Public Notice: Environmental Permit Application September 2020

Permit Application for Eccleshall Biomass

Use of recovered Wood as a source of fuel at Eccleshall Biomass Plant (EBP)

Applicant: Sustainable Energy Developments Ltd

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1. Background

The power generation plant at Raleigh Hall Industrial Estate, Eccleshall, ST21 6JL, produces 2.45 MWe of electrical power (over 4000 homes equivalent), which is exported onto the local electricity distribution network. The electricity network around Eccleshall is relatively weak; the presence of a local baseload generation plant helps Western Power Distribution (the network operator) balance the network and avoid blackouts.

The plant began operation in 2007, and used wood chip, miscanthus, and compost over size (COS) as fuels for the combuster to generate heat energy. COS is the wood fraction separated from green waste which has been through a composting process but has not composted. This wood fraction must be removed from the compost prior to horticultural uses. COS was successfully used as a fuel at Eccleshall until 2015, when it was stopped on the instruction of the Environment Agency, because it was deemed to be waste, for which the plant did not have planning permission or an operating permit.

2. Introduction

This application is being made to obtain an Environmental Permit (EP) for the use of COS as a fuel in the production of heat energy and electricity generation from the plant at Raleigh Hall Industrial Estate, Eccleshall.

The plant is regulated by Stafford Borough Council.

In order to determine the regulating authority for the plant, if it is to burn COS, the chart below has been used. The following answers have been given to determine which path is appropriate:

Waste type: non-hazardous

Does IED chapter IV apply: no

What is the capacity of the activity: 50kg/hr to 3 tonnes per hour

Is it a Chapter II IED activity: no

Consequently, the regulator is the local authority, and the permit type is Part B, and Section 5. Part B (a) of Schedule 1 Part 2 of the Environmental Permitting Regulations applies.

Consultation with the Environment Agency in 2018 confirmed that this approach was appropriate. Copies of the correspondence is in Appendix A

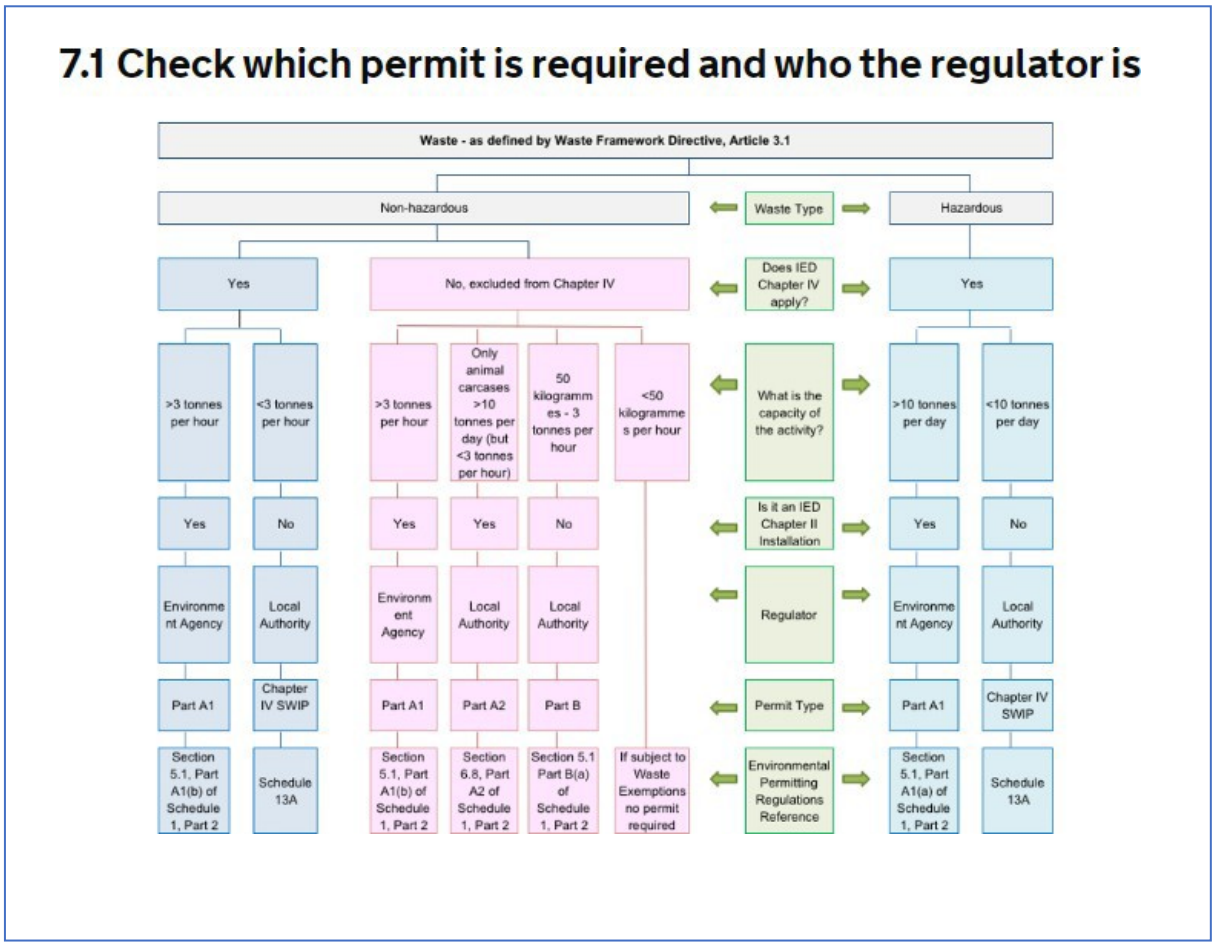

Figure 1 Decision tree of permit type and regulator[1]

The use of COS as a fuel in a power generation plant is permissible, if it is deemed to be wood waste as described in Chapter 4 of the Industrial Emissions Directive:

"wood waste with the exception of wood waste which may contain halogenated organic compounds or heavy metals as a result of treatment with wood preservatives or coatings"

In order to permitted to use COS (as it is a waste), the plant should meet the requirements of Process Guidance Note 1/12(13) Statutory guidance for combustion of waste wood (Revised: July 2013).

To satisfy the regulating authority that the plant is accepting material suitable for use as a fuel and is operated to appropriate environmental emission standards this application set outs:

- a brief description of the plant
- what sources of atmospheric emissions there are at the Plant
- How these emissions are or will be controlled to meet the requirements of the Environmental Permitting Regulations as expressed in the Process GuidanceNote.

[1] https://www.gov.uk/government/publications/environmental-permitting-guidance-the-waste-incineration-directive/environmental-permitting-guidance-waste-incineration

This document identifies (if any) what modifications to the existing plant would be required and identifying changes that would be made to:

- operating limits and procedures
- reporting procedures
- the records that will be kept in order to operate the plant and control the emissions from the Plant to meet the regulatory Environmental requirements.

3. Plant Description

The power plant comprises a fuel store, fuel handling and processing equipment, a moving grate combustor complete with cyclone separators, boiler raising superheated steam, flue gas handling equipment such as fans and ducting, a baghouse, flue stack, and a steam turbine generator to produce electricity.

The boiler is a typical steam/water cycle plant consisting of a deaerator, economisers, steam drum, a fire tube boiler, superheaters and a condenser and wet cooling tower.

This is shown below in (Figure 2) the schematic of the plant:

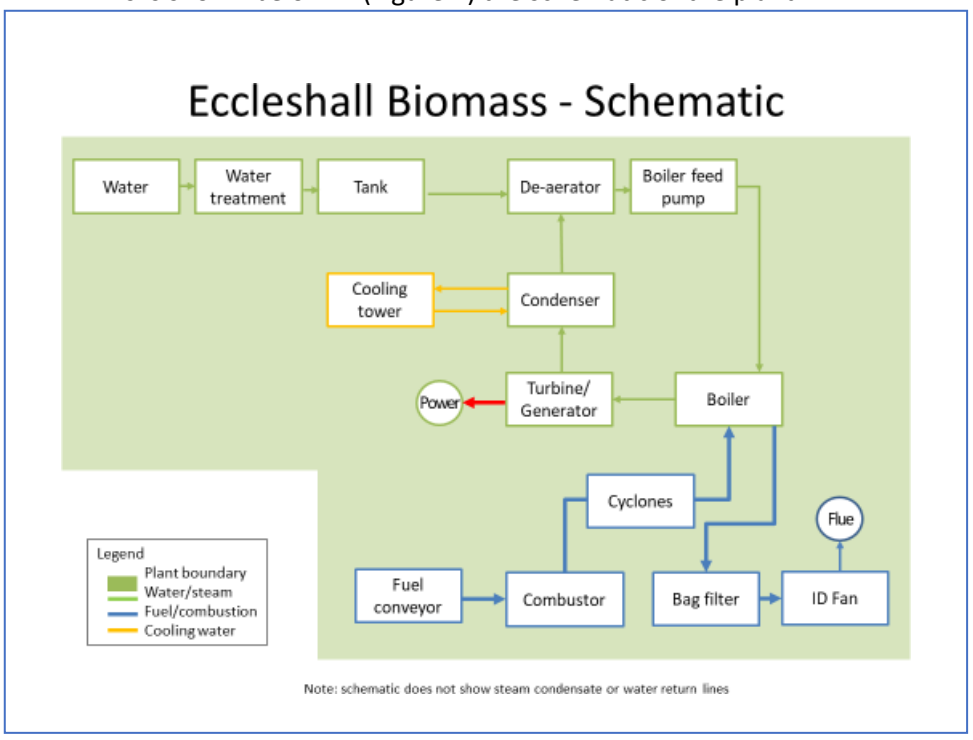

Figure 2 Schematic of the Plant

3.1. Plant Operation - overview

Wood chip is delivered to the plant from several suppliers and is derived from forestry, parks, road and agricultural sourced wood cuttings. Each delivery is weighed, visually inspected, and tested for moisture content, and the result recorded.

This wood chip (fuel) is then stored for up to 10 days in 1 of 2 fuel bays before being transferred into the fuel bunker via a loading shovel.

Once the fuel has been placed in the fuel bunker, the automated overhead crane stores the fuel and then then loads a walking floor with drag chain conveyor which feeds fuel onto the main combustion grate via 2 sets of metering feed screws.

The fuel is burnt in the furnace on an inclined moving grate. Combustion is controlled to meet heat demand by automatically adjusting the fuel flow and combustion air flows.

Fuel moves down the grate over a period of approximately four hours at a temperature of over 900^{o}C. At the end of the grate, all of the fuel is combusted, the residual hot ash is quenched in water and discharged via a conveyor.

Hot flue gases exit the combustor via 2 cyclones, designed to reduce the amount of particulate carry over from the furnace, prior to passing through the superheater, boiler, economiser, and particulate bag filter before being discharged from the stack.

Heat energy from the combustion gases, is recovered to produced superheated steam in the boiler. The steam passes through the steam turbine (converting thermal energy into electricity) and condenser before being pumped into the deaerator through the boiler again to repeat the cycle of energy recovery in a closed loop.

The operation and control of the plant is undertaken by the operators using a Distributed Control System (DCS) that gathers process control parameters and provides the operator interface for controlling the plant. Within the DCS system is a plant supervisory control and data acquisition (SCADA) system that allows the operator to monitor and control the plant. It also records and logs plant performance and operating parameters.

3.2. Plant Operation - Combustion control

The plant at Eccleshall has been designed such that the combustion control includes

- fuel content and its rate of feed;
- primary, secondary and tertiary combustion air control
- temperature(s) in the combustor, the boiler, baghouse and exit gas stack
- flue gas oxygen levels.

The fuel system allows continuous feeding on to the grate where the primary, secondary and tertiary air controls maintain combustion conditions to allow full burn-out of the fuels and effective heat transfer to the water/steam cycle.

The system has been designed to produce low levels of emissions, once the heat energy has been recovered the combustion gases pass through a particulate filter (baghouse) prior to exit via the flue stack.

3.3. Operational management

The site is operated by a competent site team who have been trained in the operation and maintenance of the plant. The plant is continuously manned for 24 hours per day.

As well as normal operations the plant is regularly inspected and maintained to meet the statutory requirement of Pressure Systems Regulations, and with good industry practice.

3.4. Maintenance

Periodic maintenance of specialised plant is undertaken by competent contractors with the appropriate knowledge, skills and training to undertake the work safely and within OEM or industry guidelines.

The records of maintenance activities undertaken at the site are recorded in the daily log and where appropriate, records and inspection reports provided by the contractors used to complete the tasks in accordance with statutory or good industry practise to ensure the plant operates safely and within its design limits of throughput and emissions.

Maintenance records are held at site.

4. Emissions sources

The plant meets the requirement of the current planning consent conditions and environmental standards.

This includes:

- control and management for surface water, process water and cooling water such that any discharges from the site are via a connected sewer or evaporation from the cooling tower.
- control and management of gaseous emissions including particulate from the combustion process
- the storage of bottom ash from the moving grate combustor
- the storage fly ash from the combustor and baghouse

4.1. Sources of emission

The table below set out the current (or potential) emissions to air from the Plant.

Location	Substance	Source	Type
Yard and access road	Dust from road borne vehicular movement	Fuel delivery vehicles	Fugitive
Fuel store	Dust and odour	Wood chip	Fugitive
Flue stack	Dust	Combustion gases	Point
Flue Stack	Carbon dioxide	Combustion gases	Point
Flue stack	Carbon Monoxide	Combustion gases	Point
Flue stack	Oxygen	Combustion gases	Point
Flue stack	Oxides of Nitrogen	Combustion gases	Point
Flue stack	Organic compounds	Combustion gases	Point
Cooling Tower	Water Vapour	Condenser cooling water	Point
Cooling Tower	Organic compound	Condenser cooling water	Point
Bottom ash stockpile	Dust	Combustor ash	Fugitive
Baghouse discharge hoppers	Dust	Baghouse dust	Point
Fly ash storage	Dust and odour	Combustor ash	Fugitive

5. Emission abatement

The following table identifies the current abatement techniques deployed at the Plant to limit or reduce the emissions to atmosphere.

The original design of the plant included abatement measures as part of the original concept design and in most case these are adequate for the control of emissions to air even with the proposed change in fuel type (which the plant was originally designed to accept).

Location	Substance	Source	Type	Current Abatement technique	Control measures	Monitoring Frequency
Yard and access road	Dust from road borne vehicular movement	Fuel delivery vehicles	Fugitive	Use of covered vehicles Offloading within the fuel reception hall	Visual inspection Fuel reception operator to ensure: Fuel meets the fuel specification Yard and access roads kept clean	Daily for each load
Fuel store	Dust and odour	Wood chip	Fugitive	Limit overall quantity of fuel held on site. Access door remains closed, outside of normal operating times	Visual and olfactory inspections Dusty or odorous loads rejected and not tipped	daily
Flue stack	Dust	Combustion gases	Point	Baghouse filter	All flue gases to pass through the baghouse during operation.	Continuous Dust monitoring
Flue stack	Carbon Monoxide	Combustion gases	Point	Combustion control system to ensure excess Oxygen is available for complete combustion	Continuous monitoring of flue gas Oxygen content	Continuous control and trend logging
Flue stack	Oxygen	Combustion gases	Point	Combustion control system to ensure excess Oxygen is available for complete combustion	Continuous monitoring of flue gas Oxygen content	Continuous control and trend
Flue stack	Oxides of Nitrogen	Combustion gases	Point	Combustion control system to ensure excess Oxygen is available for complete combustion	Manual extractive sample	Demonstrable upon commissioning and after any subsequent substantial change to the installation
Flue stack	Organic compounds	Combustion gases	Point			
Cooling Tower	Water Vapour	Condenser cooling water	Point	Monitor performance of the water/steam cycle Limit use of excessive water consumption through management of water /steam cycle	Monitor and record the usage of water and chemical dosing Ensure the water recycle rate remains 1.7-2.5 times the throughput [• check with Ian Mitchel]	

Cooling Tower	Organic compound	Condenser cooling water	Point	Chemical dosing with biocide to control the level of organic content in the water	sampling of [•] addition of biocide based on sample results	weekly
Bottom ash stockpile	Dust	Combustor ash	Fugitive		Check ash condition Dampen with water if pile is dusty	daily
Baghouse discharge hoppers	Dust and odour	Baghouse dust	Point	Follow procedure for emptying hoppers	Open storage bag and secure around discharge chute, prior to opening hopper slide valve. Seal storage bag after filling and prior to moving to stockpile	As part of emptying hoppers and daily
Fly ash stockpile	Dust and odour	Baghouse dust in storage bags	Fugitive	Follow procedure for full bulk bags	Check bags are sealed Inspect bags for mechanical damage	As part of storing bulk bags

6. Unintentional releases

The plant has been designed to limit or prevent the release of substances to the atmosphere under normal operating conditions. However, under abnormal conditions there is a possibility the substances can be released to atmosphere. Therefore, the following table below identifies the potential source, the likely outcome of a release and the corrective action required to stop the release considering the current abatement technique deployed at the Plant.

In addition, an assessment has been also been made to consider whether further changes are required to the current installation or procedure, because of introducing COS as a fuel for the Plant. Where the last column states ‘no’ then the current measures are deemed adequate. Where the column indicates a ‘yes’ then further measures are proposed under the section 8 of the application.

Location	Substance	Source	Emission	Location	Substance	Source	Emission
Yard And access road	Dust from road borne vehicular movement	Fuel delivery vehicles	Fugitive	Yes – no history of local complaint	Non- hazardous material see risk assessment	Yard and access roads kept clean	No
Fuel store	Dust and odour	Wood chip	Fugitive	Yes – no history of local complaints	Non- hazardous material see risk assessment	Local spraying of water to control dust Process material via combustor	No
Flue stack	Dust	Combustion gases	Point	Yes - Baghouse filter can be considered BAT for flue gas filtering		Monitor dust levels through routine inspection of baghouse	[Yes]
Flue stack	Carbon Monoxide	Combustion gases	Point	Yes - Combustion control system to ensure excess Oxygen is available for Complete combustion	Transient release Minimal impact see dispersion model	Increase oxygen content	No
Flue stack	Oxides of Nitrogen Oxide	Combustion gases	Point	Yes -Combustion control system to control set up to limit NOx production	Transient release – minimal impact see dispersion model		[Yes]
Flue stack	Organic compounds	Combust ion gases	Point	No requirement to sample			Yes
Cooling Tower	Organic compound	Condenser cooling water	Point	Yes – dosing water to prevent organic compounds	[• insert risk assessment finding]	Adjust chemical treatment based on monitoring results	No

Location	Substance	Source	Emission Type	Current Abatement technique adequate	Impact of release	Corrective action	Change Required
Bottom ash stockpile	Dust	Combustor ash	Fugitive	Yes	Transient condition - see risk assessment	Local spraying of water to control dust	No
Baghouse discharge hoppers	Dust	Baghouse dust	Point	Yes	Small quantities, transient condition see risk assessment	Follow ash removal procedure	No
Fly ash stockpile	Dust	Baghouse dust in storage bags	Fugitive	Yes	Small quantities, transient condition see risk assessment	Local spraying of water to control dust	No

7. Monitoring

Records of the plant performance and results of any extractive monitoring and testing are held on site. These comprise of records of inspections, tests and monitoring, including all non-continuous monitoring, inspections and visual assessments to meet requirement of our planning consent, statutory requirement under the Health and Safety at Work Act, operations and maintenance work undertaken. The records are:

- kept on site;
- kept by the operator for at least two years; and
- made available for the regulator to examine.

With the addition of COS as a fuel, the existing fuel acceptance procedure and records will be modified to include the requirements of recording and tracing waste movements and disposal under the waste regulations.

In addition, if required by the permitting authority any abnormal operations will be recorded and the local authority informed

8. New requirements to existing operation

8.1. Training

The Plant Manager will be trained and certified as technically competent in waste management by an accredited training provider.

8.2. Fuel acceptance criteria

To accept COS at the Plant, EBL will adopt Duty of Care procedures as required under section 34 of the Environmental Protection Act 1990:

- Waste Transfer Note - Identifying the source of the material and the supplier
- Graded size and description including EWC identifying the material type

This would provide traceability for the material back to its originating source as suitable waste and clean wood for use as a fuel.

8.3. Operation

Once COS is received into the fuel store, the method of fuel handling and controlling combustion is the same as is used now to burn wood chip.

8.4. Record keeping

The Plant will keep weighbridge records of all fuel deliveries to site in the form of

- Tonnage received
- Customer name and delivery ticket
- Material description/source – in the case of wood derived from waste the EWC and waste transfer consignment note. In the case of recovered materials classified as a waste.
- In the case of clean wood/biomass a description of the material as indicated on the weigh bridge ticket

8.5. Fuel compliance auditing

In order to satisfy ourselves the fuel meets the requirement of the process plant and is not impacting on the technical performance of the plant, then the following practices will be carried out on site.

- Sampling of fuel deliveries
- On site testing of moisture content
- A record of all fuel deliveries to site
- Visual inspection of each load and a random sampling [insert standard/testing procedure Equipment].
- In addition to individual load inspection and sampling, at least monthly, a composite sample of the fuel stock will be taken to determine the energy, moisture an ash content as delivered and in dry conditions. The sampling will be undertaken by [insert Accredited testing plant and testing criteria]
  Material rejection. Fuel deliveries will be rejected when the material fails to meet the delivery criteria based on the sample testing and visual inspection, prior to the load being tipped.

  Visual inspection

Additionally, the fuel suppliers will be formally audited at least once per year to demonstrate that the origin and processing of the material is being maintained.

8.6. Monitoring of combustion gases

In addition to the monitoring of COS as fuel input to the Plant, as a result of introducing clean waste wood, the following gaseous emission limits would be introduced, and the plant performance monitored against them. Any deviations against those limits would be recorded and reported to the Local Authority

Substance	Source	Emission limit[2]	Type of monitoring	Monitoring Frequency
Carbon monoxide	Combustion gases	225 mg/m3	Manual extractive testing	Annual
Total Particulate Matter	.	200mg/m3	Quantitative monitoring Visual and audible alarm and record	Continuous
.	.	.	Manual extractive testing	Annual
Oxides of Nitrogen (NOX)	Combustion gas	.	Demonstrable upon commissioning and after any subsequent substantial change to the installation	.
Organic Compounds	Combustion gases	20gm/m3	Manual extractive testing	Annual
Oxygen	Combustion gases	.	Quantitative monitoring and record	.

[2] Reference conditions for the limits 273.1K, 101.3kPa, 11% oxygen

9. Environmental Management

The Plant will continue to be managed to minimise or reduce where practicable the impact on the local environment. This will include an inventory of emissions to air, water and land as well as the use of materials for the safe operation of plant.

Where possible the aim is to minimise the use of materials or use materials that have a lower impact upon the environment. Where the activities undertaken at the Plant result in an emission to the environment this will be monitored, impact of such emission assessed and where possible measure taken to reduce the impact where it is safe and practical to do so.

Periodically and at least bi-annually the emissions and use of raw materials will be reviewed to determine whether the current measures for monitoring and reducing the environmental impact of the Plant can be improved.

Records of the environment management will be retained on site.

10. Environmental Impact Assessment

Insert Amanda Owen's findings and summary from the dispersion model

11. Conclusion

[Insert conclusion]

Craig Ibbetson
2020-06-01 09:46:00

Do we mean legionella?

Appendices

Appendix A – relevant correspondence

Appendix B – Policies, Procedures and Assessment

[Policies]

[procedures]

[COSH Assessment]

Appendix C - [Records]