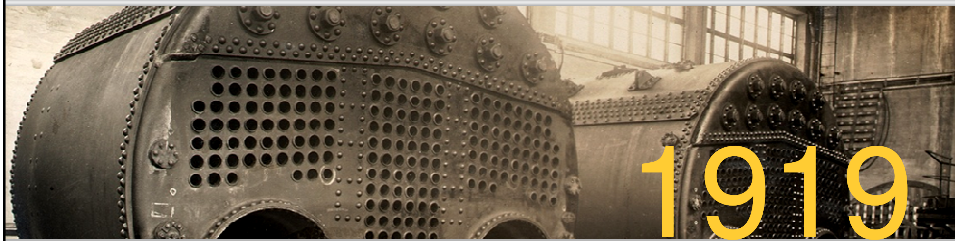


The Aalborg product range

Sameer Kalra
Vice President
Marine & Diesel division

History



- 1912** Aalborg Shipyard, Denmark established
 - 1919** First Aalborg boiler built (Scotch marine type)
 - 1937** Danish shipowners J. Lauritzen acquired Aalborg Shipyard
 - 1944** First power station boilers built
 - 1978** First After Sales service company established in Singapore and Rotterdam
 - 1995** MISSION™ concept introduced
 - 2000** Acquisition of Weisloch B.V., Netherland (Weisloch™ thermal fluid heaters)
 - 2006** Acquisition of Gosfern Pty Ltd (Gosfern™ burners) and related control & safety systems, Australia and Smit Gas Systems (SMIT GAS™ inert gas systems), The Netherlands
 - 2011** Alfa Laval acquires Aalborg Industries
- www.alfalaval.com

Key areas

Energy



Safety



Environmental



Basic needs in many industries

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Key areas and products

Energy



Heat & steam

Safety



Inert gas

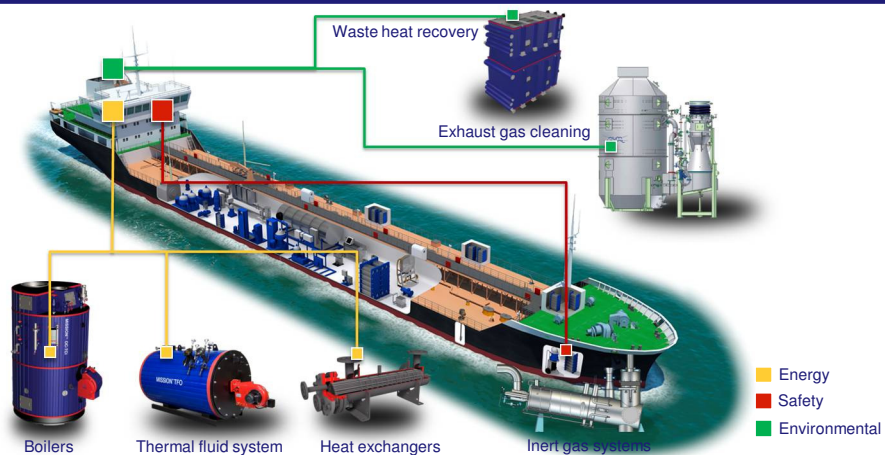
Environmental



Waste heat recovery & emissions

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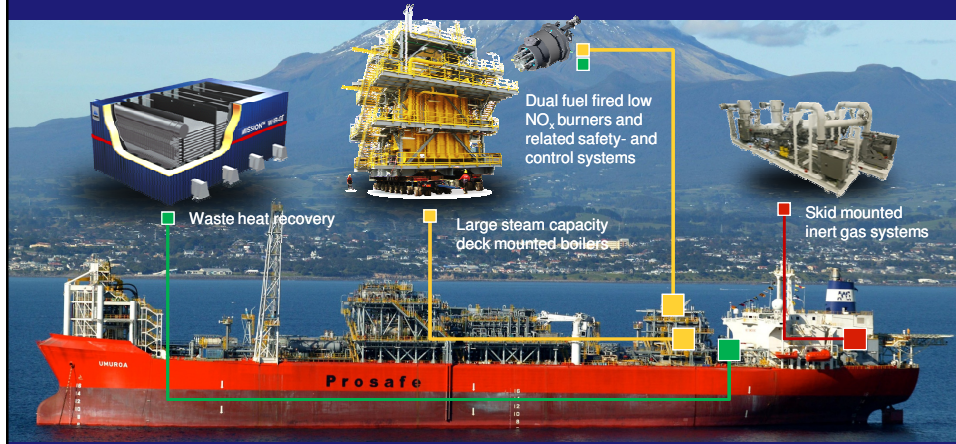
Marine product family



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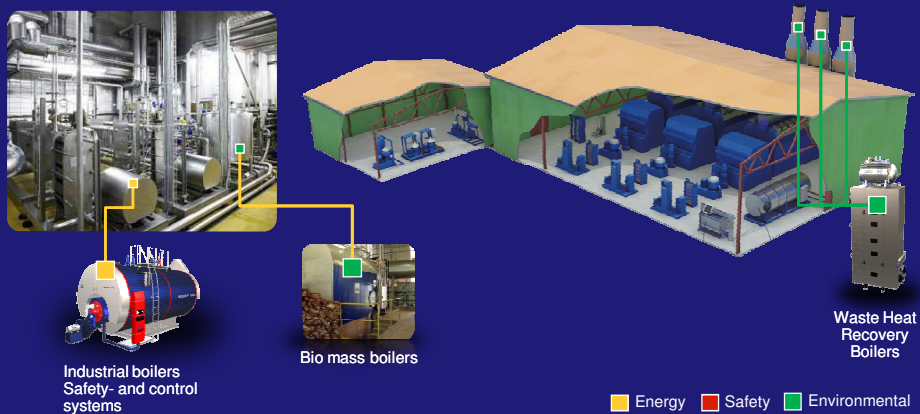
Offshore product family

- Energy
- Safety
- Environmental



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Land-based product family



- Energy
- Safety
- Environmental

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Key areas

Energy



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ENERGY

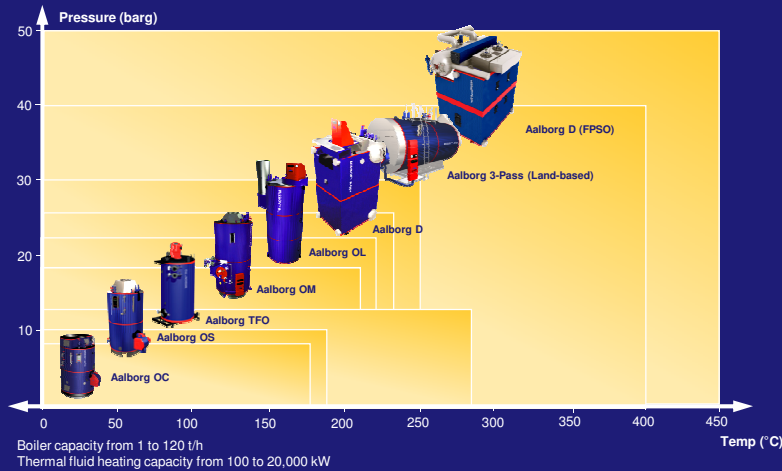
Boilers – our value proposition



- * Quality and reliability
- * Lowest life cycle costs
- * Power: Weight ratio
- * Availability - Global after sales network

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Boiler and thermal fluid capacity range



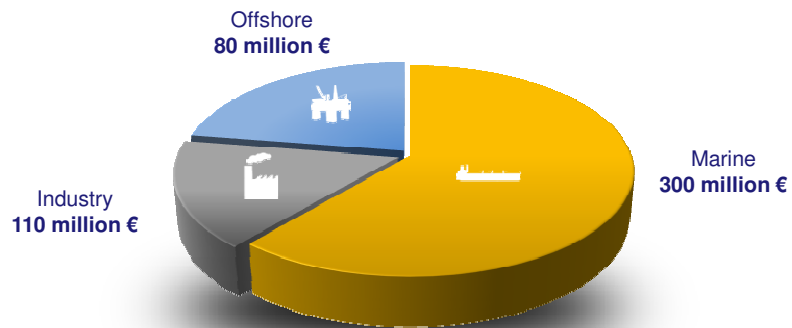
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Order value based on vessel type



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Market size estimate – former Aalborg portfolio



P&S not included

Source: Clarkson, IMA
Addressed market is vessels > 2000 dwt and Brazil land industry

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Key areas

Safety



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Why install inert gas systems?



T/T "King Haakon VII" – cargo tank explosion 29 December 1969

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Inert gas – our value proposition ?

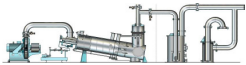

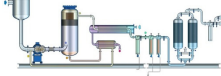


- * Quality and reliability
- * Large installed base – references
- * Availability - Global after sales network

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SAFETY

Product range

System type:	Inert gas generators	Inert gas systems (flue gas type)	Nitrogen systems
			
Capacity:	Up to 25,000 m ³	Up to 10,000 m ³	Up to 30,000 m ³
Installation:	<ul style="list-style-type: none"> * Product tankers * Chemical tankers * FPS * LNG carriers * LPG carriers 	<ul style="list-style-type: none"> * Crude tankers * Product tankers * FPS 	<ul style="list-style-type: none"> * Product tankers * Chemical tankers * FPS

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SAFETY

Order value based on vessel type




LNG carrier





LPG carrier





Chemical tanker





Crude tanker

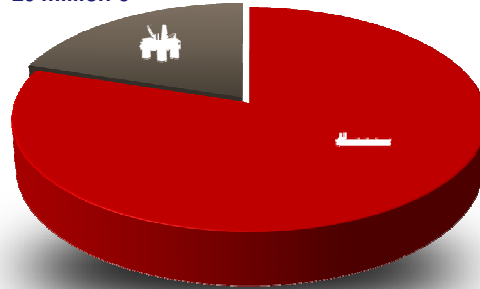


FPSO
<5 times
more

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Market size estimate

Offshore
20 million €



Marine
80 million €

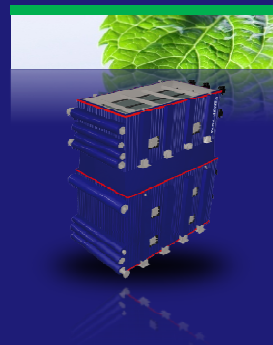
P&S not included

Source: Clarkson, IMA
Inert Gas Systems Mandatory for Tankers > 20,000 dwt

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Key areas

Environmental

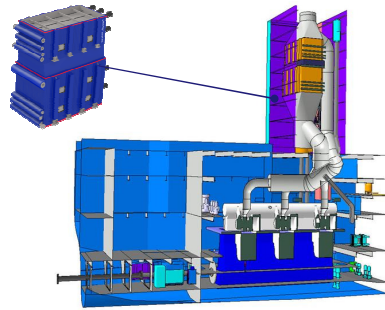


Waste heat recovery

www.alfalaval.com

Waste heat recovery system – traditional design

...extract enough heat from exhaust gas for process needs

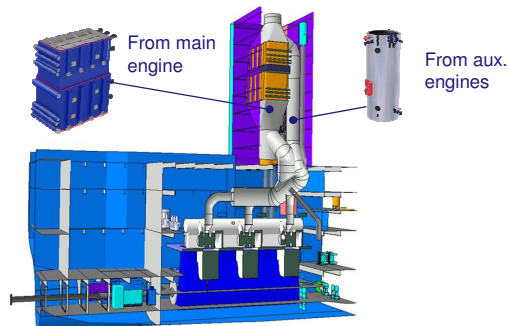


Steam for ship service- 3~4 tons/hr

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Waste heat recovery system – modern design

.....extract as much heat from exhaust gas as economically feasible.



USD 1~3m
fuel
saving/ yr
on VLPP.

Super heated steam
for steam turbine: 5 MW power

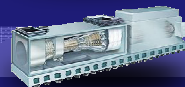
Steam for ship service :3 ~4 tons/h

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Waste heat applications



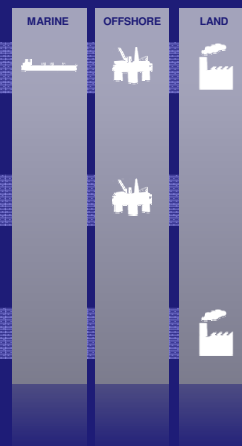
After diesel engines



After gas turbines



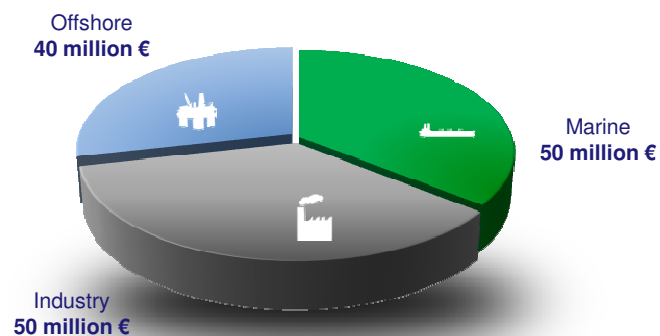
After process gas



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Market size estimate

– waste heat recovery



P&S not included

Source: Clarkson, IMA
Addressed market is vessels > 2000 dwt

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Key areas

Environmental



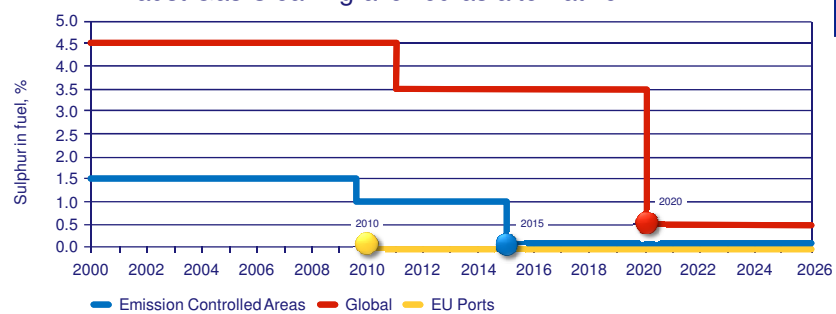
Pure SOx
Exhaust Gas Scrubber

www.alfalaval.com

Stricter legislation sulphur emission

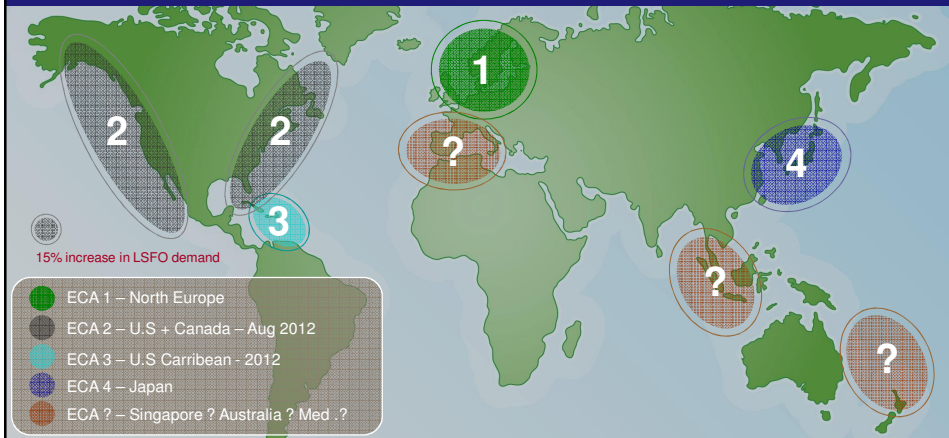
ENVIRONMENT

- * IMO MARPOL Annex VI – Decision of MEPC 58 and 59
- * Exhaust Gas Cleaning allowed as alternative



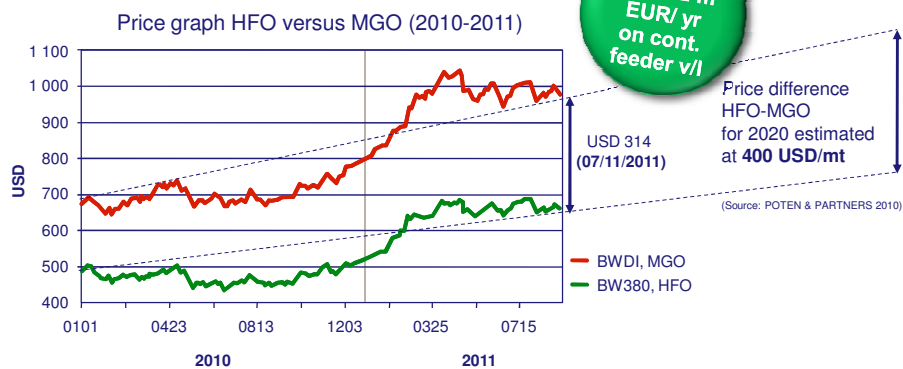
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Increasing emission controlled areas



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Fuel price differential scenarios

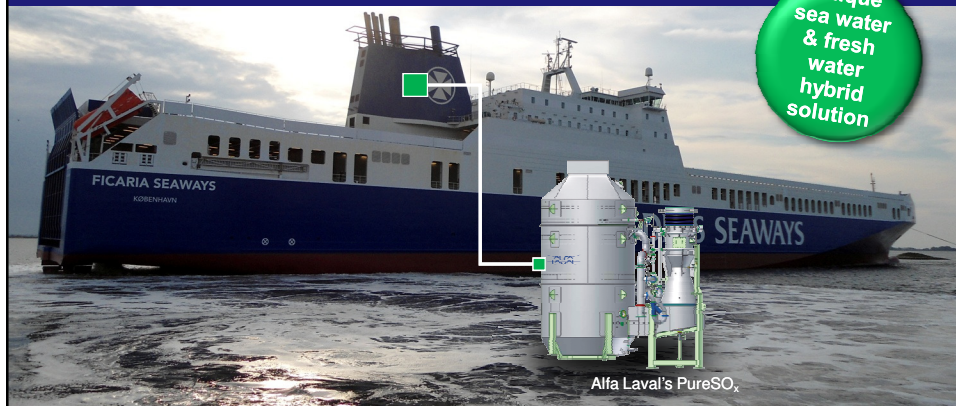


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Ficaria Seaways

– world's largest scrubber on a vessel

Unique
sea water
& fresh
water
hybrid
solution

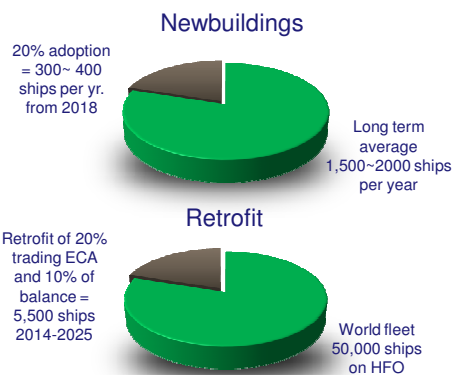


Alfa Laval's PureSO_x

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Market size estimate

– *exhaust gas cleaning*



Jokers

- * Timing: Delay in implementation of emission regulations.
- * Waste water regulations
- * Adoption of LNG as fuel – shore infrastructure

Source: Clarkson, IMA
All vessels > 2000 dwt

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Growth Drivers

Globalization, Energy, Environment & Increased living standards

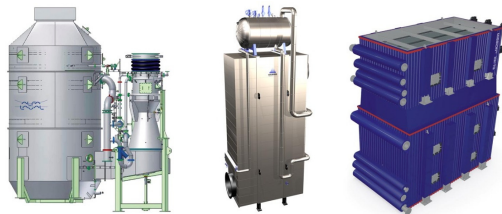
- * Transportation demand
- * Natural gas as fuel and fuel prices
- * Emissions regulations- SO_x , NO_x , CO_2
- * Demand for power in emerging markets



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R&D focus areas

- SO_x mitigation – Exhaust Gas Cleaning
- Energy savings – Exhaust gas waste heat recovery
- Natural gas fuelled boilers for marine application
- NO_x reduction – Exhaust Gas Recirculation Boiler



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Summary

- * Strong market position and full range of products in the market niches served.
- * Growth potential in end markets and geographies leveraging Alfa Laval's global presence.
- * Trade growth, energy efficiency and emission legislation demands form a solid base for future growth opportunities.

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