

LNG megastructures – the challenge for insurers

The growing demand for liquefied natural gas heralds the rise not only of the 'cities of the sea' but also the safety concerns and other risks associated with these offshore megastructures

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As the annual Lillehammer Energy Claims Conference approaches, while formally it may not be on this year's agenda, there will be more than a momentary thought in the room and during discussions in the conference corridors by the insurance industry about the arrival of the megastructures of the sea: floating liquefied natural gas facilities (FLNGs).

The first of these structures is the Prelude FLNG facility, a joint venture between Royal Dutch Shell, Kogas and Inpex, and currently under construction at the Samsung Heavy Industries (SHI) shipyard in South Korea, one of the few dry docks in the world large enough to construct a facility of such size.

These floating facilities will chill natural gas produced to -162°C (-260°F), shrinking its volume 600 times so it can be shipped direct from the field around the world without having to pipe it to shore. The liquefied natural gas (LNG) will be stored in tanks in the hull of the facility and carriers will moor alongside to offload the products.

Once complete, the facility will have decks measuring almost half a kilometre long and, fully laden, will weigh around 600,000 tonnes – six times as much as the US's mighty *Nimitz Class* aircraft carrier. It will be the largest floating offshore facility in the world, around 50% larger than any other floating structures.

Demand

According to EY, global natural gas demand has grown by around 2.7% annually since 2000. By contrast, global LNG demand has risen by an estimated 7.6% per year over the same period, almost three times faster.

Global gas demand is expected to continue to grow strongly. In its most recent annual World Energy Outlook, the International Energy Agency forecast a growing role for natural gas in the world's energy mix, with the natural gas share growing from 21% in 2010 to 25% in 2035, with natural gas being the only fossil fuel whose share was predicted to rise.

LNG demand growth is expected to be even stronger, particularly through to 2020. After 2020, demand growth is expected to continue, albeit at a

slightly slower pace as markets mature, demand shifts to more price-sensitive buyers, and some price subsidies are removed in non-Organisation for Economic Co-operation and Development (OECD) markets.

LNG graph.png

Global LNG demand by 2030 could, however, be almost double that of the estimated 2012 level of about 250 million metric tonnes. Japan, South Korea and Taiwan (collectively, JKT) have been and are expected to remain the backbone of the global LNG market, while China and India are expected to be the biggest sources of additional LNG demand.

In excess of global capacity

The Prelude FLNG will be used in the Prelude and Concerto gas fields 475 km north-east of Broome, Western Australia; drilling and gas production are both expected to begin in 2016 with a planned life expectancy of 25 years. The Prelude and Concerto fields are expected to produce 3.6m tonnes of LNG, 1.3m tonnes of condensate, and 400,000 tonnes of liquefied petroleum gas (LPG) annually.

Its value is estimated to be between \$10.8bn and \$12.6bn. According to Willis's April 2015 Natural Resources Market Review, the global energy insurance market capacity in 2015 was \$7bn. The value of the Prelude FLNG therefore significantly overshadows global upstream energy capacity.

At the same time as the Prelude facility is being completed, there are several conversions of old LNG vessels taking place, converting them to FLNG facilities. The LNG tanker *Hilli*, for example, has had 40 years of service and is expected to be used as a FLNG facility for at least 30 years,

perhaps more. While their value is not quite as dramatic as the Prelude facility, such conversions will no doubt be noted by the insurance industry.

Safety concerns

While LNG has a good safety record, many of the technologies used on the FLNG facility are ones which are used successfully onshore, but some have been adapted or modified in order for the processes, such as liquefaction and offloading, to run at sea.

New technology that has been developed for FLNG includes LNG tanks that can handle sloshing, close coupling between the producing wells and the processing facility, LNG offloading arms, cooling water intake risers, turret and mooring systems, and the marinisation of processing equipment such as absorption columns and the main cryogenic heat exchangers. All of these technologies have been extensively modelled and tested to ensure they can operate safely and efficiently under marine conditions.

Some of the technology is state-of-the-art and planned practices are new. The Prelude facility has been designed to withstand a one in 10,000 year storm and up to 340 personnel may stay in cyclone-proof accommodation during extreme storms. This differs to current practices for offshore oil operations in Australia, where workers are evacuated to safety onshore ahead of storms, and floating production units are disconnected from fields to sail to calmer waters.

A Western Australian parliamentary committee produced a recent report which commended Shell's safety record and said the company had clearly thought through risks to protect all lives on board.

The committee did, however, recommend that the Western Australian government encourage the federal government and Shell to carry out an

emergency response exercise on Prelude as soon as possible after it starts production. It wants the Council of Australian Governments to examine the need for a lead agency to co-ordinate necessary safety infrastructure and to examine the need for increased transparency on emergency response planning.

While the Australian authorities are making positive noises about its safety, ship-to-ship transfer can become dangerous if temperature controls are compromised. Historically, ship-to-ship transfers can be difficult and give rise to ignition sources where metal comes into contact with metal. No doubt these issues have been catered for, but nevertheless, when entering new frontiers for those not involved at the cutting edge, including the insurance industry at present, it will be interesting to see exactly how the process will work.

Falling gas price

And the other issue of concern is the falling price of gas. It is noteworthy that the Prelude was first commissioned in 2011. International Gas Union chief Jérôme Ferrier recently said: “Most of the projects under assessment have been put on hold until a clearer picture emerges of evolving energy costs and demand, so that the costs of certain projects can be reviewed downwards.”

While these FLNGs are not on the agenda at Lillehammer, one issue that certainly is on it is a talk entitled ‘Correlation between oil price fluctuations and upstream accidents’. It has long been feared that a fall in revenue means a fall in safety standards. With such ground-breaking technology, new territory and increased risks, the usual peril is obvious: the rogue operator or contractor who has cut costs and fails to use best practice that goes beyond regulation.

So, as the underwriters and claims adjusters head home from the bars of Lillehammer in the crisp Norwegian midnight air, the chilling thought of an accident with an FLNG facility will likely be on their minds as they diligently look to the future.