SEMI-SUBMERSIBLE & MOPU EXPERIENCE

The sole intention of this factsheet is to share general information.

Contact Details
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March 2017

FLOATING GAS SOLUTIONS

OVERVIEW

Project Discipline

Product Line

FGS

Date of first gas: July 2007
Date of hire: December 2013

Unit Type
Semi-Sub/New Build
Topsides

Client
Enterprise
Crude Oil
5,000 bopd
Field
Mississippi Canyon,
Gas Production
1000 MMscfd
Block 920, GoM
or Injection

Water Depth (m)
2,438
Water Production
2,960 bwpd
Mooring
12 leg mooring
system, 9"

Polyester rope

Scope of Work
EPCI for hull

Contract
Fixed Lumpsum

Independence Hub • USA
The Independence Hub semi-sub is the industry's first DeepDraftSemi® and still hold the record for the deepest semi-sub, specifically design by SBM Offshore to accommodate large bore SCR risers in ultra-deep water. The platform was owned and operated by Anadarko in the US Gulf of Mexico.

Unit Type
MOPU/New Build
Topsides

Client
Encana
Condensates
2,360 bopd
Field
Deep Paunke,
Gas Production
300 MMscfd
Nova Scotia
Water Production
40,250 bwpd

Water Depth (m)
44
Scope of Work
Topsides

Mooring
Installation

EEsbm

Contract
Lease

Note: Facility leased on long-term contract to Encana, inclusive of maintenance, operation and shore base facilities.

Deep Panuke • Canada
The Deep Panuke MOPU is owned and operated by SBM Offshore on behalf of Encana Corporation, offshore Nova Scotia, Canada.
The platform is designed to produce up to 300 million cubic feet per day (MMcf/d) of natural gas. The MOPU produces and processes natural gas from the Deep Panuke field, approximately 250 kilometres (155 miles) southeast of Halifax, Nova Scotia on the Scotian Shelf. The sour natural gas from the Deep Panuke field is processed offshore and transported, via subsea pipeline, to Goldboro, Nova Scotia.

With almost 20 years of experience of large offshore gas projects and 8 years of LPG FPSO offshore operations, SBM Offshore has the experience for your LNG FPSO project.
SBM Offshore offers a catalogue of solutions, spanning the entire floating gas value chain, from small to mid-scale LNG (Liquified Natural Gas) FPSOs, Gas FPSOs, FSRUs (Floating Storage and Regasification Unit) and FPGUs (Floating Power Generating Unit), based on Newbuild and Conversion concepts.

Robust LNG portfolio from small to mid-scale LNG FPSO solutions, Newbuilds and Conversions, including the patented TwinHull™ LNG FPSO, FSRUs and FPGUs

Over 10 years of LNG FPSO and FSRU development work including Pre-FEEDs and FEEDs

Investment in Research & Development in floating gas technology

Access to financing through strong relationships with top banks

In-house expertise and strategic partnerships that enhance project execution and on-time delivery

### FSRU
- Conversion
- Jetty & Turret moored solutions
- Open, closed and combined loop regasification technology
- Full EPCI scope

### Newbuild LNG FPSO
- Small-scale to Mid-scale (1 – 2.5 MTPA)
- Suitable for at shore, near shore and offshore applications
- Applicable for all key liquefaction technologies
- Storage capacity up to 241,000m³
- RAM analysis proves up to 96% uptime

### TwinHull™ LNG FPSO
- 2 LNG tankers, converted into a single integrated hull
- Unique concept, developed fully in-house
- Smart and cost effective for an LNG FPSO up to 2 MTPA
- Greater storage capacity than a single tanker
- Optimized deck-space, safely separated from accommodation
SBM Offshore is confident that with its past and current experience in gas, in-house technology development and almost 300 years of cumulative FPSO operating experience, it can provide world class, safe, reliable and cost-effective solutions to the gas market. Outlined here are examples demonstrating SBM Offshore’s strong operational track record in floating gas, including the world’s first ever new build LPG FPSO.

**Sanha LPG FPSO • Angola**

Sanha made history as the world’s first newbuild LPG FPSO when the vessel came on-stream offshore Angola for CABGOC (Chevron) in April 2005.

**Operations:** over eight years  
**Uptime:** 99.7%  
**Production:** 32.7 million bbls of Propane and 21.7 million bbls of Butane  
**Offloads:** 344  
**Safety performance:** zero Lost Time Incidents (LTIs)

The vessel was successfully operated for eight years by OPS - a joint venture between SBM Offshore and Sonangol.

**Date of first gas:** April 2005

<table>
<thead>
<tr>
<th>Unit Type</th>
<th>FPSO/New Build</th>
<th>Topsides</th>
<th>Scope of Work</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mooring Type</td>
<td>External Turret</td>
<td>Gas Production 37,370 bbls LPG per day</td>
<td>Tanker ECS</td>
</tr>
<tr>
<td>Client</td>
<td>Chevron</td>
<td>with depropanizer plant</td>
<td>Topsides EPC</td>
</tr>
<tr>
<td>Field</td>
<td>Sanha</td>
<td></td>
<td>Mooring EPC</td>
</tr>
<tr>
<td>Water Depth (m)</td>
<td>58</td>
<td></td>
<td>Installation EEsbm</td>
</tr>
<tr>
<td>Storage Capacity</td>
<td>135,000 m³ LPG</td>
<td></td>
<td>Contract Lease</td>
</tr>
</tbody>
</table>

**FPSO Tantawan Explorer • Thailand**

Tantawan Explorer was the first in a long series of “Generation 2” FPSO vessels designed, owned and operated by SBM Offshore. Having a gas processing capacity of 150 MMscfd, Tantawan established a benchmark for a series of SBM Offshore projects over the following 15 years.

**Date of first production:** February 1997

<table>
<thead>
<tr>
<th>Unit Type</th>
<th>FPSO/Conversion</th>
<th>Topsides</th>
<th>Scope of Work</th>
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</thead>
<tbody>
<tr>
<td>Mooring Type</td>
<td>External Turret</td>
<td>Crude Oil 50,000 bopd</td>
<td>Tanker PTC</td>
</tr>
<tr>
<td>Client</td>
<td>Chevron</td>
<td>Gas Export or Lift 150 MMscfd</td>
<td>Topsides EPC</td>
</tr>
<tr>
<td>Field</td>
<td>Tantawan</td>
<td>Water Production 25,000 bwpd</td>
<td>Mooring EPC</td>
</tr>
<tr>
<td>Water Depth (m)</td>
<td>74</td>
<td></td>
<td>Installation EEsbm</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Contract Lease</td>
</tr>
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</table>
SBM Offshore’s complex pre-salt FPSOs are called ‘Generation 3’ (G3).

**FPSO Cidade de Saquarema • Brazil**

To date, SBM Offshore has delivered four pre-salt G3 FPSOs in four years to Petrobras. FPSO Cidade de Paraty was the first in 2013, followed by FPSO Cidade de Ilhabella in 2014. FPSO Cidade de Maricá joined the fleet in February 2016 and her twin sister Cidade de Saquarema in July 2016.

The vessels represent a major step-change in the scale and complexity of FPSO projects, meeting the industry’s advanced offshore processing needs to develop pre-salt fields. What particularly marks out the G3 design as a step change is the sophistication of its gas processing and compression technology, including use of membrane technology for CO₂ removal and gas re-injection at extreme fluid density.

Indeed, the reservoir gas contains a high percentage of carbon dioxide (ranging from 10% to well over 50%) which has to be separated out to allow export of purified natural gas. This contaminant - along with some hydrogen sulphide - and the temperatures and pressures that have to be catered for, mean that materials selection is also a challenge.

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<th>Topsides</th>
<th>Scope of Work</th>
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<tr>
<td>Mooring Type</td>
<td>Spread Moored</td>
<td>Crude Oil</td>
<td>Tanker</td>
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<tr>
<td>Client</td>
<td>Petrobras</td>
<td>Gas Injection</td>
<td>PTC</td>
</tr>
<tr>
<td>Field</td>
<td>Lula Central</td>
<td>Gas Export or Lift</td>
<td>EPC</td>
</tr>
<tr>
<td>Water Depth (m)</td>
<td>2,130</td>
<td>Water Injection</td>
<td>Topsides</td>
</tr>
<tr>
<td>Storage Capacity</td>
<td>1,600,000 bbls</td>
<td>Water Production</td>
<td>Mooring</td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
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**Date of first Oil: July 2016**

**Kashagan project • Kazakhstan**

SBM Offshore’s scope for the project, working in partnership with Siemens, consisted of delivering three gas compressor barges, as part of the massive Kashagan complex. The barges were delivered to client Agip KCO and installed on site in 2008.
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**Date of hire: December 2013**

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<td>Encana</td>
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<td>Field</td>
<td>Deep Panuke, Nova Scotia</td>
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<td>Water Depth (m)</td>
<td>44</td>
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