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Consulting Engineers Limited

Thornton Energy Recovery Centre

Sesona Hill House Ltd

Non-Technical Summary

ENGINEERING CONSULTING

Document approval

	Name	Signature	Position	Date
Prepared by:	Katie Hampton		Environmental Consultant	16/01/2023
Checked by:	James Sturman		Lead Consultant	16/01/2023

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1 Introduction

Sesona Hill House Ltd (Sesona) is applying for an Environmental Permit (EP) for the Thornton Energy Recovery Centre (the Facility). The Facility will comprise a twin-line waste incineration plant to incinerate pre-processed refuse derived fuel (RDF) / solid recovered fuel (SRF) (herein referred to collectively as 'RDF', for simplicity). The Facility will be located at the Hillhouse Business Park, Thornton-Cleveleys, Lancashire, approximately 2.6km east of Cleveleys, 2.9km west of Stalmine, 3.9km south of Fleetwood and 8.2km northeast of Blackpool.

1.1 The Applicant

Sesona is the developer of the project. Sesona is registered in England (Company Number: 13999163) and has a registered address of 2nd Floor, 32 Grosvenor Gardens, London, England, SW1W 0DH. The main business address is Building 3, Chiswick Park, 566 Chiswick, High Road, London, W4 5YA.

The technical solution for the project is being provided by Novalux Energy Solutions Ltd. With over 12 years of experience in the renewables industry, Novalux has significant experience in the design and installation of Energy from Waste systems, including those of a similar design to the Facility, utilising thermal oil boilers alongside an Organic Rankine Cycle (ORC) system.

1.2 The Site

The Facility will be located at Hillhouse Business Park, Thornton-Cleveleys, Lancashire. The Site is located on the northern edge of Thornton, approximately 2.6km east of Cleveleys, 2.9km west of Stalmine, 3.9km south of Fleetwood and 8.2km northeast of Blackpool. The approximate National Grid Reference (NGR) for the centre of the Site is SD 34399 44026. The A585 is approximately 1.5km to the east of the Site and connects Thornton with the M55 motorway which runs west to east from Blackpool to Preston, where it ultimately meets the M6 motorway.

The Site covers an area of land which previously had an industrial use – a former chemicals manufacturing facility was located on the site which was decommissioned by 2000. The previous operations/activities have been removed, and the site is vacant and consists largely of hardstanding and internal roadways remaining from the industrial use.

The Site is bound by an access track and scrub vegetation to the east, beyond which lies the Wyre Way coastal footpath and River Wyre. The site is surrounded by industrial development which forms part of the wider Hillhouse Business Park. The closest residential properties to the Site are located off Butts Road, approximately 360m to the southwest.

A site location plan and Installation Boundary drawing are presented in Appendix A of the Supporting Information.

1.3 The Activities

The Facility 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	Limits of specified activity
Installation	Section 5.1 Part A(1) (b)	The incineration of non-hazardous waste in a waste incineration plant with a capacity of 3 tonnes per hour or more	From receipt of waste to treatment and emission of exhaust gas and disposal of any residues arising, including the storage of incinerator bottom ash and air pollution control residues.
Directly associated activities			
Directly Associated Activities		Energy generation	Energy generation and export of electrical power using an Organic Rankine Cycle turbine, with the potential to export heat to local users.
Directly Associated Activities		Back up electrical generator	For providing emergency electrical power to the plant in the event of supply interruption.

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

1. A twin-line Energy Recovery Centre (ERC) to recover energy from RDF, incorporating:
    a. RDF reception and storage facilities prior to incineration;
    b. generation of power for export to the local electricity distribution network, and the potential to export heat to local users;
    c. production of an inert bottom ash material that will be transferred off-site for processing or disposal;
    d. generation of an air pollution control residue that will be transferred off-site to a suitably licensed hazardous waste facility for recovery or disposal;
    e. storage facilities for raw materials consumed and residues generated by the Facility;
    f. a flue gas treatment facility; and
    g. control room(s) plus welfare and office spaces.

2 Details of the Facility

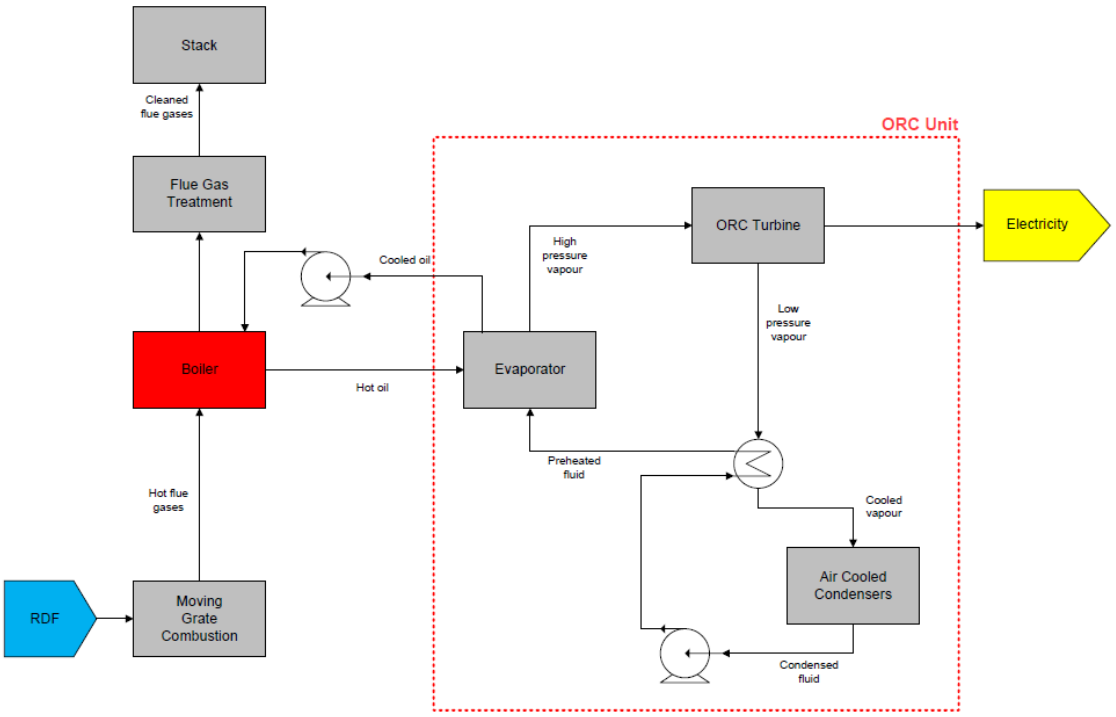
Assuming a design NCV of 10.11 MJ/kg, the Facility will process approximately 100,000 tonnes of waste per year (at a design capacity of 6.33 tph per line, and assuming 7,900 hours availability). However, the Facility will be capable of processing waste with a range of NCVs. The maximum throughput for the Facility will be up to 120,000 tpa of RDF, assuming 7,900 hours operation and an NCV of 8.43 MJ/kg. Therefore, the maximum capacity being applied for in the permit is 120,000 tpa of waste.

The Facility will include the following processes:

1. RDF will be delivered to the Facility via road and unloaded into dedicated walking floor RDF deposit areas, in addition to small quantities present in stockpile bays and the areas directly adjacent to the RDF deposit areas.
2. RDF will be transferred from the walking floor RDF deposit areas onto conveyors and subsequently into the feed hoppers for the waste incineration process. Conventional moving grate combustion technology will be employed.
3. An SNCR system will be employed to control emissions of oxides of nitrogen by the injection of urea solution into the combustion chambers.
4. The heat released by the combustion of the RDF will be recovered by means of thermal oil boilers, which are integral to the furnaces. The closed thermodynamic cycle will follow the principle of the Organic Rankine Cycle (ORC). An ORC turbine will generate electricity for export to the local electricity distribution network. There will also be the potential to export heat to local heat users.
5. The combustion gases will be cleaned in a flue gas treatment plant. This will include the injection of carbon, primarily to control dioxin emissions, the injection of sodium bicarbonate to control acid gas emissions, and the use of a ceramic filter to remove dust/particulates. The ceramic filter will also be impregnated with a catalyst to provide additional NOx abatement by selective catalytic reduction. Furthermore, flue gas recirculation will be employed which will further reduce NOx generation.
6. The cleaned exhaust gases will be released to atmosphere via two stacks of 45 m.

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

Figure 1: Indicative Schematic of the Waste Incineration Process



Simple ORC schematic

2.1 Raw materials and feedstocks

The Facility will utilise a number of different chemicals and raw materials. The chemicals and raw materials used at the site will include the following:

- sodium bicarbonate;
- activated carbon;
- urea solution;
- non-hazardous RDF; and
- auxiliary fuel (fuel oil).

Small quantities of maintenance materials will be kept at the Facility (such as oils, greases, insulants, antifreezes, welding and firefighting gases etc) for the operation and maintenance of plant and equipment.

2.2 Raw materials (including maintenance materials) will be supplied to standard specifications offered by different suppliers. All chemicals will be handled in accordance with Control of Substances Hazardous to Health (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.

2.3 Emissions

2.3.1 Emissions to air

Emissions from the Facility will be released from two stacks. Detailed air dispersion modelling of emissions has been undertaken. The emission limits proposed within this application for the Facility are consistent with the upper range of the BAT-AEL's stated in the Waste Incineration BREF for a new plant.

2.3.2 Emissions to water and sewer

The Facility is designed for 'zero-discharge', with process effluents being re-used within the ash quench. Accordingly, there will be no requirement to discharge process effluents off-site. RDF handling, raw material handling and residues handling will be undertaken within the enclosed building on areas of hardstanding with contained drainage. In addition, RDF handling and the initial quenching and handling of bottom ash will be undertaken within enclosed buildings. These measures will prevent the release of any process water from the Facility to the site surface water drainage system.

Uncontaminated surface water run-off will be discharged into the surface water drainage system. The surface water drainage system comprises a network of gullies, pipework and confluence or holding chambers. The chamber(s) provide surface water attenuation during high tides and are controlled with flap valves preventing tidal ingress during high tide.

Foul drainage will be treated in an on-site package treatment plant before treated effluent is discharged to the surface water drainage system.

2.4 Monitoring

There will be continuous monitoring of emissions to air of the flue gases from the Facility. 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 Facility will utilise modern control systems, which incorporate the latest advances in control and instrumentation technology. These systems will optimise the operation of the Facility.

Process variables at the Facility will be monitored, including RDF throughput, water use and electricity consumption. Regular sampling and analysis of Incinerator Bottom Ash (IBA) will be undertaken to confirm that the Total Organic Carbon (TOC) content is less than 3%, or LOI is less than 5%, and to confirm the non-hazardous status of the IBA.

2.5 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 liquid chemicals / hazardous materials will be situated within secondary containment, such as bunds or sumps. Secondary containment facilities will have capacity to contain 110% of the storage capacity, 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 the Facility, the Site Closure Plan will be implemented and any pollution risks will be removed from the site and it will be returned to a 'satisfactory state' prior to applying for EP surrender.

2.6 Technology selection

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

A quantitative Best Available Techniques (BAT) assessment has been completed for the Facility. This has demonstrated that the proposed techniques to be employed at the Facility will represent BAT in accordance with the relevant BAT guidance notes.

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

- Selective Non-Catalytic Reduction (SNCR) with urea 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
- sodium bicarbonate to be used as a reagent for the abatement of acid gases.

2.7 Residues

The main solid residue streams arising from the Facility are:

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

IBA will be transferred to an offsite processing facility for processing into a secondary aggregate, referred to as Incinerator Bottom Ash Aggregate (IBAA).

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.

2.8 Management

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

ENGINEERING CONSULTING

FICHTNER

Consulting Engineers Limited

Kingsgate (Floor 3), Wellington Road North,
Stockport, Cheshire, SK4 1LW,
United Kingdom

t: +44 (0)161 476 0032
f: +44 (0)161 474 0618

www.fichtner.co.uk