Vaasa LNG

General presentation
LNG facilities in Finland

• First facility was Gasum’s liquefaction plant in Porvoo (20kt/a)
• TEM investment aid boosted the execution of planned projects
  – Tornio: 33,2 m€ (Outokumpu, Skangass, SSAB, EPV)
  – Pori: 23,4 m€ (Skangass)
  – Rauma: 8,6 m€ (AGA)
  – Hamina: 27,7 m€ (Haminan Energia)

• Pori is the first to be commissioned, deliveries are planned to start late 2016. Tornio is under construction and planned to start deliveries early 2018
• Hamina, Vaasa and Rauma terminals are in project phase / planning.
Terminal planned operational area

- Operational range is estimated to be approximately 150 - 200 km from Vaasa.
- Supply methods:
  - LNG-truck
  - Ex-pipe from terminal
  - Local gas-network (Vaasa)
  - Railway (option)
- Operational area covers most of the industrial demand in Ostrobothnia.

10.3.2016
Vaskiluoto LNG terminal

Vaskiluoto LNG-terminal

- Capacity: 3000-5000 cbm
- Truck loading, Bunkering, Rail connection
- Bullet-tank solution
- Existing infrastructure
- 9 m fairway
- On-site demand from Wärtsilä and Vaasa
  Vaskiluoto powerplant
Bunkering from terminal facility

Delivery from LNG market

LNG tank

Vaporization to Vaskiluoto area

BOG

LNG

Truck deliveries to industrial sites

Delivery from LNG market
Main dimensions:

LNG-driven Ro-pax carrier

LoA: 150 m  
Width: 25 m  
Draught: 5.8 m  
Speed: 16 & 20 kn  
Ice: 1A Super  
Pax: 800
Industrial demand for LNG

Potential industries for LNG

- Mashinery manufacturing
- Food industry
- Power & heat production
- Chemical and mining
- Pulp & paper

Replaced fuels

- HFO (fuel oil)
- Gasoil
- Propane / Butane
Satellite terminal and industrial site terminal

- Supply from regional LNG terminals
- Re-gasification unit and on-site storage tank(s)
- Natural Gas end-user
Land based terminal

- Typical size of the storage tank is between 50 cbm - 700 cbm Gross capacity.
- Land-area required to build storage unit is between 200 m² - 1000 m²
Vaskiluoto area

Vaskiluodon voima
Power plant

Wärtsilä test lab

Terminal

10.3.2016

Vaasa LNG
LNG – truck deliveries

LNG – truck deliveries

- Suitable for large consumers and maritime sector.

- Road transport is most flexible for Vaasa region as most of the potential consumers are small- and mid-size end users.

- Typical sizes of LNG-trucks
  1. Semi-trailer 50 000 - 70 000 L
  2. Truck + trailer 80 000 - 95 000 L
LNG-container solution

LNG-container

- Possible future solution for small- and mid-scale consumers
- Flexible system which can adapt to changes in regional demand balance
- Separate LNG-truck and customer terminal can be replaced by container units
- Transportable similarly to a normal container
- Storage unit can include regasification and safety equipment
- The unit can be directly connected to local gas grid
- Typical 40 ft container has a storage volume of 40 cbm
Remote controlled network

All containers can be controlled locally to serve the customer and observed from centralized control room.
Other possibilities

**LNG based district heating and local gas networks**
- Possible solution for industrial parks outside district heating network
- Easy to expand in stages while demand grows
- Both gas and heat networks are possible

**Greenhouses**
- Significant energy consumers in west-coast of Finland
- Currently consuming biomass as main energy source
- LNG could be used as a support fuel
  - Possibility to use exhaust gas as a source of CO2 for cultivation?
  - Possibility to utilize cold from LNG to cooling?