

Carbon Dioxide Removal from Natural Gas, Southern North Sea

Natural Gas Processing

Customer: Tullow Oil UK

Services Provided

- Design study

Benefits to Customer

- A series of cost effective options were identified for the process topsides.
- All technologies compared against consistent criteria with sensitivity and 'step-out' studies.
- Evaluation based on well-proven and robust technologies.

Background

Carboniferous natural gas reservoirs in the southern part of the UK North Sea can contain appreciable amounts of carbon dioxide and nitrogen which need to be removed to meet natural gas calorific value / Wobbe No. specifications. Normally gas is passed to shore for processing and removal of contaminants due to high cost of offshore processing. However, for very high CO₂ content, the transportation pipeline to shore is excessive and there is a case for evaluating the relative cost of offshore CO₂ removal to the additional pipeline cost to carry CO₂ rich gas.

Project Description

- Costain was awarded a feasibility study to identify the most cost effective approach for removal of carbon dioxide from natural gas containing almost 50% CO₂.
- A number of process technologies were evaluated with particular focus on semi-permeable membranes, amine solvents, physical solvents and hybrid schemes using a combination of technologies. A range of feed gas pressures and flowrates were evaluated. The design basis assumed carbon dioxide would be stored (sequestered) in an existing depleted oil field.
- Costain identified the capital cost, operating cost, space, weight and utilities requirement for each technology / process option and assessed the plant operability, reliability and ease of installation. The significance of hydrocarbon recovery and export gas CO₂ content on the capital and operating cost and the utilities consumption of the semi-permeable membrane option was assessed by sensitivity study.
- Overall project assessment included platform and pipeline costs in addition to topsides identified by this study.