Nauticor: Comprehensive LNG supply for maritime customers in the Baltic Sea

Gdansk, March 7th 2018
Agenda

1. Introduction to Nauticor
2. Truck-to-ship supply in North & Baltic Sea
3. Ship-to-ship supply in Northwest Europe
The Linde Group is active worldwide with a global presence in more than 100 countries

Countries home to operational companies of The Linde Group

Comments

- The Linde Group, leading global player in industrial gases
- German Blue Chip Company (DAX 30)
- 135+ years of experience in gases, cryogenics and process engineering
- 18 bn EUR revenue with approx. 65,000 FTE
- Active in >100 countries
Nauticor: part of The Linde Group and dedicated supplier of LNG as marine fuel

The Linde Group – selected LNG projects

- Gablingen, Germany
- Tasmania, Australia
- Bergen, Norway
- Kwinana, Australia
- Stavanger, Norway

- Australia
- Altamont, CA, USA
- Scandinavia

Comments

- The Linde Group is a front runner in the development of LNG infrastructure
- Nauticor (former Bomin Linde) was set up in 2012 in order to develop the market for LNG as a marine fuel
- Since its startup Nauticor has established itself as a leader in this market, including through the development of physical assets and a substantial customer base.
Nauticor is a front runner in developing the downstream LNG supply chain in North-West Europe

Projects / Operations

Stockholm (operational)
- 20,000 cbm LNG terminal in Nynäshamn
- World’s first LNG Supply Vessel: AGA’s SEAGAS

Bunker Supply Vessel (operational in 2018)
- Charter contract and yard contract signed in 2016 (Bernhard Schulte, Hyundai Mipo)
- Bunker vessel under construction in South Korea, delivery in 2018

Rotterdam / Rostock / Emden / Cuxhaven etc.
- Hundreds of truck-to-ship “bunkering operations for a several customers
- Long-term supply of large ferries

07/03/2018  Source: The Linde Group, Nauticor
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Nauticor has conducted hundreds of truck-to-ship bunker operations with different customers already

- Zero incidents
- Safe, fast and flexible
- We use our unique experience to serve and consult our customers

Source: Nauticor
Nauticor supplied LNG for the RoRo ferry “SeaRoad Mersey II” which is using a unique mobile trailer tank system

Truck-to-ship supply in Germany and Denmark

Comments

• SeaRoad Mersey II is equipped with a unique mobile tank system using LNG trailers

• Nauticor performed the initial bunkering in Flensburg (GER) and Odense (DK)

• Nauticor provided end-to-end technical support including required permits as well as developing bunker guidelines and safety procedures
Truck-to-ship supply in North Sea & Baltic Sea ports for the world’s first retrofitted chemical tanker with LNG engine

Truck-to-ship bunkering in different ports in Northwest Europe

Comments

• First bunkering of a chemical tanker with LNG engine in Germany

• Largest LNG bunker operations in the Port of Rostock (GER) & Port of Moerdijk (NL)

• Delivery of approx. 140 tons of LNG with 7 trucks in 8 hours

07/03/2018  Source: Marlies Menger, Nauticor
Nauticor developed the T-piece to reduce the time for truck-to-ship bunker operations significantly

Truck-to-ship operations with parallel unloading of trucks

Details

- T-piece developed and operated by Nauticor
- Installation of the T-piece on a mobile trailer
- Availability of T-piece bunker operations in various ports in Northwest Europe, including Bremen, Hamburg, Moerdijk, Rotterdam and Amsterdam
- Unloading rate of up to 40 tons/hour
Truck-to-ship LNG supply for the world's first container vessel with a retrofitted LNG engine

Truck-to-ship bunkering operations in Germany & Netherlands

Comments

- August 2017: Initial bunkering for the world's first container vessel with an engine retrofitted for the use of LNG in the Port of Bremerhaven
- September 2017: Start of deliveries of approx. 140 tons of LNG with 7 trucks in less than 6 hours in Moerdijk and Rotterdam
- Parallel unloading of trucks with the Nauticor T-piece
Truck-to-ship supply with the Nauticor T-piece for the world’s first hopper dredger `Scheldt River`
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Destination Gotland has ordered one of the largest LNG fueled ferries and needed safe and efficient LNG supply

**Destination Gotlands new LNG fueled ferry**

**Comments**

- Destination Gotland provides transport for people, cars and cargo with four highspeed ferries
- DG provides services on different routes between the Swedish mainland and the island Gotland
- DG has ordered a new ferry with LNG engine
- The ferry is currently under construction in China and will start operations in 2018
Experienced ship-to-ship LNG supplier: The world’s first LNG bunker vessel “SEAGAS”

Operations in Stockholm and Nynäshamn

- Experience: already 1500+ safe ship-to-ship bunkering operations
- Performance: fast fuelling operation to Viking Grace (45 minutes per refuelling operation)
- Quality: "State of the art" cryogenic technology manufactured by The Linde Group
The next level: The Linde Group has ordered its second LNG bunker supply vessel for Northwest Europe

### Vessel
- **LOA:** 117 m
- **Breadth:** 18 m
- **Draught:** 5.3 m
- **Crew:** max. 20

### LNG
- **Capacity:**
  - 7,500 cbm (LNG)
  - 170 cbm (MGO)
- **Tank type:** Type C
- **Pressure:** 3.75 barg
- **Hose diameter:** 6 inch (4+8 opt.)
- **Flow rate:** 200 - 1,250 cbm /h
- **Delivery height:** 2 – 25 m

### Set-up
- **Speed:** 13 knots
- **Generator:** 3 DF gensets
- **Propulsion:**
  - 2 x azimuth thrusters
  - 2 x pump jets
- **Dynamic Positioning 2 (DP2) ready**
The construction of the Nauticor LNG bunker supply vessel is progressing well, delivery of the vessel in Q4 2018

Impression from the keel laying ceremony in February 2018

Comments

• Construction of the bunker vessel at Hyundai Mipo in South Korea
• Construction is going as planned
• Steel cutting took place in November 2017
• Keel laying ceremony in February 2018
• Official delivery to Nauticor and start of operations in Q4 2018
Nauticor will organize the supply for Destination Gotlands new LNG fueled ferry

LNG supply for Destination Gotlands new ferry

Comments

• Long-term LNG supply contract for a newbuild ferry
• LNG bunker operations in different Swedish ports
• Nauticor will organize supply with the new LNG bunker vessel
• Use of The Linde Group’s LNG terminal in Nynäshamn as back-up
• LNG consumption almost in the range of large containerships or cruiseships

07/03/2018  Source: Nauticor, Destination Gotland