

Pumps for alternative marine fuels

Robust, Efficient and Hermetically Tight Pumping Technology for Marine Engines

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Contributing to decarbonization

■ Ammonia Powered Ships

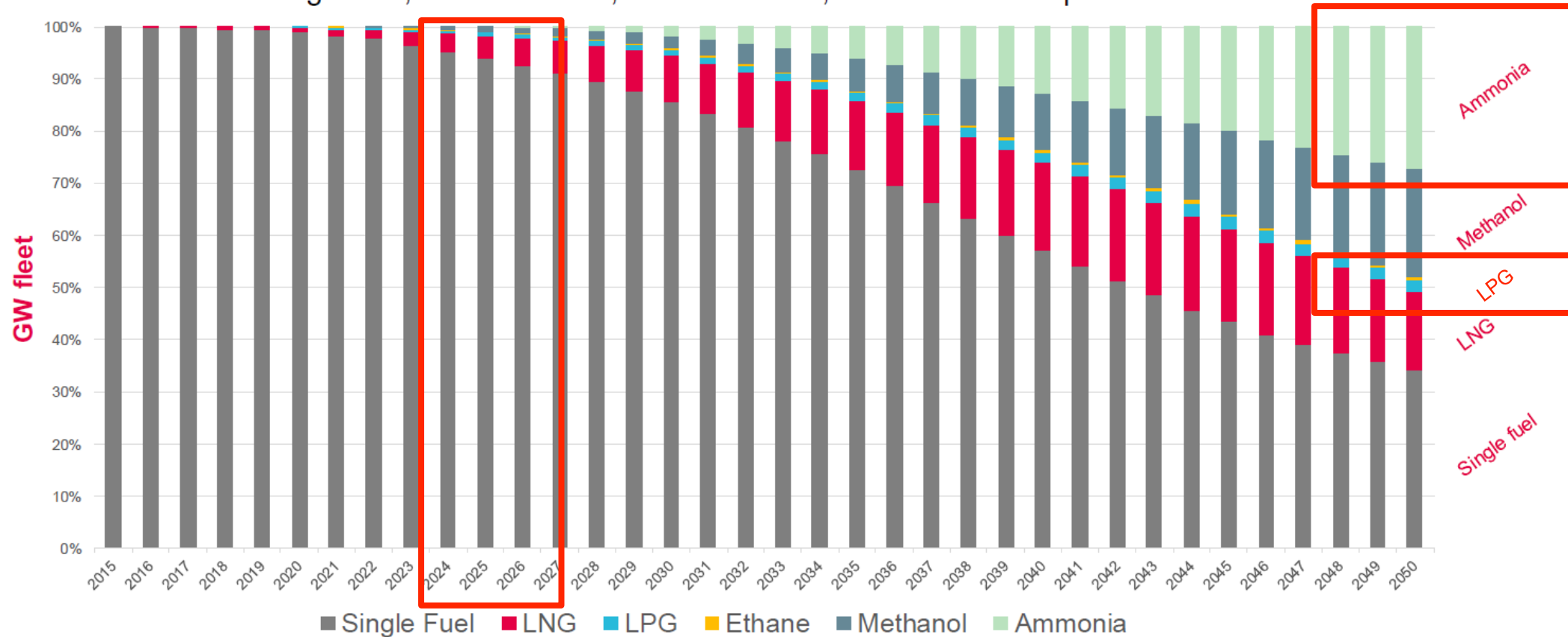
Ammonia is emerging as a potential fuel for large ships due to several key advantages that align with the maritime industry's goals for reducing emissions and improving sustainability.

- Carbon Emissions reduction
- Energy Density
- Existing Infrastructure

MAN forecast future fuel mix

Two-stroke fuel mix forecast towards 2050

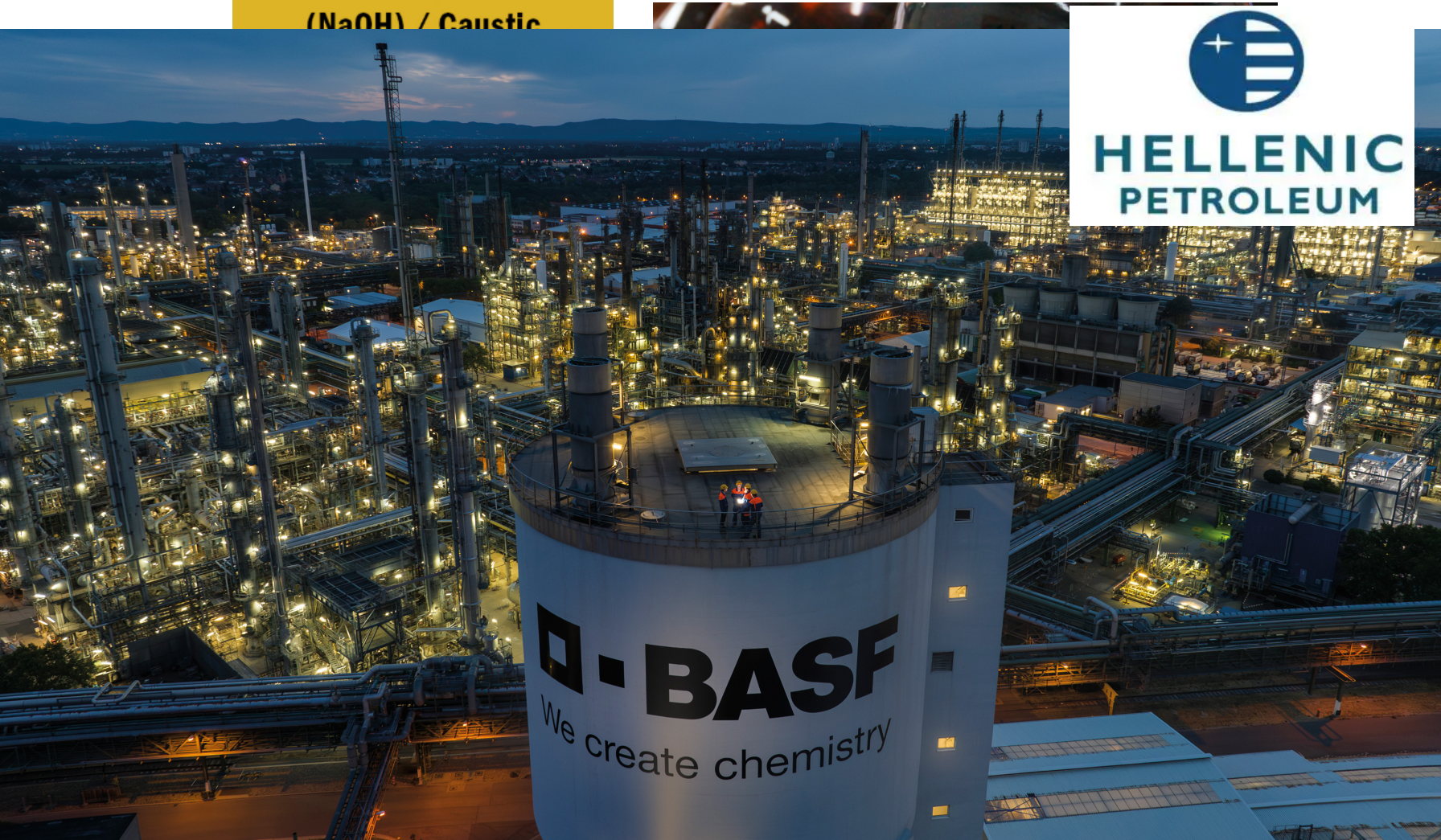
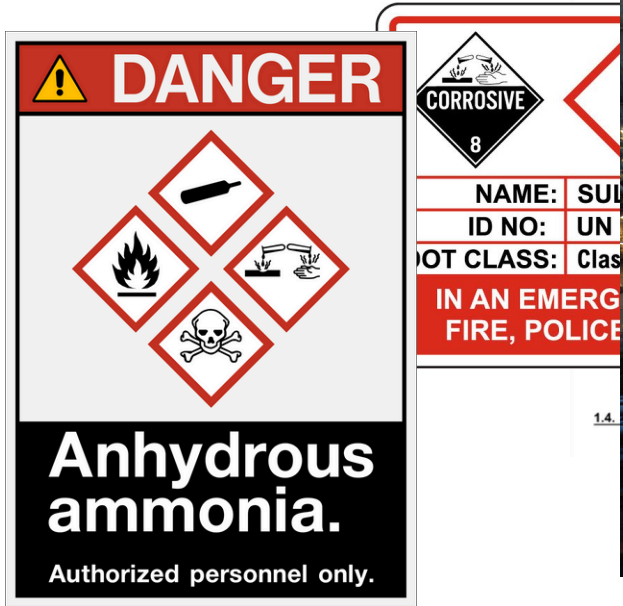
Distribution of 34% single fuel, 27% ammonia, 21% methanol, and 15% LNG expected in 2050



Assumptions: Scenario is based on known factors such as world trade growth, EEDI, EEXI, expected CO2 regulation (currently unspecified), etc.

Why LEWA?

Sodium Hydroxide
(NaOH) / Caustic



➔ Critical Fluids and Processes is our daily Business!



LEWA Milestones



Company Foundation

1952



First Patent

1954



First ACHEMA

1955



LEWA triplex

1984



G4T – biggest process diaphragm pump

2003



LEWA ecoflow

2005



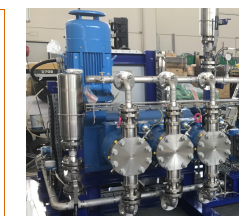
DBAG and Quadriga Capital acquire LEWA

2006



G3M developed: Participation in LNG high pressure pumps for ship propulsion systems

2012



LEWA triplex for MAN testbed in Copenhagen (LPG)

2017



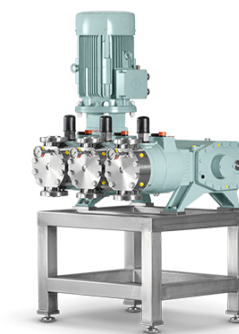
More than 40 diaphragm process pumps installed on vessels for LPG FGSS

2022



First order for Ammonia
In total, more than 100 pumps sold for FGSS

2024



Establish dedicated segment organization
More than 140 pumps on order
All first mover orders for Ammonia secured

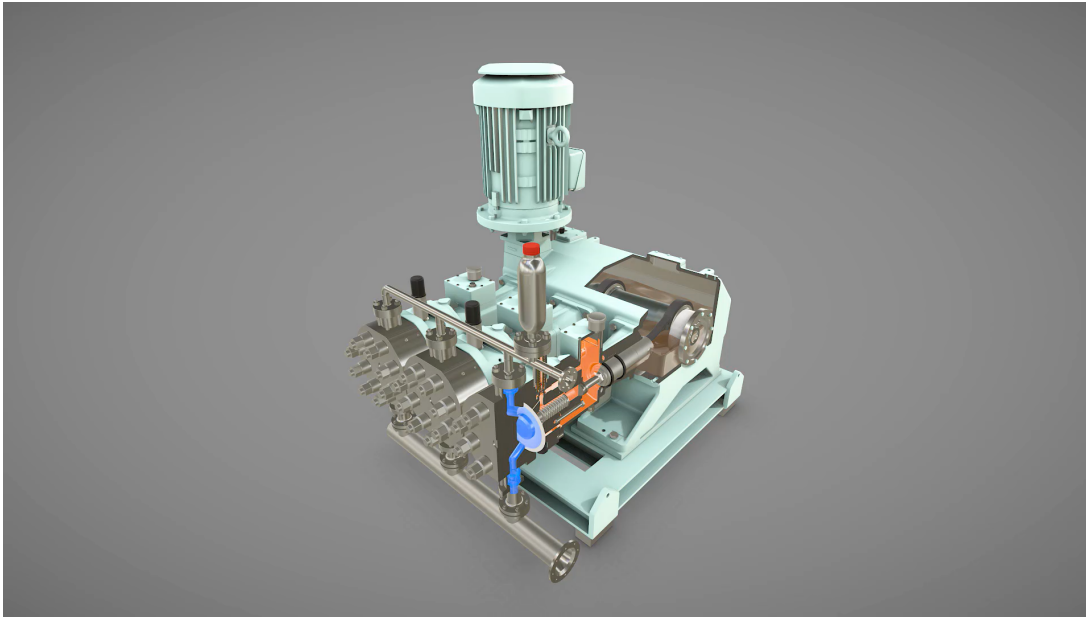
2025



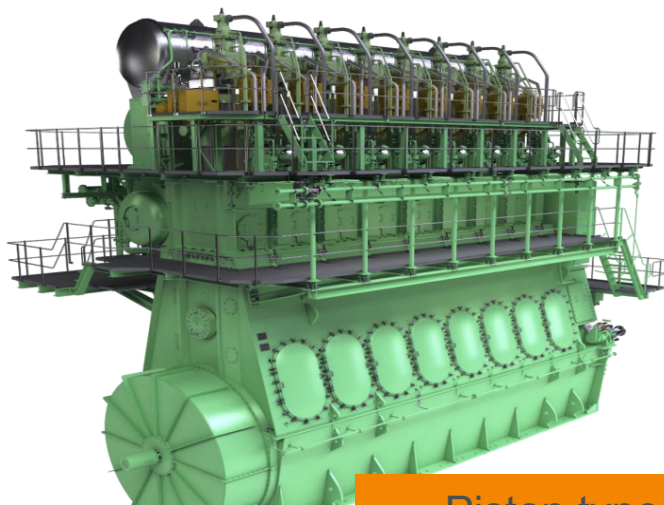
General Design of Process Diaphragm Pump

Overview

- Motor
- Pump head
- Drive unit in compact monoblock design

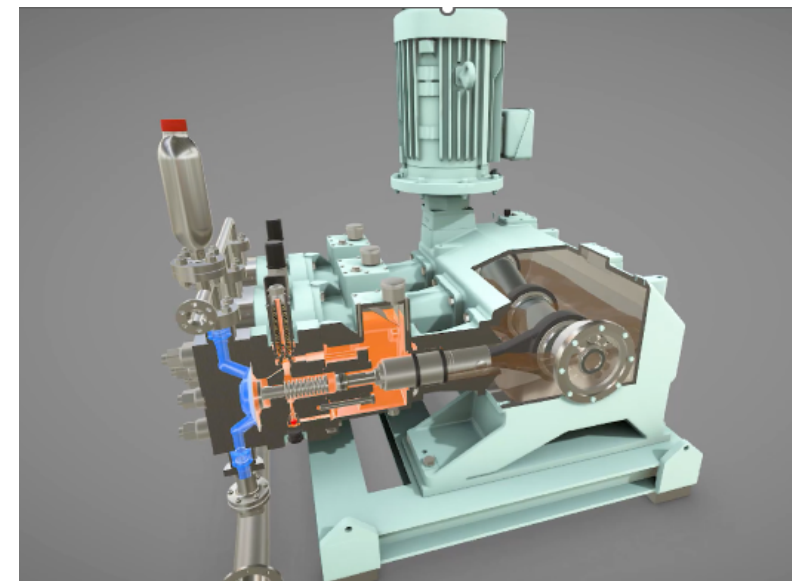
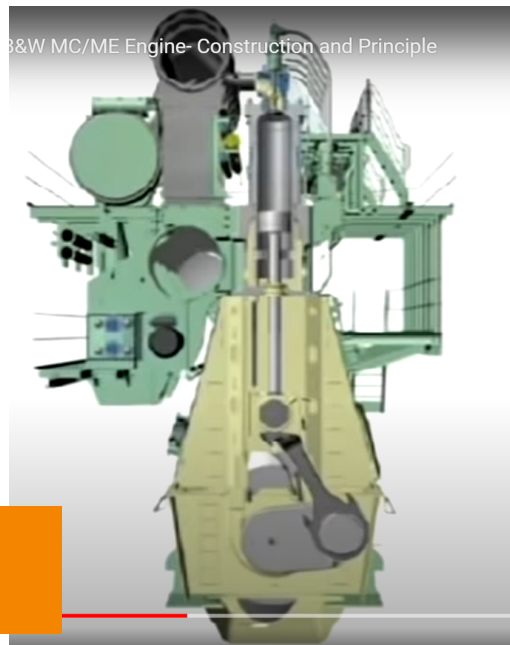


General Design of Process Diaphragm Pumps for FGSS



Low speed

Piston type machinery



100% run-dry safe

Hermetically tight

All class societies

70+ years of experience

High efficiency

High MTBF

Flex Fuels

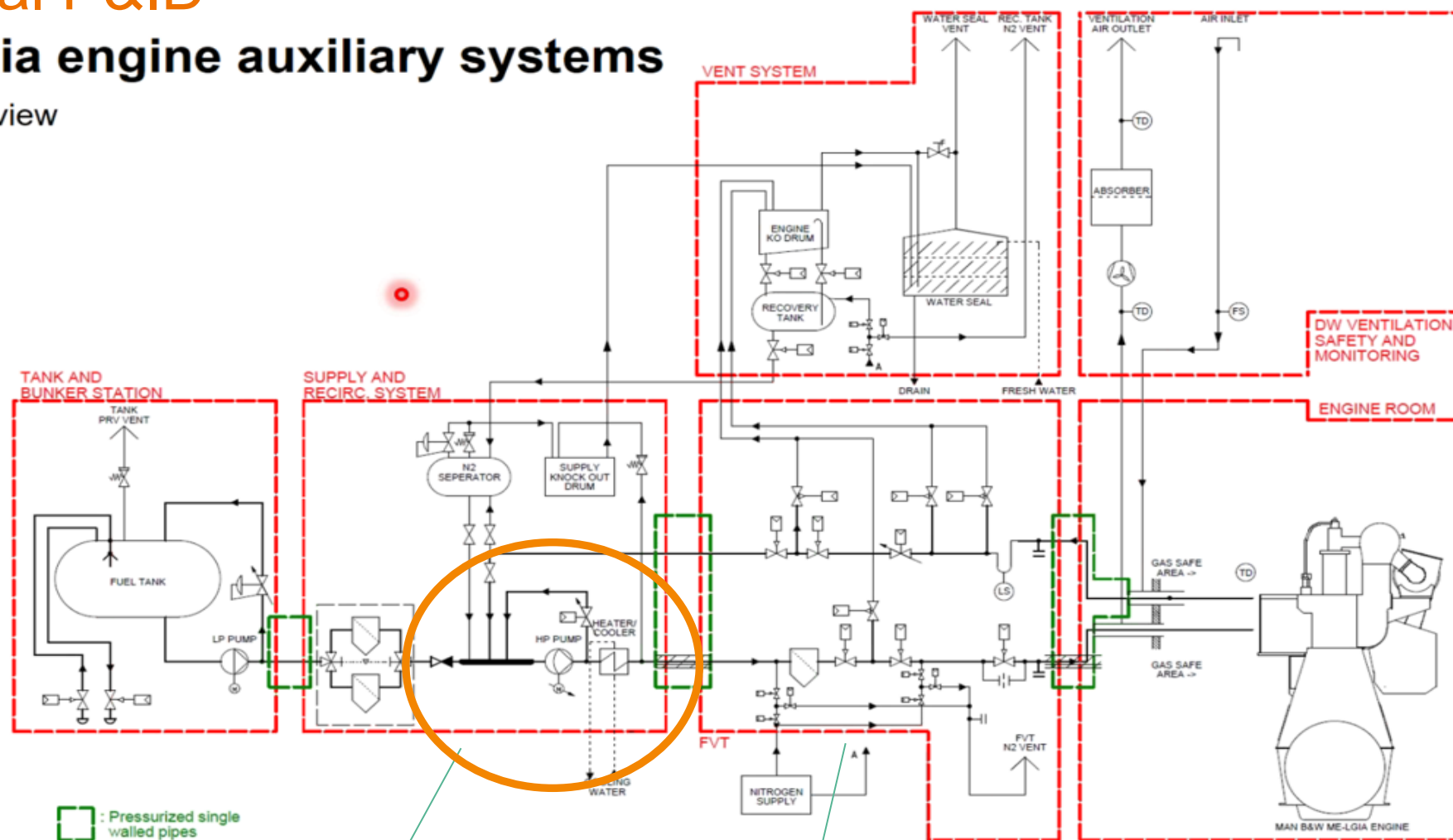
Proven, failsafe, robust design

➔ ...sharing the same DNA!

Turn down ratio

Ammonia engine auxiliary systems

System overview



 : Pressurized single walled pipes

Greener Shipping Summit 2025

FGSS module with LEWA triplex pump

Fuel Valve Train

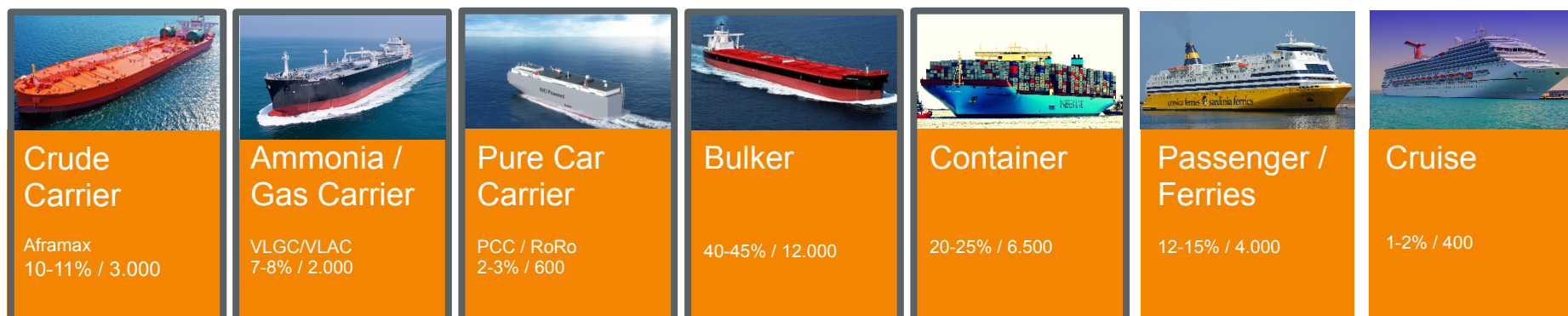
Marine Engine

FGSS (Fuel Gas Supply System) | Sweet spots

Based on existing global fleet

ShipType

(2023 ~%
distribution /
~abs. no. of ships)

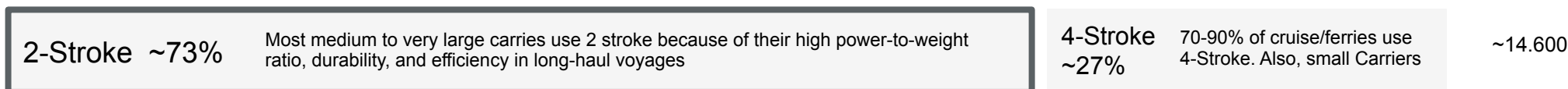


Total 2023:
28.050
~67-78%
~20.000

ShipSize



EngineType



Fuel

2050 ~% distribution

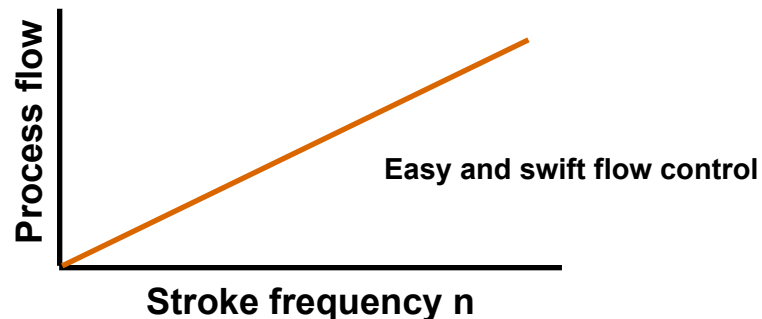


- Sweet spot in scope
- Tough competition
- Simple technology sufficient

Process Diaphragm Pumps in LPG and NH3 - FGSS

■ FGSS for LPG and NH3 engines

- LEWA process diaphragm pumps can handle LPG or NH₃ with nearly identical configuration
- More than 700 diaphragm pumps delivered for NH₃ into chemical industry
- 50 of these pumps are triplex process diaphragm pumps with
 - flowrates up to **22 m³/h**
 - discharge pressure up to **320 bar**
 - larger flowrates and pressures are possible



■ LEWA triplex process diaphragm pump

When do I use “process“-diaphragm pumps?

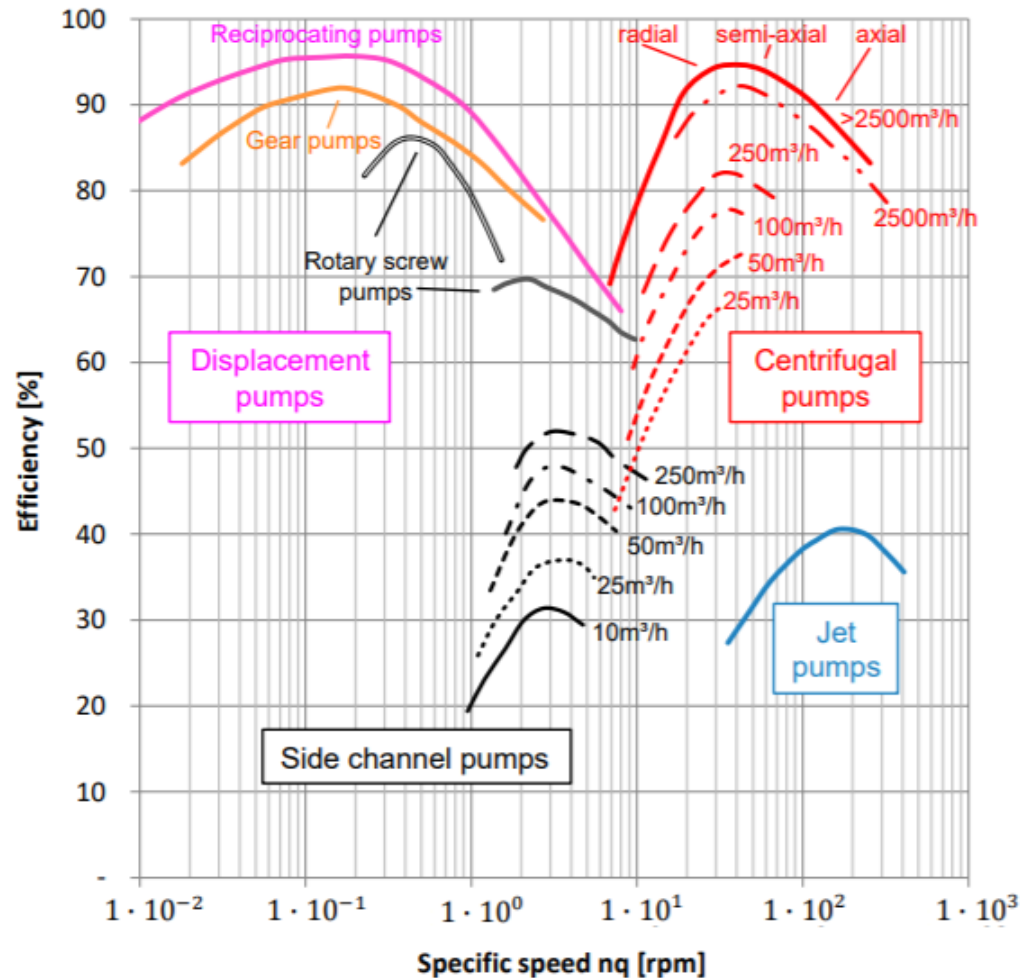


Figure 1. Maximum efficiency depending on specific speed and flowrate [2].

Selection criteria

- Flow rates → up to 200 m^3/h
- High discharge pressures → 20 to 1000 bar
- For dangerous fluids → Pump is hermetically tight → no dynamic sealing → Zero leakage
- Run dry safe 100%
- High efficiency → 85-90%
- Easy maintenance – possible on board
- Very high operational safety
- Very high availability/up time
- Ideal for marine applications and installation on seagoing vessels
- Certification according to DNV, ABS, Lloyds, KR, NK etc. are possible

Payback Period



VLGC/VLAC FGSS

6000 operating hours

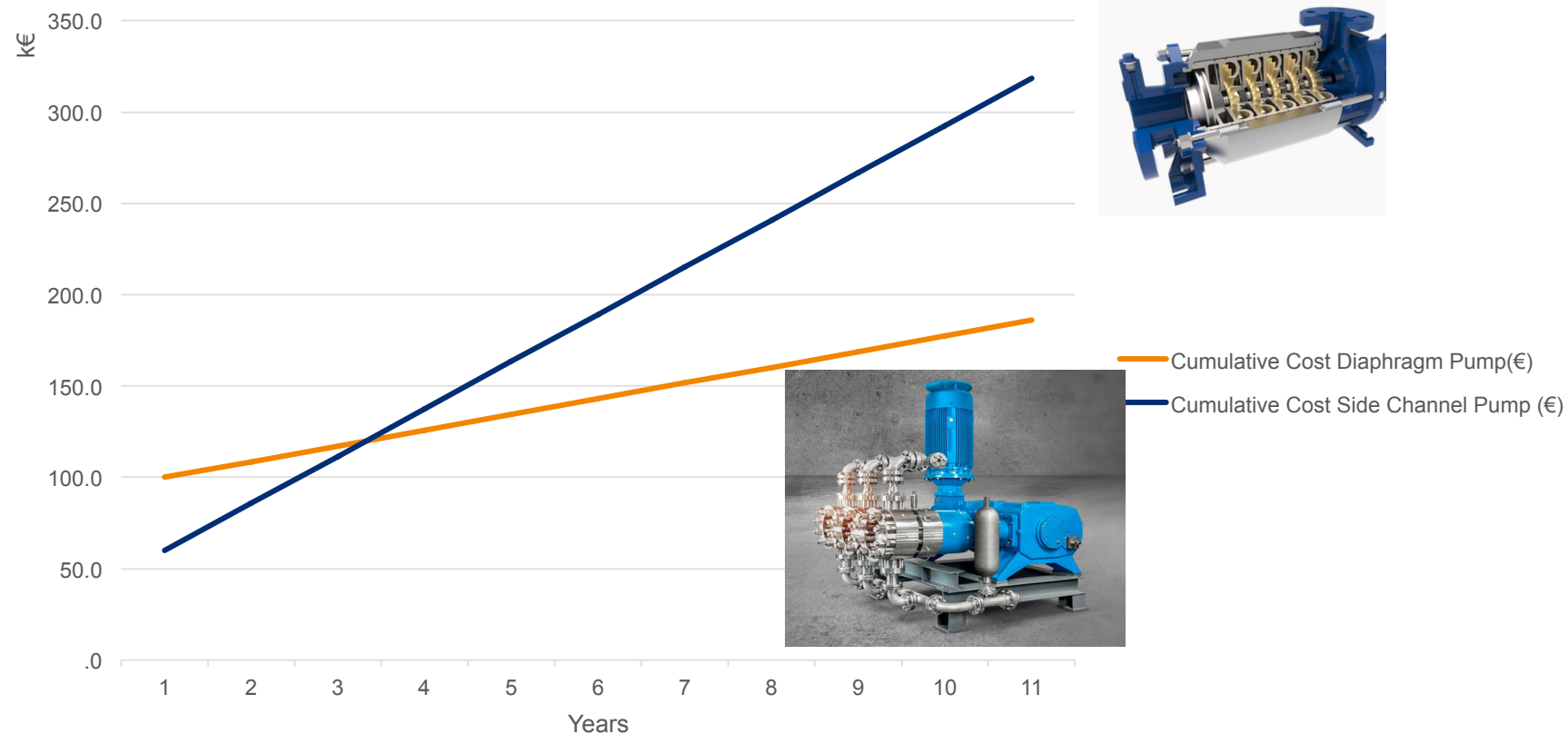
Flow rate: 10m³/h

Injection pressure: 53bar

HFO price: 429 USD/t

9.5 €-Cent/kWh

Amortization of invest

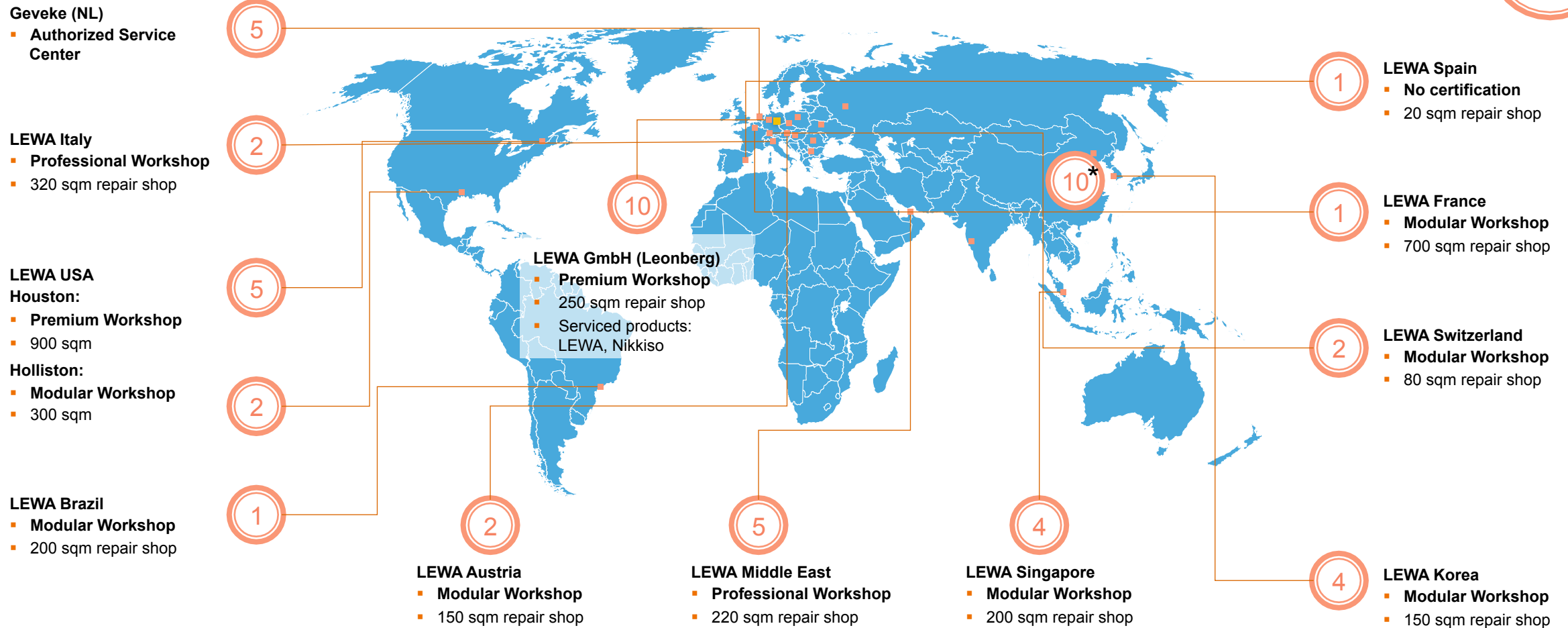


✓ Amortization after 3 years with LPG, after 2 years with ammonia (85bar inj. Pressure)

Overview of LEWA Certified Workshops (2025)



No. of
certified
Technicians



*as part of the Lewa aftersales network 4 service engineers and 6 service technicians are based in China



LEWA Process Diaphragm Pumps

the beating heart of safe and efficient
FGSS onboard ships

and the key to safe Ammonia systems
for carbon free shipping





Your  partner in Greece