

## EXTENDED EVENING TECHNICAL MEETING

### FLNG is coming...

## What does this mean for the Subsea Industry?

Wednesday, 15 October 2014

Parmelia Hilton Hotel (Argyle Room), Mill Street, Perth

Registration 5.30 pm. Presentations 6.00 pm – 8.00 pm. Networking over drinks and finger food 8.00 pm – 9.00 pm

Chaired by: Dr Ian Finnie, Integrated Geosciences Technical Authority, Fugro AG

#### **FLNG and the future of our offshore pipeline industry**

**Alan Gillen, Pipelines Technical Authority, Subsea & Pipelines Function, Woodside Energy Ltd**

The emergence of FLNG as a competitive alternative to more traditional field developments has led to a perception that our local offshore pipeline industry is doomed. However, based on the actual technology requirements, the reality could not be further from the truth. Whilst it is clear that the FLNG facilities do not require large diameter long export pipelines they do require a multitude of small to medium diameter shorter infield gathering lines. With these facilities developing generally HTHP (high-temperature and high-pressure) reservoirs these "lively" gathering lines will become more complex to design, manufacture and install. This presents an attractive opportunity for our local industry to meet these emergent technology requirements. This presentation will attempt to look at the direction FLNG may lead our offshore pipeline industry.

#### **Good Technology, Bad Seabeds and Ugly Loads - Reliably Anchoring FLNGs in Cyclone Alley**

**Ben Holland, Geotechnical Engineer, Fugro AG**

Securely anchoring massive floating production systems in "Cyclone Alley" off the north-west of Australia is a daunting prospect - and no laughing matter - as the future of FLNG technology in Australia depends on finding robust solutions. These FLNG facilities are colossal, and must be able to withstand the worst combinations of winds, waves and currents that occur on our planet, resulting in highly complex cyclic loads in excess of 2,500 tonnes per anchor. The seabeds in our region are recognised to be the most challenging in the world, from an engineering perspective. Many of these geologically young sediments have the consistency of toothpaste at mudline, and are more water than solid. Designing anchors to have sufficient capacity over the life-time of the facility requires a robust knowledge of the seabed and a profound understanding of the mechanical properties of the sediments. This talk will focus on the principal anchoring challenges that must be overcome to enable this technology to be used in Australia with confidence.

#### **Hydrodynamic Uncertainties associated with FLNG Offtake**

**Jon Gould, Senior Technical Consultant, Peritus International Ltd**

Offloading LNG from an offshore FLNG facility is a key technical and commercial risk for an FLNG Project. Whilst tandem offloading is the preferred method for offtake from FPSOs, it is non-preferred for LNG offtake due to limitations in hose technology and the need for a bow manifold arrangement which leads to the requirement of a dedicated LNG carrier fleet. The alternative, side-by-side offloading, is currently selected by both PETRONAS and Shell for their PFLNG 1&2 and Prelude projects respectively. The only examples to date of side-by-side offloading LNG in an exposed offshore location are Adriatic LNG, where the receiving facility is a fixed facility, and recently installed Toscana FSRU where the receiving facility is a converted LNGC. This presentation aims to identify the key hydrodynamic differentiators in taking LNG offtake technology to an offshore environment and explains why limitations in analytical methods and model testing mean that the risks will only be fully mitigated in the full scale environment when tested offshore.

#### **FLNG is coming – so what does this mean for our industry?**

**Adj. Prof. Kevin Mullen, Executive Engineer Subsea, INTECSEA**

FLNG represents a truly revolutionary technique that avoids expensive and vulnerably long export pipelines plus politically, socially and environmentally sensitive land-based facilities, by placing the LNG plant offshore, right above the subsea wells. This emergent opportunity has the potential to substantially revitalise Western Australia's outlook for development of natural gas reserves, steering clear of some of the major challenges encountered during recent developments. Where does the future lie without this opportunity? However, the viability of FLNG in Australia may hinge on the ability of our underwater technologies to address anticipated and unanticipated challenges. So, what about the subsea equipment? Does it need to change? Can it be optimised for FLNG? With a theme of "Smaller, Smarter, More Dangerous", this presentation looks first at how FLNG can use the existing suite of underwater technologies for developing remote gas fields. It then focuses on "smarter" subsea infrastructure which could help to give technical, economic and operational edge needed to establish FLNG as a new means to open up Western Australia's untapped gas. However, the uncertainties and dangers associated with FLNG should not be underestimated and our industry needs to be smart, agile and responsive. Casting a critical eye over public domain information on existing and upcoming FLNG developments, this presentation poses some questions but also give some answers to the key question – FLNG is coming, what does this mean for our industry?

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