The Aalborg product range

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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., Netherlands (Weisloch™ thermal fluid heaters)
2006  Acquisition of Gosfern Pty Ltd (Gosfern™ burners) and related control & safety systems, Australia and SMIT GAS™ inert gas systems, The Netherlands
2011  Alfa Laval acquires Aalborg Industries

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

Marine product family

- Boilers
- Thermal fluid system
- Heat exchangers
- Exhaust gas cleaning
- Waste heat recovery
Offshore product family

- Dual fuel fired low NOx burners and related safety- and control systems
- Large steam capacity deck mounted boilers
- Waste heat recovery
- Skid mounted inert gas systems

Land-based product family

- Industrial boilers
- Safety- and control systems
- Bio mass boilers
- Waste Heat Recovery Boilers
Key areas

Energy

Boilers – our value proposition

- Quality and reliability
- Lowest life cycle costs
- Power: Weight ratio
- Availability - Global after sales network
Boiler and thermal fluid capacity range

- Boiler capacity from 1 to 120 t/h
- Thermal fluid heating capacity from 100 to 20,000 kW

Order value based on vessel type

- VLCC tanker
- LNG carrier
- Container ship
- Bulk carrier
Market size estimate – former Aalborg portfolio

- Offshore: 80 million €
- Marine: 300 million €
- Industry: 110 million €

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

P&S not included

Key areas

Safety
Why install inert gas systems?

Inert gas – our value proposition?

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

- **System type:**
  - Inert gas generators
  - Inert gas systems (flue gas type)
  - Nitrogen systems

- **Capacity:**
  - Up to 25,000 m³
  - Up to 10,000 m³
  - Up to 30,000 m³

- **Installation:**
  - Product tankers
  - Chemical tankers
  - FPS
  - LNG carriers
  - LPG carriers
  - Crude tankers
  - Product tankers
  - FPS

Order value based on vessel type

- LNG carrier
- LPG carrier
- Chemical tanker
- Crude tanker

<5 times more
Market size estimate

Offshore
20 million €

Marine
80 million €

P&S not included

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

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Key areas

Environmental

Waste heat recovery

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Waste heat recovery system
– *traditional design*

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

Steam for ship service: 3–4 tons/hr

Waste heat recovery system
– *modern design*

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

Super heated steam for steam turbine: 5 MW power

Steam for ship service: 3–4 tons/hr

USD 1–3m fuel saving/yr on VLPP.
Waste heat applications

- After diesel engines
- After gas turbines
- After process gas

Market size estimate – waste heat recovery

- Offshore: 40 million €
- Marine: 50 million €
- Industry: 50 million €

Source: Clarkson, IMA

*P&S not included*

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Key areas

Environmental

Pure SOx
Exhaust Gas Scrubber

Stricter legislation
sulphur emission

IMO MARPOL Annex VI – Decision of MEPC 58 and 59
Exhaust Gas Cleaning allowed as alternative
Increasing emission controlled areas

15% increase in LSFO demand

Fuel price differential scenarios

Price difference HFO-MGO for 2020 estimated at 400 USD/mt (Source: POTEN & PARTNERS 2010)

Price graph HFO versus MGO (2010-2011)

Savings of 1 ~ 2 m EUR/yr on cont. feeder v/l

USD 314 (07/11/2011)
Ficaria Seaways
– world’s largest scrubber on a vessel

Market size estimate
– exhaust gas cleaning

Newbuildings
20% adoption = 300~400 ships per yr. from 2018

Retrofit
Retrofit of 20% trading ECA and 10% of balance = 5,500 ships 2014-2025

Long term average 1,500~2000 ships per year

World fleet 50,000 ships on HFO

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

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
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.