

Floating a revolutionary idea

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AUSTRALIA could host the world's first floating liquefied natural gas plant, Royal Dutch Shell executive director of gas and power Linda Cook told the APPEA 2008 Conference this week.

Cook said Shell was about to seek tenders from Asian shipbuilders for a floating LNG plant and was considering using the technology at its Prelude field.

Shell has yet to disclose the size of Prelude, which it discovered last year, but Cook indicated it was substantial but not large enough to feed a standard-sized LNG production train. This suggests the field is somewhere between one and two trillion cubic feet in size.

She said Prelude's size and its 400km distance from shore made it a good candidate for floating LNG.



A Flex LNG Producer offloading to an LNG tanker

"Prelude is relatively small and relatively far from shore, and the nearest coastline is quite environmentally sensitive," she said.

Floating LNG eliminates the need for a long and expensive pipeline and considerably reduces a project's environmental footprint, she said.

It would also allow operators to bypass Australia's overstretched construction market by having plant built in Korea or Japan, and would eliminate many environmental approvals and native title problems.

Shell has said it has settled on a "design-one-build-many approach" to its cyclone-tolerant FLNG design. The 3.5 million tonnes per annum (MMtpa) prototype will also have hydrocarbon liquids capabilities and will be 450m by 75m wide.

Cook also said that floating LNG may also be suitable for the Woodside-operated Sunrise field in the Timor Sea, in which Shell, ConocoPhillips and Osaka Gas are also partners.

Late last year, Woodside chief executive Don Voelte said the FLNG option appeared to be cheaper than either piping the gas to Darwin or East Timor for liquefaction, and he acknowledged it could sidestep the political difficulties of processing the gas in either Australia or East Timor.

Woodside executive vice president of development Paul Moore conceded the floating option would pose technical difficulties, but said rising pipeline costs made it worth considering.

When a supermajor talks, the industry listens, so Shell's comments on FLNG are making sceptics reconsider the technology's viability. But the Anglo-Dutch giant will not be the first company to use FLNG.

Norway's Flex LNG already has ships incorporating liquefaction units under construction in South Korea and expects to be liquefying its first cargo by 2011.

"We currently have three ships on order from Samsung in Korea," managing director Philip Fjeld told PNN's sister title, *Petroleum* magazine.

"The first will be ready in the second quarter of 2011."

The so-called LNG Producer ships will be able to produce about 1.5MMtpa and will be configured for a wide range of gas specifications.

Offloading will similar to systems used in crude oil floating processing, storage and offtake vessels

(FPSOs). Flex's LNG Producer vessels are designed to be able to offload to a standard unmodified LNG carrier.

The technology will provide a solution where a gas field is too small to justify an onshore LNG facility or for mid-sized companies that can't finance a large onshore facility, according to Flex.

"Our vessels can produce gas from fields that have 500 billion cubic feet of 2P [proved and probable] gas," Fjeld said.

"After 15 or so years, they can move on to other fields once the first field has been exhausted."

The company is able to make the liquefaction and gas treatment components compact by using a nitrogen expander system, according to Fjeld.

Onshore LNG plants generally use mixed refrigerant systems, which are more economical for larger LNG plants.

"Mixed refrigerant systems, which are energy-efficient but complex and use a lot of space," he said.

"In contrast, a nitrogen expander system is cheaper to build, uses less space, weighs less and is more robust. Nitrogen is also an inert gas, which means you have an in-built fire-suppressant system."

Fjeld claimed that nitrogen expander systems are also less prone to downtime and could recover within hours from a stoppage that could halt a mixed refrigerant operation for days or even weeks.

Flex LNG's representative in Australia and South-East Asia, Peter Dighton says the company is already eyeing opportunities for monetising Australian stranded gas.

"The company is looking all around the world, but Australia is a fantastic candidate," said Dighton, a Brisbane-based lawyer.

Dighton attended APPEA 2008 and said a lot of delegates were interested in the Flex technology.

"There are a lot of stranded fields in the North West Shelf, the Browse Basin, the Bonaparte and the JPDA," he said.

"There are probably at least a dozen local companies that I know of who are extremely interested because it helps them monetise gas fields that are currently worthless."

The technology may also appeal to larger companies or for larger fields where a Flex vessel can help take advantage of current market conditions to generate early cashflow in advance of an onshore development.

"I can envisage possible opportunities at Gladstone," Dighton said.

"Coal seam methane companies ramping up production for their proposed LNG projects can't just turn that production on and off. They will have to find a market for the gas that is produced before the liquefaction plants are operational, and a floating LNG vessel moored at Gladstone for a couple of years could be just what they need."

Dighton agreed there was some scepticism about floating LNG, but argued its development was inevitable.

"Floating LNG is a natural development from technologies used in LPG and crude oil operations," he said.

"I think everyone recognises floating LNG is definitely going to happen in one form or another and it will revolutionise the LNG world. It is a bit like when FPSOs first came on stream in the 1970s – now they are common and I think there are now seven operating just in Australia."

Tolhurst director Jurgen Hendrich said FLNG could be a very important development.

"FLNG solves the tyranny of distance – you can manufacture in a low labour cost environment, it negates the need for expensive pipelines, and you can relocate the floater once the resource is depleted," he said.

"However it does not solve the environmental issues associated with CO2 sequestration."

Candidates for FLNG would include fields with reasonable gas quality that had not been developed for liquids-stripping operations and that were too far from established infrastructure, according to Hendrich.

"I think West Africa could be a huge application for FLNG given its absence of real gas transmission infrastructure and proximity to North America and Europe, which has to decouple supply risk from Russia," he said.

"In Australia, I see Sunrise as a logical candidate for FLNG development. Thereafter, the other resources are CO2-challenged, but if this is resolved, the Browse is a logical application for this technology."