

Mid-scale FLNG: a solution for stranded gas fields

Engineers at Schiedam are busy developing SBM Offshore's pioneering Floating Liquefied Natural Gas (FLNG) concept. With patents in place, basic engineering is continuing and model testing will soon be performed to verify computer simulations.



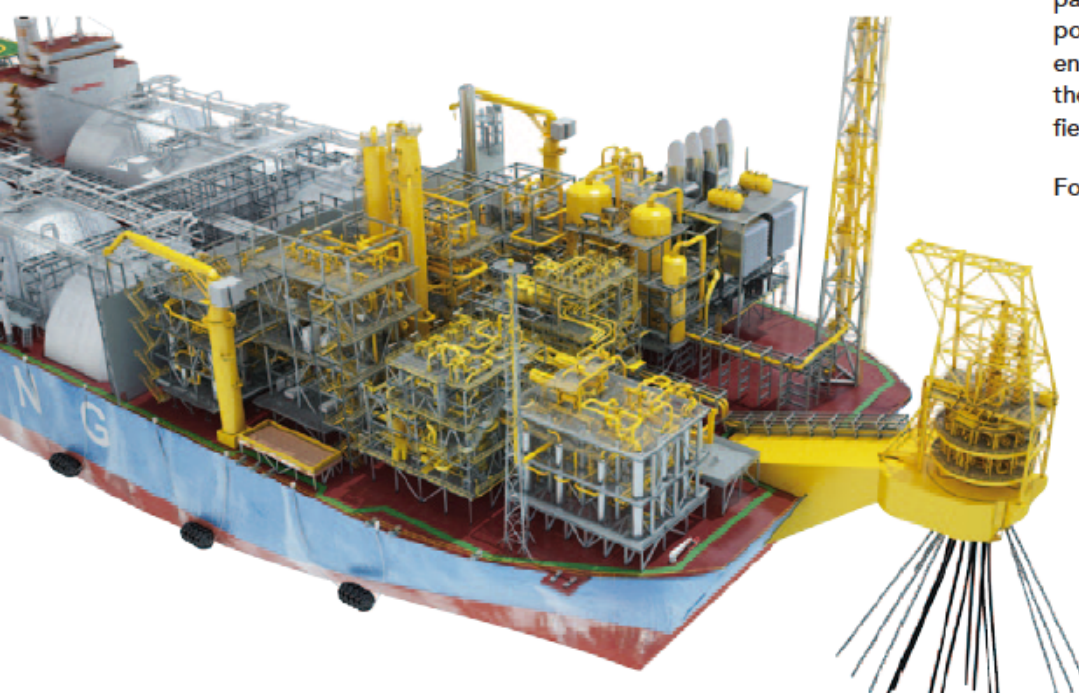
The development is well timed to take advantage of the strong growth in natural gas demand that is expected during the coming decades. In its World Energy Outlook 2012 the International Energy Agency forecasts that gas demand will rise from 3.3 trillion cubic metres (tcm) in 2010 to 5.0 tcm in 2035, an increase of 50%.

Industry estimates suggest that there are over 2,000 trillion cubic feet (Tcf) of proven undeveloped offshore gas reserves in the world today. Many of these reserves, however, are considered 'stranded' i.e. the fields are too far

further potential projects are likely to be announced in North and South America, Africa and the Middle East.

This new market will be a good complement to SBM's already strong position in the oil FPSO business. SBM has extensive experience in designing, building and operating FPSOs and is now drawing on this experience to develop its FLNG concept.

Commenting on SBM's strategy Bruno Chabas, CEO SBM Offshore said: "Our core position is for mid-scale FLNG (1.5-2 mtpa) conversion."



schedule. With such a conversion, the process facilities along with the storage and crew living quarters are located on deck.

This novel topside layout is achieved by joining together two LNG tankers. This 'twin hull' concept allows adequate space for the process facilities with the necessary space between sections of equipment to satisfy safety requirements, while providing sufficient LNG storage capacity.

SBM has performed generic pre-FEED work, together with Linde Engineering, a strong and reliable LNG topsides partner, to cater for a wide range of potential reservoir compositions and environmental conditions, which can then be easily optimised for specific fields.

For the mid-scale FLNG concept, a pre-cooled dual nitrogen expansion process without natural gas liquid (NGL) recovery has been selected, providing an optimum balance between efficiency, simplicity, robustness and safety.

Avoiding the use of mixed refrigerants on the topside and the introduction of several innovative features achieves an efficiency level approaching that of the single mixed refrigerant (SMR) process. This design provides a highly economic solution for mid-scale applications.

from shore to be considered economic. This, combined with the increasing permitting challenges of building onshore terminals, will drive the market for FLNG.

Kees Willemse Director of Proposals & Technology Development from Schiedam office, said: "With the increasing global demand for gas we expect there will be a strong market for FLNG vessels. FLNG has the potential to make a significant impact on the global LNG market over the coming decade."

According to energy analysts, Infield Systems, capital expenditure (Capex) on FLNG and offshore regasification markets will increase significantly over the period to 2018. In the short to medium term, the majority of planned FLNG projects are concentrated in Australia and South East Asia. However,

Willemse added: "This size is suitable for the 700-plus stranded gas fields between 0.5 TCF and 2 TCF and is also a good fit with SBM's current FPSO product line, in terms of project scale, risk and investment."

Many of the technologies and capabilities that SBM has in-house are applicable to the FLNG concept. For example, the same turret mooring systems used for FPSOs can be used for FLNG. Notably, SBM is providing the turret for the first new build FLNG project – a very large-scale project that is currently under construction for Shell.

Although building a new facility is possible, SBM's innovative option is to convert LNG tankers into FLNG facilities – in much the same way as has been successfully achieved for oil FPSOs. The advantage of this concept includes lower costs and a shorter

SBM's design will continue to be validated, not only in terms of economics but also for operability. Some wind tunnel testing has been performed to verify the effect of topside design on the loading of the vessel. The next step is to make a scale model of the vessel for testing in a tank.

This testing will provide SBM with the further information needed to confidently offer the concept to potential clients. Willemse summed up: "The concept is at a sufficiently advanced stage of design whereby SBM can accept specific details of the potential field – for example wave and wind conditions and gas composition – in order to tailor an optimum FLNG design to the exact needs of the client."

