



Four hours have to suffice: Due to the limited time window, the LNG is transferred parallelly from two road tankers.

- English Translation -

**FLÜSSIGGAS**

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**Eco-friendly, between Helsinki and Tallinn:**

# New High Speed Ferry Megastar with LNG Propulsion

On 29 January 2017, "Megastar", a high speed ferry with LNG propulsion, started its operation. Uniquely designed for the route Tallinn-Helsinki, the ferry already meets future emission standards for ECAs (Emission Control Areas): When running on LNG, no sulfur or soot particles are emitted. Compared with the alternatively possible operation with diesel, nitrogen and CO<sub>2</sub> emissions are reduced. Additionally, its special hull shape saves a noticeable amount of fuel.

The innovative and eco-friendly high-speed ferry has been built by Meyer Turku Oy which specialises on these kinds of ships, for use as cruising ships, car and passenger ferries and special purpose vessels.

Megastar was specially designed to connect Tallinn and Helsinki. The ferry is operated with LNG as fuel. Alternatively it is possible to use Diesel, but only under LNG propulsion the vessel fulfills the current and future requirements for ECAs (Emission Control Areas) like the Baltic Sea in which the ferry operates. The Megastar has been co-financed by the funding programme „Connecting Europe Facility“ of the European Union. Its weight is 49 000 GRT, the operating speed has been set to 27 knots. An optimised hull shape saves a considerable amount of fuel.

Bunkering takes place at Tallinn harbour: during the night, the Megastar is refuelled

from truck to ship.

The special tank trucks (semitrailers) needed were manufactured by Gofa Gocher Fahrzeugbau GmbH, Germany. Eight trucks of this kind have been built. In the product segment of LNG road tankers, Gofa is one of the leading manufacturers. The company has a track record of 55 years in the design of special tankers, and this know-how was required already in the early stages of the planning process.

Each vehicle is configured for a permitted gross vehicle weight of 40 tons, enabling it to carry 18 to 19 tons of LNG - depending on the fuel density. Operating pressure is set to max 7 bar. While these data seems to be standard values for semitrailers, these large semitrailers are designed rather special as bunkering has to take place within a time window of four hours. High performance pumps and suitable special piping had to be

installed. Two semitrailers are used at the same time for the LNG transfer. Once emptied, the third and fourth semitrailer follow.

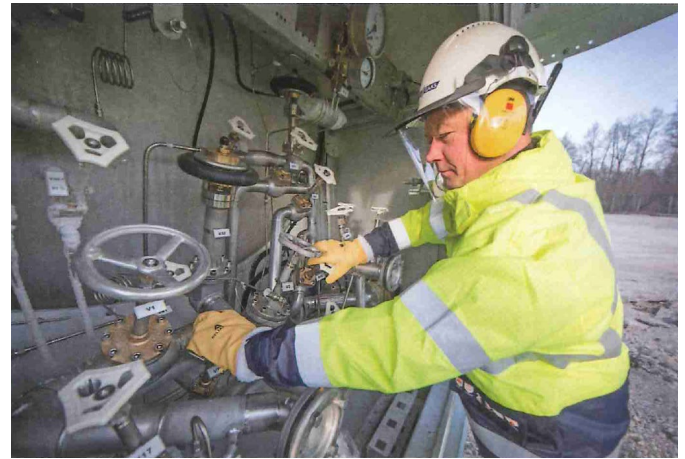
The LNG is procured by Estonian Liquid Gas Supplier Eesti Gaas. Refuelling (bunkering) of a ship with LNG underlies similar safety regulations as the refuelling with diesel or heavy oil. The security framework is set by national authorities. Highest priority is the protection against unwanted media release.

For equipment components, GOFA counted on reliable partners such as MannTek, Sweden. Their self-closing Dry Cryogenic Couplings (DCC) ensure high process reliability during bunkering.

Additionally, MannTek supplied cable released Cryogenic Breakaway Couplings (CBC) which were prescribed as an additional safety feature. In the case of excessive strain,



Self-closing Dry Cryogenic Couplings (DCC) of the Swedish company MannTek offer a high process safety for LNG bunkering / refuelling.



Looking into the control cabinet of the LNG trailer. High performance pumps and suitable piping serve for a fast media transfer.

e.g. due to a drifting-off vessel, these serve for a controlled separation (and valve closure), leaving the entire transfer equipment without damage. MannTek supplied various components for the truck-to ship bunkering system, working together as a system. More than 14.000 cryogenic bunkering operations have already taken place with MannTek equipment.

The conception of Dry Disconnect Couplings for Liquefied Natural Gas is based on the same mechanical principle as for 'normal' liquid media. Installed special seals are Teflon based and will work reliably until temperatures down to  $-200\text{ }^{\circ}\text{C}$ . But temperature is only one of various engineering challenges. Another task is to safeguard a permanently safe seal between all metallic components. Due to the different expansion coefficients of the used materials, thermal expansion and contraction have to be taken into account, which are not visible with the naked eye.

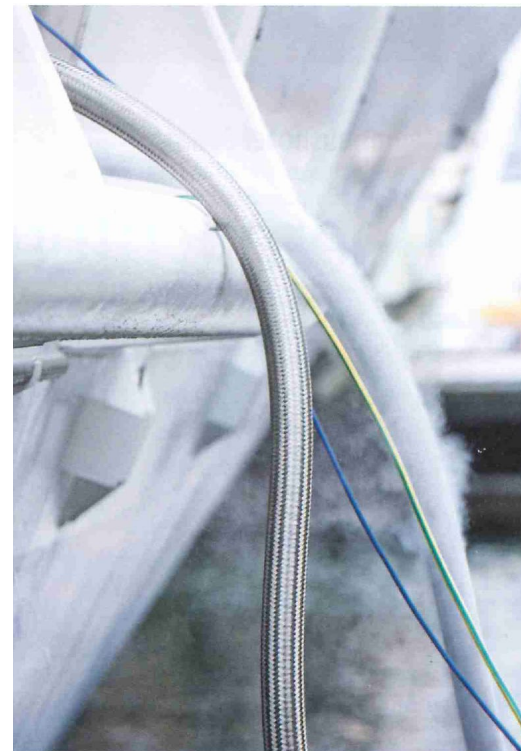
Even for uninvolved bystanders it is easy to see that LNG is transferred: Once the cryogenic medium flows through the bunkering

hose with a temperature of down to  $-160\text{ }^{\circ}\text{C}$ , air moisture condenses to a thin fog and freezes on the surface of the hose assembly.

The LNG within the cryogenic tank of the ferry - approximately 72 tons - lasts for one day of ferry operation. If needed, bunkering can also take place in Helsinki where appropriate facilities are available as a precautionary measure.

The new high speed ferry has a capacity of 2800 passengers; it offers a lot of comfort and space to move on board, various restaurants, cafes and a king size supermarket over two decks, and a family area with playground. A second loading deck and wide ramps serve for quick loading and unloading for passengers and vehicles.

The tour between Tallinn und Helsinki lasts approximately two hours. The ferry does the tour including return three times a day. So far, no passenger claimed that he misses the good old soot swaths which were previously visible at the horizon.



Once the cryogenic LNG flows through the bunkering hose, air moisture condenses to a fine fog and freezes on the surface of the hose surface.

FOTO: MEYER TURKU



January 29, 2017 - the Megastar started its daily routine operation Tallinn - Helsinki - Tallinn, three times a day.



An impressive fleet: Eight LNG semitrailers made by GOFA and operated by Eesti Gaas.