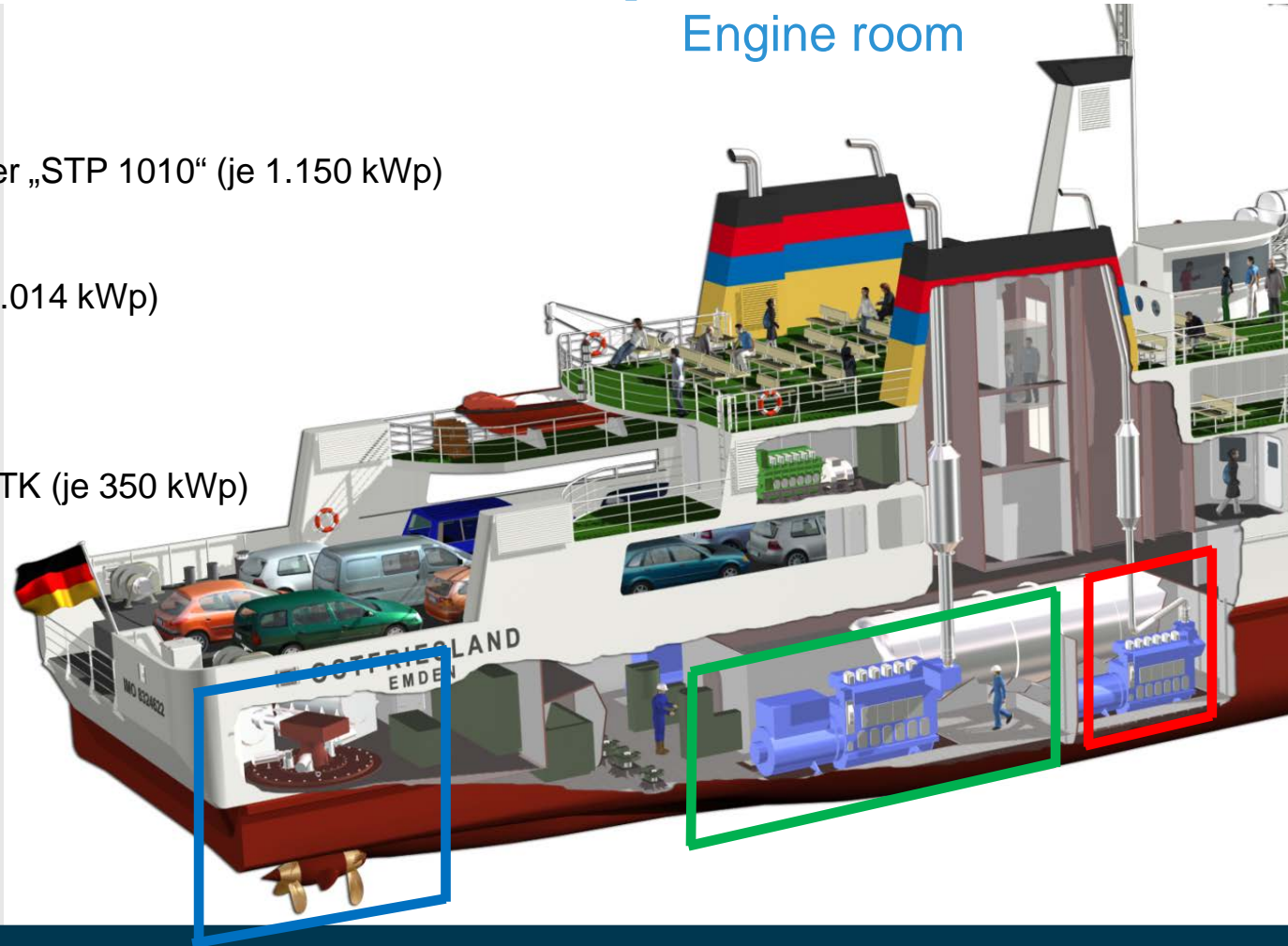
cutting the stern



Technical implementation

Engine room

- **Wärtsilä LNG Pac 45**
with coldrecovery
- **Propulsion**
2 x Schottel Ruderpropeller „STP 1010“ (je 1.150 kWp)
- **Main Engines**
2 x Wärtsilä 6L20 DF (je 1.014 kWp)
with heatrecovery
- **Aux Gensets**
2 x Mitsubishi GS6R2-MPTK (je 350 kWp)
with heatrecovery



Milestones



First Bunkering of the retrofitted MS Ostfriesland

April 30: first LNG bunkering in Bremen by experts of Bomin Linde

Milestones

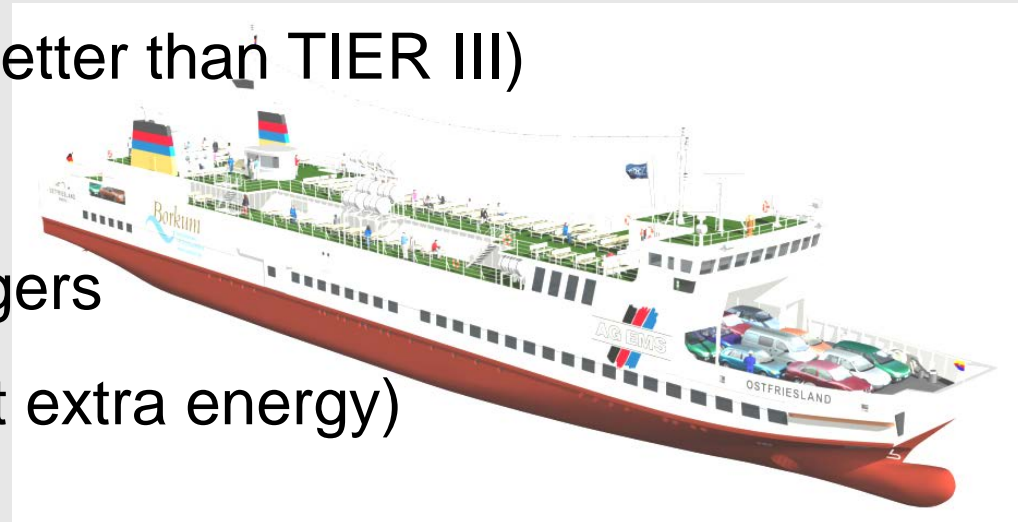


Retrofitted MV Ostfriesland on his first jorney

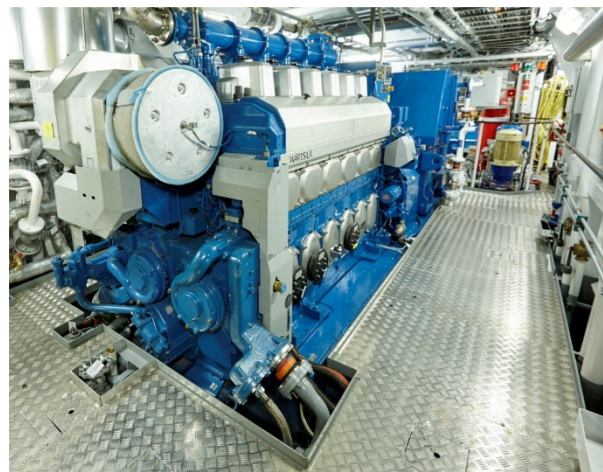
17th June 2015

Goals to achieve

- Steady duration of the journey from the mainland to the island
- Better accessibility across the whole ship for handicapped
- Clean exhaust gases (better than TIER III)
- Less noise emissions
- More space for passengers
- Air conditioning (without extra energy)
- Better manoeuvrability



Still-to-do



GAS FUELLED SHIPS

Update on engine applications,
experience and next developments



Claus Hirsch
Superintendent AG Ems

VDR Seminar Alternative Kraftstoffe
31st May and 1st June 2016, Germany

Matthias Schubert
Sales Manager, Marine Solutions Wärtsilä Deutschland

>1,500 engines → >16,000,000 running hours

MERCHANT

LNG Carrier	204 vessels
LPG Carrier	11 vessels
Tankers	14 vessels
Containers	4 vessels
Bulk Carrier	3 vessels
Car Carrier	2 vessels



881 engines

CRUISE & FERRY

CruiseFerry	1 vessel
ROPAX	3 vessels
Ferries	12 vessels



66 engines

OFFSHORE

Platform	2 vessels
FSO	2 vessels
FPSO	6 vessels
Jack-up Rig	1 vessel
OSV	24 vessels



132 engines

DF CONVERSION

FPSO	4 vessels
Chemical tanker	1 vessel
RORO	2 vessels
Ferries	3 vessels
IWW	1 vessel



36 engines

SPECIALS

Hopper Dredger	1 vessel
Tugs	6 vessels
Navy	1 vessel
Icebreaker	1 vessel
IWW	16 vessels
Guide ship	1 vessel
Cable Layer	1 vessel



46 engines

DF POWER PLANT

Plants	82
Output	5031 MW
Online since	1997



376 engines

WÄRTSILÄ 20DF 0,9 – 1.7 MW



- LNG Feeder
- Tugs
- Dredgers
- Small cargo vessels
- Barges
- Small ferries
- Aux. engines

WÄRTSILÄ 31DF 4.2 – 8.8 MW



- Small LNG / CNG vessel
- Small cargo vessels
- Supply vessel
- Dredgers
- RO-RO/RO-PAX
- Ferries
- Offshore Production
- Aux. engines with W50DF

WÄRTSILÄ 34DF 2.8 – 8.0 MW



WÄRTSILÄ 46DF 6.2 – 18.3 MW



- LNG Carriers
- Cruise ships
- Dredgers
- RO-RO/RO-PAX
- Ferries
- Large Offshore Units

WÄRTSILÄ 50DF 5.7 – 17.5 MW



W31



Diesel

DF

SG



Technologies enablers

Digitally controlled
fuel injection



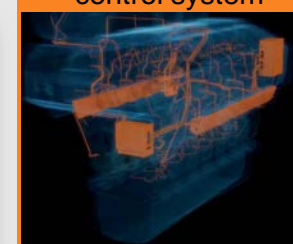
2-stage
turbocharging system



VIC / VEC



New generation UNIC
control system



DF-
Mechanical

CPP



DF-
Mechanical

FPP



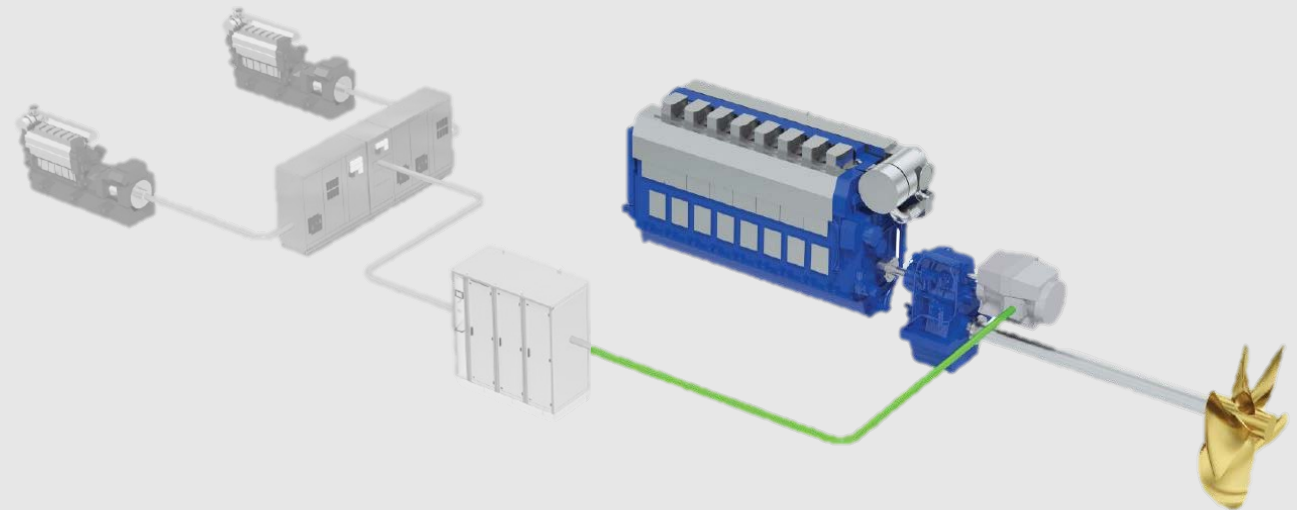
DF-
Mechanical

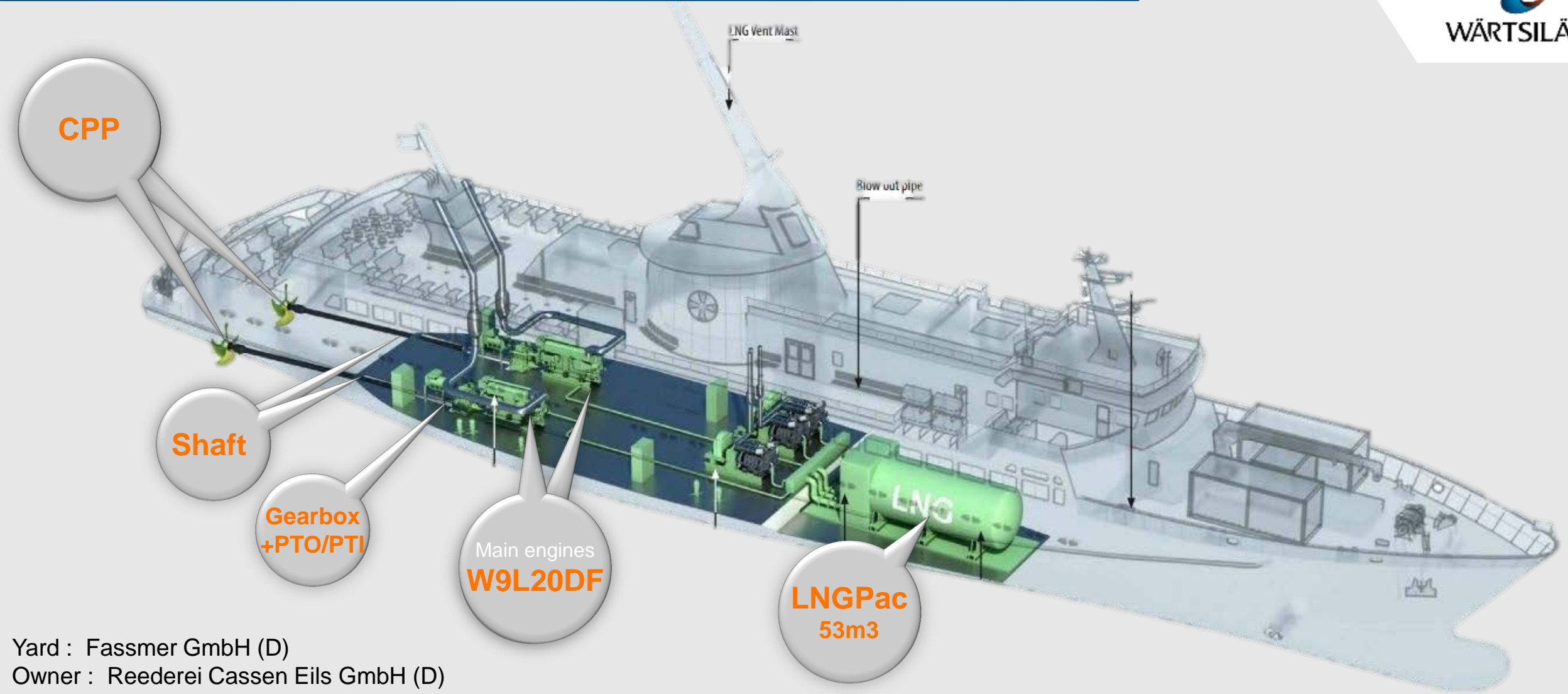
Hybrid



DF-
Mechanical

Pump drive





Yard : Fassmer GmbH (D)
Owner : Reederei Cassen Eils GmbH (D)
Amount of vessels: 1
Application: Mechanical drive
Operational area: Cuxhaven – Helgoland (Germany)
In operation since December 2015

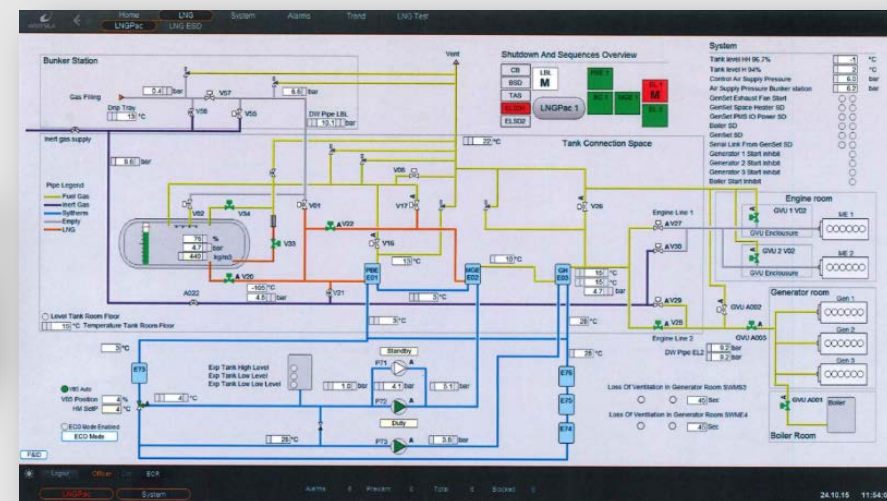
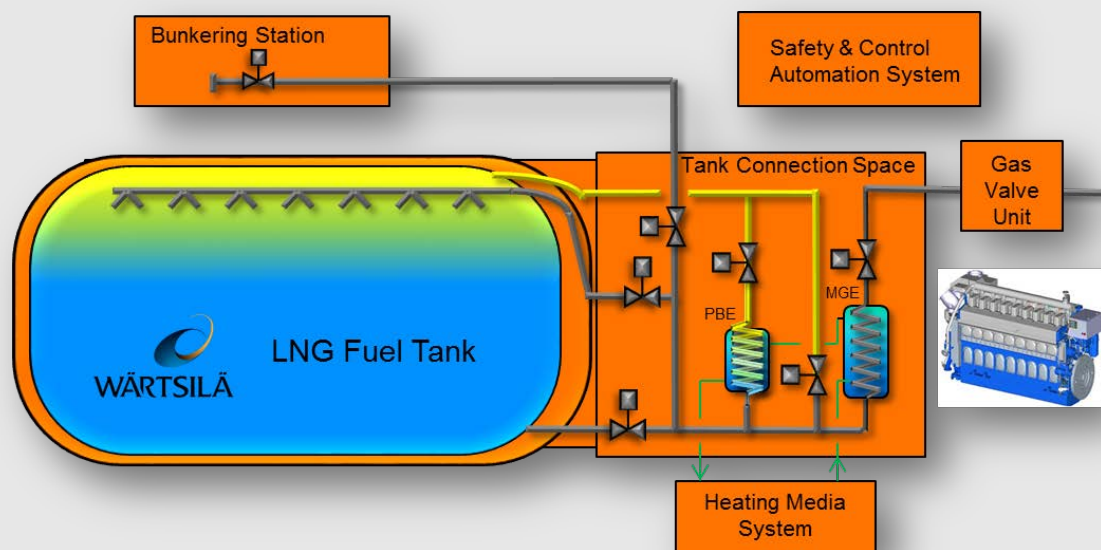
WÄRTSILÄ FUEL GAS HANDLING SYSTEMS: LNGPAC™



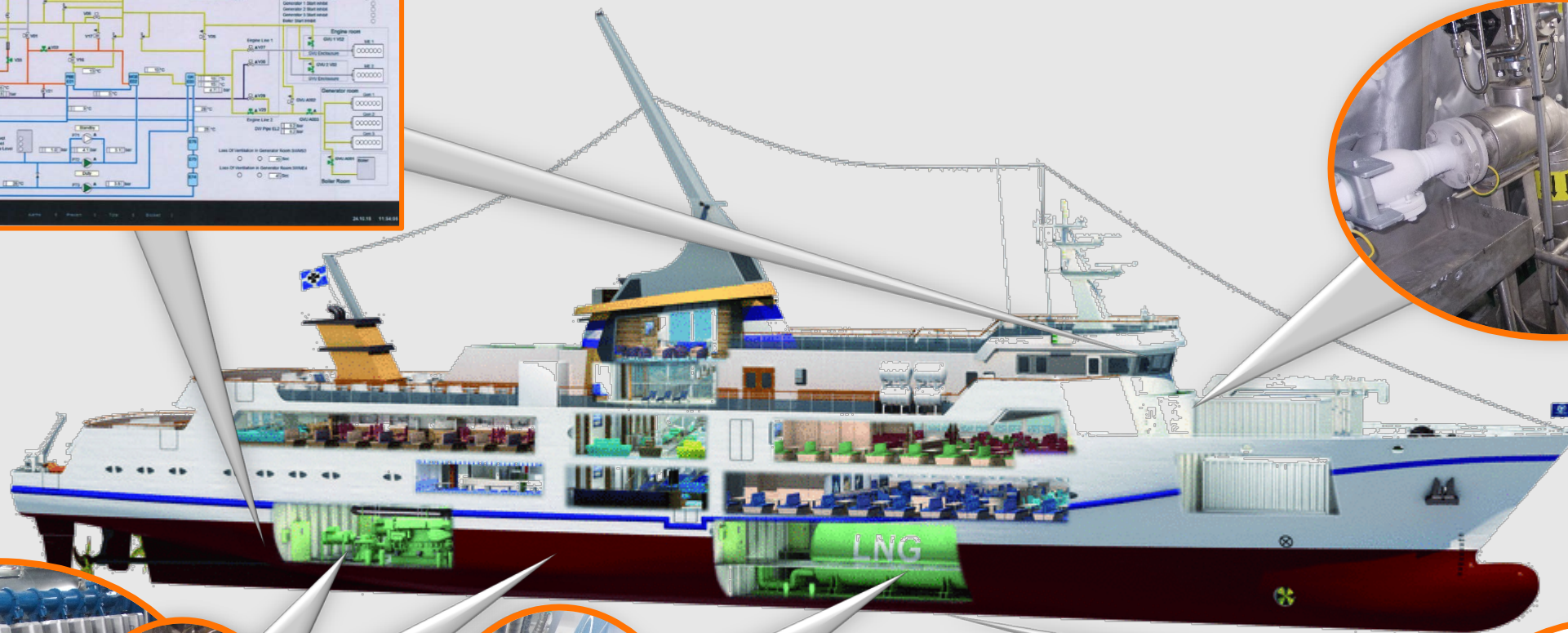
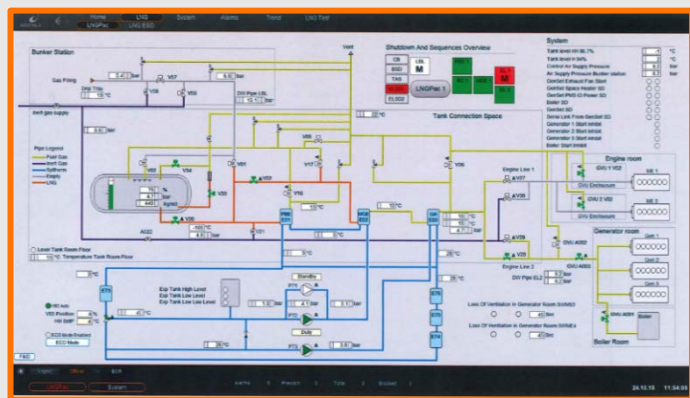
LNGPac™ : complete solution for the storage and process of LNG on board of gas fueled ships



- LNG Fuel Tank
- Fuel Gas Treatment Unit (Tank Connection Space)
 - Process system (valves, evaporators, sensors)
- Bunkering station
- Heating Media System
- Safety and Control Automation System

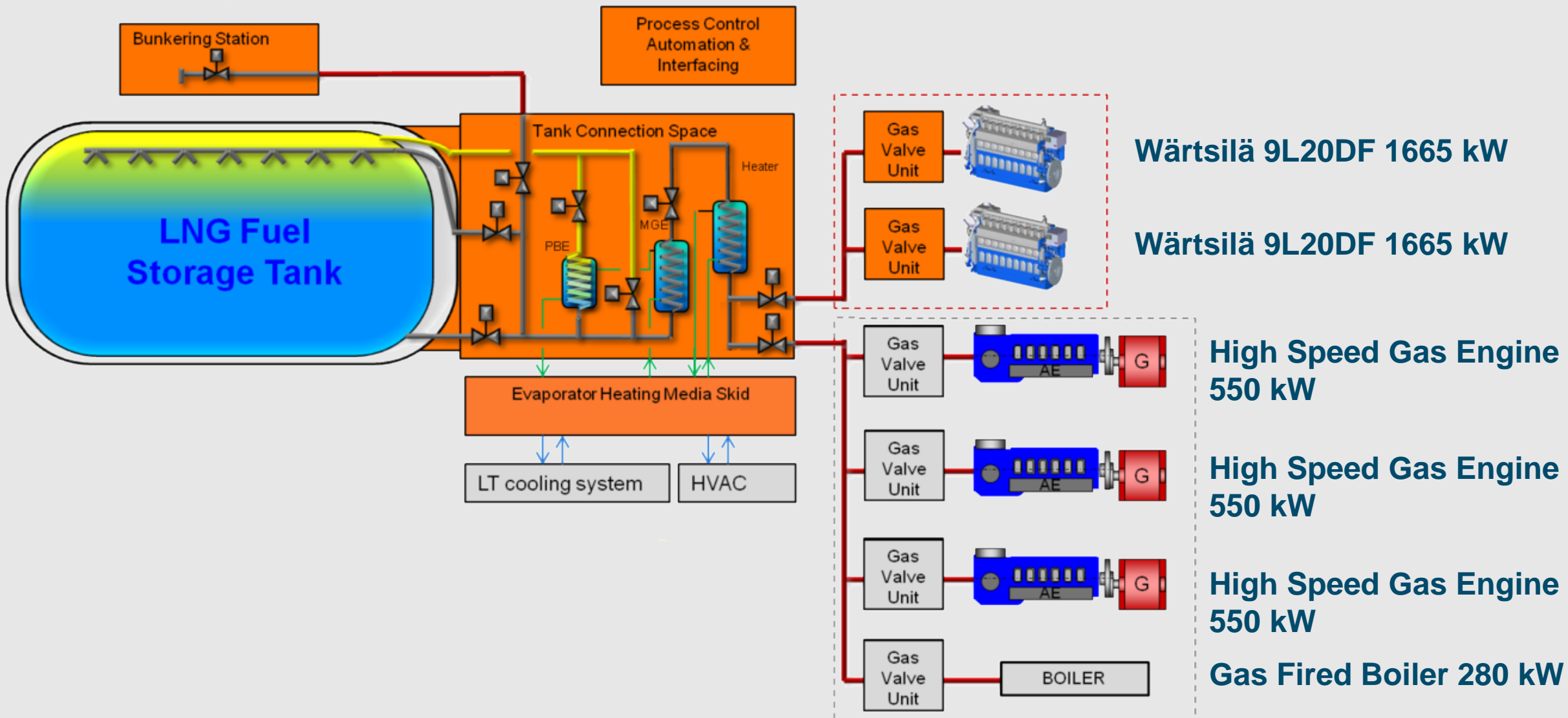


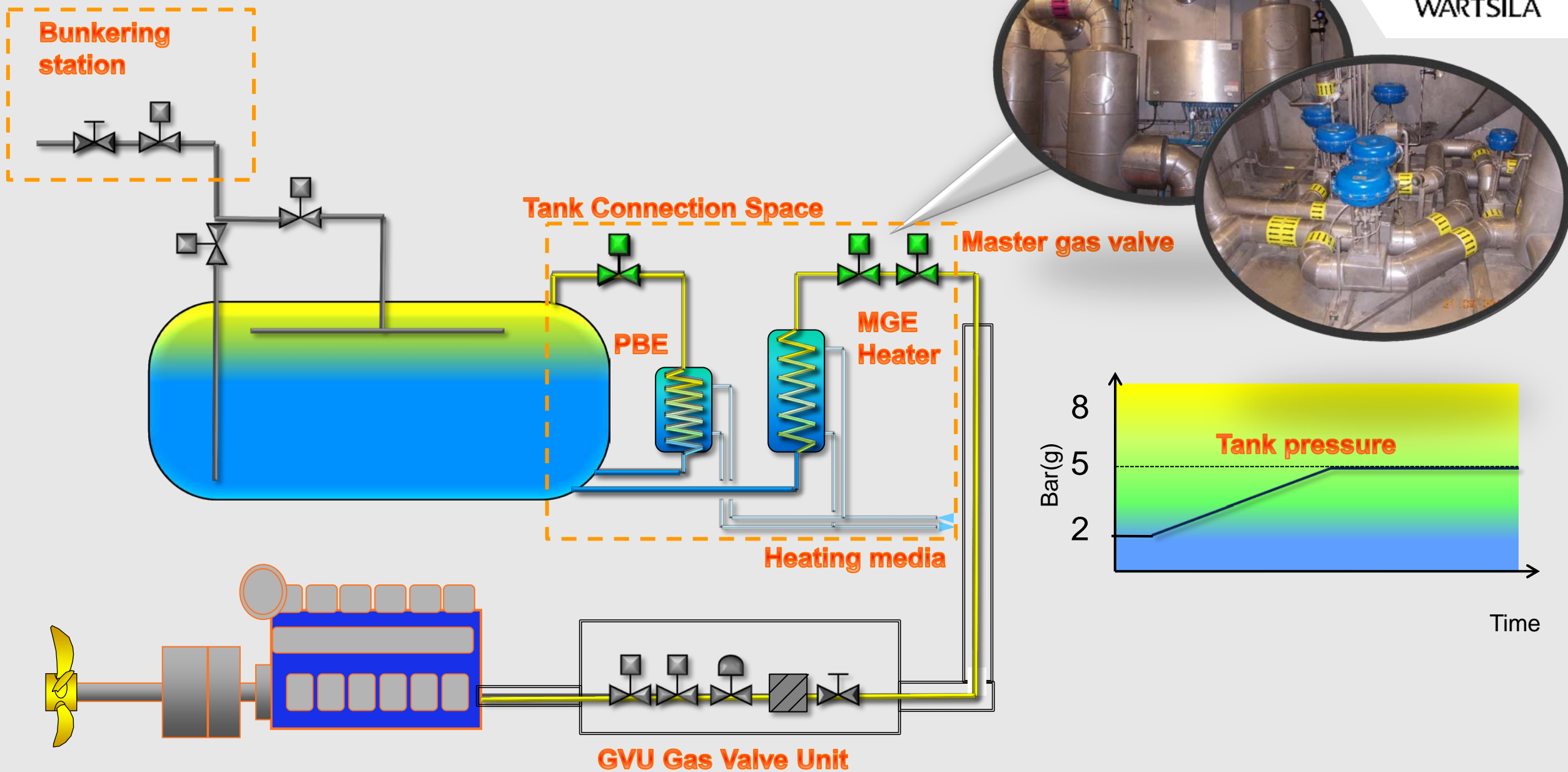
LNGPac™ Automation



- # LNGPac™ Heating Media System

LNGPac™ System





LNGPAC™ - COLD RECOVERY SYSTEM

Wärtsilä Cold Recovery System is a global patented system to be optional supplied with the LNGPac™

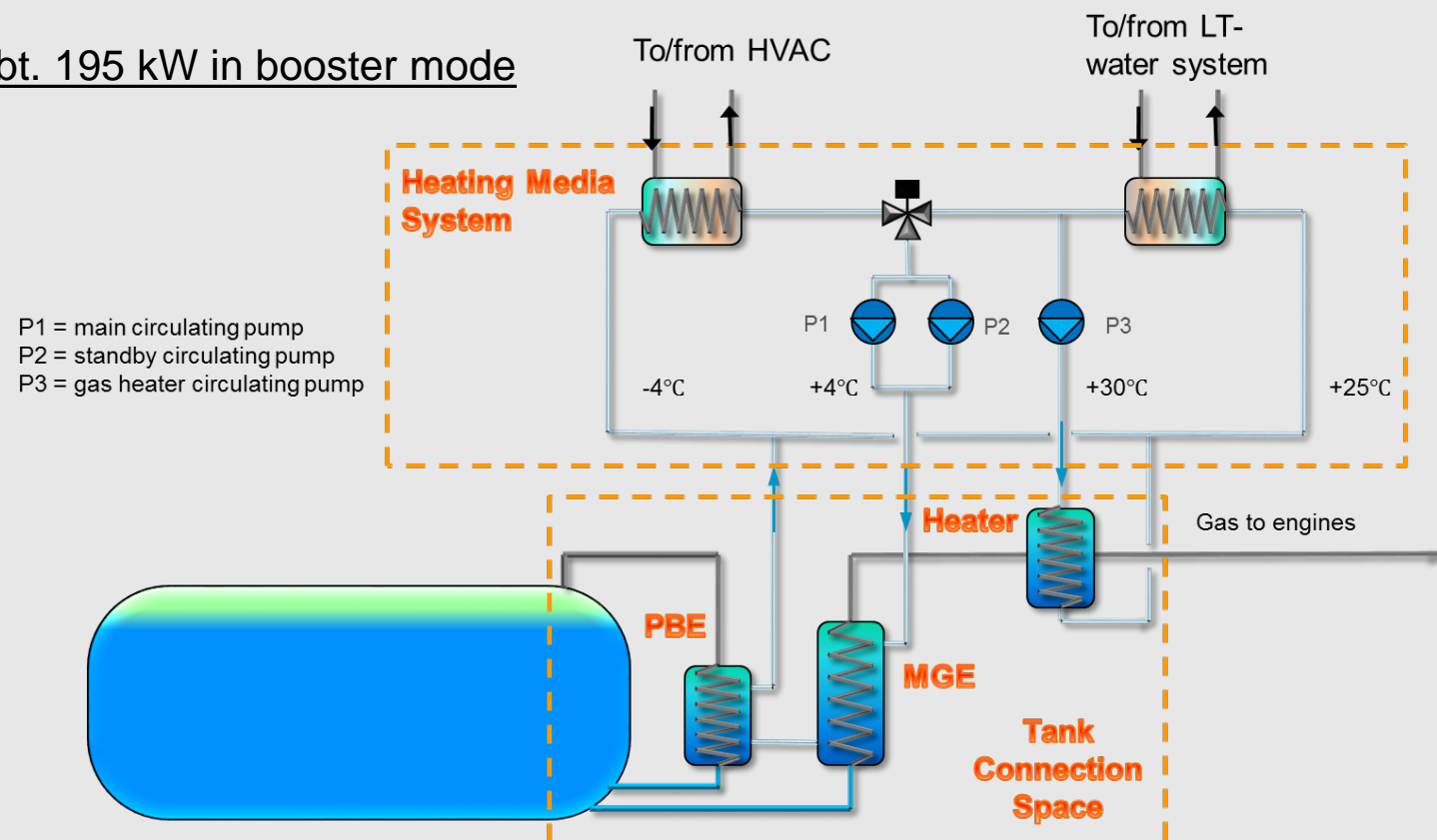
Principle:

Thermal (cold) energy from the LNG is utilized for reducing the chiller/compressor unit(s) power requirement of the HVAC system, where the cold capacity generated by LNGPac™ is dependent on the LNG consumption to the engines and limited to the maximum gas flow at 100% engine load. The additional cold is extracted during the evaporation process from LNG to NG.

Possible energy recovery on board of MS Helgoland: abt. 195 kW in booster mode
 (abt. 35 kW for each MW of DF engines installed)
 (abt. 800 kW for each Kg/sec of evaporated gas)



At low gas consumption the HMS pumps are operated at lower frequency reducing power consumption





LNGPAC™ - REFERENCES

Total number of vessels equipped with Wärtsilä LNGPac™: **64**

Total number of LNGPac™: **74**

Total volume: **20550 m³**

Number of vessels in operation: **17**

Number of vessels under construction: **47**



Owner country

Belgium	3
Canada	12
Germany	2
Norway	15
Sweden	4
UAE	1
USA	10
UK	17

Application

Dredger	2
Fish Feeder	1
Offshore special	1
Passenger	1
Product Tanker	3
PSV	12
RoPax	19
RoRo	4
Tug	4
Special vessels	17

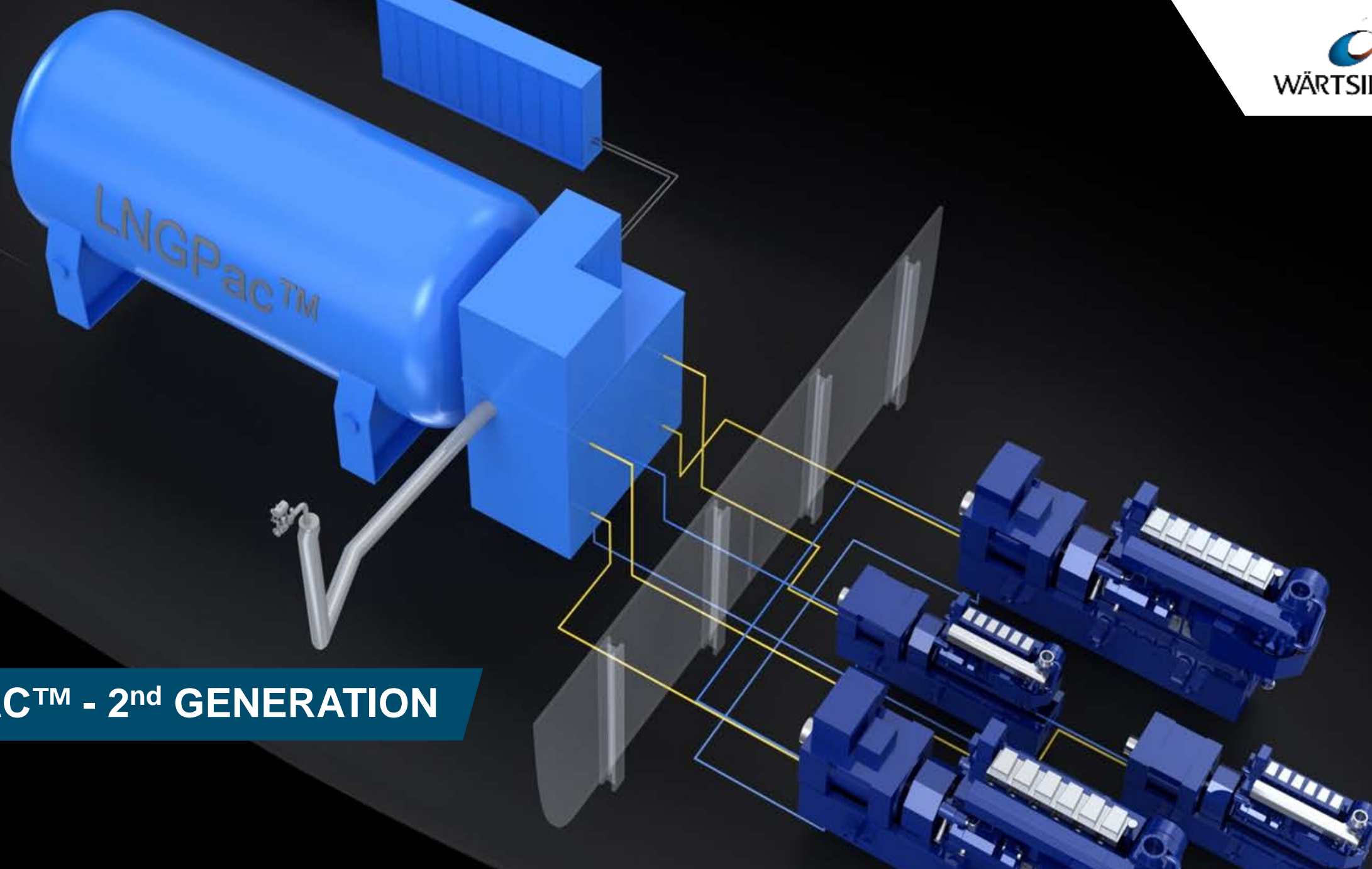
Number per class

ABS	12
BV	11
DNV-GL	16
LR	24
Tasneef	1

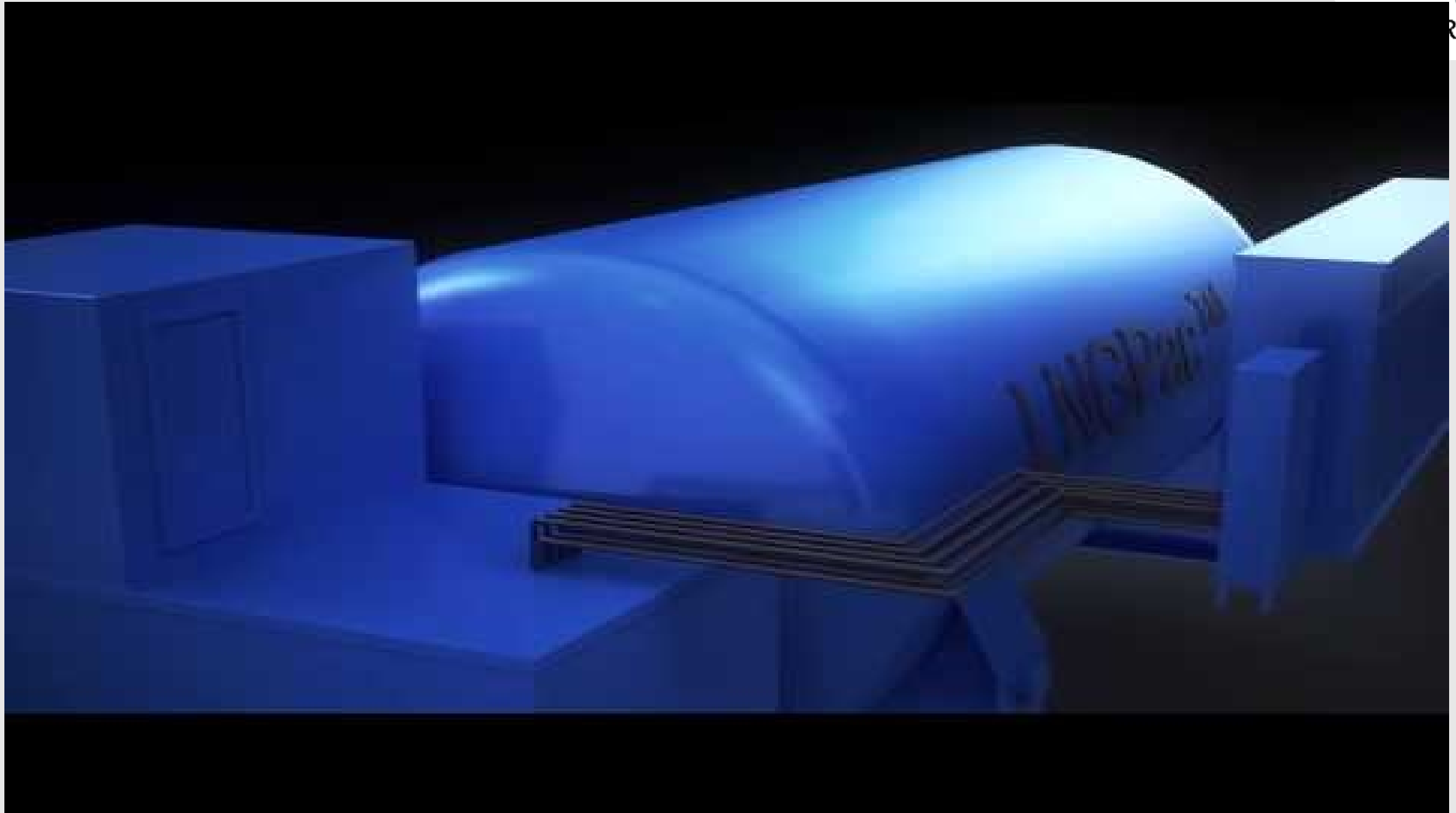
Volume per class

ABS	9600
BV	3709
DNV-GL	4478
LR	2738
Tasneef	25

NOTE: Includes also LNG fuel gas tank deliveries of Hamworthy



LNGPAC™ - 2nd GENERATION



Thank you for your attention!



SYMBIOS



Co-financed by the European Union
Trans-European Transport Network (TEN-T)

WÄRTSILÄ - YOUR KEY TO LNG

LET THE LEADER IN LNG ENABLE YOUR SMOOTH TRANSITION TO GAS



WWW.WARTSILA.COM

Thank you!

Claus Hirsch
Superintendent AG Ems

Matthias Schubert
Sales Manager, Marine Solutions Wärtsilä Deutschland GmbH