

Gravity Based Substructure Solutions for Arctic LNG

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ABSTRACT :

The arctic is re-emerging as a frontier for oil and gas developments. High gas prices offer greater incentives than ever for development of stranded fields, perhaps even in ice-bound regions of the Beaufort, Chukchi and Barents Seas.

This paper will consider technological solutions associated with the use of fixed offshore caissons for the support gas development concepts and the storage of liquefied natural gas (LNG) prior to export by ship to international markets. The technology is an adaptation of work undertaken in more temperate regions where offshore LNG solutions in relatively shallow water (< 30 m water depth) have been evaluated and constructed.

Since offshore gravity substructures will be critical building blocks to sub-Arctic and Arctic field gas developments, a number of field development scenarios will be evaluated for Chukchi and Beaufort conditions which incorporate gravity-based extraction and storage facilities. Cost and schedule estimates for a typical development will be developed to provide inputs to the assessment of viability of the scenarios

KEY WORDS: Arctic, LNG, Gravity Base, Concrete, CGS, GCG, Ice

INTRODUCTION

High oil and gas prices are encouraging development of opportunities in the Arctic. This has been demonstrated by the recent strong interest and bids for leases in the Chukchi Sea compared to lease sales of just a few years earlier. This is due to higher oil and gas prices making discoveries economic at smaller size developments than previously required for economic viability.

In addition to the prospect of increased activity in Arctic waters the areas of interest include lease sales on the Alaskan continental shelf in water depths of up to 50 meters as shown Figure 1 and Figure 2.

Further lease sales are to be expected between 2009 and 2011 in the Chukchi and Beaufort and these will almost certainly include prospects in similar and deeper waters. This is a step change from Arctic developments to date which have been limited to water depths up to 20 meters.

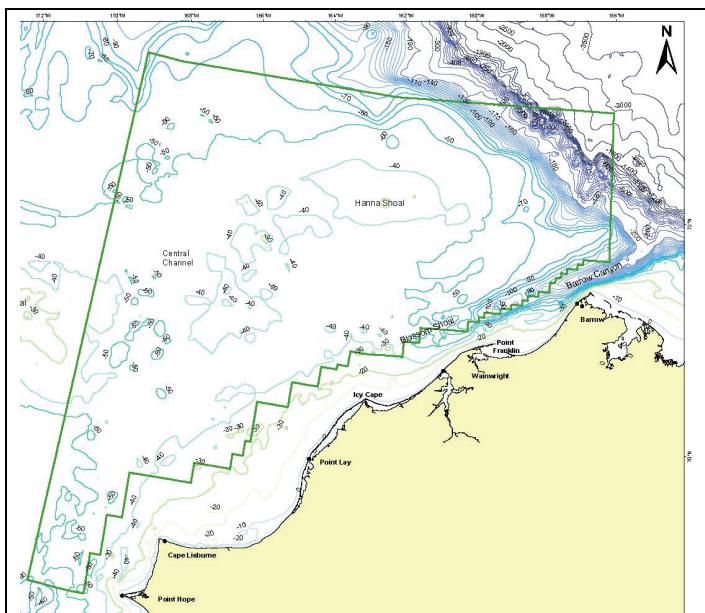


Figure 1 : Bathymetry of the Chukchi Sea Lease Sale (source MMS 2007)

It is pertinent to note that the recently sold Chukchi 163 blocks excluded a 50 mile wide coastal strip. Access to land and nearshore crossings may well become problematic as there are many environmental considerations to be balanced against the benefits of oil and gas development to the wider community as highlighted in the Chukchi Environmental Impact Assessment (MMS, 2007). It raises a question as to whether the proposed Chukchi developments should from the outset be totally offshore focused.