Swadlincote Energy Recovery Facility (SERF)

Non-Technical Summary

on behalf of R&P Clean Power Limited

Application for Environmental Permit

May 2024

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Revision	Author	Date	Quality Check	Date	Review	Date
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1 Introduction

R&P Clean Power Limited (the 'Applicant') is developing the Swadlincote Energy Recovery Facility (ERF) (the 'Facility') to process up to 230,000 tonnes per annum of waste at Cadley Hill, Swadlincote, Derbyshire. The plant has the capacity to generate 20.5 MW of electrical power, with a connection agreement in place with National Grid Electricity Distribution to export approximately 18.5 MW to the distribution network.

This document forms part of the application for the Environmental Permit required for the operation of the Facility and is intended to provide a non-technical overview of the project and how it will operate.

As part of the Environmental Permit application, the Environment Agency (EA) was contacted for pre-application advice. The reference for this pre-app advice correspondence is EPR/DP3925SK/P002.

1.1 The Applicant

R&P Clean Power Limited is registered in England (Company Number 12632942) and is the Applicant for the Permit. The Applicant's registered office address is Celixir House, Stratford Business and Technology Park, Innovation Way, Banbury Road, Stratford-Upon-Avon, CV37 7GZ.

1.2 The Facility

The proposed Facility is located in South Derbyshire at Cadley Hill. Approximately 2 km west of Swadlincote, Derbyshire. The Facility is centred at National Grid Reference SK 268 190, with the nearest postcode at DE11 9EN. The surrounding area is characterised by a mix of rural land, residential properties and industrial estates. Immediately adjacent land uses include Willshee's Materials Recycling Facility (MRF), Stanton Sewage Works, the A444 (Burton Road), residential properties to the north and south, arable farmland to the west and south and the Appleby Glade and Cadley Hill Industrial Estate to the east. See Figure 1 for the Site location.

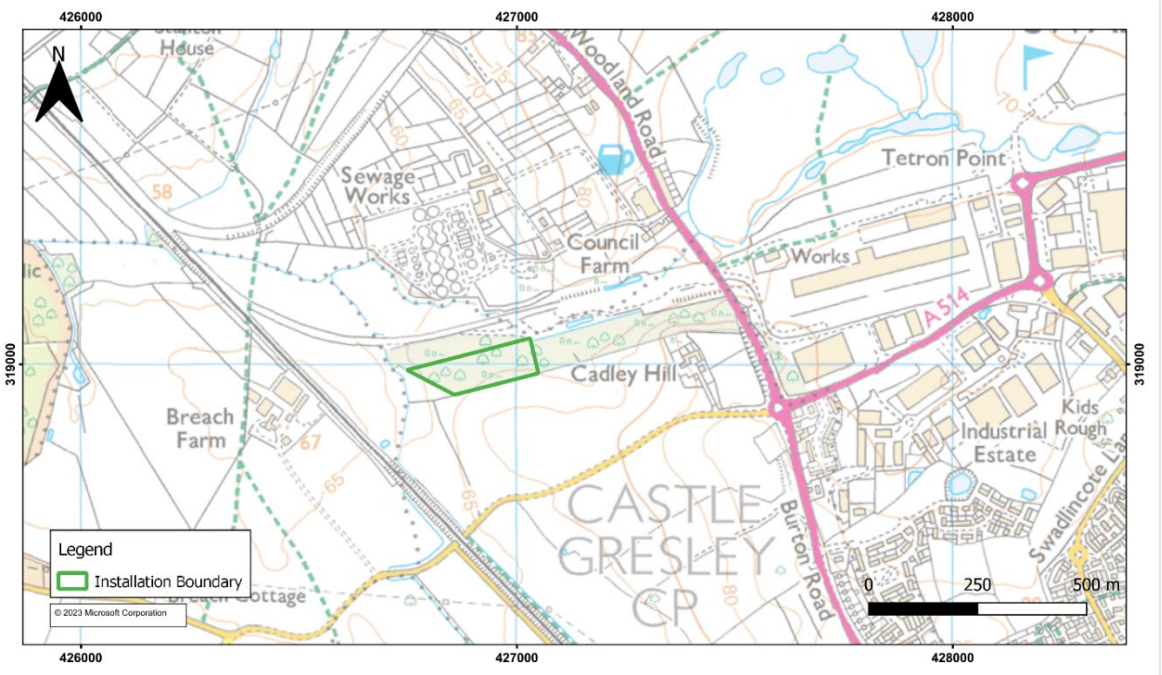

Figure 1: Site Location

1.3 Activities

The Facility will consist of a single Schedule 1 'Installation Activity', as defined within the relevant Environmental Permitting Regulations, and a number of 'Directly Associated Activities (DAA)'. These are summarised within Table 1 below.

Table 1: Activities

Type of Activity	Schedule 1 Reference	Description of Activity
Installation	5.1 Part A9(b)	The incineration of non-hazardous waste in a waste incineration plant
Waste Storage	DAA	Storage of fuel pending incineration and combustion residues prior to disposal
Process Effluent Treatment	DAA	Treatment of process effluents
Generation of Electricity	DAA	Operation of steam turbine

The Facility includes:

- Waste reception arrangements;
- Waste storage;
- Fuel oil and air supply systems;

- Furnace;
- Boiler;
- Steam turbine/generator set;
- Facilities for the treatment of exhaust gases;
- Storage of solid residues prior to disposal and/or recovery; and
- Devices and systems for controlling and monitoring operations and emissions.

The accepted wastes are defined with European Waste Catalogue (EWC) waste codes from the List of Wastes (LoW), the wastes are listed below, hereafter referred to as the 'fuel':

- 19 12 10 - Combustible Waste (Refuse Derived Fuel)
- 19 12 12 - Other Wastes (Including Mixtures of Materials) from Mechanical Treatment of Wastes other than those mentioned in 19 12 11
- 20 03 01 - Mixed Municipal Waste
- Other wastes listed in Table 1b of Form B3

The capacity of the Facility will be up to 230,000 tonnes per annum of mixed non-hazardous fuel.

2 Process Description

The plant will contain the following processes:

- **Waste acceptance** – fuel delivered to the Facility and stored within an enclosed building;
- **Fuel loading** – fuel is loaded into the feed hopper;
- **Combustion** – the fuel is combusted within a specially designed furnace and the hot gases used in a boiler to raise steam for the generation of electricity and heat; and
- **Emissions** – the combustion gases are treated by a combination of techniques before being released to atmosphere.

Figure 2 provides an illustrative overview of these processes.

2.1 Waste Acceptance

The material to be processed by the Facility will comprise of pre-treated non-hazardous waste materials in the form of fuel. The fuel will be prepared in accordance with the fuel specification and will be of a uniform quality with defined characteristics.

All fuel will be delivered to the Facility by road in covered vehicles. A weighbridge installed at the entrance to the Facility will record the tonnage of material brought in. The delivery and receipt of all material to the Facility will be in accordance with waste acceptance procedures, to ensure that only materials which meet the required specification are accepted. Delivery vehicles will be routed to the reception building, where fuel will be unloaded into an internal storage bunker.

There may be the option to accept sludge wastes and, if such opportunity materialises prior to construction of the Facility, a dedicated tank for the storage of sludges will be incorporated in the design (location to be confirmed).

2.2 Fuel Loading

Material is collected from the bunker using a remotely operated grab and deposited into the furnace feeding hopper. Operation of the grab is automated with a computer controlling operations and ensuring the optimal use of the fuel, although it can be operated in various manual modes if necessary.

During operation in fully automatic mode, the level of material inside of the bunker will be mapped and recorded using radar-based sensors to monitor the level of material precisely and continuously, and to provide fuel on a first-in, first-out basis to the hopper as it is required.

If sludge wastes are processed at the Facility, a pumping system will be provided to transfer the sludges from the storage tank into the waste feeding hopper.

2.3 Combustion Process

The fuel will be fed into the combustion chamber by a hydraulic pusher located on an inclined furnace grate to which air is provided by fans for the combustion process. The gas temperature in the combustion chamber is automatically maintained and adjusted by the recirculation of gases.

The hot gases exit the combustion chamber and enter the boiler where they transfer heat by evaporating water to raise steam, which is directed to the steam turbine for the generation of

electricity.

After passing through the turbine the steam passes to the air condenser and is recycled for reuse in a new cycle.

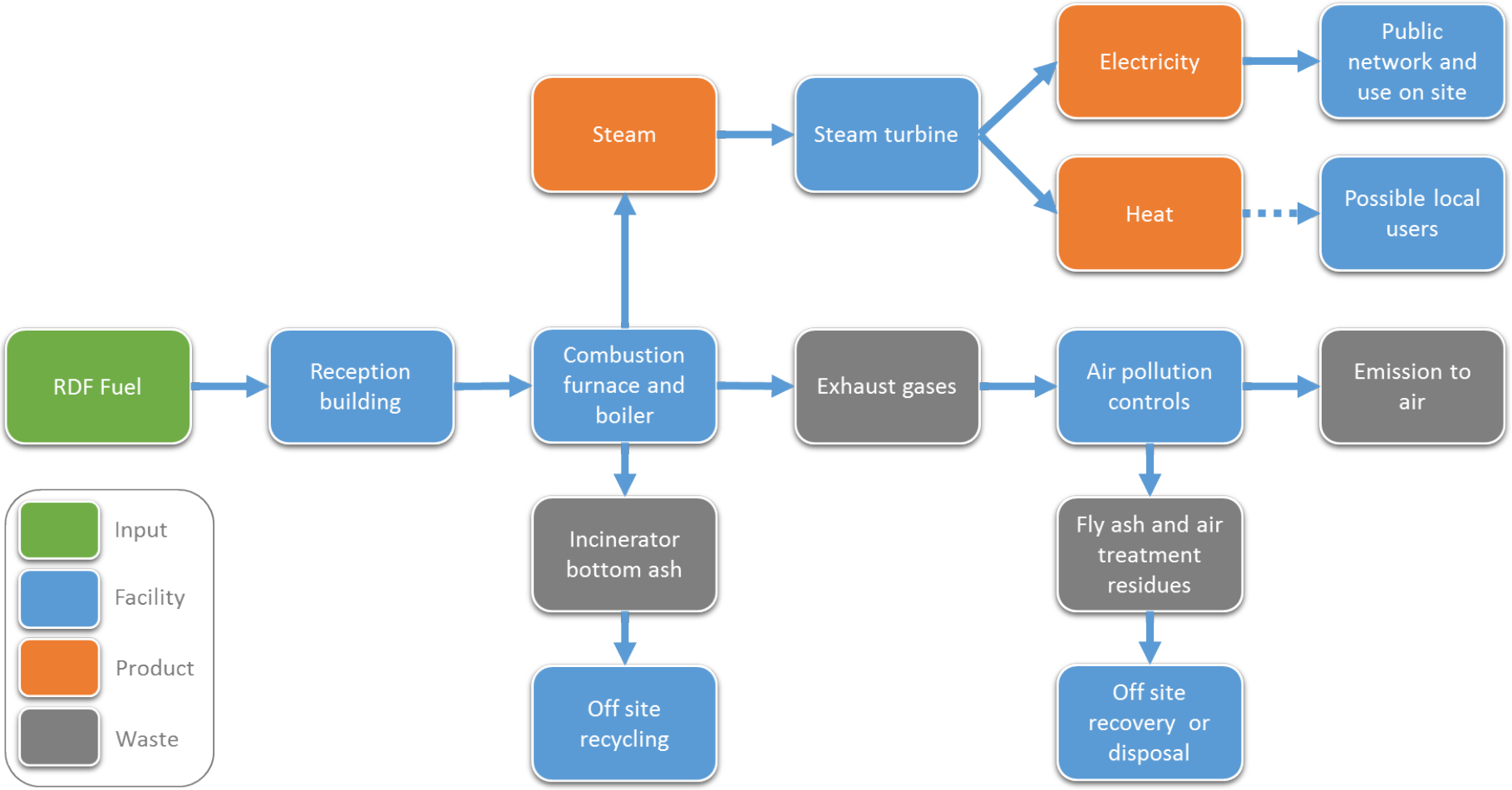

Figure 2: Process Flow

2.4 *Emissions*

2.4.1 Emissions to Air

The Facility includes a number of systems to ensure that releases to air are controlled below the limits specified within the current Waste Incineration Best Available Techniques Reference document (BREF) and the Industrial Emissions Directive (IED) which set out the standards that are expected to be achieved for facilities of this type.

The following techniques are used to reduce the emissions to atmosphere from the Facility:

1. Automated combustion control;
2. Selective Non-Catalytic Reduction (SNCR);
3. Flue Gas Recirculation (FGR) (subject to technology supplier's design);
4. Vertical reaction towers to enable lime and activated carbon reactions; and
5. Baghouse filter.

The combination of continuous monitoring and control systems with the treatment techniques enables a high level of flexibility in optimising the use of substances and processes to ensure emissions are within the prescribed limits. Detailed modelling of the dispersion of these emissions from the 60m stack installed at the Facility has been undertaken and are available as part of the application.

The potential for odour arising from the plant has been recognised, particularly during the delivery and offloading of fuel, and mitigation techniques have been included as detailed within the odour management and risk assessment which is included within the Odour Management Plan accompanying the application.

2.4.2 Emissions to Water

Process Water

There will be no emission of process effluent from the Facility under normal operation. Excess process waters arising from boiler blowdown, the demineralisation unit and the cleaning/draining of equipment and surfaces will be collected in the on-site wastewater pit and re-used in the Facility's bottom ash quenching system. Any excess process effluents will be tankered off site under a suitable waste collection contract. No process effluent will be discharged to surface water or sewer.

Surface Water

The Facility is to be served by a new stormwater network which includes use of Sustainable Drainage Systems (SuDS). Surface water runoff from the proposed buildings and infrastructure will be collected and transferred via private storm networks towards a series of attenuation features. Prior to release into any attenuation features, runoff will first drain through a series of pollution control measures (i.e., trapped gullies, manholes with catch pits etc). The attenuation features will include a combination of belowground tank storage, together with above-ground Sustainable Drainage Systems (SuDS), each sized to accommodate up to the 100-year return period storm, including 40% allowance for climate change.

Foul Water

Foul waters arising from domestic water use will drain to a new private package treatment plant.

Treated flows will discharge to the proposed swale and wetland area which can provide further polishing ahead of outfall to the downstream watercourse. The final discharge of treated foul waters will be in accordance with the general binding rules for small sewage discharges with effect from 2 October 2023. This is shown as point S1 in Figure 3 Point Source Emissions to Air and Water, provided as part of the Environmental Permit application.

2.5 *Residues*

The main solid waste residue streams from the Facility are incinerator bottom ash (IBA) and air pollution control (APC) residues.

2.5.1 Incinerator Bottom Ash (IBA)

IBA is the inert or incombustible material from the combustion process. The bottom ash discharges from the grate and is mixed with water, where wet ash is removed by a conveyor system. It is subsequently stored within an enclosed storage area and then loaded into vehicles for removal for recycling at an off-site treatment facility. Typically, this material is used as an alternative aggregate in the manufacture of construction products.

2.5.2 Air Pollution Control (APC) Residues

Fly ashes are particulates that are entrained within the combustion gases as these exit the boiler. These are combined with substances injected into the furnace and collected along with the residues from the bag filter. Together these residues are termed Air Pollution Control (APC) residues and are collected within a sealed silo. The residues will be assessed for their suitability for reprocessing at an appropriately licenced facility and their subsequent reuse. They are transported from the Facility within sealed bulk transport vehicles.

2.6 *Energy Recovery*

The Facility will generate electricity from the operation of the steam turbine, with a gross electrical efficiency of 30.3%. When operating at full load the Facility will export 18.5 MW of electricity to the public distribution network operated by National Grid Electricity Distribution. The plant has also been designed to be CHP ready – which means that it is capable of exporting heat to process or district heating loads that may be available in the vicinity of the Facility. A Heat Opportunity Report is included within the application, it has been concluded that currently potential heat loads that could be served are highly constrained by the presence of surrounding significant infrastructure. However, the Operators of the plant will review this assessment on a periodic basis.

2.7 *Monitoring*

The Facility design includes for the implementation of a continuous emissions monitoring system for the exhaust gases. The monitoring system will include monitoring of oxygen, carbon monoxide, hydrogen chloride, sulphur dioxide, oxides of nitrogen, volatile organic compounds, ammonia, and particulates. Other pollutants will be recorded by spot measurements at regular intervals. All monitoring measurements will be recorded and are reported to the Environment Agency (EA).

In addition, the Facility will include modern process control technology utilising additional monitoring sensors and instruments to control operations, optimise the performance of the

Facility and respond to emergencies or abnormal operating conditions.

3 Technology Selection

The process has been designed against the requirement that the Facility represents the Best Available Techniques (BAT) for the technology type as defined by the IED. Guidance as to what these techniques are is contained within the Waste Incineration Best Available Techniques Reference document (BREF) and within the EA's guidance document Incineration of Waste (EPR 5.01).

Comparative analysis of the proposal against the indicative BAT standards provided in the guidance has been undertaken and is provided in Section V, Appendix 3 Best Available Techniques to this application.

4 Environmental Risk Assessment

An Environmental Risk Assessment (ERA) is included with the Environmental Permit application, the objective of the ERA is to detail the potential environmental risks caused by operations, outline the management techniques and immediate actions, and to estimate the level of residual risk. The environmental risks are estimated using a 'risk matrix.' The following ERA's have been completed for the Facility's operations:

- Odour;
- Dust;
- Noise and vibration;
- Fugitive emissions to air;
- Environmental accidents and incidents; and
- Discharges to water.

The risk assessments detailed in the ERA and management plans indicate that the proposed Facility is considered unlikely to cause any significant disturbance to the identified receptors. Although there are various receptors within proximity to the Facility, the implementation of a range of management techniques will mitigate any potential impacts relating to noise and vibration, fugitive emissions to air, environmental accidents and incidents, and discharges to water. The ERA concludes that, accounting for the implementation of the mitigation measures, it is considered that the proposed Facility will not have a significant impact on the environment.

The Facility will be operated in accordance with a written EMS which will include procedures and forms to provide instruction to site operatives.

5 Management Plans

The operator of the Facility will implement management plans for key operational aspects. These have been submitted with the Environmental Permit application and a summary of each are set out in the sections below:

- **Environmental Management System –** A summary of the Environmental Management System (EMS) that will be in place when the Facility is operational is included with the application (Appendix 1) and provides an overview of the measures that will be used to manage the Facility as identified by the Environmental Risk Assessment.
- **Odour Management Plan –** An Odour Management Plan (OMP) has been prepared to accompany the application (Appendix 7). This sets out the operational measures that are in place to ensure that the site is not a source of odour pollution at the identified receptors. The permitted operation will need to operate in accordance with the approved OMP as a condition of the Permit.
- **Noise and Vibration Assessment –** A Noise and Vibration Assessment has been prepared based on the noise assessment undertaken and accompanies the application (Appendix 8).
- **Dust Management Plan –** A Dust Management Plan (DMP) has been prepared to support this application (Appendix 12). This sets out the operational measures that are in place to ensure that the Facility is not a source of dust pollution at the identified receptors. The permitted operation will need to operate in accordance with the approved DMP as a condition of the Permit.
- **Accident Management Plan –** An Accident Management Plan (AMP) has been prepared to accompany the application (Appendix 9). This sets out how the Facility will manage incidents and near misses, including recording and investigation processes, and remedial and preventative measures. The permitted operation will be required to operate in accordance with the approved AMP as a condition of the Permit.
- **Fire Prevention Plan –** A Fire Prevention Plan (FPP) has been prepared in accordance with the relevant contemporary EA guidance (Appendix 11). This sets out how the Facility is designed and sufficiently resourced to prevent and manage fires. This plan includes consideration of the storage of waste materials, and the provisions in place to manage the Facility in the event of fire, including the water resources required to detect and suppress a fire, and what will subsequently happen to any firewater used to extinguish a fire.

6 Further information

The documents and reports referenced within this Non-Technical Summary can be found within the appendices list that accompanies the wider Environmental Permit application.