

Nautical studies for the EemsEnergy Terminal

MARIN assisted N.V. Nederlandse Gasunie with nautical studies investigating the import of LNG into the port of Eemshaven. The project requires the installation and operation of two Floating Storage and Regasification Units (FSRUs). Given the fast-track schedule of less than six months for the total project duration – from idea to first gas – required swift action from MARIN.

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Studies provided included a dynamic mooring analysis to evaluate the mooring system for both FSRUs in extreme conditions, manoeuvring simulations for the port and the access channel, and a nautical risk study. As shown in the illustration, the LNG carriers will manoeuvre backwards with tug assistance and then be moored alongside a similarly sized, ship-shape FSRU. A much smaller, barge-shaped FSRU will be moored near the bow of the large FSRU to increase the total storage and regasification capacity.

The dynamic mooring analysis of both FSRUs used the existing bollards on the quay for their spring lines, but some breast lines had to be moved further inland to ensure adequate mooring line angles with the horizontal at all tide levels and vessel draughts. With these quayside modifications, the permanent mooring had acceptable line and fender loads for 100-year weather event conditions.

The manoeuvring simulations were performed by pilots from the region and tug masters from Royal Wagenborg, a local operator, and witnessed by representatives from Gasunie and government officials from the Netherlands and Germany. Carried out to evaluate and advise on the nautical aspects of the project, the simulations first focused on port manoeuvres, which established the optimum manoeuvring strategy, tug requirements and turning area. The limiting environmental



conditions were determined, and the same limits were tested in the approach channel. Besides normal runs, the simulations also included two-way traffic and emergency scenarios. The main conclusion of this phase is that the LNG carriers can safely enter and exit the port and access channel under the limiting conditions. And actually, the first LNG

carrier arrived at the new terminal on September 8!

A nautical risk study further detailed the qualitative and quantitative risks involved with the channel transit, providing government authorities with the input needed for the new admittance policy. ▢