



# Peterhead CCS Project

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## Executive Summary

The purpose of the document is to provide an overview of the technical scope of work to be carried out for the Peterhead Carbon Capture and Storage project during the Execute project phase and in particular describe how it is intended this work will be contracted. A brief description of the structure of the contractual arrangements between Shell, an incorporated joint venture company called Peterhead Carbon Capture Storage Limited (PCCS Ltd), and the various contracts and how they fit together is provided in Section 2 of this document to give an overview of the scope of the main Execute phase contracts.

The various contracts required to deliver the Execute phase works have been defined as either Tier 1 or Tier 2 sub-contracts. Tier 1 Sub-Contracts are sub-contracts during the Execute phase of the PCCS project which will be contracted by the developer. Tier 2 Sub-Contracts are sub-contracts that will be contracted by the Tier 1 Sub-Contractors during Execute. The scope of the Tier 2 Sub-Contracts have not been described in detail in this document since they will not be fully scoped and finalised by the Tier 1 Sub-Contractors until after they have been appointed post commencement of the Execute phase of the project.

The present focus of the Tier 1 and Tier 2 Execute contracts is delivery of the detailed design, construction and commissioning works needed for the developer to commence the Execute project phase. However, the scope of the Execute phase works also includes PCCS operations and decommissioning activities. Certain additional contractual arrangements covering these activities will be developed further during Execute prior to commencing the subsequent operations and decommissioning stages.

The structure of the supply chain arrangements for the Project is considered to lend itself to the tender of Engineer, Procure and Construct (EPC) contracts by the developer for the Execute phase as follows:

- Onshore Carbon Capture, Compression & Conditioning (CCCC) plant.
- Landfall, Pipeline and Subsea scope.
- Offshore scope (Goldeneye Platform modifications).
- Wells and Subsurface Engineering.

A separate EPC contract is also proposed for delivery of the Power Plant modification scope (Power Plant Scope) by SSE Generation, the power plant owner. A separate EPC contract for the CCCC scope and the Power Plant Scope is required as both are specialised scopes, with a very limited number of EPC contractors that are capable or willing to undertake both.

The PCCS construction site at the Peterhead Power Station site will be physically segregated from the existing Peterhead power plant operations and also the SSE power plant modification scope.

This document provides an overview of the modifications that have to be made to the various elements in the CCS chain as well as the EPC contracts and supporting contracts required to deliver the entire Execute phase of the Project.

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.



## 1. Project Introduction

The Peterhead Carbon Capture and Storage (PCCS) Project aims to capture around one million tonnes of CO<sub>2</sub> per annum, over a period of 10 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<sub>2</sub> capture, transport and offshore geological storage from a gas-fired power station.

Post cessation of production, the Goldeneye gas-condensate production facility will be modified to allow the injection of dense phase CO<sub>2</sub> captured from the post-combustion gases of Peterhead Power Station into the depleted Goldeneye reservoir.

The CO<sub>2</sub> will be captured from the flue gas produced by one of the gas turbines at Peterhead Power Station (GT-13) using amine based technology provided by Cansolv (a wholly owned subsidiary of Shell). After capture the CO<sub>2</sub> 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<sub>2</sub> 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<sub>2</sub> will be injected into the Goldeneye CO<sub>2</sub> 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. Structure of Execute Phase Contractual Arrangements

The Scope of Work for Execute Contracts outlines the activities to be undertaken in the Execute phase of the PCCS Project. As described in more detail in the Project Organisation plan (Key Knowledge Deliverable 11.062) [1], under the Project's contract strategy for Execute, an incorporated joint venture company called Peterhead Carbon Capture Storage Limited (PCCS Ltd) was incorporated with responsibility as the developer for the delivery of the Execute phase of the PCCS Project. The shareholders in PCCS Ltd would comprise Shell and other equity partners in the Project. PCCS Ltd will be the counterparty to DECC, on behalf of the UK government, to the Project Contract which will set out the basis on which PCCS Ltd would deliver the Execute phase of the Project. PCCS Ltd will engage Shell U.K. Limited to manage delivery of the Project on their behalf, including the carrying out and completion of any tender process, in accordance with the Operating Services Agreement (OSA). The various contracts required to deliver the Execute phase works have been defined as either Tier 1 or Tier 2 sub-contracts as follows:

- Tier 1 Sub-Contracts are contracts that are contracted by PCCS Ltd; and
- Tier 2 Sub-Contracts are contracts which are contracted by the Tier 1 Sub-Contractors.

Although the contracting party for the Tier 1 contracts will be PCCS Ltd, the Project delivery would be managed on a day to day basis by a management team staffed by Shell employees seconded directly into PCCS and pursuant to the OSA.

During the Execute phase, there is also a power plant related scope of work which will be delivered and/or managed by SSE Generation Limited and carried out under a series of Tier 2 Sub-Contracts which will be contracted by SSE.

Further technical information regarding the project's technical scope and requirements can be found in the Basic Design and Engineering Package (Key Knowledge Deliverable 11.003) [2] and the Basis of Design (Key Knowledge Deliverable 11.001) [3].

## 3. Project Execution Model

### 3.1. Execute Delivery Overview

The Project Contract for the Execute phase of the Project will be signed between DECC and PCCS Ltd. PCCS Ltd will in turn sign a number of key sub-contracts as follows:

- **Shell U.K. Limited (SUKL):** OSA (Project delivery contract)
- **SSE:** Power Plant Modification and Operations Contracts
- **Cansolv Technologies Inc.:** Carbon Capture Technology Licence Agreement
- **Crown Estates Commissioners:** Lease for storage complex and pipeline easement/licence

SUKL will tender to PCCS Ltd for a number of Execute Tier 1 sub-contracts. Proposed Execute Tier 1 and Tier 2 Sub-Contracts are shown in Figure 3-1, with Tier 1 Sub-Contracts shown in orange, and Tier 2 Sub-Contracts in blue.

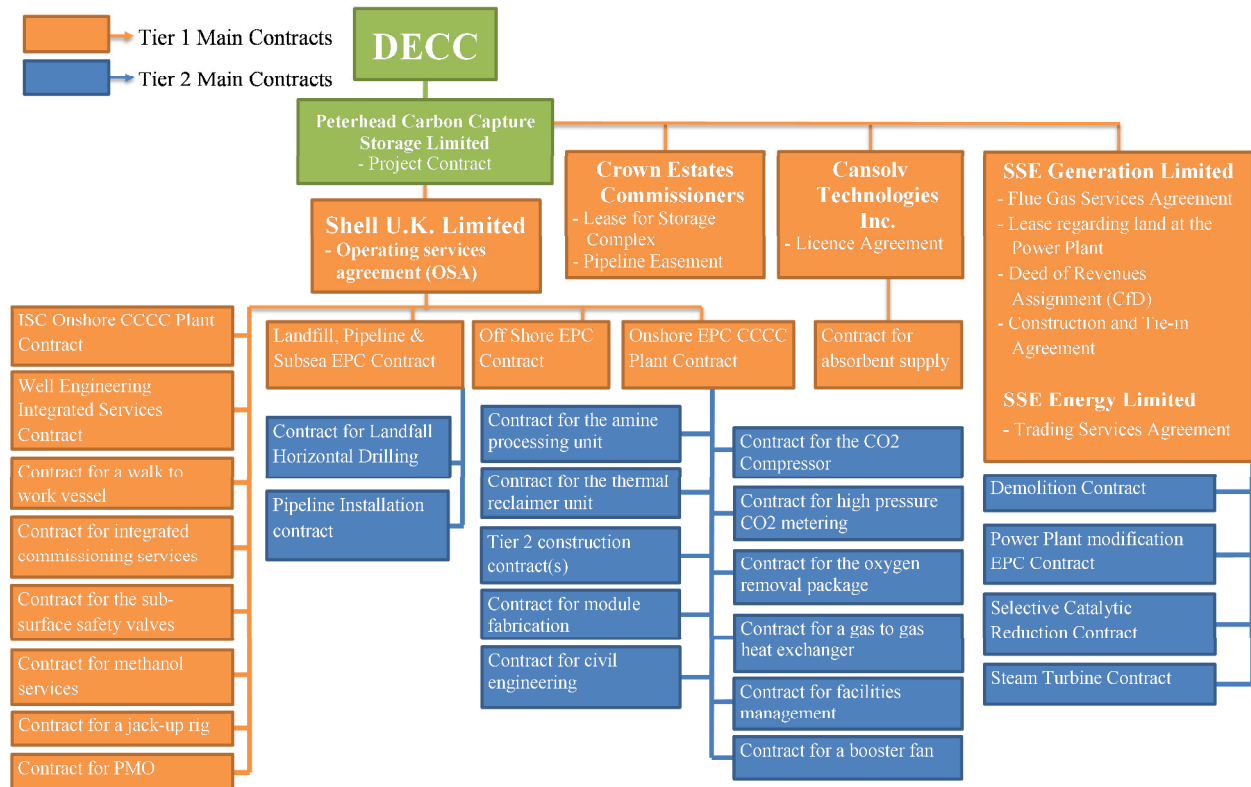


Figure 3-1: Arrangement of Project Sub-Contracts for the Execute Phase

### 3.2. Main EPC Contracts

Various contracting models were considered for implementation during FEED including a Build-Own-Operate (BOO) model. However, there was insufficient interest generated from the market for the BOO contracting strategy to be selected in preference to the more common EPC approach. Therefore, during FEED the preferred contracting strategy selected for the Execute phase was to develop the construction and commissioning scopes under five separate work packages. These major construction scopes would be managed under EPC contracts with the overall project management and full CCS chain oversight provided by PCCS. Each of the separate scope elements will be implemented by the chosen EPC Contractor. The scope breakdown for each EPC contract is discussed further in Section 4 - End-to-End CCS Chain Link EPC Contracts.

As detailed immediately above, competitive tender for an Engineer, Procure and Construct (EPC) contracting model has been selected as the preferred execution model with fixed lump sums being tendered by the developer or selected EPC Contractors for the procurement of critical onshore/offshore project requirements. Each of the EPC Contracts will be managed by a Shell Implementation Manager in accordance with the OSA. The scope of each EPC contract includes provision of project management, detailed engineering, procurement and fabrication elements. Reimbursement is generally proposed on a target cost basis, with a gain share / pain share incentive mechanism taking into account execution efficiency and timely completion with construction and pre-commissioning activities reimbursable on a target cost basis. Further details of the Execute Tier 1 and Tier 2 sub-contracts including the proposed reimbursement basis for each sub-contract can be found in the Project Phase Supply Chain Structure report (Key Knowledge Deliverable 11.146) [4].

PCCS Ltd will tender of EPC contracts for the Execute phase as follows:

- Onshore Carbon Capture, Compression & Conditioning (CCCC) plant.
- Landfall, Pipeline and Subsea scope.
- Offshore scope (Goldeneye Platform modifications).





- Wells and Subsurface Engineering.

SSE will tender for EPC contracts for the Execute phase for delivery of the Power Plant modification scope.

## 4. End-to-End CCS Chain Link EPC Contracts

The construction related aspects of the Project have been divided in six separate scope elements that are interrelated via a variety of technical and organisational interfaces as shown in Figure 4-1.

The six construction related scopes are:

1. **Power Plant Modifications:** Upgrades to the existing Peterhead Power Station, required to deliver for the PCCS project scope;
2. **Onshore CCCC Plant:** Carbon Capture Conditioning and Compression (CCCC) plant located within the Peterhead power station plot boundaries;
3. **Landfall, Pipeline and Subsea:** Landfall, new offshore pipeline to connect the CCCC plant to the existing Goldeneye pipeline and new Sub Sea Isolation Valve (SSIV) close to the Goldeneye platform;
4. **Goldeneye Platform Modifications:** Goldeneye platform modifications to allow for a change of service from hydrocarbon production to CO<sub>2</sub> injection;
5. **Wells Engineering:** A wells work over program to allow for a change of service from hydrocarbon production to CO<sub>2</sub> injection.
6. **St Fergus Modifications:** Modification of existing glycol facilities at St Fergus to allow for provision of methanol to the Goldeneye platform via the existing 4-inch (100mm) pipeline. Methanol is required for CO<sub>2</sub> injection for well start-ups.

For each construction Contract, the Tier 1 Sub-Contractor shall take complete responsibility for project management, design, co-ordination and general management of the works in accordance with good industry practice. The Tier 1 Sub-Contractor's responsibility for Contract Management includes inter-alia co-ordination and management of design, manufacture, delivery, procurement, supply, installation, erection, commissioning and testing as agreed with the developer, defect maintenance of the Plant, cost control and reporting of progress at monthly intervals.

The scope of the Onshore CCCC plant, Landfall Pipeline and Subsea and Goldeneye Platform Modifications is described in more detail immediately below. Further information on the scope of the contract for the Power Plant modifications work is provided in Section 5. Further information on the St Fergus Modifications and Wells Engineering works is provided in Section 6.

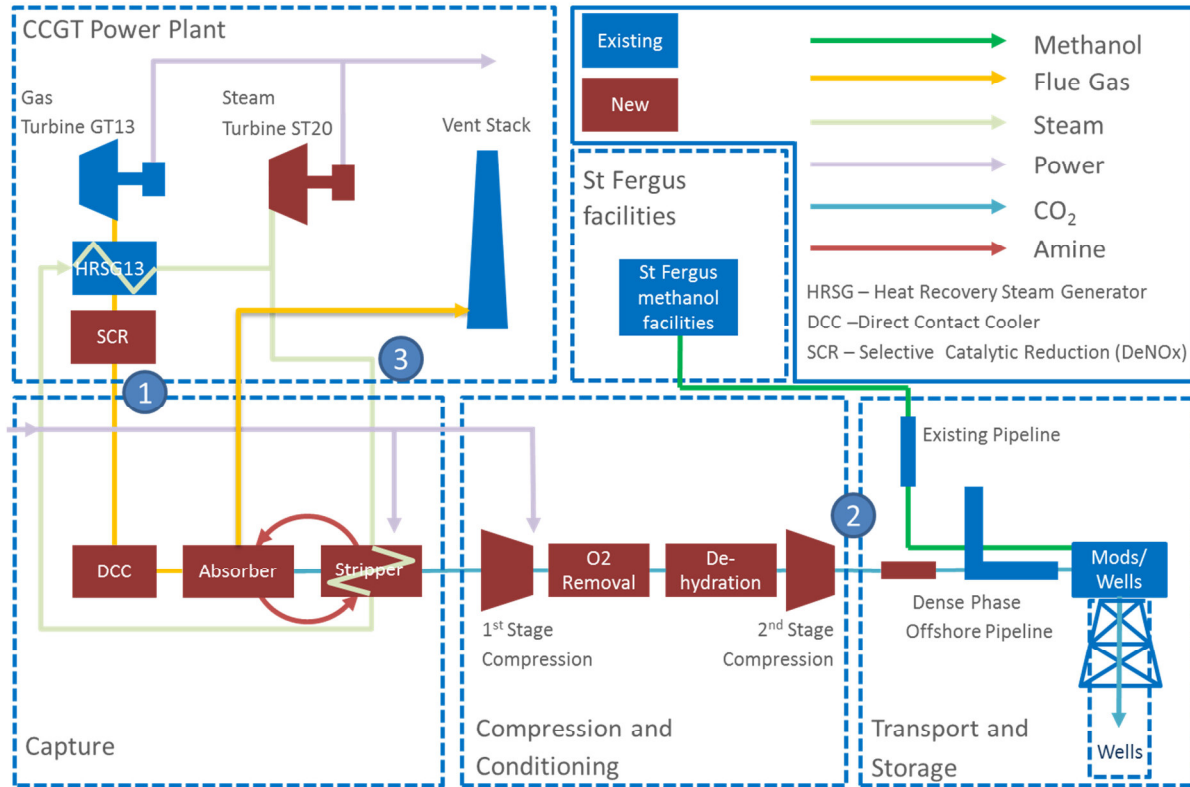


Figure 4-1: PCCS Full Chain Schematic

### 4.1. Onshore EPC CCCC Plant Contract

The Project intends to capture the CO<sub>2</sub> from the flue gas of one of the existing three gas turbines at the Peterhead Power Station.

The proposed design for the CO<sub>2</sub> capture plant comprises a direct contact cooler, a single very large absorber column, a smaller regeneration tower and associated pumps and heat exchangers, a schematic of the process can be seen in Figure 4-2. The Carbon Capture Plant (CCP) will use LP steam from the new ST20 turbine for amine regeneration. New auxiliary boilers are also required which provide MP steam to the CCP Thermal Reclaimer Units (TRUs).

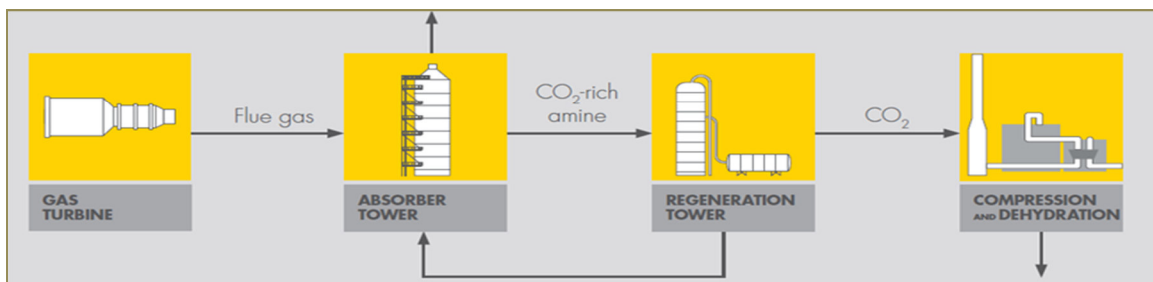


Figure 4-2: Schematic of the new Carbon Capture, Conditioning and Compression plant

Prior to commencing FEED, selection of the preferred CO<sub>2</sub> capture technology provider was undertaken following a competitive bid process. Cansolv Technologies Inc. (a subsidiary of Shell) was one of the six vendors invited to bid, and was subsequently chosen by Shell and SSE as the preferred technology provider for the required post-combustion carbon capture process. All subsequent work



has been based on Cansolv's CO<sub>2</sub> capture process shown as Tier 2 in the Contract organisation diagram.

The Onshore EPC CCCC Plant Tier 1 Sub-Contract includes the supplying and installing or the procurement of the supplying and installing of the following key equipment:

- Flue gas booster fans.
- Direct contact cooler column.
- CO<sub>2</sub> absorber column.
- Rich/lean amine heat exchangers.
- CO<sub>2</sub> stripper (regeneration tower).
- Including, but not limited to, CO<sub>2</sub> stripper reboilers.
- CO<sub>2</sub> compressor.
- CO<sub>2</sub> dehydration equipment.
- Oxygen removal reactor.
- Ion exchange package.
- Thermal reclaimer unit.
- Fresh solvent make up pumps.
- Steam system.
- Sea water cooling system.
- Closed loop cooling system.
- New onshore pig launcher facility.
- New approximately 900m onshore pipeline to the landfall.
- Waste water treatment plant.
- Electrical equipment as necessary for the Capture and Compression Plant and associated GB Transmission System connection.
- Integrated Control and Safeguarding System (ICSS) as necessary for the operation and control of the CCS Infrastructure.
- Tankage to meet the declared Capture and Compression Plant availability.

## 4.2. Landfall, Pipeline and Subsea EPC Contract

The onshore pipeline section from and including the onshore pig trap to the start of the Horizontal Directional Drilling (HDD) (or open cut) landfall will be within the Onshore EPC contractor's scope as detailed in Section 4.1 above.

The landfall, new 20-inch (508mm) subsea pipeline including tie-ins and the Sub Sea Isolation Valve will be tendered as a separate Landfall, Pipeline and Subsea EPC contract on a lump sum basis. All linepipe and hot bends will be procured by PCCS Ltd via existing Shell Enterprise Frame Agreements and will be free-issued to the Onshore and Landfall, Pipeline and Subsea EPC contractors.

The Landfall, Pipeline and Subsea scope comprises the pipeline system required to transport CO<sub>2</sub> from the Carbon Capture, Compression and Conditioning Plant to the Goldeneye platform and includes carrying out and/or the procurement of the carrying out of the following key works:

- New approximately 22 km 20-inch carbon steel CO<sub>2</sub> export pipeline from the Capture and Compression Plant to a subsea tie-in point with the existing 20-inch Goldeneye pipeline.
- New CO<sub>2</sub> export pipeline flanged subsea tie-in arrangement between the new and the existing pipeline.
- Re-use of the existing 20-inch pipeline as a CO<sub>2</sub> export pipeline from the subsea tie-in point to the Goldeneye platform.



- Replacement of the existing Sub Sea Isolation Valve (SSIV) manifold by a new SSIV manifold including replacement of a number of tie-in spools and the installation of a new control umbilical and a new Topside Umbilical Termination Unit (TUTU).
- Re-use of existing riser tie-in spools.
- Re-use of the existing 20-inch platform riser.

### 4.3. Offshore Goldeneye Modifications EPC Contract

The Goldeneye platform modification scope will be carried out by an EPC contractor under the Offshore EPC scope. A key principle of the contract is maximising pre-fabrication and minimising offshore exposure.

The Offshore Goldeneye Modifications EPC Contract includes carrying out or procurement for delivery of the required modifications to the Goldeneye Platform topsides to change it from a hydrocarbon production facility to a CO<sub>2</sub> reception and injection facility. The modifications are designed to enable the permanent storage of the captured CO<sub>2</sub> in the depleted Goldeneye reservoir and includes the following offshore scope:

- Destruction of existing pipework and equipment on the Goldeneye platform to create space for the new design.
- Installation of new CO<sub>2</sub> and methanol filters (2 x 100%).
- Installation of new pipework including a CO<sub>2</sub> injection manifold.
- Installation of new instrumentation and monitoring equipment including CO<sub>2</sub> gas detectors.
- Upgrade of the platform Integrated Control and Safeguarding System (ICSS).

Offshore accommodation for the construction workforce will be provided by a Walk-to-Work (W2W) vessel which Shell will provide the EPC contractor.

## 5. Power Plant Modifications

The Power Plant Modifications EPC Contract scope for the PCCS Execute phase will be contracted as a Tier 2 Sub-Contract by SSE Generation Limited. Unlike other Tier 2 contracts the scope of work for the power plant has already largely been defined since it was necessary to scope out the work in detail to define the relative scopes and interfaces between the power plant modification scope and the CCCC plant scope.

1. The scope of the Power Plant Modification contract which SSE is responsible for delivering includes the provision of generation facilities which are critical for successful operation of the CO<sub>2</sub> capture plant and its associated compression and conditioning plant. This includes the following; Provision of exhaust gas from Gas Turbine GT13 including a new Selective Catalytic Reduction system to be retrofitted to HRSG13 in order to reduce NO<sub>x</sub> content to within limits required by the capture plant's process specification.
2. A new steam turbine ST20 for the generation of 'clean' electrical power and the provision of low pressure steam to the capture plant (and associated receipt of clean condensate).
3. Modifications of steam & water systems associated with HRSG13 and Unit 2 in order to allow operation of GT13 / HRSG13 / ST20 ('Block 2') in conjunction with the capture and compression plant, and independently from the remainder of 'Block 1'.
4. Provision of cooling water supply to the capture plant (and associated receipt of clean cooling water return for discharge from the existing CW outfall).





5. Receipt of treated waste water from the CCCC plant's Waste Water Treatment Plant (WWTP), suitable for discharge via the existing station outfall.
6. Provision of agreed minor services (fire water / demineralised water).

Arrangements for the Power Plant Modifications contract were not fully finalised. When the HMG statement was released in November 2015, contract negotiations with the supply chain were still ongoing. The option of splitting the scope into separate Powertrain and Balance of Plant contracts was under consideration in parallel with the option to place a single Power Plant Modifications contract.

Demolition of all buildings & systems, and modifications of existing services, necessary to permit construction of the project will be the subject of a separate SSE Tier 2 Sub-Contract.

The current Peterhead Power Station site layout is shown in 5-1. The power generation modifications will take place within the existing plant buildings. The Carbon Capture Plant will be located adjacent to the main power station building. The Compression and Conditioning plant will be located in the cleared area which previously contained the fuel oil tank farm.

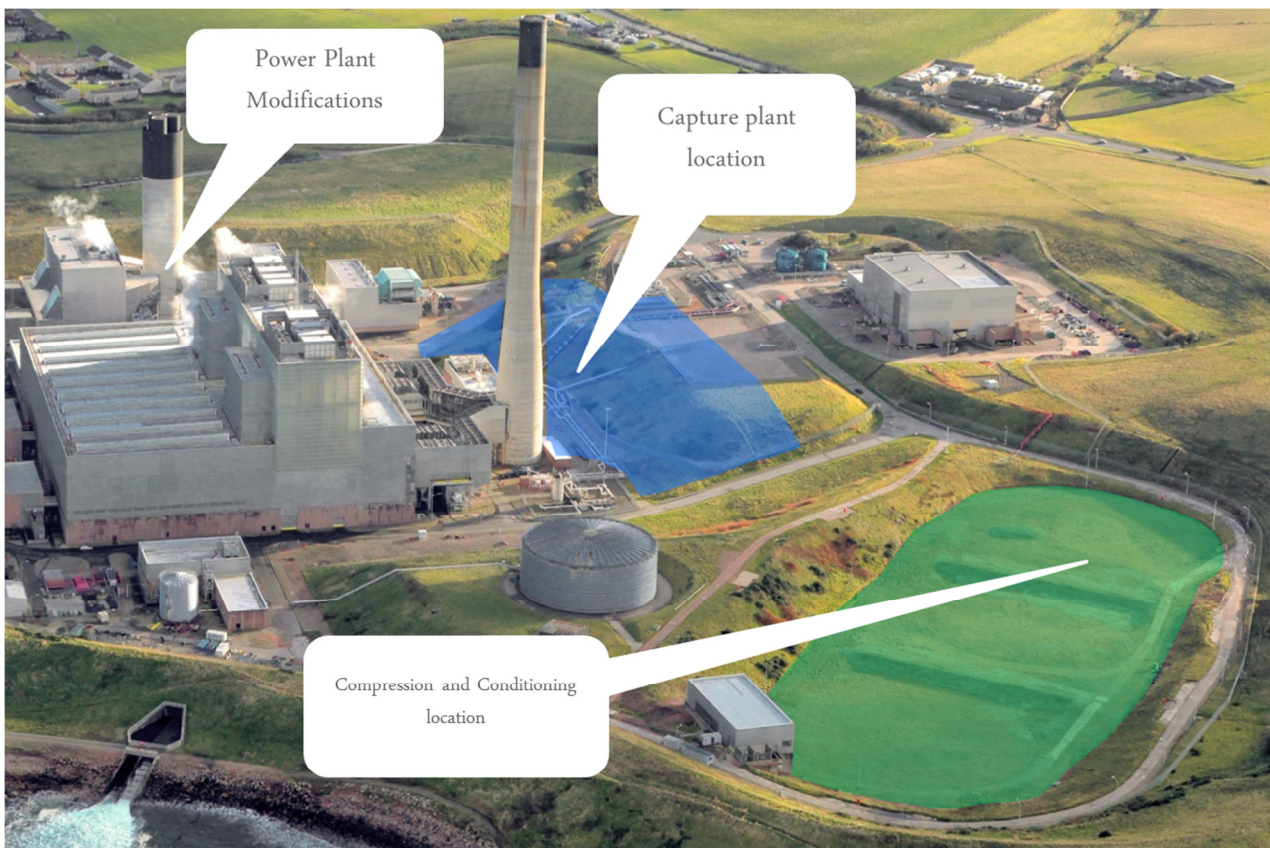


Figure 5-1: Peterhead Power Station



## 6. Shell Service Contracts – Construction Phase

### 6.1. Shell Project Management Team

Under the terms of the OSA, Shell will provide a Project Management Team responsible for delivery of the Execute phase of the Project. The Project will be led by a Shell Project Manager supported by a full time, dedicated Project Management team. The Project Manager will have 20 years’ experience in capital project execution. The other equity owners in PCCS will have designated roles within PCCS and will provide secondees within the delivery organisation

The Project Manager reports to Shell’s General Manager of Operated Projects in UK & Ireland and has specific responsibility being the delivery of the PCCS asset ready for commercial production.

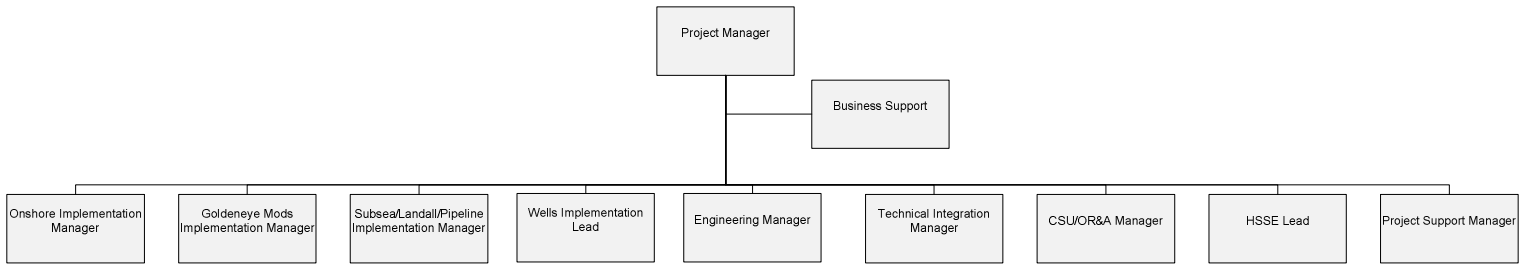


Figure 6-1: Project Management Organisation

### 6.2. Project Management Office Contract

Following the successful FEED delivery model, PCCS Ltd has decided to contract for Project Management Office (PMO) services for the provision of Project Management Office and Technical Assurance Services for the Execute Phase of the project through to completion. The PMO will provide necessary office support services, management, administration, quality assurance, safety, project services, project reporting, information management, risk and interface management, supervision and personnel that may be necessary to manage and control the execution of their works.

The PMO will operate in support of the Project Team and provide the Technical Authority Assurance required for the Onshore CCCC Plant, reviewing Execute Deliverables and their Integration / Interfacing across the full chain PCCS scope. The PMO will be responsible for and meeting DECC reporting and monitoring requirements based around monthly reviews and quarterly gateway reviews. The PMO will also be responsible for supporting Shell’s Knowledge Transfer and Management, and interface processes with DECC. The PMO may also be used to provide personnel as required to support and integrate into the Project Management Team.

### 6.3. Methanol Services Contract

Modifications are required to the existing Shell-Esso Gas and Liquids (SEGAL) system terminal at St Fergus for the PCCS project. Methanol will be injected into the CO<sub>2</sub> injection wells during well start-up. Methanol is required to prevent hydrate formation and subsequent damage to the reservoir rock upon contact between the injected CO<sub>2</sub> and the reservoir water within the depleted Goldeneye reservoir. Methanol will be provided to the platform from St Fergus, utilising the existing 4-inch glycol pipeline between St Fergus and Goldeneye. At St Fergus, the existing Goldeneye glycol processing facilities will be converted for methanol service.

The St Fergus methanol scope will be implemented by the SEGAL asset owners under their responsibility under a Construction and Tie-in Agreement (CTA). The costs of the methanol scope upgrade at St Fergus will be carried out on a reimbursable basis. The St Fergus works for the required PCCS scope will either be undertaken by the St Fergus operator for the St Fergus Owners



under the existing framework contract with the on-site Integrated Services Contractor (ISC) or could alternatively be allocated to a different contractor. As the required scope of work is relatively minor, it can potentially be implemented using existing working practices and resources. If required the SEGAL organisation can access additional project execution capability from Shell. The Peterhead CCS Offshore Implementation Manager will be responsible for the interfaces with other parts of the project.

The contract scope includes for the following activities to support the PCCS project requirements:

- Converting existing 200 m<sup>3</sup> storage tank to methanol service (including inspection and design life extension).
- Converting of existing glycol export pumps to methanol service (including replacing of seals, maintenance overhaul inspection).
- Converting glycol tanker offloading station into methanol tanker offloading station.
- Modification of interconnecting piping and installation of ESD valve.
- Technical safety scope.
- Control and Automation scope.

#### **6.4. Wells Engineering Works**

As part of the OSA, Shell Project Management shall also provide the engineering design and implementation lead services for the recompletion of the wells. This includes developing the detail design of the scope of work to be carried out on the four wells which will be recompleted as CO<sub>2</sub> injection wells. Procurement of the materials required for the wells completion and the engagement and management of suitable drilling contractors to carry out the recompletion scope of work will also be carried out under the OSA.

Offshore services and logistics required for the work to be carried out will be provided using existing Shell agreements.

#### **6.5. Walk-to-Work Vessel**

Offshore accommodation for the construction workforce will be provided by a Walk-to-Work (W2W) vessel that is fitted with a heave compensated access ramp. A W2W vessel was found to be the most (cost) effective solution for PCCS during FEED, as a flotel would be too large for the scope and the platform itself has limited bed space and life-boat capacity that would be impractical to increase.

The offshore logistics for the construction phase will be provided by Shell using existing logistics contracts and frame agreements and will be provided free of charge to the contractors.

#### **6.6. SSIV and Linepipe**

The landfall, the new 20-inch pipeline including tie-in and the Sub Sea Isolation Valve will be tendered as a separate EPC contract on a lump sum basis. All line pipe and hot bends will be procured by PCCS Ltd utilising Shell existing Enterprise Frame Agreements and will be free-issued to the contractors.



### 6.7. Integrated Commissioning Services and Contracts

Due to the integrated nature of the project, the project will appoint a Commissioning & Start-Up Manager (CSU) responsible for commissioning and coordination of individual contract works as well as coordinating interface activities between SSE and PCCS Ltd. The CSU manager is responsible for Commissioning integration, the preparation of the facilities for initial start-up as well as coordinating the Project to Asset Transfer.

Interfaces between SSE and PCCS Ltd will be defined under the CTA between the parties and certain identified support procedures developed and implemented to manage interface activities. Similarly the Shell interfaces, i.e. between the CCCC plant (Onshore Greenfield), St Fergus and pipelines team and the Offshore team including the Goldeneye platform works will be managed through a robust commissioning and start-up plan. The integrated organization structure to achieve this is shown in Figure 6-2 below with the contractual arrangement for delivery of the commissioning activities for the individual chain elements covered above.

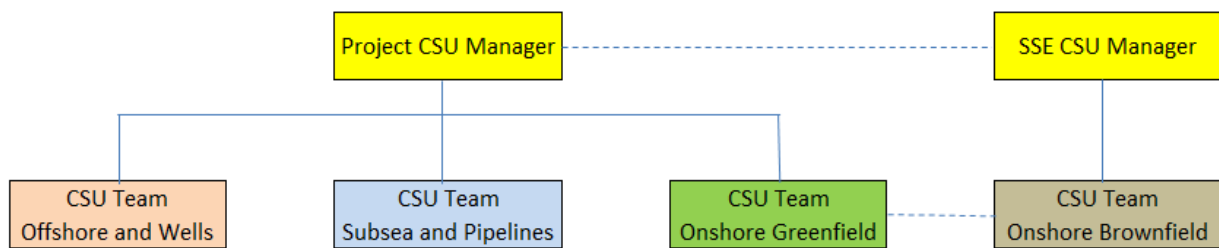


Figure 6-2: Integrated organisation structure

## 7. Service Contracts – Operations Phase

### 7.1. ISC Onshore CCCC Contract

It is anticipated that Shell as the services provider under the OSA for PCCS will operate and maintain the Carbon Capture, Compression & Conditioning Plant under an ISC Onshore CCC Contract. Management of the full chain CCS operations will be undertaken from a control building located within the CCCC plant plot area at Peterhead Power Station site.

During the operations phase a command & control management plan will be developed under an agreed collaboration between Shell and SSE which will more fully define requirements. The site emergency response management plan will define required interfaces and roles and responsibilities during any emergency event. SSE, as the site owner, will take the leading role in developing this plan.

Goldeneye and pipeline operations will be fully remotely controlled from the PCCS control room via the integrated control and safeguarding system. Communication to the Goldeneye offshore platform will be via secure satellite/line of sight transmission.

### 7.2. Pipeline Operations

The pipeline shall be operated and maintained by Shell under the OSA. Operation and monitoring shall be from the CCS control room located at the Capture and Compression Plant.

The methanol facility at St. Fergus will continue to be operated and maintained by the SEGAL operator based at St Fergus. The PCCS control room, located within the CCCC plant plot area at Peterhead Power Station site, will have visibility of, and the capability to trip the methanol system at St Fergus. In practice, the process will be controlled locally to St Fergus as requested by CCS control room via telecommunications.





### **7.3. Well Engineering Integrated Services**

Well management and CO<sub>2</sub> injection control will be automated through the integrated Goldeneye/CCS ICSS system, and will be normally controlled and monitored from the PCCS control room located within the CCCC area within the Peterhead Power Station site.

The Goldeneye platform is classified as a Normally Unattended Installation (NUI). It will be operated following good industry practice for a NUI facility where operational visits are minimized by optimizing maintenance and scheduling operational activities to coincide with mandatory / planned and ad-hoc platform visits which occur from time to time.

Overall asset management and engineering support for the Project shall be located at both Shell St. Fergus and Shell Tullos. Shell has existing maintenance policies for the Goldeneye platform which will be amended to suit the reuse of the platform and the wells for storage of CO<sub>2</sub> during the Execute phase of the PCCS Project.

## **8. Decommissioning**

After completion of the operations phase of Execute and completion of CO<sub>2</sub> injection activities, the pipeline, platform and onshore CCCC plant will be decommissioned. The wells will be plugged and sealed and topsides and jacket removed so that the reservoir can be left with the CO<sub>2</sub> stored in perpetuity.

## **9. Other Tier 1 and Tier 2 Sub-Contracts Services**

This document does not describe other underlying Tier 2 Sub-Contracts as they have not yet been finalised by the respective Tier 1 Sub-Contractors who have still to be appointed.

## **10. Conclusions**

The Tier 1 and Tier 2 Sub-Contracts presented in this document cover the delivery scope of the detailed design and construction activities required during the Execute phase of the PCCS Project. Some information is also presented on contract proposals for the subsequent operations and decommissioning activities. These will be reviewed further prior to commencement of these project stages.



## 11. References – Bibliography

1. Project Organisation incl. roles, responsibilities, resourcing and onboarding plan (Key Knowledge Deliverable 11.062)
2. Basic Design and Engineering Package (Key Knowledge Deliverable 11.003)
3. Basis of Design (Key Knowledge Deliverable 11.001)
4. Project Phase Supply Chain Structure report (Key Knowledge Deliverable 11.146)



## 12. Glossary of Terms

<b>Term</b>	<b>Definition</b>
BDEP	Basic Design and Engineering Package (sometimes also called FEED package, together with contract instructions and procedures this equals the legacy EP Project Specification, post DG3)
BOO	Build-Own-Operate
CCCC	Carbon Capture, Conditioning and Compression
CCGT	Combined Cycle Gas Turbine
CCP	Carbon Capture Plant
CCS	Carbon Capture and Sequestration
CO <sub>2</sub>	Carbon Dioxide
CSU	Commissioning and Start-up
CTA	Construction & Tie-in Agreement
CW	Cooling Water
DECC	Department of the Energy and Climate Change
EPC	Engineer, Procure and Construct
ESD	Emergency Shut-down
FEED	Front End Engineering Design
GT	Gas Turbine
HDD	Horizontal Directional Drilling
HMG	Her Majesty's Government
HRSG	Heat Recovery Steam Generator
ICSS	Integrated Control and Safeguarding System
ISC	Integrated Service Contract
LP	Low Pressure
NUI	Normally Unmanned Installation
OSA	Operating Services Agreement
PCCS	Peterhead Carbon Capture & Storage
PMO	Project Management Office
SSIV	Subsea Isolation Valve
ST	Steam Generator
SUKL	Shell UK Limited
TRU	Thermal Reclaimer Units
TUTU	Topside Umbilical Termination Unit
UK	United Kingdom
W2W	Walk-to-Work
WWTP	Waste Water Treatment Plant