BROWNHILL SKIP HIRE LIMITED

SUPPORTING DOCUMENT: APPLICATION FOR A SMALL WASTE INCINERATION PLANT PERMIT (SWIP)

SWIP Part A Application Summary

5) BAT (Best Available Technology)

FAQ

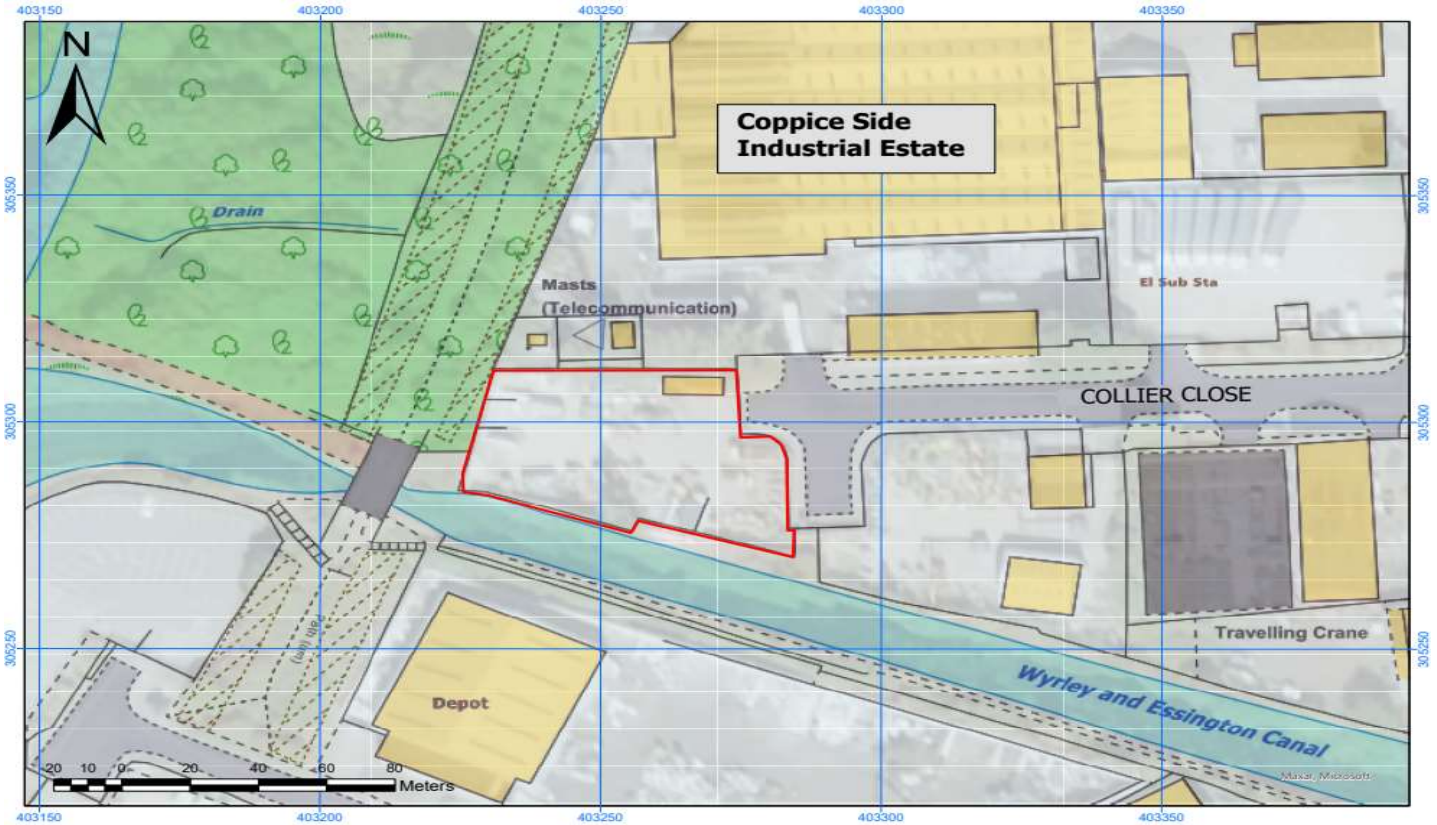
Executive Summary

Brownhills Skip Hire Ltd is making this application for a Small Waste Incineration Plant (SWIP) Permit, Part A application under The Environmental Permitting (England and Wales) Regulations 2016 for the proposed operation of a low carbon CHP facility at our site in Collier Close, Brownhills, Walsall WS8 7EU.The proposed Energy Recovery development is an Advanced Thermal Treatment Plant (ATTP) and preparation facility utilising mixed wastes to produce approximately 70kWe of renewable energy for internal use and export to the grid infrastructure facilities.

The process has been designed to operate at a maximum rate of approximately 3 tonsper hour (based on six machines) and is mechanically limited through both the feedrate of the fuel feed mechanism, the thermal capacity of the ATTP and associated forced draft extraction fans. Assuming the maximum throughput rate of the process isachieved, and the plant is operated for the maximum potential annual operating hours,there is a theoretical annual maximum throughput of 24,000 tons.

For the initial installation at Brownhills Skip Hire, we will be looking for a permit of circa 500kgs.hr (approx. 4,000 tons/annum). Accordingly, the SWIP Activity will be operated in accordance with the EnvironmentalPermitting (England and Wales) Regulations 2016 and Chapter IV of the Industrial Emissions Directive.

Site Location/Satellite Image



Overview of procedures

All fuel will be delivered directly to the site through the delivery entrance and weighedthen it will be tipped ready for manual sorting. Once sorted, the proposed waste will be size reduced to 80mm using shredding equipment. The output product, termed as Refuse Derived Fuel (RDF) is loaded into the storage bunkers. The Fuel Storage is in accordance with the relevant Fire Prevention Plan Guidance.

The feed handling system will be an open top container. It will be filled using a Telehandler. The feed handling system will supply the fuel to the ATTP. The material feed will be discharged onto a conveyor that transports the fuel to the ATTP. The scraper conveyor will feed into a trough that uses a screw feeds to transport it from the feed handling system into the ATTP Primary Chamber. The exhaust heat is directed through a refractory lined Secondary Chamber where the gasses are retained for a minimum of 2 seconds at 850 degrees Celsius. This is in compliance with the International Emissions Directive (IED). From here the exhaust gasses pass on to a heat exchanger. The heat exchanger facilitates the use of the thermal energy from the combustion process, and transfers this to our. The resultant air then returns to the stack.

The by-products of the ATTP process are controlled residues and tramp material (clinker, metals etc). Residue is collected in a water cooled ash bed (for the Primary Combustor) directly from the scraper conveyor and is emptied into a further container to dry and be exported off the site. This inert ash can be also used as a material substitute in the concrete/ tarmac industry. Tramp material is segregated into a separate container and exported off site for disposal or reuse.

Emissions to Air

The emissions release point will be fitted with MCERTs compliant continuous emissions monitoring (CEMS) equipment to facilitate management and control of airborne emissions. All emissions monitoring and sampling will be in accordance with EA M1 and M2 Guidance requirements. The system will be supplied by CBISS, which are a globally respected partner for emission monitoring.

Detailed dispersion modelling has been undertaken to determine the potential air quality impacts associated from the activity.

The assessment concludes that impacts on existing pollutant concentrations are not predicted to be significant at any identified receptor location and therefore fully complies with the assessment criteria.

Odour

Predominantly, the feedstocks will be pre-prepared (shredded and screened) prior to being moved to the Feed Storage System, thus reducing the potential for airborne nuisance issues (dusts, odours etc). Due to the nature of the mixed waste feedstocks being used in the process, there is no potential for offsite odour impacts to arise from this process.

Emissions to Controlled Water

There will be no direct process emissions to controlled water arising from the SWIP. The boiler house will have a sealed underground drainage tank, which all water from the boiler house is drained into. The water draining into the drainage tank would only be due to service of wet scrubber and boiler or spillage. The capacity of the drainage tank is adequate to hold the full capacity of the water in the system.

The water is recycled into the wet scrubber unit from the underground tank. Any excess that may occur is to be removed by a wastewater management company.

All excess water will need to be disposed of appropriately, this is the customer responsibility.

Emissions to Land

There will be no emissions to land arising from the SWIP.

1 Waste Feedstocks

The process has been designed to always operate at a rate of approximately 0.5 tons per hour and is controlled by the parameters programmed into the plant control panel to meter both the feed rate of the fuel and the input air.
Assuming the 500kg/h throughput rate of the process is achieved and the plant is operated for the maximum annual operating hours, there is a theoretical annual throughput of 4,000 tonnes (maximum of 500kg/h x 8,000 run hours per annum).

All fuel will be delivered directly to the site through the delivery entrance and weighedthen it will be tipped ready for manual sorting. Once sorted, the proposed waste will be size reduced to 80mm using shredding equipment. The output product, termed as Refuse Derived Fuel (RDF) is loaded into the storage bunkers. The Fuel Storage is in accordance with therelevant Fire Prevention Plan Guidance.

The feed handling system will be an open top container. It will be filled using a Telehandler. The feed handling system will supply the fuel to the ATTP. The material feed will be discharged onto a conveyor that transports the fuel to the ATTP. The scraper conveyor

will feed into a trough that uses a screw feeds to transport it from the feed handling system into the ATTP Primary Chamber.

Premade RDF may be delivered to site to an agreed specification stated within fuel supplycontracts. Feedstock's will either be put straight into the storage bays before being processed or they will be brought straight in to be put in the process. Materials will be screened and pre-prepared before delivery to site.

Prior to processing, all wastes accepted on site are subjected to stringent waste acceptance criteria in accordance with the site's environmental management plan and associated procedures:

- Waste Pre-Acceptance;
- Waste Acceptance; and
- Waste Rejection.

A detailed list of European Waste Catalogue (EWC) codes of wastes that will be accepted by the Installation is covered in Appendix F). The only wastes assigned with EWC codes listed in our application will be those already covered under the EA Waste Handling Licence, after a pre unload inspection of the delivered material. If any material is delivered to sitewithout an assigned EWC the load will be rejected and turned away. If the load on is notas description for the EWC code on pre unload inspection it will also be rejected following our Operational and Environmental management plan.

2 Delivery & Reception of Waste Procedure

2.1 Pre-Acceptance

Before we take delivery and receipt of waste, we first need to ensure all precautions are considered before we do this.

2.1.1 All new enquiries relating to waste (other than standard delivery queries) for the site are to be directed to the technical department.

2.1.2 The technical assessor dealing with the enquiry will undertake the following.

- Check that the waste will conform to the permitted waste types and EWC codes.
- Carry out an analysis on the material if required.

2.1.3 If the waste can be accepted, the customer will be provided with the terms and conditions of acceptance and price quoted.

2.1.4 On receipt of a customer order a unique order number will be allocated and the following information confirmed with the customer:

- Material description and quantity in tonnage
- Price
- Collection/delivery date
- Weighbridge Ticket details
- Unique order number

2.2 Waste reception on site

2.2.1 Waste will only be delivered by prior arrangements as set out above and will be subject to the duty of care procedures.

2.2.2 All drivers will park within the holding zone and make their presence aware to site staff.

2.2.3 All vehicles authorised to enter the site will enter through the gates

2.2.4 All materials delivered to the site will be subject to visual inspection and checks prior to the point of unloading to confirm the following:

- The waste types and quantities conform within permits use
- The condition and stability of the load is safe

2.2.5 The waste shall be unloaded into the unloading area. Materials will only be accepted onsite if there is adequate space to receive the load. Once checked off, the fuel in the storage area is then moved into the feed storage bunkers until used for thermal treatment.

2.2.6 Any waste load delivered that is identified as a non-conforming load, to the confirmed customer order, will be held on the vehicle whilst an investigation is carried out as to the rejection, or not, of the load, subject to the non-conformance. In cases of a rejected load a record of the rejection will be made and if necessary, the Environment Agency and/or Local Authority will be informed.

3 Amenity Management and Monitoring

3.1 Control and monitoring of Emissions, Dust Fibres and Particulates Operational Monitoring

3.1.2 The site boundary will be inspected for visual evidence of emissions, dusts, fibres or particulates continually each working day. A record of the inspection will be made if any abnormal occurrences occur.

3.1.3 Site staff will visually monitor the site for evidence of emissions of dusts, fibres and particulates throughout the hours of operation. If significant emissions are identified staff will inform management.

3.1.4 Operators will monitor the emissions from the ATTP monitoring system. The monitoring system is fully connected to the web and can be viewed fromany computer or mobile device that has passworded access to it.

3.1.5 Bio Renewables will also monitor the emissions from the ATTP using the monitoring system.

3.1.6 Should any significant emissions be identified from the operations; remedial action will be taken immediately.

Actions

3.1.7 Any complaints or reports relating to dust fibres or particulates from the operations will be investigated immediately.

3.1.8 Assuming a source can be identified, remedial action will be taken to prevent or minimise the emissions as soon as is practicable.

3.1.9 If the emissions, fibres or particulates cannot be reduced to acceptable levels, the operation generating the emissions will be stopped as soon as it is safe to do so and not recommenced until remedial actions has been taken.

3.1.10 If any emission level is breeched, complaints and remedial actions will be logged following the appropriate managerial and operational procedures.

3.2 Control of Odours

3.2.1 The site is unlikely to be a significant source of odours. The business has been running for 25 years, prior to this application, and the waste hasn't caused any adverse odour management.

Operations Monitoring

3.2.2 The site perimeter will be subject to continual monitoring each working day when operations are being undertaken.

3.2.3 Site staff will monitor the site for evidence of odours throughout the hours of operations. If significant odours are identified, staff will inform the management.

3.2.4 Should any significant odours be identified action will be taken immediately.

Actions

3.2.5 Any complaints or reports relating to odours from the operations will be investigated immediately.

3.2.6 Should any significant odours be identified; remedial action will be taken to prevent or minimise the odours as soon as is practicable. This may include improving the containment of any stored waste causing odours or arranging

for it to be consigned to a suitable licensed waste management facility as soon as it is practicable.

3.3 Control and Monitoring of Noise

3.3.1 There are likely to be no significant sources of noise from Brownhills Skip Hire operations.

Operational Monitoring

3.3.2 The site perimeter will be subject to continued noise evaluation once each working day when operations are being undertaken.

3.3.3 Site staff will aurally monitor the site for evidence of elevated noise levels emanating from operations throughout the hours of operation. If significant elevated and persistent or recurring noise is identified they will inform the technically competent senior management.

3.3.4 Should any significantly elevated noise be identified as emanating from Brownhills Skip Hire operations, action will be taken immediately.

Actions

3.3.5 Any complaints or reports relating to noise from the operations will be investigated immediately.

3.3.6 The source of the noise will be identified, and where related to Brownhill Skip Hire, remedial action will be taken to prevent or minimise the noise as soon as ispracticable.

3.3.7 If noise levels cannot be reduced to acceptable levels where Brownhills Skips Hire is responsible, the noisy operation will be stopped as soon as it is safe to do so and not recommence until remedial action has been taken.

3.3.8 Any elevated noise levels, complaints and remedial actions from Brownhill Skip Hire operations will be logged following the managerial and operational procedures.

3.4 Control of Pest Infestations

3.4.1 The operations are unlikely to cause any pest infestations.

Operations Monitoring

3.4.2 The site will be inspected once each working day for the presence of pests such as insects and vermin and a record of the inspection made.

3.4.3 If site staff identify any insect or vermin infestation, they are to immediately inform the management.

3.4.4 Should any infestation be identified; action will be taken immediately.

Actions

3.4.5 Any complaints or reports relating to pest infestations from Brownhill Skip Hire operationswill be investigated immediately.

3.4.6 A specialist pest control organisation will be contracted as soon as is practicable to eliminate the infestation.

3.4.7 The cause of the infestation will be investigated and wherever practicable the source will be permanently removed.

3.4.8 Any infestations, complaints and remedial actions will be logged following the appropriate management police and procedure.

3.5 Control of Scavenging Birds and Other Scavengers

3.5.1 The operations are unlikely to cause any pest infestations, but we will set up a contract with a local pest control company for general precautions.

Operations Monitoring

3.5.2 The site will be inspected once each working day for the presence of scavengers such as birds and foxes and a record of the inspection made.

3.5.3 If site staff identify any scavengers, they are to immediately inform the management.

3.5.4 Should any persistent scavengers be identified, action will be taken as soon as practicable.

Actions

3.5.5 Any complaints or reports relating to scavengers will be investigated immediately.

3.5.6 Action will be taken to discourage scavengers for example by removing any food source or improving enclosure to prevent access.

3.5.7 Any reports of scavengers, complaints and remedial actions will be logged following the appropriate managerial and operational procedures.

3.6 Control of Litter

3.6.1 The operations are unlikely to be a significant source of litter from Brownhill Skip Hire operations.

Preventive Measure

3.6.2 All wastes will be stored in proprietary skips or similar containers.

Operations Monitoring

3.6.3 The site and the site perimeter will be inspected once each working day for the presence of litter and a record of the inspection made.

3.6.4 Site staff will visually monitor the site for litter during the hours of operation.

Actions

3.6.5 Any litter within the site and any litter beyond the site boundary that emanated from Brownhill Skip Hire operations will be collected as soon as is practicableand at least on the same working day.

3.6.6 Any complaints relating to litter will be investigated immediately and any litter emanating from the site collected as soon as is practicable.

3.6.7 Any complaints and remedial actions relating to litter will be logged following the appropriate managerial and operational procedures.

4 Information and Site Records

4.1 Security and Availability of Records

4.1.1 The following records will be retained securely within the offices at the site:

- Site polices & procedures
- Completed routine inspections
- Copy of management system
- Copy of licensing, exemptions and permits.
- Duty of care transfer notes
- Records of the following:
  - Waste types & quantities delivered, with dates
  - Waste types & quantities despatched, with dates

- Waste types & quantities processed, with dates
- Waste tracking records (order numbers etc.)
- Pre-acceptance data
- Waste loads rejected

- Testing, inspection, maintenance and calibration records as appropriate for the following:
  - ATTP
  - Forklift and other handling equipment
  - Any other machinery
  - Laboratory Equipment
  - Weighing equipment

4.1.2 Brownhills Skip Hire records will be available for inspection by the EnvironmentAgency/Local Authority during operating hours.

4.1.3 Records will be retained for a minimum of 5 years, or any statutory period, whichever is the longer period.

4.2 Records of Waste Movements

4.2.1 A record will be kept of each load of waste accepted and removed from the site. The record will include the following details:

4.2.2 Loads in:

- Waste type/description
- EWC code
- Quantity and Weight
- Date order was received
- Date order was accepted
- Unique order number
- Customer/Waste producer
- Video monitoring of loads may also available on the day.

4.2.3 Loads out - rejected waste deliveries or residue:

- Waste type/description
- EWC code
- Quantity and Weight
- Date removed

- Video monitoring of loads may also be available on the day.

4.3 Reporting

4.3.1 All reports and notifications required by the permit shall be sent to the Local Authority using the contact details supplied in writing by the Local Authority.

4.3.2 A summary report of the waste types and quantities accepted, removed and processed from the site shall be made for each quarter. It shall be submitted within one month of the end of each quarter and shall be in a format required by the Local Authority if requested.

4.4 Notifications

4.4.1 The Local Authority shall be notified without delay following the detection of:

- Any malfunction, breakdown or failure of equipment or techniques, accident or fugitive emission which has caused, is causing or may cause significant pollution.
- Any significant adverse environmental and health effects.

4.4.2 Written confirmation of actual or potential pollution incidents shall be submitted within 24 hours.

4.4.3 Written notification shall be given to the Local Authority of the following events and in the specified timescales:

- As soon as practicable prior to the permanent termination of any of the activities,
- Termination of operation of all or part of the activities for a period likely to exceed 3 months.
- Resumption of the operation of all or part of the activities after a termination of more than 3 months or after notification under the above.

4.4.4 The Local Authority will be notified within prior to occurrence of the following matters except where such disclosure is prohibited by stock exchange rules:

- Any changes in the license holders trading name, registered name or registered office address
- Any change to particulars of the license holders ultimate holding company (including details of an ultimate holding company where a license holder has become a subsidiary
- Any steps taken with a view to the license holder going into administration, entering into a company voluntary arrangement or being wound up.
- If the license holder is not the operator: any change in the operators trading name, address, registered name or registered office address.

4.5 Site Management System

4.5.1 The site management system will be retained securely on site and will include a record of the following events:

- Start and finish date for operations undertaken at the site.
- Plant maintenance dates and records of any breakdowns.
- Problems with waste received and any actions taken
- Despatch of records to the Local Authority
- Environmental problems and remedial actions
- Complaints and remedial actions
- Leaks and spillages and remedial actions
- Fire drills and external inspections of fire equipment
- Fires and remedial actions
- Routine inspections, tests and exercises.

4.6 Plant & Equipment Design

4.6.1 Any equipment used will be fit for the purpose of its designated role. Records of the manufacturers, suppliers and specification of equipment used in the transfer station, will be maintained at the site.

4.6.2 The equipment will not be operated beyond the design specification.

Installation

4.6.3 The installation, testing and commissioning of all equipment will be undertaken by competent personnel.

4.6.4 All records of installation and commissioning will be retained.

Operations

4.6.5 Suitably trained and qualified staff will undertake the operations. A record of training will be retained.

4.6.6 Operation of the site will be undertaken in accordance with the Work Instructions and Procedures specific to the site.

Inspection & Maintenance ATTP maintenance

4.6.7 The equipment will be inspected visually before each shift and an inspection list completed and signed by the operator. If any defects are identified the machine will be withdrawn from service and no further work undertaken until defects are remedied and the machine is passed fit for service.

4.6.8 A note of any defects, repairs and routine maintenance will be made and a record kept in the Site Diary.

4.6.9 A schedule of inspection and maintenance intervals will be kept for the machine noting items requiring maintenance and he frequency of the maintenance.

4.6.10 A record of maintenance will be retained for a period of at least 3 years.

4.7 Staffing & Supervision

4.7.1 The site management team would be as follows:

- Technically Competent Management (on call 24/7)
- 1Site Supervisor & Operatives.
- A level 4 WAMITAB person will be onsite.

4.7.2 During the hours when the site is open for the receipt and dispatch of wastes or carrying out the operations there will be a minimum of one member of staff on site who is fully conversant with the requirements of the Management System License/Permit.

4.7.3 The Local Authority will be notified within 7 days of any changes in technically competent management and the name of any incoming person together with evidence that such person has the required technical competence.

4.7.4 The Local Authority will be notified within 14 days if the license holder and/or any relevant person being convicted of a relevant offence (unless such information has already been notified to the Local Authority), with details of the nature of the offence, the place and date of conviction, and the sentence imposed.

4.7.5 The Local Authority will be notified within 14 days if the license holder and/or any relevant person lodging an appeal against a conviction for any relevant offence and of the outcome when the appeal is decided.

4.7.6 Site job roles and training

Job role	Management	Supervisor	Staff
Training required	✓	✓	✓
Environmental			
Supervision of Waste management	✓	✓	✓
Polices & Procedures awareness	✓	✓	✓
Permit awareness	✓	✓	✓
Waste reception	✓	✓	✓
Waste storage	✓	✓	✓
Operations/maintenance			
Maintenance of Feed System	✓	✓	✓
Maintenance of Conveyors	✓	✓	✓
Maintenance of ATTP	✓	✓	✓
Maintenance of Emission monitoring equipment	✓	✓	✓
Accidents & emergencies			
Fire procedure	✓	✓	✓
Plant failed procedure	✓	✓	✓
Accident management plan	✓	✓	✓

5 BAT (Best Available Technology)

FAQ

Who is Bio Renewables?

Bio Renewables Ltd provides their own new and innovative technology for converting the energy contained within various waste streams into usable heat, in a process known as ***"Advanced Thermal Treatment"***. Their product, the ***ATTP***, delivers a unique and innovative option for organisations desiring growth within the renewables sector.

What do they do?

They provide a solution for organisations that wish to thermally treat waste materials and produce heat energy. Their ATTP is a complete hopper-fed, thermal destruction and residue collection system with a self-contained circa 500mm diameter exhaust duct – all within a footprint of 20.0 x 7.0m x 6.5m. The ATTP destroys the waste to an inert ash, and converts energy held within a variety of materials to Energy Recovery. This results in an increased efficiency, low emissions and reduced residue outputs.

What can be used as fuel?

The system can process most organic energy containing materials with a Calorific Value (CV) level above 15MJ/kg (Megajoules per kilo). Suitable materials must be prepared so that the system can maximise energy recovery and this relies upon feed particles being small (below 80mm) and have a moisture level below 20%. Feed fuel should be free of inerts such as metals or glass as their presence, as well as large fuel particles and increased moisture could affect reaction temperatures, levels of residue and emissions.

What are the environmental benefits?

Their ATTP system has been designed and developed to maximise the efficiency of waste fuel energy conversion to heat. This is done by ensuring that the fuel is adequately prepared so that it will more readily give up its latent energy when fed into the ATTP. The ratio of heat, air and fuel is constantly monitored, which in turn means that volatilisation of a given fuel is carried out as effectively as possible. The resultis that other than the heat produced, the ATTP emissions and residues, are consistently lower than those of conventional incineration, gasification or pyrolysis plants. With their exhaust emissions proving to be significantly lower than required by the Industrial Emissions

Directive (IED) along with producing nearly zero fly ash. Residues are typically below 10% and below many of the alternative plants.

What are the economic benefits?

Their system offers an alternative to the more usual methods of waste disposal – being landfill or incineration. These increasingly outdated means of disposal also come at considerable expense, whereas a ATTP can be incorporated both to reduce waste disposal costs within organisations and generate revenues through innovative heat and energy creation. The ATTP delivers an effective and efficient system for complete destruction of a wide variety of waste streams as well as recognised fuels, whichmeans that even if the fuel differs, their process will convert its energy into heat. Whilst doing this, their parasitic requirement, at less than 20% of potential electrical output, is lower than other methods of destruction that typically require 20%+.

How long will it last?

The ATTP has a robust steel construction that has been designed to have reduced maintenance requirements. Feed and residue processes are carried out by just two moving parts and air flow by a single fan; all monitored under our inspection and maintenance schedule. The ATTP has a life of ten years but is inspected annually and if required, can be replaced with minimum downtime. Power supply and system control are managed by maintenance free PLC and sensors.Performance data from each ATTP is fed back to Bio Renewables monitoring systems and automatically monitored, so should a component show signs of wear or damage, we will always be one step ahead.All components are immediately available keeping response times to a minimum.

How does it work?

The system core is brought to temperature using a conventional light oil burner at which point prepared feedstock is introduced. The introduced fuel immediately volatilises and increases the energy and temperature rapidly. The Primary chamber combustion ensures full volatilisation of the fuel and a residence time in excess of 2 seconds, forcing each particle convert its stored energy to heat almost instantaneously. Post the initial warm up, and usually within thirty minutes of increasing fuel and air feed, the start-up burner automatically shuts off and thefinal temperature for the process is reached a short time later. This is between 650- 850^{o}C depending on fuel type and has an associated exhaust temperature controlled within 100 - 150^{o}C depending on the client's requirements. Fully automatic start up time is achieved within thirty minutes and uses approximately fifteen litres of diesel oil. Shut down is automated with the burner coming on to ensure there is no un-processed

material;fuel feed is stopped so ending thermal destruction. Air feed continues until core temperature is at 150°C.

What fuel preparation is required?

Correctly prepared fuel-feed is the key to efficient operation within the ATTP. It is likely that materials to be used as fuel will arrive in all shapes and sizes and may need to be shredded and/or dried. All feed-fuel is required to meet the fuelspecification which states that it should have a minimum CV equal to or above 15 MJ/kg (Megajoules per kilo). Particle size must be 80mm or smaller and moisture level below 20%- in effect, the smaller and drier the better.

What is in the exhaust gas?

The process of ATTP coupled with the high operating temperatures involved result in the flue gas being much cleaner than found with standard incineration. For example, whenprocessing biomass, the emission levels are lower than required by the IED on all monitored gasses.

How is it operated?

Each ATTP is controlled by a PLC with touch screen interface. Start- up, continuous operation and shut-down are all fully automatic with minimal user interfacerequired whilst operating. During operation the input feed flow, feed moisture, air-flow and process temperatures are constantly monitored by our operating software, ensuring that an optimal excess air stoichiometric based balance is maintained for the most effectivethroughput and production of usable heat.

5.1 The Installation

5.1.1 The system requires 15-20 litres of fuel oil to start the system but that will be held in a bunded container connected to the burner. No further fuel will be required unless the temperature drops significantly (below 850c).

5.1.2 Unlike current thermal destruction technologies this system is extremely compact and modular, so ease of removal and replacement of components, as and when required.

5.2 Installation and Activities

5.2.1 The system will have a FAT (Factory Acceptations Test) prior to installationat the manufacturers and further SAT's (Site Acceptance Tests) will be carried out during the commissioning process to ensure the

ATTP is working(See Appendix C for FAT's & SAT's). With a fast start-up time and quick complete shutdown time, the ATTP is capable of being switched on and switched off in accordance with shift patterns if required or run 24/7. There is a requirement for around 15 Litres of fuel oil for start-up but once the machine is up to temperature then it is fully self-sufficient in terms of fuel required to operate. There is only one feed location for the machine and thatis at the back. The thermal section is fully enclosed and well insulated. Systems of this type and nature are extremely robust and straight forward inoperation.

There are numerous benefits to the system and some of these are:

1) Its warmup time - around 30 minutes or less. This means that there is no time for the formation of noxious gasses or emissions as with other systems.Fuel oil is used to get the system to over 850 degrees C which is past the requirement under the IED for safe operating temperatures.
2) The cool down is much quicker than current technology. The shut off time iscontrolled automatically and includes a short time with the burner on.Thermal destruction stops almost instantly. In addition, and unlike other technologies, there will besignificantly less residues left in the Thermal chamber when it is shut down.This means the chances volatilisation re-starting are negligible and the machine is in a safe condition very quickly.

Activities on site

The waste heat from the ATTP will be collected by the Heat Exchanger and converted to Electricity, to allow the plant to run with free power, but also to export the excess Electrcial Power to the National Grid – the system will be running at around 90% of its capability so around 2.0- 2.5MW thermal will be available for this process.

2.5MW thermal heat will provide enough thermal energy to run a minimum of 1 Organic Rankin Cycle (ORC) Engine (ORC spec requires between 750- 1500kw thermal). The ORC benefits from providing up to 75kwE of electrical energy. The proposed system uses 17kwE net, so not only will the ORC provide power to run the plant, but also there is provision to recover an additional 57kwE to be exported to the national grid, as a renewable source.

The monetary annual savings from this Electrical production from ATTP will be considerable and allow the process to showcase this type of process.

Brownhills Skip Hire will be operating the single ATTP both as a commercial system,

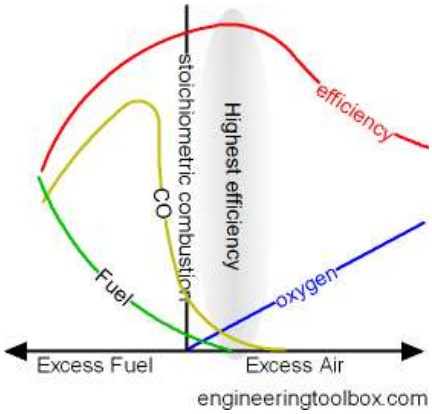
increasing there place in the Waste Hierarchy, and also provision of low carbon electrical energy to the local grid. This can be supplied under a power purchase agreement, which is not part of this environmental permitting process.

5.3 Emissions

5.3.1

Emissions are kept to a minimum during the process in the thermal core and undertaken with up to 150% excess input air. It is expected, that in commercial use, the emissions will be lower than typical IED limits due to the ATTP plant design, covered by its own Intellectual Property patent. Plant Flue Gas Data and Emissions (as an example of what can be achieved) are all measured in the exhaust stack. Classed as an ATTP, the process is capable of processing particles of waste in a fraction of a second.

Nox generation is only an issue when the excess O2 is uncontrolled. No material will be used for any length of time without a thorough evaluation of the levels ofexcess air required to maximise the destruction of the feedstock.



Plant flue gas data refers to the emissions at steady state with a stoichiometric balanceplus excess air. The system would be at optimum temperature in a fully self-sustaining mode and consuming up to 0.5 ton per hour of suitable material.

Under Part A of the SWIP we will only be processing non-hazardous materials. We havedemonstrated many times that the system can perform without issue on these types of materials and have significant amounts of data. As we will have a permanent monitoringprocess with MCERTS approved kit, we will be able to show at all stages that the ELV'sare not being exceeded.

The system can monitor the waste emissions on a constant basis, data will be available onan ongoing basis.

The system has primary combustion chamber to which an auxiliary burner is fitted. The system is designed to run in a self-sufficient state. Therefore, unless the temperature drops, the system will not use the diesel. If, however, and for a variety of reasons (low CV, badly fed, high moisture and others) the temperature drops in the chamber the

main burner is designed to come on automatically before the temperature drops below 850 degrees C. If at that point the operator chooses not to, or doesn't do anything, the system will automatically shut down. This is a safety feature and BAT.

The ATTP produces substantial amounts of waste heat. This will be directed and utilised within the facility in the form of generating Electricity for on site usage and export to the national grid.

The CEM system monitors the emissions on a 24-hour basis. The results can be downloaded and submitted directly to the local authority for their records. The results are also fed into the main control system for the plant. Undernormal use and assuming the system is correctly operated the air from the system will be free from smoke and pollutants. This means it should have an almost invisibleoutflow (except in winter when it may condense the moisture in the gas to form mini clouds. However even these should disperse within 20 feet or so from the stack.

So this is how, if the usable heat is to be recovered, the temperature of exhaust gases is to be reduced quickly enough to avoid de novo synthesis of dioxins. De novo synthesis of polychlorinated dibenzo-p-dioxins (PCDD), polychlorinated dibenzofurans (PCDF), chlorophenols (CP), chlorobenzenes (CBz) and polychlorinated biphenyls (PCB)'s requires a moderate level of flyash and also a chlorinated feedstock to occur. As synthesis starts from carbon, contained in real incinerator fly -ash and is influenced by reaction temperature and time with chlorides and catalyst in fly -ash, we are confident that this will not form. The system has minimal fly ash and with the refractory particle remover in place to ensure this and a policy of refusing chlorine containing materials, we don't believe this will be an issue. Prior to the filter, we are reducing the temperature from over 850 degrees C to around 450 degrees C in heat exchanger in a fraction of a second. This should also eliminate the chance of formation. Finally, as we have a process temperature of over 850 degrees C and a residence time significantly in excess of 2 seconds, we believe that this will also be detrimental to any formations of the above gasses.

5.4 Emissions Technology.

5.4.1 Due to the process being ATTP, there will not be the problems associated with standard treatment technology. However, the MCERTs equipment being used for the emissions monitoring is supplied by CBISS. The emissions from the system processing Biomass, RDF and Plastics demonstrated the exhaust flow is also cooled quickly, to eliminate the formation of Furan's, Dioxins or Volatiles.

Due to the low emissions levels it is acceptable that the chimney is 2 meters above the height of the apex of the highest building in a 100m radius. In addition, the stack has been fitted with a "Jet Cowl" to ensure any gasses are exhausted as high as possible before dispersion (see Doc 6: Brownhills Skip Hire-RP03 FINAL (AIR QUALITY ASSESMENT).

The energy recovery system that is being installed as mentioned above is a ORC system providing electrical energy for onsite use (parasitic load) and export to national

grid.

5.5 Raw Materials.

5.5.1 The only raw materials we expect to use in the process are:

- Fuel Oil — for the start up. No fuel oil will be used in the general operation
- End of life Fuel — the fuel for the system will be non-hazardous materials within the agreed EWC codes and will be prepared offsite/onsite from various feedstocks.

5.6 Waste Streams

The residue which is collected in the residue section is between 8 and 10% of the input. The "clinker" and vitrified material is chemically inert (lessthan 0.1% VOC and TOC content) and free from any non-volatiles. The material is potentially suitable for sale to aggregate manufacturers for roads or breeze block manufacture.

It is envisioned that material used in the system would be up to 100% diversion from landfill and used for generating renewable energy from waste with Advanced Thermal Conversion.

5.7 Waste ingress into Sewers.

5.7.1 As described there will be no release of substances into the sewer. Any material, on escape from the machine, would be dealt with in due course, and the site is not connected to the main sewer network.

5.8 Resource Efficiency and Climate Change

5.8.1 Basic Energy Efficiency Measures

The plant and ancillaries have been designed to operate with a high level of energy efficiency. Key energy efficiency measures that have been included within the design of the plant are as follows:

- All plant and equipment will be individually monitored and controlled using a SCADA monitoring system and PLC controls, optimised for efficiency of operation.
- All aspects of the combustion plant are controlled in real time to ensure maximum thermal efficiency and operational control.
- All plant energy data will be monitored and recorded and targeted to ensure optimal plant performance

5.8.2 Development of KPI's

The Operator will establish Key Performance Indicators (KPIs) when site electricity generation figures are available. The composition of the waste materials in the process will not vary greatly over the life of the plant. Should any site equipment or technology be replaced, efforts will be made to replace the unit with one which is more energy efficient, if available.

The Operator will create KPIs based on monitoring data from how much energy is used to run the site and whether this can be reduced.

The system initially will be used for Electrical Energy Production from the ATTP.

5.8.3 Basic Design Principles

The Installation has been designed to ensure that all excess electrical energy, after internal use, is supplied to the grid. A summary of the basic measures is provided below:

- Wherever possible the plant utilises the waste heat to generate electricity.
- Once connected, all parasitic loads of the plant will be provided by the generated electricity, and hence no net energy imports will be required to power and operate the plant.
- All pipelines and thermal processes will be lagged and insulated to ensure that heat loss is minimised and prevented.
- All ancillary plant (fans and motors) have been specified with high efficiency electrical motors and variable speed drives.
- The plant is controlled by PLC and optimised to ensure maximum efficiency and minimal operation of ancillary components where required.
- The Installation uses highly thermally efficient heat recovery and electrical generation technology.
- The plant will be maintained at steady capacity to avoid downtime.

5.8.4 Avoidance, Recovery and Disposal of materials

- All feedstock delivered to the site will be subject to an acceptance and pre-acceptance process that should ensure that the potential for inappropriate feedstock delivery is minimised.
- The site has a detailed inspection process to avoid unsuitable loads been introduced to the process; and
- The rejected loads will not be unloaded and will be weighed back off site with a rejection note ticket.

5.8.5 The complete plant achieves very high efficiency for the following reasons:

- The ATTP consumes 15-17kWE
- The ORC produces circa 75kwE

- Ability to export up to 75% of generated electricity to the National Grid, in line with National & Local Waste Recovery guidelines

5.8.6 The plant is rated at 15-17 Kw and will cost around 84 pence per hour to run! The system can output around 75kW electrical and 2.5MW thermal when coupled to the appropriate systems.

5.9 Containment.

5.9.1 Unintentional releases shouldn't occur due to the systems and design of the unit. However, there will be a full Health & Safety and EMP system in place and the potential releases would be limited to:

Waste as fed into the system — would be collected in separate containers to be removed from site of sent for testing.

Any potential ash or unburned residues — swept up and re-fed into the system

The stack will be sealed at each flange and also at the expansion port. As there is little physical pressure from the operation the gasses are easily kept inside the stack. Once the Heat exchangers are fitted, we will undertake daily monitoring of the system to ensure no leaks develop. Again, as there is little internal pressure this is not expected to be an onerous task.

5.10 Noise & Vibration.

5.10.1 The system is rated at less than 70Db currently so would be quiet in operation and there would be no vibration.

5.11 Monitoring.

5.11.1 The control system for the machine will constantly measure a considerable number of points and gas streams throughout the machine (immediately after destruction and after heat recovery process before final gas go to atmosphere). There is a failsafe system which shuts it all down if there are any anomalies and a standard MCERTS approved CEMs system for the gas analysis. This system manages all the speeds, throughputs and temperatures to ensure the optimum processing throughput with minimum intervention. If the feed stock (fuel) stops or thereis a power cut the system will automatically shut down and there will be noburning feed stock (fuel) left inside the ATTP. Shutdown causes the flame to extinguish immediately, and the external cladding rarely rises above hot to the touch.In conclusion the system is designed to shut down in all failure modes unless the operator clears the fault within a set amount of time (usually tenminutes).

The Control system for the ATTP is manufactured internally.The HMI will display all the relevant information both locally on thesystem and remotely down as far as mobile phones if required.

Sensors and measuring equipment include:

Pressure Sensors on both the air inlets to the ATTP
Air flow sensors to control the flow of incoming air and for the heat/mass balance
Laser levelling system to ensure the right amount of fuel
The exhaust will also be monitored prior to the heat exchangers and post stack.
The system can adjust both the air and fuel in minute steps to ensure the right ratio for stoichiometric balance.

5.12 Pollution.

5.12.1 All applicable measures will be taken in the EMP and Risk Assessments to control the possibilities of pollution. As the unit is housed in a secure concrete based and walled structure any spills or material is easily captured and dealt with. The ATTP also uses a sump design to catch any effluent in an extreme circumstance that a release occurs. The exhaust emissions monitoring will alert us toany systems failures and the shutdown procedure is completed in minutesas opposed to hours in the case of current systems. Should any activitiescease or move then the return to original state will be affected and will bean easy task due to the system being skid mounted in a walled environment.

The exhaust will only measure the emissions and alter the settings or perform an automatic shutdown if they cannot be achieved. The Control system does the alerting to any problems or failures. In short there are minor issues which have a time of 10 minutes to manually sort before an automatic shutdown and major issues which are automatically shut down immediately. Temperature, fuel starvation, moisture, sensor failure, and mechanical failure are all monitored constantly.

As discussed above the system constantly monitors all the relevant settings to ensure the best processing parameters. Should the system be unable to continue this process the system will give 10 minutes warning and if no solution is available it will shut down. As the cooldown is also taking place within the heat exchangers, they will also monitor the air temp to ensure the most effective settings.

5.13 Policies and Procedures.

5.13.1 There will be a full Environmental management plan and Health & Safety risk assessments and operating procedures. All operatives will be fully trained in line with current legislation.

5.14 Environmental impact.

5.14.1 A full Air Quality Assessment was carried out by a third party (please see

Doc 6: BROWNHILLS SKIP HIRE-RP03- FINAL (AIR QUALITY ASSESMENT) and it was concluded that there would not be any environmental impact.

5.15 BAT Comparison

An assessment of the applicable indicative BAT requirements (as stated by EPR Guidance Note 5.01Incineration) for the sector has been carried out. The following indicative BAT measures are considered to be met by the process.

5.15.1 Operations

- High levels of housekeeping will be employed throughout the site.
- All vehicles will be loaded and unloaded at the rear of the site.
- All prepared fuel will be stored under cover.

5.15.2 Waste Charging

- **All feedstock into the ATTP will be on an automatic feed system to prevent waste build at start-up:**
  - Until the required temperature has been reached.
  - Whenever the required temperature is not maintained; and
- Waste charging will be interlocked with ATTP conditions so that feed cannot take place when:
  - The temperatures and airflows are inadequate;
  - Where the continuous monitors show that the emission limit values are being exceeded for a period of time in excess of the limits set within IED; or: -
  - Monitoring results required to demonstrate compliance with emission limit values are unavailable.
- The feed rates will be maintained at the optimum feedstock design rate.

5.15.3 Legislative Requirements

- The gases resulting from the process will be maintained at above 850ºC for at least 2 seconds.
- Residue produced by the plant will comply with the IED/WID 3% TOC requirements: and
- The installation will not give rise to significant ground level air pollution as demonstrated in the ‘Environmental Impact’ and AQA.

5.15.4 Emissions to Air

- The gas is cooled quickly to avoid de novo synthesis of dioxin between 450ºC and 200ºC (This process is controlled by the Digital software interfacing with the emissions software); and
- All indicative IED ELV's (Emission Limit Values) will be met.

5.15.5 Odour Emissions

Odour will be minimised through the following measures:

- Containing waste to designated areas.
- Ensuring that no putrescible waste is processed at the plant.
- Regular cleaning of waste handling areas.
- The design of all waste handling areas facilitates cleaning

5.16 The Industrial Emissions Directive (IED) and Best Available Technology (BAT) Compliance

Chapter IV of the IED describes all aspects of management and operation of a process as well as the environmental impact but allows for the Member State to vary the requirements of the IED where there is good reason. The following tables outline the IED technical requirements that apply and a justification of how they have been met.

The gases evolved from the process are fully oxidised in the combustor at temperatures above 850°C for a period of over 2 seconds.

A level of combustion will be achieved such that the requirements of the IED will be met.

***Table 1 - Chapter IV Compliance - SPECIAL PROVISIONS FOR WASTE INCINERATION PLANTS AND WASTE CO-INCINERATION PLANTS**	
IED technical requirement	Justification
Article 41 – 45	NA
Article 46 Control of Emissions (1) Waste gases from waste incineration plants and waste co-incineration plants shall be discharged in a controlled way by means of a stack the height of which is calculated in such a way as to safeguard human health and the environment.	Significant ground level pollution will not arise as a result of this installation. This application discusses this in detail. Atmospheric Dispersion Modelling has been completed by the by a third party.
(2) Emissions into air from waste incineration plants and waste co-incineration plants shall not exceed the emission limit values set out in parts 3 and 4 of Annex VI or determined in accordance with Part 4 of that Annex. If in a waste co-incineration plant more than 40 % of the resulting heat release comes from hazardous waste, or the plant co-incinerates untreated mixed municipal waste, the emission limit values set out in Part 3 of Annex VI shall apply.	All Chapter IV IED Emission Limit Values will be met by the Installation.
(3) Discharges to the aquatic environment of wastewater resulting from the cleaning of waste gases shall be limited as far as practicable and the concentrations of polluting substances shall not exceed the emission limit values set out in Part 5 of Annex VI.	There are no wastewater discharges resulting from the process. The exhaust gases will be clean due to the high temperature the system operates at.

(4) The Emission Limit Values shall apply at the point where waste waters from the cleaning of waste gases are discharged from the waste incineration plant or waste co-incineration plant. When waste waters from the cleaning of waste gases are treated outside the waste incineration plant or waste co-incineration plant at a treatment plant intended only for the treatment of this sort of waste water, the emission limit values set out in Part 5 of Annex VI shall be applied at the point where the waste waters leave the treatment plant. Where the waste water from the cleaning of waste gases is treated collectively with other sources of waste water, either on site or off site, the operator shall make the appropriate mass balance calculations, using the results of the measurements set out in point 2 of Part 6 of Annex VI in order to determine the emission levels in the final waste water discharge that can be attributed to the waste water arising from the cleaning of waste gases. Under no circumstances shall dilution of wastewater take place for the purpose of complying with the emission limit values set out in Part 5 of Annex VI.	N/A There are no wastewater discharges resulting from the process. The exhaust gases will be clean due to the high temperature the system operates at.

(5) Waste incineration plant sites and waste co-incineration plant sites, including associated storage areas for waste, shall be designed and operated in such a way as to prevent the unauthorised and accidental release of any polluting substances into soil, surface water and groundwater. Storage capacity shall be provided for contaminated rainwater run-off from the waste incineration plant site or waste co-incineration plant site or for contaminated water arising from spillage or fire-fighting operations. The storage capacity shall be adequate to ensure that such waters can be tested and treated before discharge where necessary.	There will be an environmental management system (EMS) in place to include procedures to manage waste delivery and reception. Hazardous waste will not be accepted at the Installation. All waste handling activities and the main process will take place inside the process building. All external process areas will be hardstanding served by appropriate drainage systems. All surface water runoff drains to an onsite storage pond.
(6) Without prejudice to Article 50(4)(c), the waste incineration plant or waste co-incineration plant or individual furnaces being part of a waste incineration plant or waste co-incineration plant shall under no circumstances continue to incinerate waste for a period of more than 4 hours uninterrupted where emission limit values are exceeded. The cumulative duration of operation in such conditions over 1year shall not exceed 60 hours.	The plant will have a continuous emissions monitor system (CEMS) located on the exhaust flues of the combustion plant. In the unlikely event of CEMS failure, a complete shutdown will be carried out until the CEMS is fully operational again.

The time limit set out in the second subparagraph shall apply to those furnaces which are linked to one single waste gas cleaning device.	
Article 47 Breakdown In the case of a breakdown, the operator shall reduce or closedown operations as soon as practicable until normal operations can be restored.	The feed system for the process is automated and in the event of temperature loss or departure from operating conditions the process will automatically shut down in a controlled manner.
Article 48 Monitoring of Emissions (1) Member States shall ensure that the monitoring of emissions is carried out in accordance with Parts 6 and 7 of Annex VI.	Monitoring will meet all the requirements of Article 48. The plant is designed to have continuous emissions monitors (CEMS) located on the exhaust stack of the combustion plant. The CEMS will be IED complaint and monitor CO, CO^2, HCl, Hf, NO, NO^2, N^2O, NOx, NH^3, O^2, SO^2, H^2O, temperature, pressure and flow.
(2) The installation and functioning of the automated measuring systems shall be subject to control and to annual surveillance tests as set out in point 1 of Part 6 of Annex VI.	CEMS will be installed in the stack for continuous monitoring of emissions to air to comply with IED. In the event of the failure of the CEMS, a complete shutdown will be carried out until the CEMS is fully operational again.
(3) The competent authority shall determine the location of the sampling or measurement points to be used for monitoring of emissions.	The exact positions of all sampling points will be agreed with the Local Authority prior to commencement of operation.

(4) All monitoring results shall be recorded, processed and presented in such a way as to enable the competent authority to verify compliance with the operating conditions and emission limit values which are included in the permit.	Reporting format will be agreed with the Local Authority prior to commencement of operation and will reflect the requirements of the permit. CEMS will be backed up by non-continuous check monitoring to comply with the IED.
(5) As soon as appropriate measurement techniques are available within the Union, the Commission shall, by means of delegated acts in accordance with Article 76 and subject to the conditions laid down in Articles 77 and 78, set the date from which continuous measurements of emissions into the air of heavy metals and dioxins and furans are to be carried out.	Should such a technique become available, it will be adopted as required.
Article 49 Compliance with the Emission Limit Values The emission limit values for air and water shall be regarded as being complied with if the conditions described in Part 8 of Annex VI are fulfilled.	The plant has been designed to comply with the specific ELV's stipulated by Part 8 of Annex VI of the IED. The reference conditions in the exhaust gas will be Temperature 273 K; Pressure 101.3 kPa, 11% oxygen; Dry Gas
Article 50 Operating Conditions (1) Waste incineration plants shall be operated in such a way as to achieve a level of incineration such that the total organic carbon content of slag and bottom ashes is less than 3 % or their loss on ignition is less than 5 % of the dry weight of the material. If necessary, waste pre-treatment techniques shall be used.	The design, which incorporates a combustion chamber, ensures that the minimum temperature of 850°C is met at the final point of combustion whenever waste is being fed, and the residence time of combustion gases at or above this temperature is >2s. The EMS includes procedures for the checking of waste composition and removal of contaminants.

(2). Waste incineration plants shall be designed, equipped, built and operated in such a way that the gas resulting from the incineration of waste is raised, after the last injection of combustion air, in a controlled and homogeneous fashion and even under the most unfavourable conditions, to a temperature of at least 850°C for at least two seconds. Waste co-incineration plants shall be designed, equipped, built and operated in such a way that the gas resulting from the co-incineration of waste is raised in a controlled and homogeneous fashion and even under the most unfavourable conditions, to a temperature of at least 850 °C for at least two seconds. If hazardous waste with a content of more than 1% of halogenated organic substances, expressed as chlorine, is incinerated or co-incinerated, the temperature required to comply with the first and second subparagraphs shall be at least 1100°C. In waste incineration plants, the temperatures set out in the first and third subparagraphs shall be measured near the inner wall of the combustion chamber. The competent authority may authorise the measurements at another representative point of the combustion chamber.	These conditions are met.

(3) Each combustion chamber of a waste incineration plant shall be equipped with at least one auxiliary burner. This burner shall be switched on automatically when the temperature of the combustion gases after the last injection of combustion air falls below the temperatures set out in paragraph 2. It shall also be used during plant start-up and shut-down operations in order to ensure that those temperatures are maintained at all times during these operations and as long as unburned waste is in the combustion chamber. The auxiliary burner shall not be fed with fuels which can cause higher emissions than those resulting from the burning of gas oil as defined in Article 2(2) of Council Directive 1999/32/EC of26 April 1999 relating to a reduction in the sulphur content of certain liquid fuels, liquefied gas or natural gas.	The ATTP is fitted with a diesel oil fired auxiliary burner to ensure combustion temperature reaches a suitable temperature prior to waste introduction. The auxiliary burners will be diesel oil fired.
(4). Waste incineration plants and waste co-incineration plants shall operate an automatic system to prevent waste feed in the following situations: (a) at start-up, until the temperature set out in paragraph 2 of this Article or the temperature specified in accordance with Article 51(1) has been reached.	The waste will be loaded into a bunker, prepared if required, stored in a large hopper and then loaded onto a conveyor which will supply the ATTP. This is a semi-automated system. The feed system will have automatic shutdown to prevent waste feed if the temperature in the Vortex at the final point of combustion is <850°C, or if emission limit values, obtained via the CEMS, look to be breached.

(b) whenever the temperature set out in paragraph 2 of this Article or the temperature specified in accordance with Article 51(1) is not maintained. (c) whenever the continuous measurements show that any emission limit value is exceeded due to disturbances or failures of the waste gas cleaning devices.	
Article 51 Authorisation to change operating conditions	No requests to change operating conditions will be required.
Article 52 Delivery and reception of waste (1) The operator of the waste incineration plant or waste co-incineration plant shall take all necessary precautions concerning the delivery and reception of waste in order to prevent or to limit as far as practicable the pollution of air, soil, surface water and groundwater as well as other negative effects on the environment, odours and noise, and direct risks to human health.	All waste will be received directly into a purpose designed reception area. All pollution abatement and prevention methodologies are detailed in main application document.
(2) The operator shall determine the mass of each type of waste, if possible according to the European Waste List established by Decision 2000/532/EC, prior to accepting the waste at the waste incineration plant or waste co-incineration plant	The site will only receive materials as specified on the acceptable EWC codes. The range of waste codes from the List of Wastes (England) Regulations 2005 that will constitute this prepared fuel is included in the application. All waste will be weighed at the weighbridge. Unsuitable material and material that is hazardous, or contains unwanted materials, will not be accepted.

(3) Prior to accepting hazardous waste at the waste incineration plant or waste co-incineration plant, the operator shall collect available information about the waste for the purpose of verifying compliance with the permit requirements specified in Article 45(2).	No hazardous waste will be accepted into the plant.
(4) Prior to accepting hazardous waste at the waste incineration plant or waste co-incineration plant, at least the following procedures shall be carried out by the operator:	No hazardous waste will be accepted into the plant.
Article 53 Residues (1) Residues shall be minimised in their amount and harmfulness. Residues shall be recycled, where appropriate, directly in the plant or outside.	It is a new installation, so a waste minimisation audit is yet to be carried out. This will be done in compliance with the permit condition specified.
(2) Transport and intermediate storage of dry residues in the form of dust shall take place in such a way as to prevent dispersal of those residues in the environment.	N/A
(3) Prior to determining the routes for the disposal or recycling of the residues, appropriate tests shall be carried out to establish the physical and chemical characteristics and the polluting potential of the residues. Those tests shall concern the total soluble fraction and heavy metals soluble fraction.	Chemical analysis will be undertaken regularly.
Other requirements (former WID compliance requirement not specifically stated under the IED) Technical Competence	The site will be operated by Brownhills Skip Hire Ltd and at least one Manager will hold all necessary qualifications to be defined as

Former WID Article 6 (8) The management of the incineration or the co-incineration plant shall be in the hands of a natural person who is competent to manage the plant.	'Technically Competent' as defined by the Environment Agency Operator Competence Scheme and WAMITAB Certificate of Technical Competence Schemes.
Former WID Article 11 (3) The residence time as well as the minimum temperature and the oxygen content of the exhaust gases shall be subject to appropriate verification, at least once when the incineration or co-incineration plant is brought into service and under the most unfavourable operating conditions anticipated.	Oxygen, moisture and temperature measurements will be made via the CEMS as well as spot sampling and analysis.
Former WID Article 11 (4) The continuous measurement of HF may be omitted if treatment stages for HCl are used which ensure that the emission limit value for HCl is not being exceeded. In this case the emissions of HF shall be subject to periodic measurements as laid down in paragraph 2(c).	The CEMS specified for the plant will continuously monitor HF and HCl
Former WID Article 11 (5) The continuous measurement of the water vapour content shall not be required if the sampled exhaust gas is dried before the emissions are analysed.	N/A

Former WID Article 11 (6) Periodic measurements as laid down in paragraph 2(c) of HCl, HF and SO2 instead of continuous measuring may be authorised in the permit by the competent authority in incineration or co-incineration plants, if the operator can prove that the emissions of those pollutants can under no circumstances be higher than the prescribed emission limit values.	CEMS will provide for continuous HCl and SO2 measurement.
Former WID Article 11 (7) The reduction of the frequency of the periodic measurements for heavy metals from twice a year to once every two years and for dioxins and furans from twice a year to once every year may be authorised in the permit by the competent authority provided that the emissions resulting from co-incineration or incineration are below 50 % of the emission limit values determined according to Annex II or Annex V respectively and provided that criteria for the requirements to be met, developed in accordance with the procedure laid down in Article 17, are available. These criteria shall at least be based on the provisions of the second subparagraph, points (a) and (d). Until 1 January 2005 the reduction of the frequency may be authorised even if no such criteria are available provided that: L 332/100 EN Official Journal of the European Communities 28.12.2000 (a) the waste to be co-incinerated or incinerated consists only of certain sorted	After one year of operation sampling and measurement for dioxins and furans will be reduced from twice a year to once a year, once it is demonstrated that the emissions are shown to be 50% of those stated in Annex V.

combustible fractions of non-hazardous waste not suitable for recycling and presenting certain characteristics, and which is further specified on the basis of the assessment referred to in subparagraph (d); (b) national quality criteria, which have been reported to the Commission, are available for these wastes. (c) co-incineration and incineration of these wastes is in line with the relevant waste management plans referred to in Article 7 of Directive 75/442/EEC. (d) the operator can prove to the competent authority that the emissions are under all circumstances significantly below the emission limit values set out in Annex II or Annex V for heavy metals, dioxins and furans; this assessment shall be based on information on the quality of the waste concerned and measurements of the emissions of the said pollutants. (e) the quality criteria and the new period for the periodic measurements are specified in the permit; and (f) all decisions on the frequency of measurements referred to in this paragraph, supplemented with information on the amount and quality of the waste concerned, shall be communicated on a yearly basis to the Commission.	

Former WID Article 13 (3) The incineration plant or co-incineration plant or incineration line shall under no circumstances continue to incinerate waste for a period of more than four hours uninterrupted where emission limit values are exceeded; moreover, the cumulative duration of operation in such conditions over one year shall be less than 60 hours. The 60-hour duration applies to those lines of the entire plant which are linked to one single flue gas cleaning device.	The plant will have a continuous emissions monitor system (CEMS) located on the exhaust flues of the combustion plant. In the unlikely event of emissions exceedance, a complete shutdown will be carried out until the plant complies again.
Former WID Article 13 (4) The total dust content of the emissions into the air of an incineration plant shall under no circumstances exceed 150 mg/m3 expressed as a half-hourly average; moreover, the air emission limit values for CO and TOC shall not be exceeded. All other conditions referred to in Article 6 shall be complied with.	The WGFS system ensures the carry over of dust in the ATTP is reduced to below the set limits. Furthermore, We use a water filled Ash Pit in the Primary Chamber, which significantly reduces Dust, as the potential for dust carry over further downstream in the system.

5.17 Risk Assessment for the ATTP.

Below is a generic risk assessment for the Bio Renewables ATTP. We will put all our own risk assessments in place to correspond with the operations on the site.

Assessment Type	Assessment Title	Assessors Name	Date of Assessment	Recommended Review Date (unless significant change occurs)
Dynamic	ATTP	M.Brennan	8th February 2022	8th February 2023

Legislation, guidance and information used in support of this assessment	Persons effected by the hazards in this assessment
Health & Safety at Work Act 1974, Environmental Protection Act 1990, Special Waste Regulations 1996, COSHH Regulations 1994, Control of Pollution Act 1974 and 1989 amendment, Carriage of Dangerous Goods by Road and Rail(Packaging and Labelling) Regulation 1994, the Industrial Emissions Directive (IED) / Waste Incineration Directive (WID), The Regulatory Reform (Fire Safety) Order 2005, The Employment Act 1989, Personal Protective Equipment at Work Regulations 1992	**All staff and visitors on site. Possible employees in surrounding businesses.**

PLR (Probable Likelihood Rating)	PSR (Potential Severity Rating)
1 = Highly Improbable.	1 = Negligible Injuries
2 = Remotely Possible.	2 = Minor Injuries (First aid required)
3 = Occasionally.	3 = Major Injuries (HSE Reportable)
4 = Fairly Frequent.	4 = Injuries causing disability or permanent condition
5 = Frequent.	5 = Fatal Injuries
6 = Almost a certainty.	**6 = Multiple Fatalities**

Total Risk Rating

PLR x PSR = Risk Rating

1-6 Low Risk **15-16 High Risk**

8-12 Medium Risk 18-36 Very High Risk

Ref	Hazard To Be Assessed	How Might Persons Be Affected	Existing Measures In Place	PLR	PSR	RR	Control Measures To Be Implemented To Reduce Risk Further	Timeframe
1	Accepting/taking delivery of the waste stream.	Contamination	The waste streams coming into the site will be controlled by the waste operator and transport company. It will follow the procedure of the	2	3	6	Transportation responsibilities lay within the waste operator/transporter, so copies of their policies, procedures and	

Ref	Hazard To Be Assessed	How Might Persons Be Affected	Existing Measures In Place	PLR	PSR	RR	Control Measures To Be Implemented To Reduce Risk Further	Timeframe
			permit and laws. Full training and PPE giving to staff handling the waste type.				risk assessment will be available on site.	
2	Holding the waste before it is processed into the system.	Contamination to individuals and other waste. Cuts	Waste delivered will follow the process already put into place by the waste operator and government regulations.	2	2	4	The handling of the waste is all carried out by the waste operator.	
3	If the system ceases operation and there is waste still inside.	Contamination.	If the waste cannot be processed through the System on the same day, then all waste will be moved back into the normal onsite process.	1	2	2	None.	
4	Transferring waste into the system.	Contamination.	A fork lift/grab/shovel will be used to lift the waste in the shredder helping to reduce the amount of human contact with the waste.	2	3	6	None.	
5	Waste spills	Contamination.	All spills will be dealt with by staff using the approved PPE and training.	2	3	6	None.	

Ref	Hazard To Be Assessed	How Might Persons Be Affected	Existing Measures In Place	PLR	PSR	RR	Control Measures To Be Implemented To Reduce Risk Further	Timeframe
6	Emissions faults	Possible air pollution causing contamination in people's lungs causing permanent Condition.	The system has an emergency shutdown procedure. So if the emissions start to go out of the IED and WID guidelines then the system will be shutdown. Monitoring equipment fixed to the stack to record and observes the emissions continually. All staff will be given required training to ensure the system is shut down before it goes out of guidelines, so on site engineers can modify or repair the fault.	1	5	5	None	
7	Fire on the System	Burns, Smoke inhalation.	The System has been designed with very few components that cannot with stand high temperatures since it will operate at >850c. The system has been built to full EU/UK regulations so it has been fitted with alarms/emergency stops and the software it runs has fire detecting systems as well. On the site there will be the required firefighting equipment available and the Emergency Fire Evacuation plan.	1	5	5	None.	

9	Explosion on System	Burns, Smoke inhalation, cuts, scaring, Death	The software on the system has a number of warning identifications pathways on it so it should never get to the point of explosion. There are also a number of emergency	1	6	6	None	

Ref	Hazard To Be Assessed	How Might Persons Be Affected	Existing Measures In Place	PLR	PSR	RR	Control Measures To Be Implemented To Reduce Risk Further	Timeframe
			shutdown points build on to the system following EU/UK regulations. Waste streams will be sorted and organised following the waste operator's current process so if explosives come in with the waste it should be identified before it gets to the System. In the unlikely event of an explosion all staff will shadow the onsite Emergency Fire Evacuation plan.					

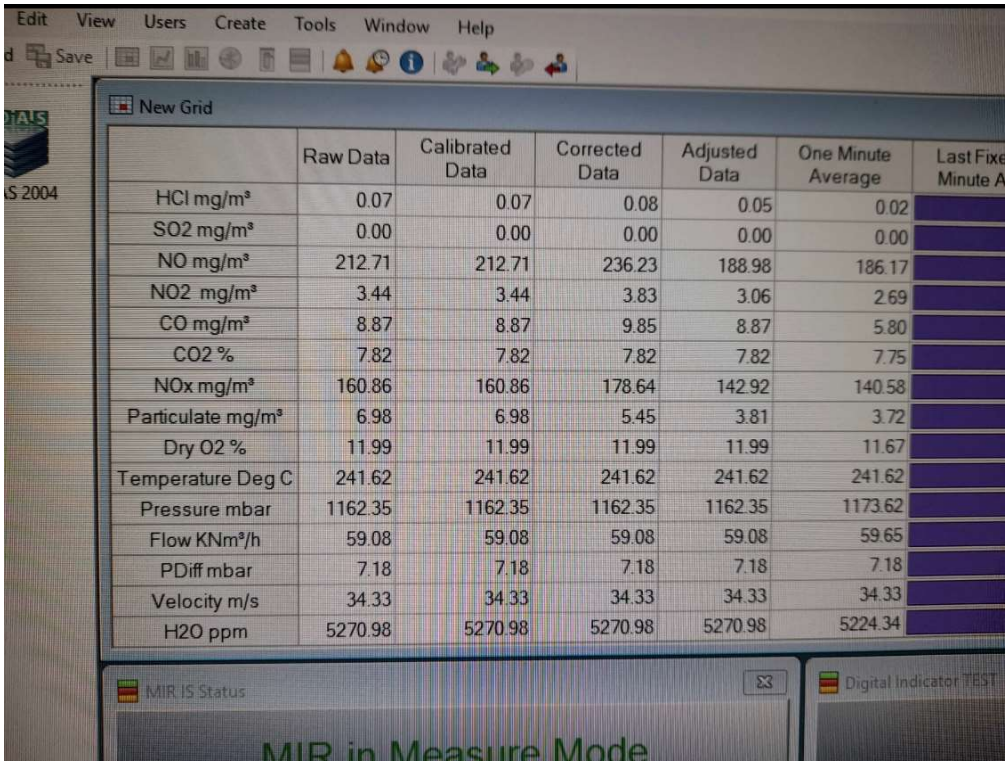
Appendix A

N/A

Appendix B

Typical Emission readings for the ATTP

The following emissions are typical of the levels that have been seen on various studies undertaken onsite. All fractions of material are processed, once the ATTP is at a steady state, with no discernible smoke or plume from the stack.



	Raw Data	Calibrated Data	Corrected Data	Adjusted Data	One Minute Average	Last Fixe Minute A
HCl mg/m³	0.07	0.07	0.08	0.05	0.02	
SO2 mg/m³	0.00	0.00	0.00	0.00	0.00	
NO mg/m³	212.71	212.71	236.23	188.98	186.17	
NO2 mg/m³	3.44	3.44	3.83	3.06	2.69	
CO mg/m³	8.87	8.87	9.85	8.87	5.80	
CO2 %	7.82	7.82	7.82	7.82	7.75	
NOx mg/m³	160.86	160.86	178.64	142.92	140.58	
Particulate mg/m³	6.98	6.98	5.45	3.81	3.72	
Dry O2 %	11.99	11.99	11.99	11.99	11.67	
Temperature Deg C	241.62	241.62	241.62	241.62	241.62	
Pressure mbar	1162.35	1162.35	1162.35	1162.35	1173.62	
Flow KNm³/h	59.08	59.08	59.08	59.08	59.65	
PDiff mbar	7.18	7.18	7.18	7.18	7.18	
Velocity m/s	34.33	34.33	34.33	34.33	34.33	
H2O ppm	5270.98	5270.98	5270.98	5270.98	5224.34	

Appendix C

FAT’s & SAT’s

These documents will formally follow as part of the commissioning process, on completion of the SWIP Approval.

Appendix D

CBISS CEMS Information

CEMS (Continuous Emission Monitoring System)

A CEMS systems will be installed to monitor the flue gasses leaving the stack:

- Gaseous compounds sampling: a sampling lance mounted at the stack wall is used to take continuous samples from the flue gas. Via a heated sample line these samples are transported to the CEMS analyzer to analyze the chemical composition of the flue gas.
- Dust measurement: a dust analyzer is installed on the stack platform to measure the dust concentration, based on an optical measurement principle.

Both units will be manufactured by a premium brand European / UK supplier. The CEMS will continuously send information to the plant automation PLC and PC based HMI's (Human Interface) for operator supervision and data logging. The emissions data are accessible for external parties such as authorities as a dedicated PC as Data Acquisition System (DAS) is installed for direct reporting to authorities. The plant automation PC's can be made accessible for supervision via the internet for remote monitoring.

The following parameters will be monitored continuously and send to the Central Control Room and as such shown on PC-based HMI for operator supervision: CO, NOx, SO2, Dust (Particulate Matter), HCl, HF, O2, TOC, H2O. Other parameters can be added, upon client request.

Excellent performance for multigas measurements in dry sampling, including HCL, HF, NO, NO_2, N_20, SO_2, CO_2, TOC, CH_2, CO, O_2.

Designed to operate under IED.

Graphite 52M

Heated FID VOC Analyser

The Graphite 52M is fitted with FID for continuous and simultaneous measurement of THC, NmHC and CH_4 in compliance with EN 12619

The FID is temperature controlled up to 191°C to eliminate condensation. Extremely compact and with a very short response time, this heated FID provides continuous monitoring of total VOC's, in compliance with the industrial emissions directive

Customise to Suit your Requirements

Featuring an interactive menu, real-time calibration graphs and user adjustable response and averaging time, the Graphite 52M is designed to be customised to meet your analytical requirements.

Data Collection, Processing & Visualisation

With built in data storage of 2 months, the Graphite 52M is fully supported by MCERTS certified CDAS Elite Data Acquisition Software and a comprehensive service and support package. This analyser provides automatic reports to meet customer specific requirements

"Continuous monitoring of total VOC's, in compliance with the IED".

KEY BENEFITS

- Up to 191°C (heated detector for HC measurement)
- Fast response time, designed to measure wet & corrosive sample
- High efficiency, long-life catalyst
- Easy access components guarantee reduced maintenance times
- Ethernet connection for remote maintenance and troubleshooting
- Optional portable analyser

a1-cbiss | DATA SHEET **GRAPHITE 52M CEM**

Technical Specification

APPLICATIONS

- Waste incinerations
- Sewage sludge incineration
- Contaminated soil burning plants
- Mercury mines and refineries
- Fluorescent light bulb recycling plants

MEASUREMENT PRINCIPLE

- Ranges: 0-10/100/1000/10000 ppm or user programmable range up to 50 000 ppm
- Lower detectable limit: 0.05 ppm of the 10 ppm range

TEMPERATURE & PRESSURE

- Temperature of the heated block: up to 191°C
- Operating temperature: +5°C to +40°C
- Ambient temperature: +5 bis +30°C

MCERTS Certification Range

- TOC: 0-15mg/m³

POWER

- Power supply: 230 VAC, 50Hz or 115 VAC, 60 Hz
- Power consumption: 500VA during start up

PHYSICAL

- Dimensions: 483 x 470 x 177mm (W x D x H)
- Weight: 22kg approximately

SPAN & DRIFT

- Accuracy: < 1% of the displayed value between 15% and 100% of the F.S.
- Zero drift: <1%/24h F.S. <2%/7 days F.S.
- Span drift: <1% / 7 days F.S.
- Linearity: <1% for concentration between 10 % and 90% of the scale

APPROVALS

- MCERTS

- Expert consultancy
- Project management
- In-house project design & build
- Installation & comissioning
- After product service & support

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Rev 2.1 May 18

ISOQAR 0026 Cert No 996 ISO9001, ISO14001

a1-cbiss | DATA SHEET

MIR-FT
Fourier Transform Infra-red

Installed across the majority of the UK's municipal waste incinerators, the MIR-FT offers multiple gas measurements from wet & corrosive samples

With the emissions limits tightening and new gases being introduced, this instrument allows future gas upgrades, providing the solution for today and what may happen tomorrow.

Assists In Achieving IED Compliance

Designed to operate under the Industrials Emissions Directive, the MIR-FT offers maximum availability and complete compliance with QAL 1 of EN14181 & EN15267-3.

Leading Edge Technology

- 180°C heated sample line / measurement cell (in association with HOFI sampling system according to the application), ensuring no sample loss or composition changes
- Ideal for measuring trace concentrations in wet, corrosive gas streams
- Suited for hot wet measurements of soluble gases such as HCl, HF, NH_3 etc.

"Fast and rugged, the MIR-FT is unmatched in its accuracy and reliability".

Gases analysed

NO_2 CO CO_2 SO_2 O_2 HF

NO NH_3 HCl N_2O H_2O TOC

KEY BENEFITS

- Automatic spectral interference corrections
- Fast and simultaneous measurements for multiple gases
- Windows based PC driven software with on-board data acquisition
- Capable of automatic QAL 3 checks when used in conjunction with IVIS unit
- MCERTS Certified

Technical Specification

GENERAL

- Utilises Fourier Transform Infra-Red technology
- IED compliant
- Fast and simultaneous measurements for multiple gases
- Multi-component measurement capabilities

APPLICATIONS

- Energy from Waste
- Power & Combustion
- Biomass
- DeNOx (SNCR, SCR)

PHYSICAL

- Dimensions: rack 19", 616 x 483 x 220mm (DxWxH)
- Weight: 20 kg approximately

PERFORMANCE

- Lower detectable limit: 2% full scale
- Response time: <2mins depending on the gas
- Operating temperature: +10°C to +35°C
- Interferometer resolution: 8 cm-1
- Measurement cell: multi-reflexion, 5m
- Power supply: 220V, ± 15%, 50-60Hz, 200VA

CERTIFIED RANGES

- NO: 0-150mg/m³ - 0-600mg/m³
- NO_2: 0-200mg/m³
- CO: 0-75mg/m³ - 0-300mg/m³
- CO_2: 0-25%
- SO_2: 0-75mg/m³ - 0-500mg/m³
- N_2O: 0-100mg/m³
- HCl: 0-15mg/m³ - 0-90mg/m³
- NH_3: 0-15mg/m³
- H_2O: 0-30%
- O_2: 0-25%

SPAN & DRIFT

- Zero drift: ± 1% full scale / 30 days
- Span drift: ± 1% full scale / 30 days
- Repeatability: ± 2% full scale

COMPLIANCE

- MCERTs certified to EN15267-3
- QAL1 as defined by EN14181
- QAL3 compliance to EN14181

Specifically designed for CEMS, the MIR-FT would be rack mounted in air conditioned enclosures.

Complete systems would normally comprise of;

- Sample extraction and conditioning probe (with integrated temperature, pressure and flow measurement)
- Heated sample lines
- Automatic calibration units
- Instrument air drying system
- CDAS Data Acquisition Software

QAL 181
Particulate Monitoring System

The PCME QAL 181 is an approved Particulate Continuous Emission Monitor providing high quality emission measurement for low dust concentrations

Highly Accurate Emissions Data

The QAL181 is suitable for measuring particle emissions after both bag filter and electrostatic precipitator arrestment plant and is especially relevant where it is critical to obtain reliable, accurate and robust emissions data for compliance to the IED

Works Reliably in High Dust Applications

The instrument has reduced cross-sensitivity to changing particle type and is unaffected by changes in velocity making it of interest to operators of all types of industrial processes where emissions are challenging to monitor using conventional methods

With online calibration capability, the QAL 181 not only minimises drift but also offers the QAL 3 facility when used with CDAS Elite Data Acquisition Software.

"Tackle challenging stack conditions using instrument reliability & robust high temp options".

KEY BENEFITS

- ProScatter® Forward-scatter technology with a minimum detection limit of < 0.05 mg/m³
- Complies with Waste Incineration Directive and Large Combustion Plant Directive EN 13284-2 and EN 14181 (Europe)
- ProScatter® technology provides enhanced measurement due to reduced cross-sensitivity to particle type and size compared to other scatter monitors
- Forward-scatter measurement technique with automatic zero and span checks that fully challenge the system's ability to measure forward-scattered light and satisfy daily drift checks
- Robust and rugged for challenging high-temperature 500 °C stack conditions and Ex hazardous zones

Technical Specification

TEMPERATURE

- Temperature Range: Stack temperature 0-250°C
  Stack temperature 0-400°C (option)

POWER

- Output: RS-485/MODBUS to control unit
- Power: 24V DC (Provided by control unit)
- Process Conditions: Non-condensing

PHYSICAL

- Insertion of interaction volume into stack: 15mm to 600mm (user adjustable)
- Minimum stack diameter: 250mm
- Ingress protection: IP65

SPAN & DRIFT

- Long term zero drift: <0.1mg/m³
- ELV Range (Emission Limit Value): 0 - 10 mg/m3 to 0 - 100mg/m³
- Minimum Detection Level: <0.1 mg/m³
- Resolution: 0.01 mg/m³

CERTIFIED RANGES

- Certification range: 0 -15mg/m³ (QAL1 approval)
- Extended certification range: 0-100mg/m³ (QAL1 approval)
- Measurement capability: 0-300mg/m³

The PCME QAL 181 ProScatter® technique benefits from improved levels of performance when compared to other forward-scatter systems due to its increased area of detection (more than 10x larger) and smaller angles of incidence, thus reducing variability in sensitivity and measurement due to particle type and size as found in other scatter monitors.

The PCME QAL 181 ProScatter® rugged design provides durable long-term measurement. In addition to the reduced cross-sensitivity to changing particulate type and size, increased instrument lifetime and improved measurement reliability are indicated due to:

- No moving parts in the instrument path for increased lifetime and reliable measurement.

- Suitable for stacks with flue gas temperatures up to 500°C, using a high-quality Quartz rod for transmission of forward-scattered light to the detector. The Quartz rod will not age prematurely and become brittle when used at elevated temperatures, in contrast to other forward-scatter systems that use fibre-optic cables.

- Inbuilt data logging, recording of measured particulate and internal diagnostic value for added confidence and security of data.

- TCP/IP Ethernet, RS485, RS232, 4x4 - 20mA outputs, 1x 4-20mA input, 4x Relay outputs, 1x Relay input for increased choice of integration with your DCS or DAHS (controller specific).

- Powerful multilingual, text-driven menu for setup without the use of external equipment, with a large display for an improved user experience.

- Proven rugged, robust mechanical design for harsh environments.

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a1-cbiss | DATA SHEET

DATA ACQUISITION SOFTWARE

CDAS

CBISS DATA ACQUISITION SOFTWARE

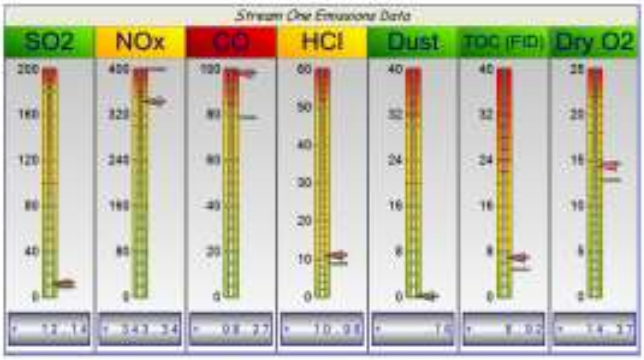
"Do More With Your Emissions Reporting & Storage"

a1-cbiss Data Acquisition Software (CDAS) is a fully MCERTS accredited (parts A, B, C1 & C2) real time data acquisition and reporting software.
- Now available for touch screens and Windows® 10.

The CDAS software suite continually evolves around your requirements making it the complete solution for your site to meet the stringent demands of EN14181.

Energy from Waste and Biomass sites are required to continually measure emission parameters from chimney-stacks to ensure compliance as defined in the site permit.

CDAS collects raw data from a wide range of Continuous Emissions Monitoring Systems (CEMS) to eliminate the risk of excess emissions thus providing legislative compliance.



Self-configured workspace

CDAS is unique in that it allows the data to be viewed in a fully configurable screen layout to support individual preferences.

"CDAS is the Most Advanced MCERTS Certified Data Acquisition Software Package Available"

KEY FEATURES

- EN14181 - QAL2 calibration functions
- Ethernet communications
- 3 level user security system
- Secure encrypted data files storing data at different stages of processing
- EN14181 QAL3 periodic calibration options
- EN14181 QAL3 analysis reports
- Software support for dual system redundancy

a1-cbiss | DATA SHEET **DATA ACQUISITION SOFTWARE**

Data Storage

- Separate storage of data at different stages of data processing (Raw, Calibrated, Corrected, Adjusted)
- Unlimited data storage*
- Archive is never deleted
- Data is stored per day so easy to back up and transfer

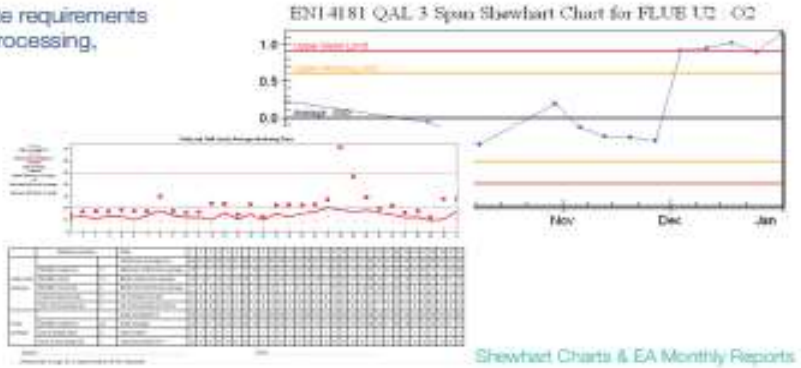
Data Storage Process Screen

Dual Redundancy

To maximise data capture, two copies of CDAS can be set up in a duty/standby dual redundant arrangement. If the duty machine develops a fault, CDAS standby will collect data from the instrument itself so no data is lost.

Reports

- Produce reports for agency/site requirements
- Variety of data logging, data processing, trending and reporting
  - Day Reports
  - Month Reports
  - Annual Reports
  - Mass Reports
  - Percentile Reports
- Agency Reports
  - EA/SEPA Monthly
  - EN 14181 QAL 2
  - EN 14181 QAL 3
- Custom Reports



Shewhart Charts & EA Monthly Reports

Alarms

- Counts number of alarm exceedance in a day (Alarms can also be set against this value)
- Sends SMS or Email Message on Alarms

Alarm Screen

*CDAS will never delete any data, the amount of data stored is only limited by available storage space on the system

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ISOQAR 0026
Cert No 995
ISO9001, ISO14001

Appendix E

ELECTRICITY PRODUCTION – ELECTRATHERM ORC

ElectraTherm
BY BITZER GROUP

4400B SPECIFICATION SHEET

BITZER SEMI-HERMETIC EXPANDER/GENERATOR

POWER+ GENERATOR

ElectraTherm's POWER+ GENERATOR produces fuel-free, emission-free power from low grade waste heat using the Organic Rankine Cycle (ORC) and proprietary technology. The company's patented BITZER semi-hermetic twin screw expander/generator combination enables the POWER+ GENERATOR to generate fuel-free and emission-free electricity from various forms of waste heat. ElectraTherm's patented ORC design represents a dramatic change from radial or axial turbine technologies, providing a more cost efficient, robust design with no shaft seal between the expander/generator combination, greatly enhancing reliability. The 4400B is an evolution of ElectraTherm's Series 4000 and the BITZER expander offers enhanced performance across the operating range with a maximum output increased to 75kW.

4400B POWER+ CONFIGURATIONS - UP TO 75kWe

4400B STAND ALONE

// Dimensions*: 2.0 x 2.4 x 2.3 m
// Weight: 3,290 kg / 7,245 lbs
// Customizable balance of plant
// Indoor or outdoor installation

4400B-FL

// Dimensions*: 12 x 2.4 x 2.9 m
// Weight: 6,095 kg / 13,438 lbs
// Turnkey inc. liquid loop radiator, all piping/pumps, minimal engineering

* Renderings may not be exact representations of final POWER+ product.

HEAT TO POWER APPLICATIONS

ElectraTherm generates electricity from various heat sources, including:


Stationary Engines


Biomass/Biogas


Boilers & Process Heat


Oil & Gas, Geothermal

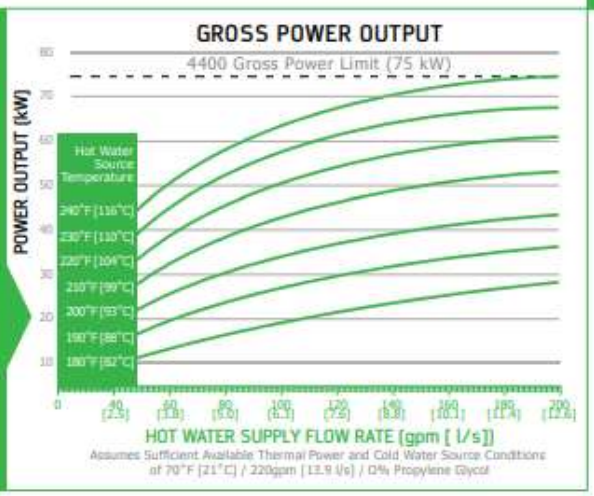

Flare Elimination

4400B

4400B PERFORMANCE PARAMETERS - UP TO 75kWe

ElectraTherm's Water Cooled Condensing System Performance

HOT WATER INPUT PARAMETERS	Hot water input temp range	°F	170 - 240
		[°C]	[77 - 116]
	Thermal input range	MMBTU/hr	1.3 - 3.5
		[kWth]	[380 - 1050]
	Flow rate range	gpm	50 - 200
		[l/s]	[3.2 - 12.6]
WATER COOLED CONDENSING PARAMETERS	Cooling water input temp range	°F	40 - 150
		[°C]	[4 - 65]
	Heat rejected to cooling water range	MMBTU/hr	1.3 - 3.3
		[kWth]	[380 - 980]
	Cooling water flow rate	gpm	220
		[l/s]	[13.9]
LIQUID LOOP RADIATOR (LLR)	LLR approach to ambient air temp	°F	20
		[°C]	[11]
	Heat rejected to LLR	MMBTU/hr	1.3 - 3.3
		[kWth]	[380 - 980]



PERFORMANCE CHARACTERISTICS

Nominal Rating	Up to 75kWe* @ 380 - 500V / 3 phase / 50 & 60 Hz
Ambient Operation	32°F - 100°F (0°C - 38°C)**
Power Factor Correction	Load and Site Dependent - from 0.9 to 1
Total Harmonic Distortion	<3%
Emissions	Zero (Closed Binary Cycle)
Minimum Operating kW Output	15kWe

DESIGN ATTRIBUTES

Refrigerant Plumbing	Built to ASME and CE Standards
Power Block	BITZER Semi-Hermetic Twin Screw Expander Generator Combination
Generator	Grid-Tied Induction (Brushless Construction, Asynchronous)
Heat Exchangers	Compact, Brazed Plate Construction
Design Life	20 Years
Lubrication	Patented Process Lubrication
Grid Protective Relay (GPR)	External Additional GPR Interface Included

SYSTEM DESCRIPTION

Working Fluid	R245fa (Pentafluoropropane)***
Heat Source	Hot Water 170°F - 240°F (77°C - 116°C)
Cooling Requirement	Water 40°F - 150°F (4°C - 65°C)
Minimum Temp Differential	Between Hot Water Input and Cooling Water Input = 80°F / 27°C
Controls	Programmable Logic Controller Based Custom Controls
Remote Monitoring	Machine accessible with included VPN router
Operation	Designed for Unattended Operation
Cabinet	NEMA 3R Outdoor Rated /IP 54 Compliant
Shipping	Ships from Flowery Branch, GA, USA
Dimensions & Weight	Various Configurations Available (see first page)
Sound Pressure	80dBA at 1 meter. Sound Attenuated Option: <72dBA at 1 meter

FEATURES INCLUDE:

- // Ease Of Installation
- // Low Maintenance
- // Robust, Twin Screw Expander Power Block
- // CE Certified
- // Remote Monitoring
- // Automated Control System
- // Modular and Scalable
- // Zero Emissions
- // Zero Toxic By-Products
- // Zero Fossil Fuel Requirements
- // Dual-Heat Stream Input + Radiator Option Available

*Output depends on hot and cold resources
**Extreme environments require optional equipment
***R245fa is a non-flammable and non-ozone depleting working fluid

ElectraTherm
BY BITZER GROUP

ElectraTherm, Inc. // 4080 Enterprise Way // Flowery Branch // Georgia 30542 // USA
Tel +01 775-398-4680 // Toll Free: 1-877-883-7101 // www.electratherm.com

Appendix F

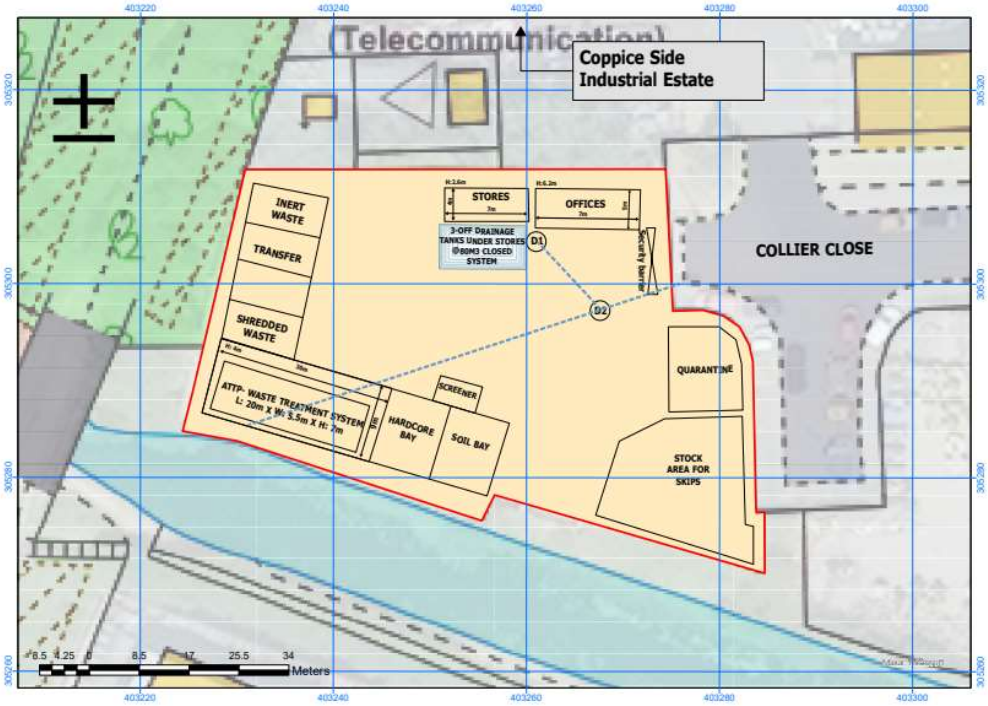
EWC Codes

European Waste Catalogue Code	Description
15	**Waste packaging**
15 01	**Packaging (including separately collected municipal packaging waste)**
15 01 01	paper and cardboard packaging
15 01 02	plastic packaging
15 01 03	wooden packaging
15 01 05	composite packaging
15 01 06	mixed packaging
15 01 09	textile packaging
17	**Construction and demolition wastes (including excavated soil from contaminated sites)**
17 02	**Wood, glass and plastic**
17 02 01	wood
17 02 03	plastic
17 06	**Insulation materials and asbestos-containing construction materials**
17 06 04	insulation materials other than those mentioned in 17 06 01 and 17 06 03
20	**Municipal wastes (household waste and similar commercial, industrial**
20 01	**Separately collected fractions**
20 01 01	paper and cardboard
20 01 10	clothes
20 01 11	textiles
20 01 38	wood other than that mentioned in 20 01 37
20 01 39	plastics
20 02	**Garden and park wastes (including cemetery waste)**
20 02 01	biodegradable waste
20 03	**Other municipal wastes**
20 03 01	mixed municipal waste
20 03 02	waste from markets
20 03 07	bulky waste

Appendix G

N/A

Appendix J
Site diagram



Waste And Industry Compliance Ltd

Brownhills Skip Hire Ltd.

Legend

- Site Boundary
- D1 Drain
- Indicative Surface water drainage

Grid reference:
SK 03350 05254

Drawing Number:
Brownhills Skip Hire-Walsall-DW01

Page Size: A3

All Dimensions to be checked on site and not scaled from this drawing.
This drawing is not for construction
This drawing is for planning only
All services to be checked on site and not scaled from this drawing

Title: Site Layout	Date: 20/08/2022	Author: S. Barnes
Site Location: Collier Close, Walsall, WS8 7EU	Version: FINAL	Scale: 1:500

Appendix K
Gas Retention Time

The Residency Time of an Incinerator is defined as the volume in the afterburner, after the last point of air injection, which needs to demonstrate >2 Seconds. The parameters used for modelling this combustion process is shown on the model data sheet and can be used on any similar software such as CFD Modelling to achieve similar result.

Consumption for secondary chamber	Waste feed in (kg/hr)	Diesel (kg/hr)	Chamber size for 2 second retention (m3)	Gas flow (m3/s)	Flue gas temp (ºC)	Heat output (kW)
1	300	39	8.16	4.08	853	1309
2	350	29	8.24	4.12	852	1342
3	400	20	8.36	4.18	859	1579
4	450	10	8.44	4.22	858	1759
5	500	1.8	8.58	4.29	869	1935
6	600	1.8	8.98	4.49	880	2148
7	700	1.8	9.50	4.75	889	2630
8	800	1.8	10.84	5.42	905	3097
9	900	1.8	11.76	5.88	917	3729
10	1000	1.8	12.85	6.43	923	4265

As the ATTP will be operating at no greater than 500kg/hr, we can see the following:

- Waste Feed operating at >850ºC
- >10% 02 Content
- Gas flow will be 4,29m3/s
- At the above flow rate, we therefore have sized the secondary chamber >8.58m3
- This Secondary chamber volume is calculated AFTER the last point of air injection, prior to the gasses flowing through the 2 second Residency Time Secondary Chamber
- Secondary Burner will be in transition pipe from Primary to Secondary combustor