Marine Solutions:
Setting our course in challenging markets

Roger Holm
President, Marine Solutions & Executive Vice President
The most complete marine offering on earth

We are the leading provider of innovative products and integrated solutions in the marine and oil & gas industries.

As a leader in our fields, we need to continuously develop and transform ourselves to meet changing customer needs.

We have a passion to do right for our customers and the environment.
Our offering covers all market segments

OIL & GAS  MERCHANT  CRUISE & FERRY  NAVY  SPECIAL VESSELS

LEADER IN:  EFFICIENCY • GAS AND DUAL-FUEL SOLUTIONS • ENVIRONMENTAL SOLUTIONS

THROUGH OFFERING:

• Lifecycle solutions for ship owners and operators
• Integrated solutions for the shipbuilding industry, owners and operators
• The best customer value and customer experience in the marine industry
POTENTIAL IN NICHE VESSEL SEGMENTS DESPITE CHALLENGING MARKET CONDITIONS
Marine markets heading towards rebalancing, but more is needed
Seaborne trade impacted by maturing of Chinese economy

While Chinese driven demand for CAPEX commodities decreases, the demand for OPEX commodities and personal travel increases. Cruise, LPG, LNG and tanker sectors benefit from the Chinese transition.

Source:Clarksons Platou, IMF, Goldman Sachs
Oversupply in the world oil market continues – However the balance is expected to tighten in 2017, while producers drive cost

---

**Crude oil supply and demand**

<table>
<thead>
<tr>
<th>Year</th>
<th>Balance</th>
<th>Supply</th>
<th>Demand</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>82</td>
<td>90</td>
<td>88</td>
</tr>
<tr>
<td>2013</td>
<td>88</td>
<td>92</td>
<td>86</td>
</tr>
<tr>
<td>2014</td>
<td>92</td>
<td>96</td>
<td>94</td>
</tr>
<tr>
<td>2015</td>
<td>94</td>
<td>98</td>
<td>92</td>
</tr>
<tr>
<td>2016</td>
<td>96</td>
<td>100</td>
<td>94</td>
</tr>
<tr>
<td>2017</td>
<td>98</td>
<td>100</td>
<td>96</td>
</tr>
</tbody>
</table>

**Offshore E&P Capex and Brent oil price**

<table>
<thead>
<tr>
<th>Year</th>
<th>EP Expenditure (MUSD)</th>
<th>Brent oil price (USD/bbl)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>2013</td>
<td>50 000</td>
<td>120</td>
</tr>
<tr>
<td>2014</td>
<td>100 000</td>
<td>80</td>
</tr>
<tr>
<td>2015</td>
<td>150 000</td>
<td>60</td>
</tr>
<tr>
<td>2016</td>
<td>200 000</td>
<td>40</td>
</tr>
<tr>
<td>2017</td>
<td>250 000</td>
<td>20</td>
</tr>
<tr>
<td>2018</td>
<td>300 000</td>
<td>0</td>
</tr>
</tbody>
</table>

---

Source: EIA, Bloomberg, Clarksons Platou, Rystad Energy
INTRODUCTION OF ENVIRONMENTAL LEGISLATION CONTINUES

SO\textsubscript{2} legislation:
- Current cost of low sulphur fuels have reduced the pressure to consider alternative solutions
- LNG gaining popularity

NO\textsubscript{X} legislation:
- Only North American waters affected from 1.1.2016
- NO\textsubscript{X} reducing techniques such as selective catalytic reduction (SCR) or exhaust gas recirculation (EGR) are needed

Ballast Water Convention:
- The Convention will enter into force on 8 September 2017
- Applies for all vessels above 400GT in operation and newbuild

Black and grey water:
- Regulations being developed locally
- Non-discharge zones and port facilities compete with onboard cleaning
- EU Inland water ways 2013 Black and grey water

Source: Marine Solutions internal analysis, IMO
Drivers vary in different vessel segments

**Bulk:** Imbalanced market as a result of over-ordering and slowing Chinese imports.

**Offshore:** Low oil prices, oversupply of oil and gas, oversupply of vessels and reduced capital expenditure limit contracting.

**Containers:** Severe supply and demand imbalances in most trade lanes.

**LNG:** Plentiful supply and low prices encourage new countries to consider gas, leading to shifts in trade patterns. Significant order book limit ordering. Low oil prices restrain LNG infrastructure developments.

**Tankers:** Low oil prices support demand for oil, oil products and oil storage. Worries of oversupply as the fleet is rapidly expanding.

**Cruise:** Ordering expected to remain on good levels due to increasing passenger volumes in Asia.

**LPG:** Strong demand growth in China and India. Worries of oversupply, as OB at 23% of fleet.

**Ferries:** Fleet renewal, potential implementation of new emission regulations and favourable newbuilding prices drive contracting.
General market sentiment remains weak, but activity in selected segments is still resilient

Source: Clarksons Platou. Historical contracting as per September 1st, 2016. Note: Other merchant = MPP, general cargo, RoRo and vehicle carriers.
Cruise industry booming due to increasing passenger volumes in Asia

Cruise vessel deliveries
Number of vessels

Asian passenger capacity
China CAGR 2015-2020: 26%

Annual market capacity growth

Source: Clarksons Platou, Cruise Industry News.
Abundance and low prices of LNG encourages new countries to consider gas. Global LNG supply will surge in 2016 after five years of stagnation.

**LNG TRADE**

- Global LNG trade estimated to grow by 3% in 2016
- New supply coming online, which will lead to major shifts in trade routes
- Demand for LNG driven by low gas prices and more cost-efficient solutions for regasification
- China, India and ASEAN countries will emerge as key buyers, while demand growth in Japan and Korea weakens

**World seaborne LNG trade**

<table>
<thead>
<tr>
<th>Year</th>
<th>Million tonnes</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>0</td>
</tr>
<tr>
<td>2002</td>
<td>50</td>
</tr>
<tr>
<td>2004</td>
<td>100</td>
</tr>
<tr>
<td>2006</td>
<td>150</td>
</tr>
<tr>
<td>2008</td>
<td>200</td>
</tr>
<tr>
<td>2010</td>
<td>250</td>
</tr>
<tr>
<td>2012</td>
<td>300</td>
</tr>
<tr>
<td>2014</td>
<td>350</td>
</tr>
<tr>
<td>2016</td>
<td>400</td>
</tr>
</tbody>
</table>

**FSRU (Floating Storage and Regasification Unit)**

- A more cost efficient alternative, expected to gain in popularity over permanent import terminals
- Mobility and flexibility of the asset
- Conversion of modern LNG carriers allows fast deployment

**Natural gas imports: Emerging markets**

<table>
<thead>
<tr>
<th>Year</th>
<th>Bn m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>0</td>
</tr>
<tr>
<td>2008</td>
<td>50</td>
</tr>
<tr>
<td>2009</td>
<td>100</td>
</tr>
<tr>
<td>2010</td>
<td>150</td>
</tr>
<tr>
<td>2011</td>
<td>200</td>
</tr>
<tr>
<td>2012</td>
<td>250</td>
</tr>
<tr>
<td>2013</td>
<td>300</td>
</tr>
<tr>
<td>2014</td>
<td>350</td>
</tr>
<tr>
<td>2015</td>
<td>400</td>
</tr>
</tbody>
</table>

**Share of LNG of total gas imports in 2015:**

- China: 43%
- India: 100%

Source: Clarksons Platou, Lloyds List, Bloomberg, IEA.
OPPORTUNITIES THROUGH OUR BROAD PRODUCT PORTFOLIO AND CONNECTIVITY
Wärtsilä Gas Solutions

- Regasification systems for FSRUs, jetty installations and onshore LNG terminals
- Requalification systems LNG/LPG for gas-carriers and onshore facilities
- Small scale LNG and biogas liquefaction
- Fuel Gas Systems for LNG and dual-fuel engines
- Tank Control Systems for LNG/LPG tank gauging
- Gas Recovery capture and safety systems
- Oil/Water separation technology for upstream market

Conversion project Höegh FSRU
Supply of the re-gasification system for an FSRU (Floating, Storage, Re-gasification Unit) conversion project that Höegh LNG plans to carry out on a modern LNG vessel.

Customer: Höegh LNG
Delivery: Autumn 2017
OUR PORTFOLIO PROVIDES ROBUST SUPPORT FOR DIGITALISATION

NACOS PLATINUM
• Full-blown automation, navigation and control system
• Intelligent route planning
• Plug-in software for various applications (also 3rd party)
• Remote maintenance and connection
• Advanced security layers against cyber threats

DYNAMIC POSITIONING
• Enabling future-proof automated concepts

SENSORS IN OUR CORE PRODUCTS
• Enabling big data generation for onboard and onshore purposes
• An engine example: 178 sensors in W31DF providing a vast range of usage / condition data
Wärtsilä has developed and delivered sophisticated battery/hybrid systems since 2007. These systems include energy management control, power electronics and battery integrations.

MARINE HYBRID SOLUTIONS

- Fuel savings and reduced emissions
- Optimised engine operation
- Reduced engine transients
- Increased redundancy and efficient operations
- Increased performance
The ferry can run 100% on battery

The new Wärtsilä «On-Air» induction charging system «Top up battery» when loading and unloading the vehicles

Wärtsilä wireless system can transfer up to 1 MW of electricity

Automatic mooring (by Cavotec) and Wärtsilä charging station reduce operation time and avoid waste of ferry energy
We are well positioned to ride the upcoming ballast water management system retrofit wave

Wärtsilä equipment and service thought leadership

- Technology choice
  - Aquarius-UV or Aquarius-EC
- Design & Engineering
  - Modular or bespoke design
- Supply, PM & Installation
  - Supervisory → full turnkey
- System integration
- Fleet-wide agreements
- Crew training
- Global life-cycle support

Legislative drivers

- Global minimum standard
  - Entry into force September 2017
- US specific requirements
  - Entry into force December 2013

Newbuild market

- Annual opportunity based on vessel contracting
- BWMS included in new ship specifications

Retrofit market

- ~34,000 ships

Competition

- Currently ~50 competitors, expected to reduce to 10-20
We benefit from exposure to different vessel segments

Rolling annual order intake per vessel segment, MEUR

Ships contracted 2013-2020 (actual / Wärtsilä forecast), units

Source: Clarksons Platou, IHS, Wärtsilä internal forecast & AMI International (Navy forecast).
Increasing order value potential across vessel segments

<table>
<thead>
<tr>
<th></th>
<th>Earlier scope value</th>
<th>+ Hamworthy</th>
<th>+ MSI</th>
<th>Business potential</th>
</tr>
</thead>
<tbody>
<tr>
<td>Merchant</td>
<td>1-3 MEUR</td>
<td>1-5 MEUR</td>
<td>1-5 MEUR</td>
<td>1-13 MEUR</td>
</tr>
<tr>
<td>Gas carriers</td>
<td>2-12 MEUR</td>
<td>5-15 MEUR</td>
<td>1-2 MEUR</td>
<td>1-29 MEUR</td>
</tr>
<tr>
<td>FSRU</td>
<td>4-15 MEUR</td>
<td>20-30 MEUR</td>
<td></td>
<td>4-45 MEUR</td>
</tr>
<tr>
<td>Offshore</td>
<td>1-15 MEUR</td>
<td>1-5 MEUR</td>
<td>1-10 MEUR</td>
<td>1-30 MEUR</td>
</tr>
<tr>
<td>Cruise</td>
<td>5-20 MEUR</td>
<td>4-10 MEUR</td>
<td>20-33 MEUR</td>
<td>4-63 MEUR</td>
</tr>
<tr>
<td>Ferry</td>
<td>3-7 MEUR</td>
<td>2-3 MEUR</td>
<td>2-15 MEUR</td>
<td>2-25 MEUR</td>
</tr>
<tr>
<td>Special vessels</td>
<td>1-7 MEUR</td>
<td>1-3 MEUR</td>
<td>1-10 MEUR</td>
<td>1-20 MEUR</td>
</tr>
<tr>
<td>Navy</td>
<td>1-15 MEUR</td>
<td>&lt;1 MEUR</td>
<td>2-15 MEUR</td>
<td>&lt;1-31 MEUR</td>
</tr>
</tbody>
</table>
WIDE COMPETITIVE LANDSCAPE DUE TO A BROADER OFFERING

E&A

Propulsion

Gas Systems

Engines

WÄRTSILÄ

Marine Solutions

Flow Systems

Ship Design

Environmental Solutions

Exhaust Gas Cleaning

Ballast Water Management

Compressors

Inert Gas
TRANSFORMING OUR ORGANISATION TO MEET MARKET REQUIREMENTS
Restructuring measures taken in Marine Solutions (2015 and 2016 programs)

Announced headcount reductions – 1,100 in total

Announced annual savings – MEUR 80 in total
Operational excellence – We are increasingly lean and flexible

Capacity cost development
MS level reduction during the past 12 months

Engine assembly lead time development
Recent example from one factory and product line

Engine production WIP inventory reduction
Recent example from one factory and product line
FOCUS ON INNOVATION

Thought Leadership

Innovation Culture

- Organise think tanks to accelerate innovative ideation
- Engage in customer innovation workshops
- Scout for trends and new solutions through cooperation with other companies (JV’s, universities, start-ups and customers)
Our broad portfolio supports us in challenging markets

- Contracting continues to be challenging, visibility is shortening
- Opportunities in niche segments: Cruise & Ferry, Specials, RoRo
- Regulatory pressures will attract investments in newbuild and retrofit markets
- We are adapting to an environment of lower demand
- Our recent acquisitions have further strengthened our market position and product portfolio
THANK YOU!