LNG – FUEL FOR THE FUTURE

TOMMY MATTILA

SkanGas
Skangas year in 2015

- **Revenue**: 202 million euro
- **Deliveries**: 376,700 tons
- **Growth in volumes**: 33%
- **Investments**: 43 million euro
- **Accidents**: 0
- **LNG truck loading**: 5,385 operations
- **LNG ship bunkering**: 966 operations
- **People**: 53
- **Growth in volumes**: 33%
# Skangas LNG portfolio

<table>
<thead>
<tr>
<th>Liquefaction plants</th>
<th>Risavika</th>
<th>Design capacity: 300,000 t/y</th>
</tr>
</thead>
<tbody>
<tr>
<td>Porvoo</td>
<td></td>
<td>Design capacity: 20,000 t/y</td>
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<thead>
<tr>
<th>Other supply</th>
<th>3rd party FOB</th>
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<tr>
<th>Terminals</th>
<th>Risavika</th>
<th>30,000 m³</th>
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<tbody>
<tr>
<td>Øra</td>
<td>6,400 m³</td>
<td></td>
</tr>
<tr>
<td>Lysekil</td>
<td>30,000 m³</td>
<td></td>
</tr>
<tr>
<td>Pori (2016)</td>
<td>30,000 m³</td>
<td></td>
</tr>
<tr>
<td>Tornio, Manga*(2018)</td>
<td>50,000 m³</td>
<td></td>
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<table>
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<tr>
<th>Ships</th>
<th>Coral Energy</th>
<th>15,600 m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coralius (2017)</td>
<td>5,800 m³</td>
<td></td>
</tr>
<tr>
<td>Coral Energice (late 2017)</td>
<td>18,000 m³</td>
<td></td>
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<table>
<thead>
<tr>
<th>Trucks</th>
<th>20 Trailers</th>
<th>22.5 ton</th>
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<tr>
<td></td>
<td>5 Jumbo Trailers</td>
<td>30.0 ton</td>
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*Skangas 25% share*
Skangas Nordic Reach

- Liquefaction plant
- Existing/under construction terminal
- Future terminal
- Marine supply area
- Office

Locations:
- Tornio
- Pori
- Espoo
- Porvoo
- Gävle
- Ora
- Lysekil
- Göteborg
- Risavika
Truck delivery
Bunkering at terminal
Ship to ship
Why? LNG is the cleanest alternative

LNG full fills all coming emission regulations as such with out any extra systems.

- LNG is sulphur free. IMO and EU directive limits the sulphur to 0.1% from 1.1.2015
- NOx reduction 85-90%. Reduction limit for new buildings 80% from 2021 (TIER III)
- CO2: EEDI index from 1.1.2013.
- EU and IMO is planning for more measures to reduce CO2.
- Particles: reduction of PM emissions.

No oil spill risk

Bio-LNG → LBG possibilities

Availability and price will determine the market development
Why ? LNG is competitive

The price development of LNG is foreseen to be more stable than that of oil. **Long term competitiveness.**

- Growing “large scale LNG” in Europe and Globally
- More gas reserves than oil

The LNG supply chain is more expensive than that of oil. Especially in the start up phase when the volumes are small.

Building the infrastructure is key

- what is the price of LNG ?
- is LNG available ?
Global LNG market

- Current global LNG production about 240 MTPA (about 330 bcm)
- Finnish total gas pipeline market under 3 bcm
- New production coming to the market
Price development 2012-2017

GO v.s. TTF
EUR/MWh

11
LNG storage > 1000 cbm

Direct bunkering ex pipe

Bunker vessels 2017

Truck supply all over ECA
How big is the potential?

+ 50,000 vessels
370,000,000 ton's
4,400 TWh

1200 x VLCC (310,000 DWt)
LNG bunkered 2015

about **100 000 ton** of LNG as bunkers excluding LNG carriers

**0.03 %** of the worlds bunker market
How fast is the market moving?
Vessels currently using LNG as fuel (+50 000)

77

* Excluding Gas Carriers
There are currently 165 confirmed LNG projects

Additional orders beyond 2018 are confirmed

Updated 19 April 2016
Excluding LNG carriers and inland waterway vessels
They did it! 27 vessels

Nor Lines
Fjord Line
Viking Line
Furetank
Torghatten
Terntank
Tarbit shipping
Eidesvik
Thun
Containerships
Tallink
...

18
An observation

- We see an increase in LNG ready vessels prepared for running on alternative fuels like LNG

- Ship owners are smart people
  - You think ahead and prepare for the future
  - You limit the exposure for fuel price developments
  - You do not over-invest

- Emission regulations will become stricter

- Clean fuel will always be the right choice for the future
Renewable biogas, LBG

- Biogas liquefied (LBG) distributed via the LNG supply chain.
- Can be **used in current LNG Marine applications directly** without additional investments.
- Certified according to sustainability criteria. Fulfills Nordic Svanen label and Finnish “avainlippu”. Supplied according to “Green Gas” principle.
- Own waste can also be used for LBG production.
LNG summary – cleanly with natural energy gas

Environmental restrictions will get stricter – natural gas /LNG is a part of the solution for Industry, Marine and Traffic segments.

Significant resources of gas, increased infrastructure ensures availability and competitiveness.

LNG will be a major fuel for shipping a question of time.

Finland can benefit from LNG technology clusters, ship yards, engineering and engine technology, advantage and forerunner opportunity for global clean tech market within the Marine sector.
Oil or gas?