Focus on customer segments
Orders received January – September 2011, Pro-forma
An extended offer – Marine & Diesel

Marine market

Diesel power market

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Diesel power
Power demand is growing

Growth in world electric power generation and total energy consumption, 1990-2035.

EIA, International Energy Statistics database (as of Nov. 2009), web site www.eia.gov/emeu/international.
Diesel power – market drivers

Main electricity drivers

• Industrialization in fast-growing markets
• Increased living standard
• “Re-build” of electrical grids, e.g. Iraq and Japan
• Privatization of electricity distribution, e.g. Turkey

Diesel power drivers

• Electricity demand in remote locations
• Partial load and quick startup of plants (peak load)
• A diesel power plant can be built in relatively short time
"Diesel power" market is growing – with natural gas

** Since 2006, BioFuel separated from LFO. Source: Diesel&Gas Turbine Worldwide.
Fuel trends for power plants

**Heavy fuel oil (HFO) usage**
- Remote locations where gas is not available
- Dual fuel plants, e.g. transition until gas is available
- Middle East

**Natural gas usage**
- Where gas is available, preferred over HFO
- Improved efficiency -> competing with gas turbine power plants
Alfa Laval in diesel power stations

- Oil waste reduction
- Separation
- Fuel conditioning
- Steam cooling
- Lube oil cooling
- Crankcase gas cleaning
- Filtration
- Exhaust gas waste heat recovery
- Sea water filtration
- Desalination
- Central cooling
- Engine circuit cooling

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Market leadership with core technologies

- **Separator**
  - Protect engines from particles
  - Increase lifetime of lube oil

- **Air heat exchanger (radiator)**
  - Engine cooling

- **Waste heat recovery boiler**
  - Produces steam by using heat from exhaust gas

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Power plant overview
Attock 160 MW power plant in Pakistan

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Strong combined presence
The marine industry
Marine trends

Shipbuilding

Fuel prices

Seaborne trade

Environmental legislation
Seaborne trade growing rapidly

Total seaborne trade, million tonnes

40% growth

Source: IHS
Contracted and delivered vessels (above 1,000 gt), November 2011

Number of vessels

Source: SAI (IHS)
Contracted vessels per region
(above 1,000 gt), October 2011

Source: SAI (IHS)
Environmental legislation

More legislation

...and higher demands
Alfa Laval onboard a vessel

Desalination
Cooling and heating
Ballast water treatment
Fuel conditioning
Filtration
Inert gas generation
Exhaust gas cleaning
Waste heat recovery
Steam generation
Thermal fluid heating
Cargo heating
Crankcase gas cleaning
Oil treatment
Bilge water treatment
Tank cleaning

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Market leadership with core technologies

**Separator**
- Protect engines from particles
- Increase lifetime of lube oil
- Reduces oily waste
- Cleans oily water

**Heat exchanger**
- Engine cooling
- Heating of fuel oil
- Heating and cooling of cargo

**Fresh water generator**
- Fresh water from sea water by using waste heat

**Oil/gas fired boiler**
- Generates steam by burning oil or gas

**Waste heat recovery boiler**
- Produces steam by using heat from exhaust gas

**Inert gas system**
- Creates inert gas for tanks

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Separator performance saves fuel

- Process water
- HFO 100%
- HFO 99.5%
- Oil loss
- HFO sludge
- Sludge tank
- Recovered oil
- Water
- HFO 33%
- Water 66%
- Overboard
- Sludge tank
- Bilge water tank
- Sludge
Waste heat recovery system reduces fuel consumption and emissions

Fuel savings >10% for large engines

Super heated steam for steam turbine

Steam for ship service

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Pure thinking
Leading position in environmental applications
# Marine legislation, examples

November 2011

<table>
<thead>
<tr>
<th>Focus</th>
<th>Legislation/Limitations</th>
<th>Newbuilt</th>
<th>Existing</th>
</tr>
</thead>
</table>
| **Sulphur oxides (SO\textsubscript{x})** | Stricter legislations in ECA*  
Stepwise changes.  
2015 in ECAs* and 2020 on open ocean | X        | X        |
| **Nitrogen oxides (NO\textsubscript{x})** | Stricter legislations in ECAs* from 2016  
(80% reduction) | X        |          |
| **Bilge water**                    | Overboard limit 15 ppm                                                                | X        | X        |
| **Ballast water treatment (limits of invasive species)** | Install Ballast water treatment system  
Enter into force when ratified by 30 states represented 35% of WST  
(currently 30 states, 26% of WST) | X        | X        |
| **Energy efficiency design index (EEDI)** | IMO's initiative to stimulate more efficient shipping (design and operation) | Under development | |
Sulphur emissions (SO\textsubscript{x})

Legislation: Sulphur in fuel

- Global
- ECA
- IMO

System tested on ferry/RoRo

SO\textsubscript{x}

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Nitrogen emissions (NO$_X$)

**Legislation**

* Emission control areas 80% NO$_X$ reduction on new built vessels from 2016
Ballast water treatment

**Legislation**

- Treatment systems installed
  - New built vessels from 2012
  - Existing vessels from 2014/2016

>200 systems sold

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Oily waste treatment

Legislation/market driver

PureBilge – bilge water treatment
- Overboard limit 15 ppm
Oily sludge treatment
- Minimise waste onboard
- Fuel cost savings

>400 systems sold

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Strong combined presence
– Shipyards and owners
Summary

* Diesel power growing with natural gas
* Seaborne trade growing fast
* Strong position of environmental solutions