

## CASE STUDY

# LNG BUNKERING INFRASTRUCTURE: SHIP-TO-SHIP BUNKERING IN THE PORT OF ROTTERDAM DEALING WITH MARKET UNCERTAINTY

### SUMMARY

The Port of Rotterdam case study illustrates how important strategic alignment between LNG suppliers, infrastructure providers and ports is to the successful and timely delivery of LNG bunkering. It also shows how market uncertainty demands a proactive approach to risk management, the need to build optionality, and effective communication between partners and stakeholders.

### THE CASE STUDY

#### Introducing the Port of Rotterdam case study

The commissioning of the Cardissa in September 2017 was the culmination of several years' collaboration between Shell, the Port of Rotterdam and the GATE Terminal to develop large-scale LNG bunkering infrastructure in the second biggest conventional oil bunkering port in the world.

During the course of 2017, Shell concluded a number of major bunker supply deals with customers who will be serviced, at least in part, out of Rotterdam. These include LNG for Siem Car Carriers' new builds that will export Volkswagen vehicles from Europe to North America; Sovcomflot, for the first LNG-fuelled Aframax, in the Baltic and northern Europe; Carnival, in North West Europe and the Mediterranean for its LNG-fuelled cruise ships; and Containerships OY, for dual-fuel box ships deployed in North West Europe.



### ALIGNING AROUND A NEW BUSINESS OPPORTUNITY

The three key partners behind the development of LNG bunkering in Rotterdam are Shell, the GATE Terminal and the Port of Rotterdam itself. They saw the opportunity to build a new business, servicing large sea-going vessels based on leveraging the existing LNG infrastructure in the port.

Shell has a global strategy to develop the market for LNG in transportation, linked to a huge supply portfolio, representing approximately 30% of the global LNG market. Shell is looking to develop LNG bunkering at current fuel oil bunkering hubs such as Rotterdam, Singapore and the Gulf Region.

The Port of Rotterdam sees LNG as one of the strategic pillars of the port's broader

energy transition ambitions, having a target of reducing its CO<sub>2</sub> emissions levels by more than 90% by 2050. The port is approaching this step by step, with a strong focus on cleaner fuels. LNG is an important first step in decarbonisation and it also addresses local emissions. Rotterdam's goal is to make the port an attractive place for shipping lines to bunker LNG, just as it has done for conventional, oil-based fuels.

The GATE Terminal has been developing facilities to service small scale LNG customers since 2012. It started with exploring how to connect 5,000 -15,000 cum loads to high value markets in Scandinavia where small scale LNG terminals were being built. In 2014, it acted on customer demands for 50, 100 and 200 cum loads for short-sea shipping vessels by developing a loading station to

supply LNG for truck-to-ship bunkering. This market continued to grow but GATE recognised a gap for 200 – 5,000 cum loads for large sea-going vessels which could not be serviced by trucks or bunkering at its two unloading jetties, where LNG bulk carriers have priority.

### BRINGING TOGETHER THE PIECES OF THE JIGSAW

To realise this new business opportunity at the Port of Rotterdam, the three partners needed to work together closely.

Shell, taking advantage of the fact that capacity at the GATE Terminal was underutilised, acquired 1bcm of a RWE's capacity in 2015. It worked with the GATE JV partners, Gasunie and Vopak, providing them with the contractual commitments for loading slots for them to be able to make the investments in a small-scale loading jetty for bunker vessels. And, in parallel, it made the investment in the Cardissa bunkering vessel – a Shell only venture.

With Shell as the anchor bunkering partner, GATE developed the third jetty, including the LNG loading infrastructure. It worked closely with both Shell, aligning on technical requirements for the bunker vessel, and the Port of Rotterdam which made the necessary investments in the marine facilities i.e. the quay and basin associated with the jetty.

The Port made additional investments in a dolphin, or column channel, where vessels can undertake ship-to-ship LNG bunkering. This allows them to bunker even if they are not loading or unloading cargo at the port. It also put the necessary bunkering regulations in place, including those for SIMOPS, drawing on work done by SGMF and EU agencies and platforms such as EMSA and ESSF, and developed a specific LNG bunkering accreditation

#### FACT BOX:

<b>Bunker vessel:</b>	Name: Cardissa Capacity: Two Type-C cargo tanks, total tank volume, 6,500 cum Max bunkering rate: 1,100 cum/hr Gross tonnage: 9,816 tons Dimensions: 119.9 m length 19.4 m breadth Class: Lloyds Register Shipyard: STX, Korea
<b>Commissioned:</b>	September 2017
<b>Ownership:</b>	Shell Western LNG, Netherlands
<b>Charterer:</b>	Shell Western LNG, Netherlands
<b>Home port:</b>	Rotterdam
<b>GATE Terminal:</b>	Ownership – Gasunie (50%) and Vopak (50%) Nameplate capacity of 8.8 mmpa Three LNG storage tanks of net capacity 180,000 cum each Two jetties for bulk LNG carriers plus a dedicated third jetty for LNG bunker vessels



system. Finally, the port introduced incentives to stimulate the uptake of LNG as a marine fuel. These consist of two elements: the ESI (Environmental Shipping Index) – a points-based system which offers a 10% discount on port dues for the cleanest ships; and a specific LNG bunkering incentive – a further 10% discount is available to shipping lines if they choose to bunker LNG in Rotterdam.

Throughout the development of the project, partners have been in constant dialogue with existing and potential customers to understand their needs and their concerns. Their ambition is to ensure that LNG bunkering can take place in the same way as conventional oil-based bunkering and for Rotterdam to become an LNG bunkering hub.

## DEALING WITH MARKET UNCERTAINTY – PRO-ACTIVE RISK MANAGEMENT AND BUILDING OPTIONALITY

Building a large-scale LNG bunkering solution in the early stages of market development meant that the partners needed to take on a significant amount of technical, commercial and regulatory risk.

When Shell decided to make its investment in the Cardissa, it did not yet have customer demand secured. It would take two years to build the third jetty and two and a half years to build the bunkering vessel. It managed this risk by designing a very flexible vessel as customer requirements were uncertain. Will they have atmospheric or pressurised tanks? Where will the bunker manifold be located? How big will they be? These were questions that came up time and time again. To minimise the technical risks associated with this new vessel type and the potential for delays, Shell chose to work with established OEMs with whom it had good relationships.

If the GATE Terminal had taken the safe, ‘utility approach’ the third jetty would never have been built. However, GATE could not take all the investment risk, so agreed a contractual framework with Shell, where Shell committed to take the majority of the loading slots.

Given the market uncertainty, the jetty was also designed to be flexible with three loading arms. GATE needed to iterate the design with Shell and the rest of the market, informing everyone of what was possible and what were the associated costs. GATE’s view was that it is all about creating optionality, for example the basin can accommodate 40,000 cum vessels but is currently only dredged for 20,000 cum; and GATE has the option to build a fourth jetty.

The other issue that the terminal had to manage was the ‘fit’ of the third jetty and related operations within the existing GATE set-up. It should not jeopardise what already existed at the terminal, for example, in developing potential solutions to deal with the boil-off gas associated with bunkering operations. It had to fit with the existing customer contracts and, finally, it had to fit financially i.e. should not upset existing financing. GATE managed these issues by working with the existing bulk LNG customers and bankers, keeping them informed through a constant dialogue.

The absence of clear regulation, obtaining the required permits, and local community acceptance of LNG bunkering were key project risks. The Port of Rotterdam has been pro-active in developing LNG bunkering regulations and accreditation, with an eye on the bigger picture of ensuring consistent regulation across ports in Europe and elsewhere. It made a big effort to inform stakeholders such as the local fire brigades and safety authorities and involve them from early on in the process. This has been the case also for developments on the sea side where the permitting authority is the port harbour master. The port has played a major role in communicating with local communities – permits were needed on the land side from the local authorities.

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