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Consulting Engineers Limited

Tees Valley Energy Recovery Facility

Viridor Tees Valley Ltd

Non-Technical Summary

ENGINEERING CONSULTING

Document approval

	Name	Signature	Position	Date
Prepared by:	Alice Merry		Environmental Scientist	27/06/2024
Checked by:	James Sturman		Lead Consultant	27/06/2024

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1 Introduction

Viridor Tees Valley Ltd (Viridor) is applying to the Environment Agency (EA) under the Environmental Permitting Regulations (EPR's) for an Environmental Permit (EP) to operate the Tees Valley Energy Recovery Facility (the Facility).

The Facility will comprise of a twin line incineration plant (the Facility) to incinerate incoming non-hazardous residual waste, and will be in an area known as Grangetown Prairie.

1.1 The Applicant

Viridor is one of the UK's leading recycling, resource and waste management companies. Viridor provides a range of recycling and waste management solutions to transform domestic and commercial waste and recyclables into high quality raw materials and renewable energy, in turn contributing to the improvement of the UK's resource efficiency.

Viridor currently operate ten operational Energy Recovery Facilities (ERF's) which recover energy from residual waste streams. Viridor is the largest operator of ERF's within the UK and has invested over £1.2 billion in the development of a network of advanced ERFs across the UK, which reduce the country's reliance on landfill or export of waste. These facilities include the Beddington, Cardiff and Runcorn ERF's.

1.2 The Site

The Facility will be located on land within the South Tees Development Corporation (STDC) area, which comprises 4,500 acres (1,800 hectares) of land that forms part of the STDC Regeneration Master Plan.

The ERF will occupy a 25-acre (10 hectare) site situated at the southwestern corner of the STDC area, within the Grangetown Prairie Zone. The site lies 1.2km south of the River Tees and approximately 4 miles to the northeast of Middlesbrough Town centre. The Facility will be located at an approximate national grid reference NZ 54436 21340.

The Facility is bounded to the north by the main Middlesbrough to Redcar railway line, to the east by the site of Lackenby steel works, to the south by industrial units and beyond them the A66 road and to the west by various industrial units. Access to the site will be via a new site access on the corner of Eston Road that will serve a new internal highway network for the Grangetown Prairie plots. This access will be constructed as part of the enabling works for all development plots by STDC. The Site is brownfield land which has been cleared and was once dominated by industrial buildings at the heart of the steel making industry on Teesside. Some industrial buildings /plant still surround the Grangetown Prairie site on its south, east and western boundaries.

A site location plan and installation boundary drawing are presented in Appendix A of the Application Pack.

1.3 The Activities

The Facility will consist of two Schedule 1 installation activities (as defined in the Environmental Permitting Regulations) and their directly associated activities. The activities to be undertaken at the site include the following:

1. a twin-line waste incineration plant processing waste which is delivered to the Facility from off-site via road;

2. generation of power for export to the National Grid and the potential to export heat;
3. production of an 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 off-site to a suitably licensed hazardous waste facility for disposal or recovery.

Table 1 lists the Schedule 1 and directly associated activities which are proposed at the Facility.

Table 1: Scheduled and directly associated activities

Type of Activity	Schedule 1 Activity	Description of Activity	Limits of specified 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	From receipt of waste to treatment and emission of exhaust gas and disposal of any residues arising. Waste types are specified in the Supporting Information.
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	From receipt of waste to emission of exhaust gas and disposal of waste arising. Waste types are specified in the Supporting Information.
Directly associated activities			
Directly Associated Activities		Energy generation	Generation of electrical power using a steam turbine, with electricity exported to the National Grid, and the potential to export heat to local heat users from energy recovered from the flue gases
Directly Associated Activities		Waste reception area	The receipt, handling and bulking for transfer off-site of non-hazardous waste.
Directly Associated Activities		A medium combustion plant comprising a diesel generator	For providing emergency electrical power to the plant in the event of supply interruption. Operation for no more than 50 hours per year for testing purposes (unless in emergency situations).
Directly Associated Activities		Surface water management	From collection of uncontaminated surface water drainage to the discharge to drainage pond and SUDS.

2 The Facility

2.1 Waste incineration process

The main activities associated with the operation of the Facility will be the combustion of waste to raise steam and the generation of electricity in a steam turbine/generator.

The Facility includes two waste incineration lines, waste reception (or 'tipping hall'), waste bunker, turbine hall, air cooled condensers, boiler hall including boilers and FGT system, ash handling/storage facility, and an 80 m stack.

The Facility will have a design capacity (combined thermal boiler capacity) of approximately 150 MWth. The Facility has been designed to export power to the National Grid. The Facility will generate approximately 48.2 MWe of electricity in full condensing mode at the design point (with average ambient temperature). The Facility will have a parasitic load of approximately 10% (approximately 4.6 MWe). Therefore, the export capacity of the Facility, with average ambient temperature, will be approximately 43.6 MWe.

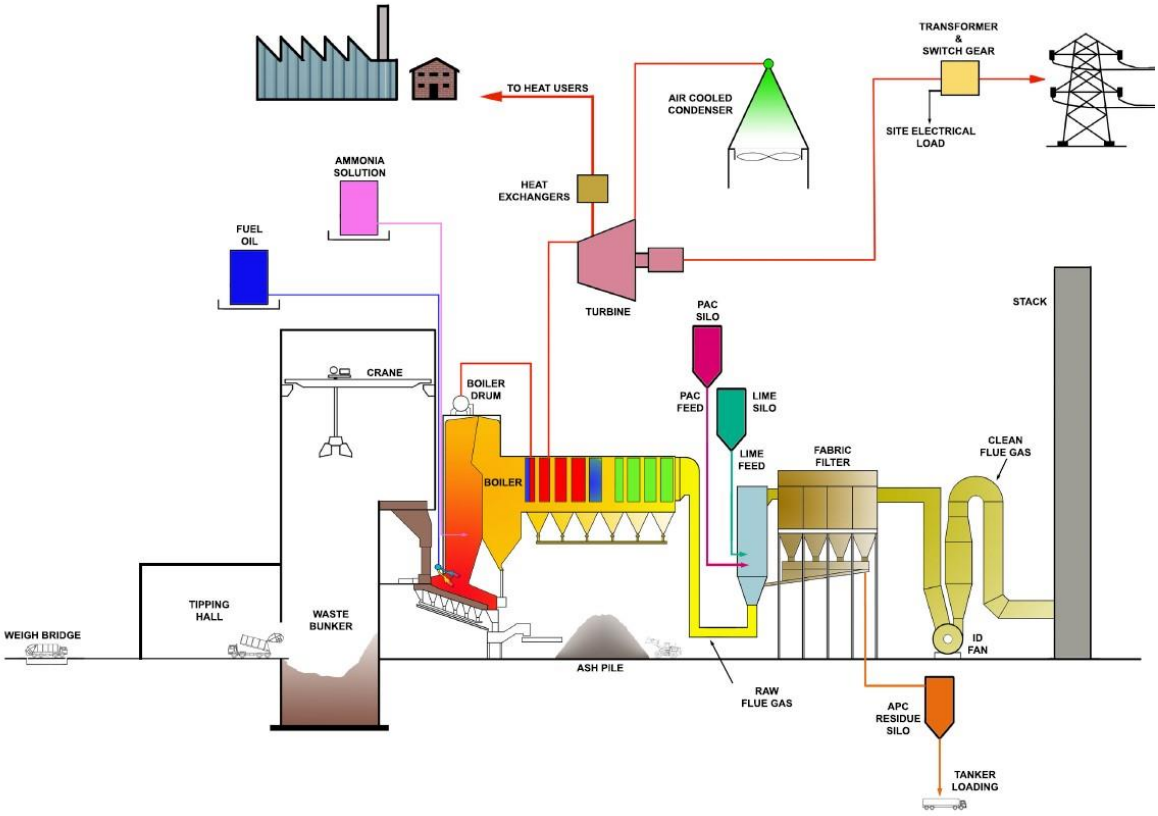
As the waste quality will fluctuate, and if heat is exported from the facility to local heat users in the future, the power exported will fluctuate. The power exported will also fluctuate depending on ambient temperatures.

The Facility will be constructed as 'CHP Ready' and will have the capacity to export up to 12 MWth of heat, subject to technical and economic feasibility. The CHP assessment (refer to Appendix G) has identified that there are opportunities to export an annual average net load of up to approximately 5.5 MWth, with a peak load of 12 MWth to potential heat users. The amount of heat exported will depend on the demand of the heat users and will be subject commercial agreements with the potential heat users.

'Enabling' heat off-take equipment would be installed as part of the Facility. Should a contract(s) be agreed with the potential heat user(s), heat export infrastructure will be installed (comprising of a feed pipe and a return pipe). The Facility will be designed as carbon-capture ready and combined heat and power (CHP) ready with provision of space for future installation of CCUS and/or CHP equipment if required.

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

Figure 1: Indicative Schematic of the Waste Incineration Process



2.2 Raw materials

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

The Facility 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:

- low sulphur fuel oil;
- ammonia solution;
- hydrated lime (CaOH2);
- activated carbon; and
- water treatment chemicals.

Raw materials (including maintenance materials) will be supplied to standard specifications offered by the suppliers. 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.

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.

2.3 Emissions

2.3.1 Emissions to air

The cleaned flue gas will be monitored for pollutants and discharged to atmosphere via the stack.

A Continuous Emission Monitoring System (CEMS) will be installed to monitor concentrations of the pollutants in the flue gas.

Periodic measurements will be carried out once every 6 months. In the first year of operation, monitoring may be carried out more frequently as required by the environmental permit.

The Continuous Emission Monitoring System (CEMS) will be MCERTS approved. There will be a duty CEMS on each line and a stand-by CEMS capable of operating on either line. This will ensure that there is continuous monitoring data available even in the event of a problem with the duty CEMS.

2.3.2 Emissions to water and sewer

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 convey the surface water to the surface water attenuation storage system via petrol interceptors. The surface water will then be discharged off-site via the drainage pond and sustainable urban drainage system (SuDS). The surface water drainage system will be fully segregated from any foul or process water systems.

Where practicable process effluents will be re-used within the process. Process effluents will be stored within a process water tank or similar prior to reuse and recycling within the process. In the unlikely event that excess process effluents are generated, such as during emptying of the boilers, these will require discharge. It is intended to tanker these off-site for treatment at a suitably licensed waste management facility.

It is proposed to treat foul effluent from domestic facilities in a wastewater treatment plant at the site. The treated effluent will then be discharged to foul sewer. Any excess wastewaters that are generated will be tankered off-site for treatment at a suitably licensed waste management facility.

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 carbon monoxide, hydrogen chloride, sulphur dioxide, nitrogen oxides, ammonia, volatile organic compounds (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.

2.5 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 Facility to minimize its impact upon the local environment.

Qualitative and quantitative BAT assessments have 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:

- two moving grates for the combustion of waste;
- SNCR with ammonia solution for the abatement of oxides of nitrogen;
- a dry system for the abatement of acid gases;
- Lime to be used as a reagent for the abatement of acid gases;
- Multi-compartment fabric filter for the control of particulates;
- Air cooled condenser; and
- Odour modification system.

2.6 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 off-site for processing at a suitable licensed waste management company prior to re-use (e.g. as a secondary aggregate).

APCr is classified as hazardous (due to its elevated pH) and requires specialist landfill disposal or treatment. Viridor re-use APCr to neutralise acid wastes and are currently investigating other options for the disposal of APCr. If a suitable option for the recovery of APCr cannot be identified, then it would be sent to a suitably licensed hazardous waste storage facility or landfill for disposal as a hazardous waste. The reuse of APCr is an evolving market and Viridor will continue to explore alternative options for the treatment of APCr throughout the lifetime of the Facility.

APCr will be removed from site in enclosed tankers thereby minimising the chance of spillage and dust emissions. During the tanker filling operation, displaced air released to the atmosphere would first pass through a fabric filter.

2.7 Management

The Facility will be designed and constructed following the latest international and national regulations, standards and guidance. This will incorporate risk management techniques such as HazOp studies prior to construction and thorough commissioning and testing before plant takeover.

Viridor will implement its accredited Integrated Management Systems at the Facility.

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