Technology

GAS COMPRESSOR BARAGE EXPERIENCE

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

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FLOATING GAS SOLUTIONS EXPERIENCE

With almost 20 years of experience of large offshore gas projects and 8 years of LPG FPSO offshore operations, SBM Offshore is uniquely qualified for your LNG FPSO project.

Kashagan Project • Kazakhstan

Kashagan project

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.
SBM Offshore is confident that its past and current experience in gas, in-house technology development related to floating LNG and leveraging more than 270 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.

SBM Offshore’s latest pre-salt FPSOs are of a design that SBM calls ‘Generation 3’.

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 the pre-salt fields. What particularly marks out the G3 design as an FPSO game changer 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.

To date, SBM Offshore has delivered three pre-salt G3 FPSOs in a series of four to Petrobras. FPSO Cidade de Paraty was the first in 2013, followed by FPSO Cidade de Ilhabela in 2014. FPSO Cidade de Maricá recently joined the fleet in February 2016, her twin sister Cidade de Saquarema is expected for mid-2016.

Date of first Production: November 2014

<table>
<thead>
<tr>
<th>Unit Type</th>
<th>FPSO/Converted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mooring Type</td>
<td>Spread Moored</td>
</tr>
<tr>
<td>Client</td>
<td>Petrobras</td>
</tr>
<tr>
<td>Field</td>
<td>Sapinhoas</td>
</tr>
<tr>
<td>Water Depth (m)</td>
<td>2,140</td>
</tr>
<tr>
<td>No. of Risers</td>
<td>55</td>
</tr>
<tr>
<td>Vessel Size DWT</td>
<td>265,243</td>
</tr>
<tr>
<td>Storage Capacity</td>
<td>1,600,000 bbls</td>
</tr>
</tbody>
</table>

**Topsides**
- Crude Oil: 150,000 bopd
- Gas Injection: 210 mmscfd
- Gas Export or Lift: 140 mmscfd
- Water Injection: 180,000 bwpd

**Scope of Work**
- Tanker: PTC
- Topsides: EPC
- Mooring: EPC
- Installation: EE
- Contract: Lease

**FPSO Cidade de Ilhabela ● Brazil**
Sanha LPG FPSO

The Sanha LPG FPSO made history as the world’s first ever new build LPG FPSO in April 2005 when it first came on-stream offshore Angola. OPS (a JV of SBM Offshore and Sonangol) successfully operated her for eight years on the Sanha field for client CABGOC (Chevron). Under the terms of the lease contract the unit was jointly owned by SBM Offshore and Sonagol until May 2013, when CABGOC exercised a purchase option.

**Date of first gas: April 2005**

<table>
<thead>
<tr>
<th>Unit Type</th>
<th>FPSO/New Build</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mooring Type</td>
<td>External Turret</td>
</tr>
<tr>
<td>Client</td>
<td>Chevron</td>
</tr>
<tr>
<td>Field</td>
<td>Sanha</td>
</tr>
<tr>
<td>Water Depth (m)</td>
<td>58</td>
</tr>
<tr>
<td>No. of Risers</td>
<td>4</td>
</tr>
<tr>
<td>Vessel Size DWT</td>
<td>94,000</td>
</tr>
<tr>
<td>Storage Capacity</td>
<td>135,000 m³ LPG</td>
</tr>
</tbody>
</table>

**Topsides:**
- Gas Production: 37,370 bbls LPG per day
- with depropanizer plant

**Scope of Work:**
- Tanker: ECS
- Topsides: EPC
- Mooring: EPC
- Installation: EEsub
- Contract: Lease

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Tantawan Explorer

Tantawan Explorer was the first in a long series of “Generation 2” FPSO vessels 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/Converted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mooring Type</td>
<td>External Turret</td>
</tr>
<tr>
<td>Client</td>
<td>Chevron</td>
</tr>
<tr>
<td>Field</td>
<td>Tantawan</td>
</tr>
<tr>
<td>Water Depth (m)</td>
<td>74</td>
</tr>
<tr>
<td>No. of Risers</td>
<td>5</td>
</tr>
<tr>
<td>Vessel Size DWT</td>
<td>137,000</td>
</tr>
<tr>
<td>Storage Capacity</td>
<td>1,000,000 bbls</td>
</tr>
</tbody>
</table>

**Topsides:**
- Crude Oil: 50,000 bopd
- Gas Export or Lift: 150 MMscfd
- Water Production: 25,000 bwpd

**Scope of Work:**
- Tanker: PTC
- Topsides: EPC
- Mooring: EPC
- Installation: EEsub
- Contract: Lease

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Note: Long-term lease to Chevron inclusive of maintenance, operation and shore base facilities. In 2008, Chevron exercised its purchase option for the FPSO.
The Indépendance HUB

The Indépendance HUB is SBM Offshore’s industry-first DeepDraft Semi®, specifically designed to accommodate large bore SCR risers in ultra-deep water. The platform is owned and operated by Anadarko.

Date of first gas: July 2007

<table>
<thead>
<tr>
<th>Unit Type</th>
<th>Semi-Sub/New Build</th>
</tr>
</thead>
<tbody>
<tr>
<td>Client</td>
<td>Enterprise</td>
</tr>
<tr>
<td>Field</td>
<td>Mississippi Canyon, Block 920, GoM</td>
</tr>
<tr>
<td>Water Depth (m)</td>
<td>2,438</td>
</tr>
<tr>
<td>Production Risers</td>
<td>12 x 10” SCRs</td>
</tr>
<tr>
<td>Export Risers</td>
<td>20” SCR (gas)</td>
</tr>
<tr>
<td>Total Payload</td>
<td>19,300 tonnes</td>
</tr>
</tbody>
</table>

**Topsides:**
- Crude Oil: 5,000 bopd
- Gas Production or Injection: 1000 MMscfd
- Water Production: 2,960 bwpd
- Mooring: 12 leg mooring system, 9” Polyester rope

**Dimensions (m):**
- Hull: 71 x 71 x 49
- Hull columns: 14 x 14
- Pontoon: 12 x 8
- 2 Level Deck: 43 x 67
- Draft (m): 32
- Scope of Work: EPCI for hull
- Contract: Fixed Lumpsum

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.

Date of hire: December 2013

<table>
<thead>
<tr>
<th>Unit Type</th>
<th>MOPU/New Build</th>
</tr>
</thead>
<tbody>
<tr>
<td>Client</td>
<td>Encana</td>
</tr>
<tr>
<td>Field</td>
<td>Deep Panuke, Nova Scotia</td>
</tr>
<tr>
<td>Water Depth (m)</td>
<td>44</td>
</tr>
<tr>
<td>No. of Risers</td>
<td>8</td>
</tr>
</tbody>
</table>

**Topsides:**
- Condensates: 2,360 bopd
- Gas Production: 300 MMscfd
- Water Production: 40,250 bwpd

**Scope of Work:**
- Topsides: EPC
- Mooring: EPC
- Installation: EESBM
- Contract: Lease

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

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