Sizing up Gasnor's small-scale LNG

Active on Norwegian coastal LNG distribution duties for several years, the 1,100m^3 *Pioneer Knutsen* is about to get a big brother

The Pioneer Knutsen STS transfers in spring 2007 opened up a new chapter in Gasnor's coastal LNG distribution activities

As Gasnor's promotional literature points out, the utility company has already accumulated four years of experience with small-scale LNG distribution activities in Norway. The challenge for the company is to supply clean energy to industrial, transport and power sector customers which are sited at remote locations considerable distances apart along the country's rugged coastline. LNG has been deemed to be a key solution to the problem although gas is also delivered by pipeline and in compressed form at several locations.

Gasnor AS, which was established by a number of Norwegian and international energy companies in 1989, has two LNG liquefaction plants – one at Kollsnes, near Bergen, and the second at Karmøy – with a total production capacity of 140,000 tonnes per annum. By utilising a coastal LNG carrier and 14 road tankers to deliver LNG to its own small, unmanned coastal terminals around Norway, Gasnor is able to control the full LNG supply chain. Of the 30 terminals operated by Gasnor, eight are served by ship.

Because the distances are so large and the volumes of LNG comparatively small, the challenge has been to ensure the cost-effectiveness of the service. Utilising the small 1,100m^3 *Pioneer Knutsen*, on charter from Knutsen OAS for 15 years from March 2004, has proved to be successful in that the ship size is optimised for many of Gasnor's customers and their needs. *Pioneer Knutsen* utilises established quay facilities, either public or private, from where it connects to the terminal's storage tanks.

Like the truck drivers that discharge LNG at the various terminals, *Pioneer Knutsen* utilises flexible hoses to transfer cargo. Truck drivers and the ship's crew are trained to handle cargo discharge operations.

A new dimension was added to the Gasnor operation in April-June 2007 when a series of ship-to-ship (STS) transfers were carried out involving the discharge of cargo parcels from the 87,600m^3 *Höegh Galleon* 'mother ship' to *Pioneer Knutsen* in the protected waters of Måløy fjord. The ability to source LNG from other, large terminals by means of oceangoing ships means that Gasnor is not limited to its own liquefaction plants for product.

This capability will be enhanced, as will economy of scale opportunities, when Gasnor takes a new 7,500m^3 LNG carrier, *Coral Methane*, on a 15-year time charter from Anthony Veder in October 2008. The ship, which is being built at the Remontowa yard in Poland, has been designed as a multipurpose LNG/LPG/ethylene carrier with a dual-fuel propulsion system that can run on both natural gas cargo boiloff and heavy fuel oil.

The cargo-handling plant on *Coral Methane* was designed by TGE Gas Engineering, the Bonn-based consultants utilising their extensive experience of ethylene carrier cargo systems in the choice of Type C insulated, pressure vessel cargo tanks. Such units require no secondary barrier containment system and there are no partial filling restrictions.

The design, typically, yields cargo boiloff gas (BOG) rates in the 0.35-0.45 per cent per day range. There are various options for dealing with this BOG, including burning it in a thermal oxidiser; reliquefying it, accepting a pressure increase during the voyage, provided the receiving terminal can accept it, or, as is the case with *Coral Methane*, utilising it for propulsive power. *LNG*