New products and solutions for a changing planet

- Marine Division

Sameer Kalra
Head of Marine Division
Alfa Laval Group
PureBallast
- Market leading position in ballast water treatment

• First supplier with
  - USCG Type Approval with zero days hold-time
  - Revised IMO G8 Approval – mandatory from October 2020

• 1500 m$^3$/h larger UV reactor strengthened the position in bulker and tanker segment

• Unmatched global 24/7 service offer to support compliance
PureBallast
− Available opportunity ahead of us

EUR 8 B
market value

Retrofit

New build

October, 2019
* Source: Clarkson & Alfa Laval analysis
PureSOx

- Market leading position in SOx cleaning

- Delivered on ramp-up
- New modular water cleaning system launched
- Connectivity & compliance services gains traction
PureSOx

Available opportunity ahead of us

- Higher than anticipated scrubber uptake in 2018-19
- Significant uncertainty between low and high cases depending on fuel delta, fuel availability and regulation
- Higher market potential 2020-2026 than our 2018 guidance

Source: Clarksons Research

*) Market potential 2020-2026
## Other environmental products

<table>
<thead>
<tr>
<th>Product</th>
<th>Waste water</th>
<th>Waste oil</th>
<th>Exhaust gas</th>
<th>Waste heat</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Alfa Laval PureBilge</td>
<td>Alfa Laval PureDry</td>
<td>Alfa Laval PureNOx</td>
<td>Alfa Laval Aalborg Micro</td>
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<thead>
<tr>
<th>Driver</th>
<th>MARPOL Regulation</th>
<th>Fuel Efficiency</th>
<th>NOx Regulation</th>
<th>Fuel Efficiency</th>
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MARPOL Regulation and Fuel Efficiency are drivers for the products.
Fuel challenge
**Marine fuel mix projection**

- 2018-2050

- **Significant transition to compliant fuel from 2020 onwards**

- **Heavy Fuel Oil and Scrubber will continue to have a role in the medium term**

- **Liquid Natural Gas projected to be the transition fuel towards decarbonization**

- **Industry working towards a non-fossil fuel based future**

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**Energy use and projected fuel mix 2018-2050 for the simulated IMO ambitions pathway with main focus on design requirements**

Units: EJ/yr

- LSFO or MGO
- LPG
- LNG
- Liquefied methane (bio/electro)
- Hydrogen
- HFO and scrubber
- Electricity from grid
- Ammonia
- Advanced biodiesel

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LSFO, low-sulphur fuel oil; MGO, marine gas oil; LPG, liquefied petroleum gas; LNG, liquefied natural gas; HFO, heavy fuel oil; Advanced biodiesel, produced by advanced processes from non-food feedstocks.
Gas as a fuel
- LNG capable fleet development scenarios

![Graph showing LNG capable fleet development scenarios from 2013 to 2031, with two lines representing low and high case scenarios, and a red line representing base case scenario. The graph shows the number of ships from 0 to 14,000 across the years.]

- Significant increase in vessels selecting gas as a fuel going forward
- Long term charter commitments needed to drive this development

Modified from: Shipping Market Overview, September 2019, Clarksons Research
### Gas as a fuel

#### Product opportunities

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
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<td>Exhaust gas cleaning</td>
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<td>EGR water cleaning</td>
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<td>Waste heat recovery</td>
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<td>Filtration</td>
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<td>Ballast water treatment</td>
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- **Freshwater generation**
- **Marine service**
Alfa Laval Test & Training Centre

- Prepared for the future
Summary

- Leading provider of solutions into the environmental area
- Gas as a fuel will provide new opportunities
- We have the capability to meet the future