Peterhead CCS Project

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Table of Contents

Table of Figures

List of Tables

Executive Summary

The purpose of this document is to provide key information on fixed price / lump sum and (if appropriate) reimbursable mechanisms for each significant sub-contract or supply contract applicable to the Project execution phase.

The approach to the reimbursement mechanisms in the Supply Chain was found to be in line with the contracting execution models used as standard within the industry and in Shell's business as usual approach.

There were no unique characteristics of the PCCS project that required a wholesale re-think on how Shell should contract with the supply chain.

Her Majesty's Government (HMG) Autumn Statement and Statement to Markets on 25 November 2015 regarding the Carbon Capture and Storage Competition confirmed that the £1 billion ring-fenced capital budget for the Carbon Capture and Storage Competition was no longer available. This meant that the Competition could not proceed on the basis previously set out. In accordance with the agreements with DECC, the Peterhead FEED was completed as planned in December 2015. The Government and Shell are committed to sharing the knowledge from UK CCS projects, and this Key Knowledge Deliverable represents the evolution and achievement of learning throughout the Peterhead FEED and Shell's intentions for the detailed design, construction and operating phases of the project at the time of HMG's Statement to Markets. Specifically for this deliverable the information reflects the negotiations with the Engineering, Procurement and Construction (EPC) Contractors, SSE and Cansolv, and not executed Agreements.

1. Introduction

1.1. Project Introduction

The Peterhead Carbon Capture and Storage (CCS) Project aims to capture around one million tonnes of CO_2 per annum, over a period of up to 15 years, from an existing Combined Cycle Gas Turbine (CCGT) located at SSE's Peterhead Power Station in Aberdeenshire, Scotland. This would be the world's first commercial-scale demonstration of post combustion CO_2 capture, transport and offshore geological storage from a gas-fired power station.

As the Goldeneye gas-condensate field has ceased production, the production facility will be modified to allow the injection of dense phase CO_2 captured from the post-combustion gases of Peterhead Power Station into the depleted Goldeneye reservoir.

The CO_2 will be captured from the flue gas produced by one of the gas turbines at Peterhead Power Station (GT13) using amine-based technology provided by Cansolv (a wholly-owned subsidiary of Shell). After capture the CO_2 will be routed to a compression facility, where it will be compressed, cooled and conditioned for water and oxygen removal to meet suitable transportation and storage specifications. The resulting dense phase CO_2 stream will be transported direct offshore to the wellhead platform via a new offshore pipeline which will tie in subsea to the existing Goldeneye pipeline.

Once at the platform the CO_2 will be injected into the Goldeneye CO_2 Store (a depleted hydrocarbon gas reservoir), more than 2 km under the seabed of the North Sea. The project layout is depicted in Figure 1-1 below:

Figure 1-1: Project Location

2. Key Information on Costs Uncertainty Mechanisms in Subcontracts or Supply Contracts

The key information on fixed price/lump sum and reimbursable mechanisms for EPC and EPCI contracts applicable to the Execute phase in this Deliverable reflects the negotiations at the time of the project being cancelled. The discussions were ongoing with the supply chain in Q4 2015 and Agreements were not executed.

2.1. The Onshore Carbon Capture, Compression and Conditioning (CCCC) Plant EPC Contract

Shell encouraged the EPC Contractors to bid on a lump sum basis. However, during the early tender clarification meetings it became clear that, for certain elements, the EPC contractors were not willing to offer lump sum. The EPC pricing model selected aimed at fixing as much of the cost as possible. The Engineering and Procurement elements were Lump Sum however for elements, such as Construction and commissioning man hour rates, a reimbursable target cost mechanism basis was preferred by the EPC Contractors.

The EPC Bidders were not prepared to commit to offer a fixed price lump sum for the Construction elements of the EPC Contract and indicated their preference for a collaborative pricing execution model. They felt the lump sum approach for Construction would not address the challenges of understanding the site, the interfaces and the deployment timescales, and the approach was a significant barrier to establishing a reliable Total Installed Cost (TIC) which needed to be developed and fixed to ensure constructability strategies were reliable for execution.

In summary, the shortlisted EPC Contractors were not prepared to take the risk of a large construction job in the North East of Scotland/UK on a fixed price lump sum basis. Therefore, all engineering and procurement activities were to be executed on a fixed price lump sum basis. All construction activities on the Peterhead worksite (both for Shell and SSE) were to be executed on a target cost payment mechanism/execution model. The EPC Bidder's preference for Construction was to build a pricing execution model collaboratively over time, on a Target Cost basis.

It was anticipated that the selected onshore EPC Contractor would agree back-to-back reimbursement models with his selected Sub-contractors.

The target cost reimbursement mechanism was still being finalised when the project was cancelled.

2.2. The Peterhead Power Station Modifications EPC Contracts

SSE initially encouraged the EPC Contractors to bid the total scope on a lump sum basis. The EPC contracts were neither concluded nor progressed to a finalised position, however at the time of the project being cancelled, the discussions that was ongoing with the supply chain in respect of the respective packages were as follows.

- Powertrain – Lump Sum Fixed Price based on a NEC option A, the basis of this was broadly in line with the T&Cs issued to Shell and DECC.
- Balance of Plant – Target Cost based on a NEC Option C, with Lump Sum elements for the Engineering and Procurement of Major Items of Plant, All construction Target Cost. The Power train scope is more mature/well defined so fixed lump sums can be secured from the Supply Chain. For the Balance of Plant EPC (because of the scope definition and risks involved), only target cost prices can be secured from the market. The basis of the T&C were proposed to be broadly in line with the core clauses identified in the ITT issued.

- Demolition – Target Cost based on an NEC option C.

It was fully anticipated that the selected EPC Contractor would agree back-to-back reimbursement models with his selected Sub-contractors.

2.3. Licensor Technical Package (Cansolv) costs

There were four types of cost associated with the Licensor Technical Package (Cansolv technology): License costs, hardware costs, absorbent costs and finally costs associated with any additional service.

1) License costs

   The licensing costs were a lump sum payment payable upon the project becoming effective.

2) Hardware costs

   Critical pieces of equipment, instrumental to the capture technology were being supplied by Cansolv. These pieces of equipment were to be supplied directly to the EPC Contractor.

3) Absorbent Costs

   The Absorbent Agreement was a long term agreement (5 years) for regular deliveries of Amine. The costs were fixed for a certain period and escalated thereafter according to a pre-determined escalation formula which mirrored the product's cost structure.

4) Services

   A number of support services were required for the operation of the plant. These services, when not already included in other parts of the scope were to be reimbursed to Cansolv on an hourly basis.

2.4. Project Management Organisation (PMO) Contract

In order to have PMO resourcing flexibility, Shell intended to reimburse the Contractor against a Schedule of Rates with a monthly Fixed Management Fee.

2.5. Offshore Goldeneye Modifications EPC Contract

Given one of the main value drivers of the project was Cost Certainty, the reimbursement mechanism for the Offshore Goldeneye Modifications EPC Contract was a hybrid mixed pricing mechanism of both Fixed Lump sum (for Engineering and Procurement elements) and reimbursable (for the Construction elements).

The model selected maximised the use of lump sum pricing where appropriate. The scope cannot be fully lump sum mostly due to the logistics provision being executed by Shell. Without the logistics provision the Contractor would not have complete control of the offshore installation/construction.

The areas that were to accommodate lump sum were: Contractor Project Management, Detailed Design, Procurement, Onshore Fabrication, As-built/handover. For the Offshore installation/construction a target price incentive mechanism was to be utilised. This incentive mechanism was going to apply to the offshore execution duration, where the Contractor could obtain a penalty/premium between -5 and +15% of the Target Cost value. The Offshore Goldeneye Modifications EPC contract cost would have been approximately 70% Lump Sum.

It was fully anticipated that the selected offshore Goldeneye Modifications EPC Contractor would agree back-to-back reimbursement models with his selected Sub-contractors.

2.6. Landfall, Pipeline and Subsea EPCI Contract

An Engineering Procurement Construction Installation (EPCI) model was selected as the preferred reimbursement model for the Landfall, Pipeline and Subsea EPCI contract which included fixed lump sum costs for:

A) Procurement for execution of critical onshore/offshore project requirements.
B) EPCI Contractor procurement/fabrication for execution of all non-critical onshore/offshore requirements.
C) Placement of Horizontal Directional Drilling (HDD) /shore crossing with the EPCI Contractor for HDD, pig launcher and onshore valve facility, Installation of pipeline, Pre-commissioning and Testing activities.
D) Placement of Offshore Services with the EPCI Contractor for;
    a) Lay barge / Pipelay Vessel for Installation of 20" [508 mm] Rigid Pipeline.
    b) Survey vessel for pipeline lay support activities.
    c) Diving Support Vessel (DSV) Installation of spool pieces, umbilical, pipeline and umbilical tie-ins, hyperbaric welding and concrete mattress.
    d) Multi Service Vessel (MSV) for installation of Subsea Isolation Valve (SSIV) structure and Pig receiver.
    e) Rock dumping vessel for pipe line crossings and shore approach.

Given one of the main value drivers of the project was Cost Certainty, the reimbursement mechanism for the Landfall, Pipeline and Subsea EPCI aimed to maximise the use of lump sum pricing.

It was anticipated that the selected Landfall, Pipeline and Subsea EPCI Contractor would agree back-to-back reimbursement models with his selected Sub-contractors.

With respect to HDD (Horizontal Directional Drilling), in the event that HDD was not feasible, the cost of the alternative Open Cut solution was to be be executed on a combination of Lump sum and reimbursable basis.

2.7. Jack-Up Rig Contract and other Well Engineering Contracts

The Jack-Up Rig contract structure was to be set up as a reimbursable day rate contract. The Well Tubulars Contract was to be set up as a Fixed Price for equipment with a reimbursable services contract. The rest of the Well Engineering contracts were to be set up as Lump Sum (LS) with Reimbursable elements. Further details on Well Engineering Contracts are shown in Table 2-1.

Table 2-1: Well Engineering Contracts

Category	Lump Sum (LS) or Reimbursable
Jack-up Rig	Reimbursable Day rate
Well Eng Integrated Services Contractor	LS with reimbursable elements
Christmas Trees	LS with reimbursable elements

Category	Lump Sum (LS) or Reimbursable
Wellhead / Tubing Hanger	LS with reimbursable elements
Tubulars	Fixed price equipment with reimbursable services
Subsurface Safety Valve	LS with reimbursable elements
Packers	LS with reimbursable elements
Sand Screens	LS with reimbursable elements
Cementing	LS with reimbursable elements
Gauges	LS with reimbursable elements
EWL	LS with reimbursable elements
Slickline / Well Test / Subsea	LS with reimbursable elements
Tractors / Specialist Tooling	LS with reimbursable elements

2.8. Walk to Work Vessel and other Offshore Logistics Contracts

The reimbursement structure for the Walk to Work Vessel and other logistics Contracts was to be set up as reimbursable rates. These are detailed in Table 2-2.

Table 2-2: Walk to Work Vessel and other offshore logistics Contracts

Category	Lump Sum (LS) or Reimbursable
Walk to Work Vessel	Reimbursable (Day rate)
Walk to Work Gangway Lease and Services	Reimbursable (Day Rate)
Standby Vessel	Reimbursable
Supply Vessels	Reimbursable
Helicopters	Reimbursable (unit rate)

2.9. Seismic Contracts

All contracts (mainly existing Shell Framework Agreements) for the provision of Seismic services were to be reimbursed on a reimbursable day-rate basis based on the number of days the vessel was required due to the ad-hoc nature of the work.

2.10. Operations and Maintenance contracts

All support contracts (mainly existing Shell Framework Agreements) for the provision of operations and maintenance services were to be reimbursed on a reimbursable day-rate basis due to the ad-hoc nature of the work.

3. Conclusion

The approach to the reimbursement mechanisms in the Supply Chain was found to be in line with the contracting execution models used as standard within the industry and in Shell's business as usual approach.

The PCCS project, like all projects, had its own unique features which deserved special treatment with respect to certain contractual arrangements.

However it was recognised that there were no unique characteristics of the PCCS project that would have required a wholesale re-think on how Shell should contract with the supply chain.

4. Glossary of Terms

Term	Definition
BAU	Business As Usual
CCCC	Carbon Capture, Compression and Conditioning
CCGT	Combined Cycle Gas Turbine
CCS	Carbon Capture and Storage
CO_2	Carbon Dioxide
DECC	Department of Energy and Climate Change
DSV	Diving Support Vessel
EPC	Engineering, Procurement and Construction
EPCI	Engineering, Procurement, Construction and Installation
EWL	Electric Wire Line
FEED	Front End Engineering Design
GT	Gas Turbine
HDD	Horizontal Directional Drilling
HMG	Her Majesty's Government
LS	Lump Sum
MSV	Multi Service Vessel
PCCS	Peterhead Carbon Capture and Storage
PMO	Project Management Organisation
SSE	SSE Generation Ltd
SSIV	Subsea Isolation Valve
T&C	Terms and Conditions
TIC	Total Installed Cost
UK	United Kingdom

5. Glossary of Unit Conversions

Table 5-1: Unit Conversion Table

Function	Unit - Imperial to Metric conversion Factor
Length	1 Inch = 25.4 millimetres