

## CONFIDENTIAL CLIENT OFFSHORE FIELD DEVELOPMENT

### Feasibility, Concept Select and Pre-FEED, Campos Basin, Brazil

For an offshore field development in the Campos Basin, Brazil ICON performed feasibility, concept select and Pre-FEED Engineering.

#### Background

The field was discovered in 2003, and is approximately 100kms offshore in 160m water depth. The current operator acquired the asset in 2019.

The main producing reservoirs contain a heavy oil that requires artificial lift. Given the lack of associated gas, the selected artificial lift method is Electric Submersible Pumps (ESPs).

Prior to ICON engagement, the development concept comprised subsea wells tied back to an FPSO. Due to market conditions and commercial and technical risk assessment, this development concept was considered potentially sub-optimal for the field.

#### Feasibility and Concept Select Studies

ICON was selected by the Operator to initial perform feasibility and concept select studies. This work was conducted in close association with the Operator's subsurface, wells, operations and regulatory functions.

The work involved the following:

- review of the previous facilities work undertaken on the;
- develop a basis of design for the field;
- brainstorm of all potential development options;
- technically and commercially assess the development options; and
- consider specific opportunities such as phased development, capex vs opex trade-offs, potentially recycled field hardware available for re-deployment etc.

ICON executed the work in Australia with support of its Specialist Matter Experts (SME) resources in Europe, Asia, USA and Brazil.

Selected examples of options and sub-options assessed included:

- wells - dry vs wet trees, number of wells;
- drilling mode - jackup vs platform rig vs floater vs tender assist;
- artificial lift - number of ESPs, means of workover;
- power generation - associated gas vs import gas vs crude;
- production facility - FPSO vs platform v other; and
- oil storage and export - FPSO vs FSO vs tie-in to third party.

At the conclusion of the feasibility and concept stage, a preferred development concept (Base Case) was selected. In addition, selected sub-options were recognised as potentially adding value to the Base Case development scheme.

#### Pre-FEED Engineering

Following on immediately after the conclusion of the Feasibility and Concept Select Stage, ICON commenced the Pre-FEED phase.

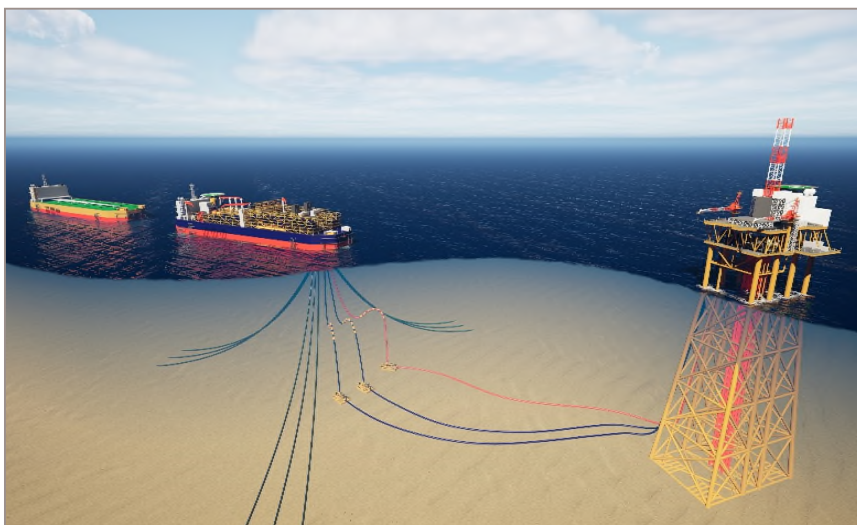
The purpose of the Pre-FEED Engineering was to further assess the Base Case scheme and sub-options, such that a defined development scheme could be selected. This one development scheme would then enter the project FEED phase.

This Pre-FEED workscope was included the following activities:

- preliminary process design and equipment sizing,
- further definition of the fixed platform, and further assessment of MOPU-type platforms,
- FPSO mooring studies - spread vs fixed, and
- condition assessment and adequacy checks of existing hardware (e.g. FPSO, FSO, MOPU)

ICON again executed the work in Australia with support of its SME resources in Europe, Asia, USA and Brazil. In addition field surveys were required to assess specific existing hardware.

As a result of the above Pre-FEED Engineering work a defined concept was agreed by the Operator. The concept comprised a fixed platform with dry trees, tied-back to a turret-moored FPSO. This selected development scheme significantly improved the project economics and also resulted in an improved technical risk profile over the field life.



The existing FPSO-led field development concept was revised in favour of a Normally-Manned Installation to FSO design.