EXPERIENCE THE BUNKERING OF M/S MEGASTAR

Bergen

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1. The oldest Estonian energy company, roots in 1948.
2. Sale of natural gas, electricity, CNG (8 stations) and LNG.
3. Owner of the largest gas distribution network in Estonia (1,500 km).
4. Two subsidiary companies:
   - Gaasivõrgud (gas distribution service),
INFORTAR bought out the Eesti Gaas from Gazprom, Fortum and Itera in April 2016.
BUNKERING OF M/S MEGASTAR
M/S MEGASTAR - THE NEWEST LNG FERRY

Built in: Meyer Turku Shipyard, Finland
Gross tonnage: 49 000
Length: 212 meters
Capacity: 2 800 passengers, 800 cars
Engine: dual fuel (LNG/MGO)
Service speed: 27 knots
In operation since 29\textsuperscript{th} of January 2017
The vessel cost is ~ EUR 230 million

Carried over two million passengers during its first year of service on the Helsinki-Tallinn route
Approximately one year ago AS Eesti Gaas bunkered their first load of LNG to new ferry Megastar operating between Tallinn and Helsinki.
• Preparation works at 2016 - HAZID, HAZOP and QRA (in cooperation with Tallink and Port of Tallinn).

• Procurement of LNG trailers and hiring transport companies.

• Recruiting and training new staff in our bunkering school.
Eesti Gaas has 8 semi-trailers from GOFA in order to transport and bunker LNG.

The semi-trailers have powerful Cryostar 1000 l/min cryogenic pumps.

Full set of PPE is worn by every driver-operator.
TRAINING PROGRAMM

- Bunkering school - multistage training and examination of bunkering driver-operators
Sources of LNG

- There are several LNG import-export terminals/production in the region and on the coast of Baltic Sea.

- In operation:
  - Paldiski
  - Muuga
  - Skulte

- Planned:
  - Porvoo
  - Hamina
LNG SUPPLIES

• Eesti Gaas supplies LNG mainly from Pskov (Russia) liquefaction plant (350 km).

• Some supplies has made from Pori (Finland), Klaipeda (Lithuania) and Świnoujście (Poland) terminals.
TTS BUNKERING PROCEDURE

- Safety zones, check-list and etc.
- Duration of bunkering: 4 times a week at night (between 2-6 a.m.).
- 2 - 4 trucks per night (37 - 74 tons).
- Emergency Shut-Down (ESD).
- Break-Away-Couplings (BAC).
- Dry Cryogenic Couplings (DCC).
DCC CONNECTIONS – 0-EMISSION OPERATIONS

- **Easy to handle**
  Push and turn – free flow
  Turn and pull – closed.

- **Safe**
  The valve cannot be opened until the unit is coupled and closes automatically when disconnecting.

- **Environmentally friendly**
  Accidental spillage eliminated

- **Reliability**
  No loss or spillage of liquids at connection and disconnection
LESSONS LEARNED AND RESULTS
1. Distrust about safety of using LNG as a marine fuel.
2. Preparation and coordination with all parties of all technical documentation and bunkering procedures.
3. Staff preparation and exchange.
4. Logistic and tight bunkering schedule.
5. Crossing the Russian-Estonia border.
6. Bunkering technical, operational and safety aspects.
7. LNG quality (MN).
RESULTS OF THE FIRST YEAR OF BUNKERING

• More than 730 successful TTS bunkering operations have been completed since 30\textsuperscript{th} of January 2017.

• A total of ~13 300 tons of LNG bunkered.

• More than 600,000 km have covered in delivering the LNG.
• For the first-time use of LNG in the bunkering of ferries in Estonia, Eesti Gaas won the Energy Deed of the Year Prize 2017.
CONCLUSION

• Eesti Gaas is the first and the only company in Estonia and Baltic States that has developed a solid TTS LNG bunkering capability and is ready to offer the service to all interested ports in the region.

• The bunkering of the Megastar ship has provided us with invaluable experience with various sources of supply, logistics and technological solutions for LNG.
NEXT STEP

Ship-to-ship bunkering – EG bunker vessel will be ready in …
THANK YOU!

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