

CASE STUDY

LNG BUNKERING INFRASTRUCTURE: PETRONET LNG'S KOCHI TERMINAL ADAPTING EXISTING INFRASTRUCTURE FOR LNG BUNKERING

SUMMARY

The Kochi case study illustrates how LNG bunkering may evolve outside traditional deep-sea bunkering locations on the back of strategically located bulk LNG infrastructure. It shows how opportunities may be captured by new entrants who are prepared to move quickly and work with experienced bunkering partners, as well as emphasising the importance of effective education and collaboration.

THE CASE STUDY

Introducing the Kochi case study

Petronet LNG's Kochi terminal was developed to serve the growing energy markets of Kerala, Tamil Nadu and Karnataka. Construction started in 2009 and the terminal was commissioned in September 2013.

It was originally envisaged and designed as an LNG storage and regasification terminal and when it was planned no thought was given to LNG bunkering. However, during its construction phase, small modifications were made at its unloading jetty to the unloading arms, enabling reloading of LNG into barges (5,000-10,000 cum) to service the needs of a local power plant, as there were challenges to building a gas pipeline from the terminal.



RESPONDING WITH AGILITY TO A NEW BUSINESS OPPORTUNITY

The first bunkering opportunity arose in the spring of 2015. Petronet was approached by a bunkering agent, through one of its shareholders, enquiring about the possibility of refuelling a pure LNG vessel. The 120m long, 5,000 DWT, Nor Lines' Ro-Ro vessel, MV Kvitbjørn, needed to bunker on its way to Norway from the Chinese shipyard in which it was constructed.

The Kochi terminal only had large, 16inch manifolds available for reloading. Representatives from the bunkering agent and Petronet met at Kochi and discussed potential solutions. Finally, they decided on a technical solution involving the use of existing loading arms with attached cryogenic hoses and the creation of a small manifold with a necessary reducer spool on the main deck of the Kvitbjørn. At the time, there were very few available guidelines relating

to bunkering standards and processes. After several weeks of extensive reading, research and analysis the Petronet team decided to use a combination of the Port of Antwerp, IAPH, ABS and DNV GL's guidelines and procedures. The local team in Kochi then undertook a HAZOPS analysis based on existing bulk LNG unloading standards.

As this was the terminal's first bunkering operation, loading was completed at a deliberately slow rate. The Kvitbjørn was successfully loaded with 127 tonnes of LNG in March 2015 and made history by becoming the world's first vessel to operate between Asia and Europe solely on liquefied natural gas (LNG).

A few months later an additional Nor Lines RoRo vessel, the MV Kvitnos, was bunkered following similar procedures. This time, 173 tonnes of LNG was bunkered and operations were completed more quickly.

LEVERAGING EXISTING INFRASTRUCTURE AND LOCATION TO DEVELOP AN LNG BUNKERING HUB

Petronet was keen to explore additional business opportunities because, at the time, the Kochi terminal was operating at low capacity due to delays in commissioning the pipeline infrastructure connecting the Tamil Nadu, Bangalore and Mangalore markets.

The company recognised the opportunity afforded by the terminal's existing LNG storage and break-bulk infrastructure and strategic position at the southern tip of India, close to major East-West shipping routes. It decided to explore the potential of becoming a major LNG bunkering hub, not only for India, but for Asia too.

To develop a scalable, commercial solution, Petronet is undertaking the following activities, focused on ship-to-ship LNG bunkering. First, it is developing a dedicated technical solution involving an independent LNG fuelling line attached by a smart cryogenic hose in a two-phase process. In Phase I, it is being set up with manual controls; Phase II will examine the case for increased automation using DNV GL standards based on ISO 18683 and other standards. This will require gap mapping and a qualitative risk assessment for the proposed levels of business activity – to see if complete automation is warranted. Second, Petronet has started a detailed risk management process assessment

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FACT BOX:

Facility:	Nameplate capacity of 5 mmtpa Dolphin-based jetty facility designed for LNG tankers from 65,000 to 216,000 cum, with the ability to accommodate smaller tankers and ships Two LNG storage tanks of net capacity 155,000 cum each
Commissioned:	September 2013
Ownership:	Petronet LNG 100%
Services offered:	<ul style="list-style-type: none"> • LNG regasification • Storage and reloading – for bulk LNG operations • LNG bunkering – tank-to-ship since 2015; exploring opportunities for ship-to-ship • LNG truck loading – for non-pipeline connected customers • Gassing up and cooling down services – for LNG bulk carriers

for LNG bunkering operations. And third, it is in discussion with third parties who have the expertise and assets i.e. bunkering vessels, to deliver LNG ship-to-ship bunkering.

Petronet has signed MOUs with Inland Waterways Authority of India and Indian Port Association for development of LNG bunkering infrastructure on National Waterway -1 (River Ganges) and Major Ports along the Indian Coast respectively. Petronet's BD-Marine division is exploring options and partners for developing bunkering facilities to cater for the above needs. Through expansion of its truck loading business, trucks will load LNG at the terminal and deliver to bunker stations on inland waterways, potentially supporting LNG retrofit vessels operating on inland waterways until the requirement of a bunker barge is established from increased demand of LNG as bunker fuel. Additionally, LNG bunkering infrastructure is also planned at major ports for coastal shipping.

REALISING THE OPPORTUNITY – EDUCATION AND COLLABORATION

Petronet's experience to date has shown how critical it is to educate potential customers and other enabling stakeholders about the role of LNG as a marine fuel.

In addition to engaging with technical and commercial partners, such as DNV GL and potential bunkering operators, Petronet is also co-operating with the local port authority, the Port of Cochin which is operated by the Indian government. Broader stakeholder engagement has been positive. Local communities have been accepting of the potential new business as they are familiar with LNG operations - Kochi is an established LNG terminal and the distribution of LNG by truck started two years ago. Local state regulators have also been co-operative and Petronet has been working closely with national regulators through different forums to develop regulations for LNG bunkering in India.