

# Energy hunger pushes drive for floating systems

Efforts to tap previously unreachable gas supplies are fuelling the development of floating liquefaction and regasification solutions



BARRY PARKER

PEERING into their crystal balls, forecasters at ExxonMobil have estimated that global demand for energy will grow 35% between 2005 and 2030.

"New technologies will continue to open up previously unreachable supplies of natural gas, the cleanest burning major fuel, enabling natural gas to overtake coal as the second largest global energy source," futurists at the oil major have said.

The Energy Information Administration estimates that worldwide natural gas consumption will grow from 108trn cu ft in 2007 to 156trn cu ft in 2035, a gain of around 44%.

Traditional liquefied natural gas supply chains where gas is gathered, then liquefied at a shore-side terminal, loaded as LNG, and then regasified after discharge at the destination are evolving to serve new sources and destinations. In the short term, the recent disaster in Japan will likely boost incremental demand for LNG.

On the supply side, analysts Wood Mackenzie have estimated that global liquefaction capacity could reach 13.8trn cu ft or 390bn cu m annually. This is roughly 284m tonnes of LNG.

Following a huge surge in liquefaction growth in the Middle

Offloading operations at Dubai Supply Authority floating LNG regasification facility at Jebel Ali Port. *Dusup / FenderCare Marine*

East, notably Qatar, offshore Australia is seen as the next major supplier of gas for export as LNG. As the previously unreachable supplies come online, with gas fields located hundreds of miles from the shore, giant floating liquefaction plants are on the drawing board.

In Australia, more than a dozen onshore terminals are planned, or already in the construction phase,

**35%**

ExxonMobil estimate of the growth in global energy demand between 2005 and 2030

**44%**

EIA estimate of the growth in worldwide natural gas consumption between 2007 and 2035

where gas is piped in from offshore fields, cooled down and exported as LNG. Proximity to the burgeoning Asian markets at a time when China seeks to reduce dependence on energy cargoes moving through the potentially vulnerable Straits of Malacca, makes Australian gas an attractive resource.

If decision makers at Royal Dutch Shell give their final approvals, expected later in 2011, the oil giant would move ahead with plans for the first FLNG — a vessel of 480 m loa, which would process gas at the Prelude field, offshore northwest Australia.

A concept developed by Shell, the floating liquefaction plant, which has gained the requisite environmental approvals, would produce 3.6m tonnes of LNG, 1.3 m tonnes of condensate and 400,000 tonnes of liquefied petroleum gas annually, starting in 2016.

Another project in the works

but facing political challenges is Sunrise LNG spearheaded by Woodside Petroleum, with participation from Conoco Phillips, Shell and Osaka Gas. The project would be deployed in waters straddling Australia and Timor-Leste. The viability of FLNG, with a cost reported to exceed \$5bn per unit, has been the subject of continuing wrangling between Woodside and leaders in Timor-Leste — who have been pushing, instead, for a pipeline and onshore gas processing.

On the receiving end, especially for those near populated areas, permitting issues have delayed or completely prevented the construction of receiving terminals. Floating regasification systems are already a reality, and have begun to fill in the void in consuming areas, where they can be quickly interfaced into existing gas supply grids. ■

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## FRSU pioneers hold investor attention

THE niche for floating storage and regasification units is populated by Excelerate Energy, teamed up with Exmar, as well as Golar LNG, Mitsui OSK, and Höegh LNG. The sector is attracting attention from investors who have recently voted "yes", with their wallets on both Golar LNG and Höegh.

Most recently, Golar LNG successfully raised more than \$300m for its newly launched partnership, Golar LNG Partners, which will concentrate on FSRUs, all converted from traditional LNG carriers.

Three FSRUs are already deployed — two in Brazil for Petrobras and one in Abu Dhabi — each serving onshore power generation facilities. A fourth, still undergoing conversion, will enter an 11-year charter following conversion at Singapore's Jurong shipyard. It is due for completion in the second quarter of 2012. That FSRU will store LNG and then pipe out gas to a pair of Indonesian power plants. Conversions of other LNG carriers in the Golar fleet, in conjunction with new contracts, could fuel future growth.

Höegh LNG already manages two FSRUs, *GDF Suez Neptune* and *GDF Suez Cape Ann*, owned jointly with Mitsui OSK, importing gas into the northeastern US.

Last month, Höegh LNG placed an order with Hyundai for

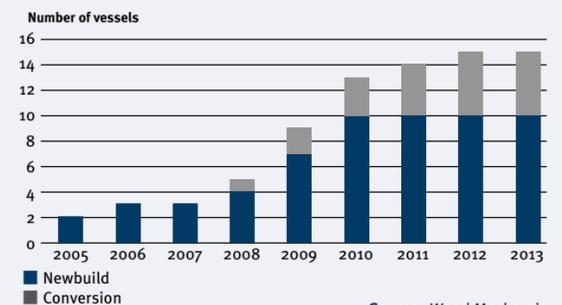
two firm newbuildings, with a reported price-tag of circa \$300m each. It has options for a further four. Financing will come partly from a \$200m private equity placement supplemented by bank debt, launched in anticipation of a June listing, on the Oslo Stock Exchange.

Excelerate Energy is well known as an early proponent of shipboard regasification systems, trademarked as Energy Bridge, and ship-to-ship transfer technology, including its proprietary GasPort systems.

Its eight Energy Bridge vessels, some of which are jointly owned with technical manager Exmar, can operate in conventional LNG trades, but also feature onboard regasification capability. Excelerate has also been serving energy-starved Boston, Massachusetts, with imports into the Northeast Gateway, a terminal that opened in late 2009. Energy Bridge vessels discharge gas that has been vapourised aboard the ships through a submerged turret, with transmission onward to Boston's gas network.

Excelerate has deployed a variation, where conventional incoming LNG vessels transfer their cargo to a moored Energy Bridge vessel for regasification and sendout into the local grid, in Bahia Blanca, Argentina, with a second project, at Escobar, soon to come online. ■

### DEVELOPMENT OF FLOATING REGASIFICATION FLEET



# FLNG projects must shift from drawing board to reality



WILLIAM J SEMBER

IT COMES as no surprise that the market for liquefied natural gas carriers is bullish. All factors spell

## Industry Viewpoint

opportunity for shipowners. The long-term prospect for gas demand is positive, the LNG carrier orderbook is at a 10-year low and day rates are high. As a result, an additional 150 LNG carriers may be ordered over the next 10 years.

However, if one looks at the broader LNG picture, the commercial attractiveness of floating LNG can no longer be denied.

From a class perspective there are no technology showstoppers for FLNG. Liquefaction plants have

been suitably optimised to efficiently use deck space while taking into account the safe and efficient operation of process equipment. As recently as five years ago, floating solutions were still considered novel concepts. But technological advances mean that they have moved closer to reality.

More than a dozen FLNG concepts have been reviewed and granted approval in principle from class societies and are waiting for project go-ahead. Along with these concepts comes a great deal of associated technologies for the use of LNG systems offshore.

Emerging proprietary technologies and transport designs have come of age and industry is poised for the first projects. With more than one-third of global gas reserves stranded by their location or field size without commercially viable access to world markets, the attractiveness of FLNG has now moved from a technical exercise to a commercial exercise with the numbers suggesting a solid business case.

Major projects in progress include Shell's Prelude field in the Browse Basin off Western Australia, which gained environmental approval in late 2010 and has a target production start date of 2016.

It is being closely followed is the onshore Queensland Curtis Coal Seam Gas project as well as projects offshore Papua New Guinea, Brazil, and Indonesia, in particular

Inpex's Abadi Field gas project.

Experts are also predicting that one FLNG project will be announced by the end of this year with two additional projects by the second quarter of 2012.

FLNG can offer a number of advantages over land-based terminals. FLNG installations can result in lower overall project costs and reduced environmental footprint because long pipelines to shore, onshore development infrastructure and offshore compression platforms are not needed. With gas deposits often in remote or stranded areas far from the coast the 'marinising' of production, liquefaction and export facilities offers great potential for many future development projects.

While some have been looking at the doom and gloom of the LNG downturn and a perceived oversupply of LNG tonnage, others

in industry have stayed the course and continued to advance the industry's technology. The past five years have been spent successfully advancing both the technology and commercial attractiveness of the FLNG concept as a means of delivering new sources of cleaner energy.

Technology developments have addressed issues as the integration of subsea architecture with FLNG; offloading systems, in particular for harsher environments with tandem configurations based on cryogenic hoses or flexible pipes; and the qualification and testing of components with regard to LNG transfer systems. There have also been further enhancements to containment systems and considerations for sloshing impact loads as the cargo tanks have increased in size along with various filling conditions for offshore FLNG operations.

The advances and level of sophistication in all these subjects are evident. The time for commercialisation and the first project is now. ■ William J. (Bill) Sember is an ABS corporate officer and vice-president global gas. His focus is on the development and support of gas projects worldwide. Prior to this role, he served as president and chief operating officer. Mr Sember recently chaired the technical session on FLNG at the Gastech 2011 conference in Amsterdam.

**"The attractiveness of FLNG has now moved from a technical exercise to a commercial exercise with the numbers suggesting a solid business case"**

**Expression of Interest**

The Port of Tallinn Authority invites operators/investors to express their interest in the LPG terminal development in **Port of Tallinn's Muuga Harbour, Estonia.**

Terminal territory for development is 7.2 ha. Existing berth with a length of 196 m and a depth of 11 m. Expansion possibilities. Railway and road connections.

Detailed Land Use Plan and Strategic Environment Impact Assessment (SEIA) in Effect.

Interested parties are kindly invited to send an e-mail to [n.baidina@ts.ee](mailto:n.baidina@ts.ee) to obtain more information.

Terminal area 7.2 ha

196 m / -11 m

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