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# EARLS GATE ENERGY CENTRE LIMITED

## REPLACEMENT CHP PLANT

## NON-TECHNICAL SUMMARY



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| 4 | | | | |
| 5 | | | | |
| 6 | | | | |
| 7 | | | | |

# TABLE OF CONTENTS

# 1 INTRODUCTION

Earls Gate Energy Centre Ltd (herein referred to as Earls Gate) are proposing to build a renewable energy plant (the Facility) to provide heat and electricity for the existing CalaChem facility and adjacent industrial uses in Earls Gate Park, Grangemouth.

The Facility will be fuelled by Refuse Derived Fuel[1] (RDF), and is intended to replace the existing gas fired energy plant which is operated by CalaChem Limited (hereafter referred to as 'CalaChem') which supplies heat and electricity to the CalaChem site and other heat users on the Earls Gate Park; power not required by Calachem will be exported to the National Grid.

To ensure that the heat demand required by the CalaChem site is always available, the Facility will include up to 50MWth steam output gas fired boilers which will be used satisfy the heat demand during periods of outage and to pick up spikes outside the CHP plant's design capacity.

## 1.1 The Application

Earls Gate is a Special Purpose Vehicle which has been set up for the development, build and operation of the Facility.

Earls Gate is a 100% subsidiary of Hargreaves Services plc however it is the intention of the applicant to divest 50% of the equity in the SPV on financial close to a sector specialist investor. The Directors of Earls Gate are:

- Iain Cockburn;
- Paul Newman; and
- Neil Young.

Earls Gate will subcontract the operation of the Facility to an Operations and Maintenance (O&M) sub-contractor who will be responsible for the day-to-day operation of the Facility. However, Earls Gate will retain overall control and ownership of the facility.

## 1.2 The Site

The Facility is located in Grangemouth, within the administrative region of Falkirk Council, Scotland. The development site location is shown in the Site Location Plan (Drawing: 2070-004), presented in Annex 1.

The Earls Gate Park occupies an area of 12.3ha to the south and west of the CalaChem site, approximately 1.4km to the west of Grangemouth. The site comprises approximately 2.7ha on the south and west of the existing CalaChem manufacturing facility.

The land which the Facility will be located on is 'brownfield' and was used previously as part of the wider chemicals manufacturing activities, but is currently disused. To the north, the site is bound by the existing CalaChem facility, with the A904 Earls Road located further beyond. A railway line bounds the site to the south, with residential housing and the Juniper Wildlife Centre beyond. To the east, the site is bound by unoccupied land and to the west the site is bound by Earls Gate Park. The site is accessed via Earls Road to the north. Trees and scrub along the northern railway boundary and dense woodland plantation to the south provide strong visual enclosure to the southern site margin.



[1] RDF as defined in the planning application 'will comprise treated municipal and commercial waste, generally considered to have minimum 50% biogenic content and potentially up to 70%.'

Both the A905 road and M9 motorway rise on embankment, crossing the Grangemouth Railway on bridges. The M9 motorway continues on embankment to the north-west of the site, with bridges across the Earls Gate Roundabout. Associated steep embankments support dense woodland plantation that continue along the A905 Beancross Road to Earls Gate Roundabout. The combination of embankment and woodland plantation strongly defines the western margins of Earls Road Industrial Estate, physically and visually segregating it from industrial zones to the west of the motorway.

The approximate centre of the Facility is at British National Grid reference 291830, 681210.

In a wider context, the REP site is approximately 6km to the south-east of the Kincardine on Forth Bridge and approximately 20km to the west of the Forth Road Bridge. The nearest main airport is Edinburgh (Turnhouse), some 24km to the south east. The Bo'ness and Kinneil railway line comes in from Birkhill to the south and veers east, running largely parallel to the A904 and terminates at Bo'ness Station.

Landcover and uses are mixed in this urban fringe landscape and includes Helix Park, the primary recreational facility within the study area. To the north of the park, Kelpies Hub includes a new extension of the Forth & Clyde Canal and the regionally important landmark sculpture, 'The Kelpies', visible across a wide area including higher ground in the south to flatter open landscape areas in the north.

The area to the north of the River Carron is sparsely populated comprising of flat and extensive farmland combining with the expansive tidal mudflats and widening River Forth to the east. Longannet Power Station and its associated stack is a significant feature in views across the landscape to the north-west.

Storage tanks, chimneys and buildings at Grangemouth oil refinery and adjoining industrial areas are prominent in the south.

The nearest settlements to the CalaChem site are Grangemouth, which borders the Ineos Grangemouth Petrochemical Complex (to the west), Bo'ness (to the north-east) and Polmont (to the south-west), all of which are situated approximately 2 to 3km away. The nearest dwellings are approximately 0.4km from the installation boundary, to the south and south-east.



## 1.3 The Activities

The activities covered by this application include:

(1) Single line CHP plant processing RDF which is delivered to the site from off-site sources;

(2) generation of heat and power and export to the National Grid;

(3) production of inert bottom ash material that will be transferred off-site to a suitably licensed waste treatment facility for recovery/disposal; and

(4) generation of an air pollution control residue that will be transferred to a suitably licensed hazardous waste facility for disposal or recovery.

### 1.3.1 CHP plant

The CHP plant includes a single waste treatment/energy recovery line, waste reception, waste storage, water, natural gas and air supply systems, boilers, facilities for the treatment of exhaust gases, on-site facilities for treatment or storage of residues and waste water, flues, stack, devices and systems for controlling operation of the CHP plant, recording and monitoring conditions.

The waste treatment/energy recovery plant has been designed as a combined heat and power plant and will have capacity to provide heat and power to CalaChem and other industrial users on Earls Gate Park and to supply power to the National Grid. The turbine has been designed to generate up to 21.6 MWe and up to 33.3 MWth of heat. The Facility will have a parasitic load of 2.7 MWe. Therefore, the maximum export capacity of the Facility is 19.9 MWe. However, this will fluctuate depending on the heat export from the Facility.

The Facility has been designed to thermally treat RDF with a range of net calorific values (NCV's). The nominal design capacity of the thermal treatment line is approximately 27 tonnes per hour of RDF, with an average NCV of 10 MJ/kg. The plant will have an assumed availability of approximately 8,000 hours per annum. On this basis, the facility will have a nominal design capacity of approximately 216,000 tonnes per annum.

Allowing for an availability of 8,760 hours per annum at the nominal design capacity, the maximum capacity of the CHP plant is approximately 236,500 tonnes per annum.

### 1.3.2 Gas Fired Boilers

There will be up to five gas fired boilers which will supply supplementary steam to the Calachem site. Each of the boilers will have a thermal capacity of approximately 12 MWth. Therefore, the aggregated capacity of the five boilers is approximately 60 MWth.

The boilers will be maintained in hot-standby to ensure that they can provide suitable heat to the CalaChem site when required.

The boilers will be located in a boiler house in the northeast corner of the Facility.

The boilers will be used to supplement the heat supplied to the CalaChem site by the CHP plant to address peaks in the heat demand as well as a source of heat during periods of outage.

The exhaust flues from the gas fired boilers would be released from a common windshield within the main gas fired boiler building.

# 2 DETAILS OF THE PROPOSED FACILITY

## 2.1 The Process

The Facility will consist of two combustion processes:

- The CHP Pant; and
- The gas fired boilers.

### 2.1.1 The CHP plant

In outline the CHP plant process would be as follows:

(1) Pre-treated waste fuels will be delivered to the facility and unloaded into the waste bunker.

(2) Fuel will be transferred from the waste bunker into the feed hopper for the CHP plant.

(3) The CHP plant will utilise a conventional moving grate combustion system.

(4) Residues from the combustion chamber would be removed in a water bath to contain dust releases and provide a gas seal.

(5) Emissions of nitrogen oxides would be controlled by the injection of urea into the combustion chamber.

(6) Hot gases from the waste combustion would be passed through a boiler to raise steam. The steam would then be passed to a steam turbine to generate electricity for export to nearby users and the National Grid. Heat will be exported to local heat users.

(7) The combustion gases would be cleaned in a flue gas treatment plant. This would include the injection of carbon, primarily to control dioxin emissions, the injection of lime to control acid gas emissions, and the use of a fabric filter to remove dust.

(8) The cleaned exhaust gases would be released to atmosphere via two stacks of up to 79m.

### 2.1.2 The Gas Fired Boilers

The gas boilers will consist of five fire tube boilers.

The flue gases from the combustion of natural gas within the combustion chamber will pass through tubes running through a sealed container of water. The heat from the flue gases will be transferred through the walls of the tubes by thermal conduction, heating the water to produce steam.

The burners within the boilers will be of a low NOx design. NOx emissions from the boilers will be controlled through the design of the burners and the design of the combustion control systems.

## 2.2 Raw Materials and Feedstocks

The Facility will utilise a number of different chemicals and raw materials within the different waste treatment processes. The chemicals and raw materials used at the site will include, but not be limited to, the following:

(1) RDF;

(2) Natural gas;

(3) Urea;

(4) Hydrated lime;

(5) Activated carbon; and

(6) Boiler treatment chemicals.

These will be supplied to standard specifications offered by different suppliers. All chemicals will be handled in accordance with COSHH Regulations as part of the quality assurance procedures and full product data sheets will be available.

Periodic reviews of all materials used will be made in the light of new products and developments. Any significant change of material, where it may have an impact on the environment, will not be made without firstly assessing the impact and seeking approval from the EA.

Earlsgate will maintain a detailed inventory of raw materials used at the Installation and will have procedures for the regular review of developments in raw materials used within the Facility.

## 2.3 Emissions

### 2.3.1 Emissions to Air

Emissions from the thermal treatment process within the CHP plant will be released from a 79m stack. Detailed air dispersion modelling of emissions from the stack has been undertaken. This has demonstrated that the impact of emissions to air will not have a significant impact on local air quality. All emissions to air from the CHP Plant will comply with any relevant emission limits in the IED and other relevant Air Quality Guidance.

Emissions from the gas fired boilers will be released from a 33m high stack within the gas fired boiler building.

### 2.3.2 Emissions to Water

The Installation will give rise to surface water run-off from roads, vehicle parking areas, building roofs, hard-standings and hard landscaped areas. Surface water will be discharged into the CalaChem drainage systems.

Where practicable process effluents will be re-used within the process. A small quantity of effluent will require discharge. Effluents from the Facility will be discharged into the CalaChem drainage systems.

There will not be any discharges to water from the Facility.

### 2.3.3 Emissions to Sewer

There will be no discharges to sewer from the Facility.

## 2.4 Monitoring

There will be continuous monitoring of emissions to air from the CHP plant for oxygen, carbon monoxide, hydrogen chloride, sulphur dioxide, nitrogen oxides, ammonia, VOCs, and particulates will be undertaken for the flue gases from the CHP plant. Other pollutants will be monitored by spot measurements at regular intervals. All continuous emissions measurements will be recorded and operators will be alerted if emissions to air approach the permitted limits.

Periodic monitoring of emissions from the gas fired boilers will be undertaken.

The results of all emissions monitoring will be reported to SEPA.

Solid residues generated by the plant will be sampled on a regular basis to assess bottom ash burnout and to monitor the levels of specified pollutants.

The Facility will utilise modern control systems, which incorporate the latest advances in control and instrumentation technology. These will be used to control operations and optimize the operation of the Facility.

## 2.5 Ground Conditions

An Initial Site Report (Annex 2) has been developed which explains the ground conditions at the time of submission of the PPC application.

It is acknowledged that the planning permission includes a planning condition which requires classification of the ground conditions and if required remediation of any contamination which is identified within the site. Therefore, the Initial Site Report may need to be updated prior to commencement of operations to reflect the ground conditions prior to commencement of operations.

All chemicals will be stored in an appropriate manner incorporating the use of suitable secondary and other measures (such as acid and alkali resistant coatings) to ensure appropriate containment and tertiary abatement measures.

All storage facilities for chemicals will be designed in accordance with Environment Agency Pollution Prevention Guidance PPG 2, PPG 3 and PPG 18. The potential for accidents, and associated environmental impacts, is therefore limited.

Deliveries of all chemicals will be unloaded and transferred to suitable storage facilities. Areas and facilities for the storage of chemicals and liquid hazardous materials will be situated within secondary containment. Secondary containment facilities will have capacity to contain whichever is the greater of 110% of the tank capacity or 25% of the total volume of materials being stored, in case of failure of the storage systems.

Tanker off-loading of chemicals will take place within areas where the drainage is contained with the appropriate capacity to contain a spill during delivery.

Upon cessation of the CHP activities on site, a Closure Plan will be implemented and any pollution risks will be removed from the site. The ground will be returned to a '*satisfactory state*'.

## 2.6 Technology Selection

The processes have been designed against the background of a detailed assessment of the prevailing environmental conditions at the site location, in order that the objectives of the Industrial Emissions Directive (IED) are met. Best Available Techniques will be employed at the Installation to minimize its impact on the local environment.

A quantitative BAT Assessment has been completed for the CHP Plant. This has demonstrated that the proposed techniques to be employed at the Installation will represent BAT in accordance with the relevant BAT guidance notes.

## 2.7 Residues

There will be two solid residues generated by the CHP Plant:

- Incinerator bottom ash (IBA); and
- Air Pollution Control residues (APCr).

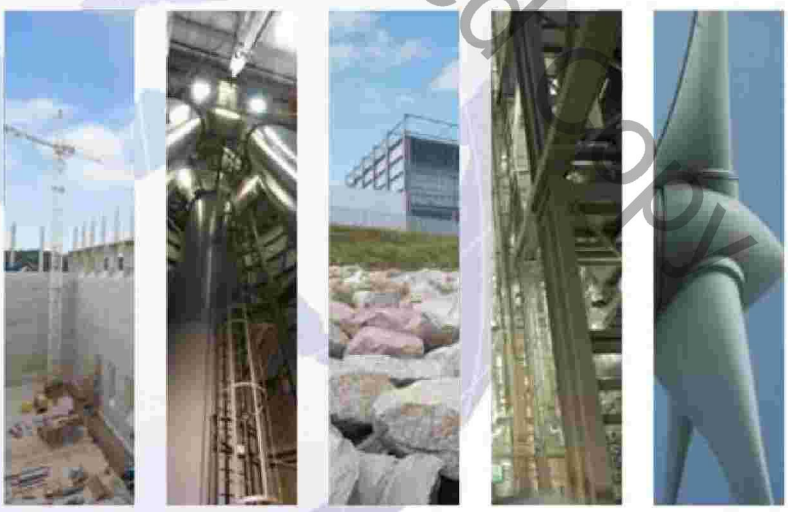
It is intended that the IBA from the CHP plant to an off-site IBA processing facility. If a suitable recovery facility will not accept the residue, it may be transferred for disposal in an off-site non-hazardous landfill. There will not be any recovery of metals from the IBA at the CHP Plant.

APCr is classified as hazardous and requires specialist disposal or treatment. It may be possible to send the residue to a waste treatment contractor, to be used to neutralise acids and similar materials. Using the residues in this way avoids the use of primary materials. If these options are not available then it will be sent to a suitably licensed hazardous waste landfill for disposal as a hazardous waste.

## 2.8 Management

Earls Gate expect that the day-to-day operation of the CHP plant will be subcontracted to a third party organisation through an operation and maintenance (O&M) contract. Earls Gate will ensure that under the O&M contract Earls Gate retain control and ownership of the Facility and it will be operated to the exact instruction of Earls Gate.

Earls Gate will require the O&M contractor to implement environmental management systems in accordance with BS EN ISO 14001:2004 Environmental Management System Standard and with the operating and maintenance instructions of the EPC contractor responsible for the design of the Facility.



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