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Consulting Engineers Limited

Redcar Energy Centre

Redcar Holdings Limited

EP Application Non-Technical Summary

ENGINEERING CONSULTING

Document approval

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1 Introduction

Redcar Holdings Limited (Redcar Ltd) is applying for an Environmental Permit (EP) for the Redcar Energy Centre (REC) which will comprise a fuel preparation facility, Energy Recovery Facility (ERF) to incinerate incoming non-hazardous waste, and an IBA treatment/processing facility (IBA facility). REC will be located on approximately 10 hectares of land at the Redcar Bulk Terminal, approximately 4.5 km west of Redcar town centre and 8.5km northeast of Middlesbrough city centre.

1.1 The Applicant

REC is being developed by Redcar Ltd, a joint venture between investment company Low Carbon and waste management company PMAC Energy, and the special purpose vehicle responsible for the delivery of the project.

Low Carbon is a UK investment and asset management company, focussed on large scale renewable energy projects including solar, onshore wind, offshore wind, waste-to-energy, battery storage and other technologies. Low Carbon has previous experience in the development of Energy from Waste (EfW) plants including the Kelvin Energy Recovery Facility in West Bromwich. PMAC Energy is a waste management company responsible for the initial development and promotion of REC. PMAC Energy has a background in waste processing and procurement and currently holds contracts to supply other EfW facilities in Europe, both sourcing waste from the UK and mainland Europe.

Redcar Ltd is registered in England (Company Number: 11544871) and has a registered address of 2nd Floor Stirling Square, 5-7 Carlton Gardens, London, SW1Y 5AD.

1.2 The Site

REC will be located on approximately 10 hectares of land at the Redcar Bulk Terminal, approximately 4.5 km west of Redcar town centre and 8.5km northeast of Middlesbrough city centre.

REC will be located at an approximate National Grid Reference of NZ 55890 26032, with the nearest postcode listed as TS10 5QW.

The site was previously heavily industrialised as it formed part of the former Teesside Steel Works (the Steel Works). The Redcar Bulk Terminal was used for the shipment of coal, coke and other bulk goods, and for importing iron ore.

The eastern boundary of the site is formed by coke ovens associated with the Steel Works, with a further area of the Steel Works located to the southeast of the site. The north and northeast boundaries of the site are formed of a high earth bund, beyond which lies an area of sand dunes which are part of the Bran Sands. The western boundary of the site is not enclosed or marked but a further storage area of the Redcar Bulk Terminal and the Tees Estuary lies beyond it.

Access to REC will be via a series of internal access roads which serve the industrial area, with a link to the A1085 which provides a strategic access to Middlesbrough and beyond via the A19.

A site location plan and Installation Boundary drawing are presented in Appendix A.

1.3 The Activities

REC will consist of a combination of Schedule 1 installation activities (as defined in the Environmental Permitting Regulations) (EPR) and directly associated activities. (DAAs).

Table 1-1: Environmental Permit Activities

Type of Activity	Schedule 1 Activity	Description of Activity
Installation	Section 5.1 Part A(1) (b)	Line 1 – The incineration of non-hazardous waste in a waste incineration plant with a capacity of 3 tonnes per hour or more
Installation	Section 5.1 Part A(1) (b)	Line 2 – The incineration of non-hazardous waste in a waste incineration plant with a capacity of 3 tonnes per hour or more
Installation	Section 5.4 Part A(1) (b) (ii)	**D13:** Blending or mixing prior to submission to any of the operations numbered D1 to D12 **R1:** Use principally as a fuel or other means to generate energy **R3**: Recycling/reclamation of organic substances which are not used as solvents **R4**: Recycling/reclamation of metals and metal compounds **R5**: Recycling/reclamation of other inorganic materials
Installation	Section 5.4 Part A(1) (b) (iii)	**D13:** Blending or mixing prior to submission to any of the operations numbered D1 to D12 **R5**: Recycling/reclamation of other inorganic materials **R4**: Recycling/reclamation of metals and metal compounds
Directly associated activities		
Directly Associated Activities		Energy generation
Directly Associated Activities		A medium combustion plant comprising a diesel generator
Directly Associated Activities		Surface water management
Directly Associated Activities		**R13**: Storage of wastes pending any of the operations numbered R1 to R12 (excluding temporary storage, pending collection, on the site where it is produced) **D15:** Storage pending any of the operations numbered D1 to D14 (excluding temporary storage, pending collection, on the site where it is produced)
Directly Associated Activities		**R13**: Storage of wastes pending any of the operations numbered R1 to R12 (excluding

Type of Activity	Schedule 1 Activity	Description of Activity
		temporary storage, pending collection, on the site where it is produced) **D15:** Storage pending any of the operations numbered D1 to D14 (excluding temporary storage, pending collection, on the site where it is produced)

The activities to be undertaken at the site include the following:

1. a fuel preparation facility to process incoming waste to produce a residual waste-derived fuel for treatment at the ERF or transfer off-site;
2. a twin-line Energy Recovery Facility (ERF) to recover energy from waste;
    a. generation of power for export to the National Grid and the potential to export heat;
    b. production of an inert bottom ash material that will be transferred to the on-site IBA Recycling facility (see below), or an off-site IBA processing facility;
    c. generation of an air pollution control residue that will be transferred off-site to a suitably licensed hazardous waste facility for disposal or recovery; and
3. an Incinerator Bottom Ash (IBA) Recycling facility which will process bottom ash from the ERF and imported IBA from other waste incineration facilities in the local area, as well as blending with other imported inert wastes delivered directly to the IBA facility to create a secondary aggregate, referred to as Incinerator Bottom Ash Aggregate (IBAA).

2 Details of REC

2.1 The fuel preparation facility

The fuel preparation facility will include the following key components: main building including storage bays and storage bunkers, process equipment (including moving floor feeder, conveyors, de-baler, shredder). Baled waste will be stored in concrete bays. There will also be a tipping area within the building for reject material from the ERF.

The fuel preparation facility will be capable of processing up to approximately 200,000 tonnes per annum of non-hazardous waste, expected to be a mixture of municipal solid waste (MSW) and commercial and industrial (C&I) waste that has been pre-treated to remove recyclates prior to arriving at the fuel preparation facility in a baled form. Bulky waste will also be accepted for shredding. The primary purpose of the fuel preparation facility will be to process the incoming waste into a waste-derived fuel or Refuse Derived Fuel (RDF) which will be transferred for processing either within the ERF or another off-site waste incineration plant.

2.2 The ERF

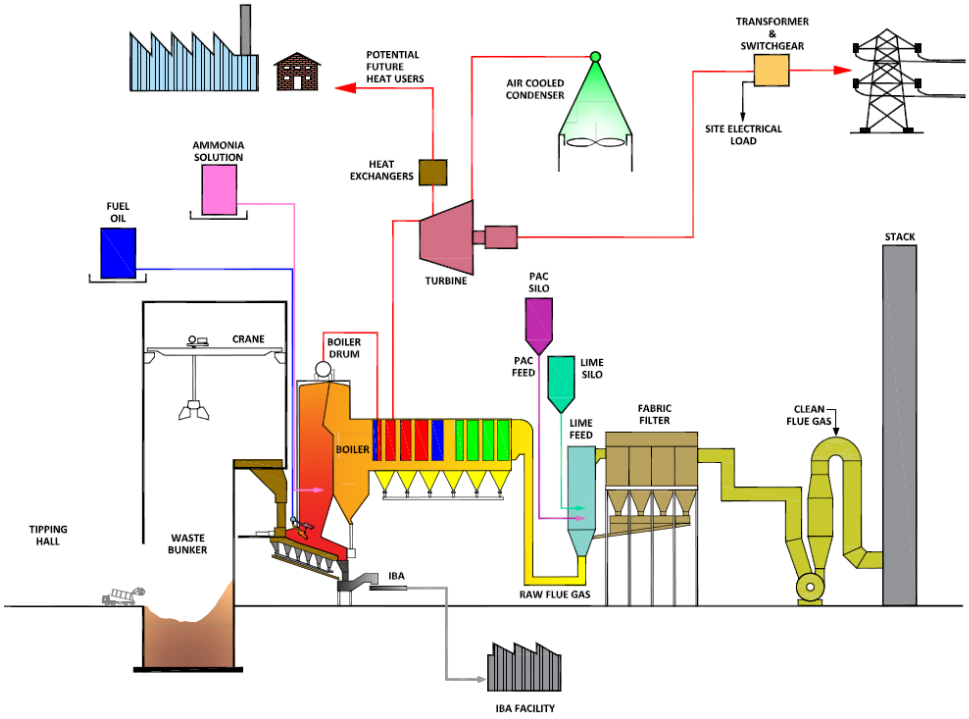
The ERF will process approximately 450,000 tonnes of waste per annum (at the design capacity of 28.1 tph per stream with a design NCV of 10.5 MJ/kg and an availability of approximately 8,000 hours). This is represented by the design point on the firing diagram – refer to Appendix A. It is expected that the maximum capacity of the ERF will be 500,000 tonnes per annum of waste.

The ERF will include the following processes:

1. Incoming waste will be delivered to the ERF and unloaded into the waste bunker.
2. Incoming waste would be transferred from the waste bunker into the feed hopper for the waste incineration plant.
3. Emissions of nitrous oxides would be controlled by the injection of ammonia solution into the combustion chamber.
4. Hot gases from the waste combustion would be passed through boilers 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, with the potential to export heat to local heat users.
5. 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.
6. The cleaned exhaust gases would be released to atmosphere via two stacks of 90 m.

An indicative process diagram for the ERF is presented in Figure 1.

Figure 1: Indicative Schematic of the Waste Incineration Process



2.3 The IBA recycling facility

The IBA recycling facility will include the following key components: conveyor systems, storage/reception bunker, hopper, mechanical processing equipment (including vibrating screens, magnetic and eddy current separation), storage yard, containers for recovered metals. The IBA recycling facility will be capable of processing up to approximately 180,000 tonnes of IBA and other materials for blending each year, delivered from both the adjacent ERF and off-site sources.

The purpose of the IBA facility will be to produce a secondary aggregate (IBAA) product for use in the construction industry.

2.4 Raw materials and feedstocks

The primary 'raw material' to be stored at the fuel preparation facility will be non-hazardous waste. Small quantities of maintenance materials will also be kept at the fuel preparation facility (oils, greases, insulants, antifreezes, welding and firefighting gases etc) for the operation and maintenance of plant and equipment on site.

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

- hydrated lime ($CaOH_2$);
- activated carbon;
- ammonia solution;
- mains water;
- non-hazardous mixed waste;
- auxiliary fuel; and

- water treatment chemicals.

The main material to be stored at the IBA facility will be IBA and IBAA. Small quantities of maintenance materials will be kept at the IBA facility (such as oils, greases, antifreezes etc) for the operation and maintenance of plant and equipment, including IBA processing equipment and mobile plant.

Raw materials (including maintenance materials) 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 Environment Agency (EA).

The Operator will maintain a detailed inventory of raw materials used and will have procedures for the regular review of developments in raw materials used.

2.5 Emissions

2.5.1 Emissions to air

Emissions from the ERF will be released from two stacks. Detailed air dispersion modelling of emissions has been undertaken. The emission limits proposed within this application for the ERF are consistent with the upper range of the BAT-AEL's stated in the Waste incineration BREF, with the exception of NOx which is proposed at a lower concentration of 100 mg/Nm^3.

It is not anticipated that the operation of the fuel preparation facility or IBA facility will lead to any point source emissions to air. Fugitive emissions to air are discussed further within the Supporting Information.

2.5.2 Emissions to water and sewer

There will not be any discharges of process effluent to surface water or groundwater from REC.

Where practicable, process effluents will be re-used within the process. Excess amount of process effluent will require discharge; for the fuel preparation facility and ERF, it is currently intended to discharge these to sewer in accordance with a Trade Effluent Consent to be obtained from the Sewerage Undertaker. However, if a Trade Effluent Consent cannot be secured, the effluents will be tankered off-site for treatment at a suitably licensed waste management facility. For excess process effluents resulting from the IBA facility, these will be tankered off-site for treatment at a suitably licensed waste management facility.

Surface water run-off from buildings, roadways and areas of hardstanding will be discharged into the site surface water drainage system. The site surface water drainage system will drain to an attenuation pond located to the northwest of the site, prior to discharge to the River Tees. The attenuation pond will have a capacity of approximately 4,500m^3 – this has been designed in accordance with SUDS requirements. Oil interceptors would treat surface water prior to discharge off-site. There will be provisions in place for the isolation of the surface water drainage system (such as penstock valves) in the event of an emergency (e.g., a fire or significant spill).

Domestic effluents from welfare facilities will be discharged to foul sewer.

2.6 Monitoring

There will be continuous monitoring of emissions to air of the flue gases from the ERF. The monitoring system will include monitoring of oxygen, carbon monoxide, hydrogen chloride, sulphur dioxide, nitrogen oxides, ammonia, VOCs, and particulates. 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. The results of emissions monitoring will be reported to the EA. The ERF will utilise modern control systems, which incorporate the latest advances in control and instrumentation technology. These systems will optimise the operation of the ERF.

It is not proposed to undertake monitoring of uncontaminated surface water from the site. Any excess process discharges to sewer would be monitored in accordance with the requirements of the Trade Effluent Consent should one be obtained.

Process variables at the fuel preparation facility, ERF and IBA facility will be monitored, including waste throughputs, water use and electricity consumption. At the IBA reception bunker, regular sampling and analysis of IBA will be undertaken to confirm that the TOC content is less than 3%, or LOI is less than 5%, and to confirm the non-hazardous status of the IBA.

2.7 Ground conditions

A Site Condition Report has been developed which details the ground conditions within the Installation Boundary.

All chemicals will be stored in an appropriate manner to ensure appropriate containment and secondary and tertiary abatement measures where appropriate. 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, such as bunds. 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 operation of REC, the site closure plan will be implemented, and any pollution risks will be removed and the site will be returned to a ‘satisfactory state’.

2.8 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 REC to minimize its impact upon the local environment.

A qualitative BAT review has been completed for the IBA facility which has demonstrated that dry treatment of IBA represents BAT for the IBA facility.

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

The following techniques are proposed to be employed at the ERF:

- SNCR with ammonia solution for the abatement of oxides of nitrogen;
- a moving grate for the combustion of waste;
- a dry system for the abatement of acid gases; and
- lime to be used as a reagent for the abatement of acid gases.

2.9 Residues

The main solid residue streams arising from the ERF are:

1. Incinerator Bottom Ash (IBA); and
2. Air Pollution Control residues (APCr).

It is intended that the IBA from the ERF will be transferred to the adjacent IBA processing facility.

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, the APCr will be sent to a suitably licensed hazardous waste landfill for disposal as a hazardous waste.

It is not expected that the operation of the fuel preparation facility or IBA facility will lead to the generation of significant quantities of residues. A small amount of reject material (not suitable for recovery at the adjacent ERF) may be produced at the fuel preparation facility – this will be transferred off-site to a suitably licensed waste management facility. Any material which is rejected from the fuel preparation facility (‘unacceptable’ waste) will be transferred off-site for processing in line with the waste hierarchy. At the IBA facility, any unburnt, oversized or unsuitable materials that are found within the IBA will be removed and stored separately for further inspection. This material will either be sent back to the ERF for further combustion or rejected and transported off-site to a suitably licensed waste management facility, in accordance with the waste hierarchy.

2.10 Management

To ensure effective management of REC, Redcar Ltd will develop a documented management system that clearly defines the management structure for REC, as well as setting out the roles and responsibilities of all staff.

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