

# RUNCORN ENERGY RECOVERY FACILITY

**Environmental Permit Variation Application**

**Best Available Techniques Assessment**

Prepared for: Viridor Energy Limited

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## 1.0 INTRODUCTION

SLR Consulting Ltd (SLR) has been instructed to prepare an Environmental Permit (EP) variation application for the Runcorn Energy from Waste Facility, Barlow Way, Runcorn, Cheshire, WA7 4HG, (hereafter referred to as 'the Site') operated by Viridor Energy Limited.

This Best Available Techniques (BAT) Assessment describes how the design and operation of the facility will conform to the requirements of the Best Available Technique Reference (BREF) Note for Waste Incineration Processes<sup>1</sup>.

## 2.0 SUMMARY OF PROPOSED VARIATION

Viridor are applying to vary the Site's EP as follows:

- The addition of the following waste code to Table S2.2 of the permit;

EWC Code	Description
20 03 01	mixed municipal waste

EWC 20 03 01 waste code is non-hazardous waste and can include household waste and that from other sources similar in nature and composition. This proposed new waste type is considered to be highly similar in nature and composition to that of a number of waste codes already accepted to the Site under the EP, including:

- 19 05 01 – non-composted fraction of municipal and similar wastes
- 19 05 02 – non-composted fraction of animal and vegetable waste
- 19 05 03 – off-specification compost
- 19 06 04 – digestate from anaerobic treatment of municipal waste
- 19 06 06 – digestate from anaerobic treatment of animal and vegetable waste

It is not considered that the proposed addition of this EWC waste code will cause any greater environmental risk, nor will require any operational changes to the Site due to the operations on Site already accepting waste highly similar in nature and composition.

The following operational changes are also included within this EP variation application;

- Remove the direct discharge of digestate to the feed hopper. This is currently referenced as an approved Operating Technique in the EP but is not an activity undertaken on Site; and
- Reflect that Air Pollution Control Residues (APCR) is now sent off-site for recovery. Previously, the EP's approved Operating Techniques referred to APCR being disposed of off-site.

## 3.0 BEST AVAILABLE TECHNIQUES ASSESSMENT

The purpose of this BAT assessment is to demonstrate that the existing infrastructure and operational procedures on Site are suitable to accept municipal black bag waste and that recovery of APCR from the facility represents BAT.

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<sup>1</sup> Best Available Techniques (BAT) Reference Document for Waste Incineration 2019

The relevant BAT Conclusions (BATc) and an assessment of the plant's demonstration of these is outlined in Tables 1 and 2 overleaf.

**Table 1 BAT for Proposed Acceptance of Mixed Municipal Waste**

BATc Requirement	BATc Details	Specific Measure
<p>BAT 9. In order to improve the overall environmental performance of the incineration plant by waste stream management (see BAT 1). BAT is to use all of the techniques (a) to (c) given below, and, where relevant, also techniques (d), (e) and (f).</p>	<p>(a) Determination of the types of waste that can be incinerated</p> <p>- Based on the characteristics of the incineration plant, identification of the types of waste which can be incinerated in terms of, for example, the physical state, the chemical characteristics, the hazardous properties, and the acceptable ranges of calorific value, humidity, ash content and size</p>	<p>The facility had been designed to accept a variety of waste types, many of which are similar in nature and composition to the proposed mixed municipal wastes for acceptance. Therefore, the systems and operational procedures already in place on Site cover those needed to treat mixed municipal waste.</p> <p>The facility employs a water-cooled grate system. The use of a water-cooled grate system is an appropriate and suitable option for the incineration of MSW for the following reasons;</p> <ul style="list-style-type: none"> <li>• The use of a grate system is a well-developed technique which is proven for the recovery of energy from waste materials comprising or derived from MSW, as identified in Section 2.3.1. of the Waste Incineration BREF.</li> <li>• Water-cooling is most often applied where the calorific value of the waste is higher, e.g. &gt;12–15 MJ/kg for MSW, as identified in section 2.3.1.2. of the Waste Incineration BREF. Therefore, the facility is adequately designed to treat MSW which may have a higher calorific content.</li> <li>• Municipal waste is frequently subject to significant short-term fluctuations in calorific value, increasing or decreasing the thermal loading on the plant and auxiliary equipment. The multi-stage water cooled grate system in operation at the facility is designed to account for these fluctuations. Thermal peaks resulting from variations in calorific value, are absorbed by localised cooling providing improved temperature control within the furnace. This allows for a high continuous</li> </ul>

BATc Requirement	BATc Details	Specific Measure
		<p>throughput and operational flexibility, i.e. is suitable for different waste materials and a wide range of calorific values.</p> <p>Changes in the composition of municipal waste will be compensated for by adjusting commercial and industrial waste input volumes. This blending of commercial and industrial waste with municipal wastes will limit the impact of changes in the municipal waste's composition.</p>
	(b) Set-up and implementation of waste characterisation and pre-acceptance procedures	Waste characterisation and pre-acceptance procedures are already existing on Site as part of the EMS. The procedures involving waste characterisation and pre-acceptance checks are outlined in the Working Plan submitted with the original EP application in 2009.
	(c) Set-up and implementation of waste acceptance procedures	Waste acceptance procedures are already existing on Site as part of the EMS. The procedures involving waste acceptance checks are outlined in the Working Plan submitted with the original EP application in 2009.
	(d) Set-up and implementation of a waste tracking system and inventory	<p>Deliveries are pre-notified to the Site. At the point of delivery to the Site, loads are assigned unique identifies and an associated record created. Associated with each load is a record of the:</p> <ul style="list-style-type: none"> <li>• Date and time of delivery;</li> <li>• Customer;</li> <li>• Source site;</li> <li>• Job reference;</li> <li>• Description of waste;</li> <li>• Tonnage;</li> <li>• Sampling requirements;</li> </ul>

BATc Requirement	BATc Details	Specific Measure
		<ul style="list-style-type: none"> <li>• EWC code;</li> <li>• SIC code;</li> <li>• Pre-approval records including waste characterisation information, compliance testing and compliance assessment;</li> <li>• On-site verification undertaken; and</li> <li>• Decision to approve / reject.</li> </ul> <p>Records are maintained within a database with links to associated document such that information regarding any individual load can be readily called upon.</p>
	(e) Waste segregation	<p>Waste acceptance procedures are already existing on Site as part of the EMS and are outlined in the Working Plan submitted with the original EP application in 2009. Wastes are currently separated within the storage bunker, whereby a larger section served by 10 tipping bays accepts the RDF fraction, biomass and appropriately treated C&amp;I waste material, whilst a smaller section accepts the lower calorific value digestate fraction. MSW will be accepted in to the 10 tipping bays along with the RDF, biomass and C&amp;I waste streams.</p>
	(f) Verification of waste compatibility prior to the mixing or blending of hazardous wastes	<p>Not applicable as hazardous wastes are not accepted to Site.</p>



BATc Requirement	BATc Details	Specific Measure
<p>BAT 11. In order to improve the overall environmental performance of the incineration plant, BAT is to monitor the waste deliveries as part of the waste acceptance procedures (see BAT9(c)) including, depending on the risk posed by the incoming waste, the elements given below.</p>	<p>Municipal solid waste and other non-hazardous waste;</p> <ul style="list-style-type: none"> <li>— Radioactivity detection</li> <li>— Weighing of the waste deliveries</li> <li>— Visual inspection</li> <li>— Periodic sampling of waste deliveries and analysis of key properties/substances (e.g. calorific value, content of halogens and metals/metalloids). For municipal solid waste, this involves separate unloading.</li> </ul>	<p>The facility had been designed to accept a variety of non-hazardous waste types, including pre-processed fuels derived from MSW. These wastes are similar in nature and composition to the proposed mixed municipal waste for acceptance. Therefore, the systems and operational procedures already in place on Site are considered to cover those needed to treat mixed municipal waste.</p> <p>The operational procedures for waste deliveries already in place on Site, as outlined in the Working Plan submitted with the original permit application in 2009, are;</p> <ul style="list-style-type: none"> <li>• Waste consignment paperwork is inspected;</li> <li>• A visual inspection of the incoming waste material is undertaken periodically or in all cases where a consignment is suspected to contain non-conforming waste materials;</li> <li>• Vehicles are weighed on entering and exit of the Site to determine the weight of material and the weight of incoming material from rail deliveries is recorded.</li> </ul> <p>With respect to MSW, the waste delivered to the facility will have undergone intermediate acceptance and bulking at third party waste transfer stations. The waste will therefore have already been subject to waste acceptance controls at these third party facilities.</p> <p>Key risks associated with MSW include:</p> <ul style="list-style-type: none"> <li>• physically large items which can block the feed chute;</li> <li>• high variability in moisture content and CV leading to combustion irregularities; and</li> <li>• unsuitable wastes such as hazardous waste which the facility has not been designed to process.</li> </ul>

BATc Requirement	BATc Details	Specific Measure
		<p>Viridor’s existing quality controls over the waste input limit the potential for the above risks to be realised.</p> <p>Where visual inspections or spot checking identify wastes which are unsuitable or not permitted for acceptance at the facility, for example oversized materials, these will be segregated and stored within the Site’s designated quarantine area prior to removal off-site to a suitably licensed facility.</p> <p>The Site’s Waste Acceptance Procedures includes a schedule of periodic sampling of waste deliveries and analysis of CV, halogens and metals/metalloids content.</p> <p>Viridor has no intention of accepting radioactive materials at the Site, low level or otherwise. As such, the Site’s pre-acceptance and waste acceptance processes will be employed to screen for potential sources of radioactive waste materials. Where there is a risk of radioactive materials being present, the waste stream will not be approved for delivery to the Site.</p>
<p>BAT 12. In order to reduce the environmental risks associated with the reception, handling and storage of waste, BAT is to use both of the techniques given below.</p>	<p>(a) Impermeable surfaces with an adequate drainage infrastructure</p>	<p>As outlined in the original permit application, containers from rail deliveries are stored on an impermeable hardstanding, before being transferred onto shuttle vehicles for transfer to the tipping hall. Deliveries by road are transferred directly to the tipping hall. The tipping hall is within an enclosed building to ensure any leaks, spillages or emissions are contained. Waste is stored within a bunker in the tipping hall. The tipping hall and bunker are provided with impermeable surfacing and a sealed drainage system which contains any runoff within the hall and bunker.</p>
	<p>(b) Adequate waste storage capacity</p>	<p>The RDF bunker section is designed to hold approximately 22,250m<sup>3</sup> of RDF, biomass and C&amp;I derived fuel and is considered sufficient storage capacity for the current operations on Site. As this variation application</p>

BATc Requirement	BATc Details	Specific Measure
		<p>does not propose to increase the maximum annual throughput of the facility, there is no reason to consider that the bunker will not continue to provide sufficient storage capacity.</p> <p>The larger RDF bunker section provides sufficient storage for approximately 7 days operation at the nominal capacity (48.2 t/hr) or approximately 3.5 days at the nominal capacity (91 t/hr).</p>
<p>BAT 14. In order to improve the overall environmental performance of the incineration of waste, to reduce the content of unburnt substances in slags and bottom ashes, and to reduce emissions to air from the incineration of waste, BAT is to use an appropriate combination of the techniques given below.</p>	<p>(a) Waste blending and mixing</p>	<p>As outlined in Section 4.2.3.1 of the Waste Incineration BREF, mixing of any wastes can serve the purpose of improving feeding and combustion behaviour. Specifically, solid heterogeneous wastes (e.g. municipal and packaged hazardous wastes) can benefit from a degree of mixing in the bunker prior to loading into feed mechanisms.</p> <p>Mixing of incoming waste materials occurs within the bunker using overhead cranes. As outlined in Section 4.2.3.1 of the Waste Incineration BREF, cranes are commonly applied at municipal plants where batch loads are delivered for pre-incineration storage in a common bunker.</p>
	<p>(b) Advanced control system</p>	<p>Continuous emissions monitoring system (CEMS) analysers are located on the stack. The CEMS feeds live emissions data to the plant's advanced control system to ensure that emissions are compliant with the EP by adjusting the combustion control process and flue gas treatment systems. This includes regulating air flows, waste feed and chemical dosing rates.</p>
	<p>(c) Optimisation of the incineration process</p>	<p>Combustion control takes place using a number of different plant features. The main features are the primary and secondary air systems, waste feed system, additive dosing system and auxiliary fuel firing system. The primary and secondary air flow can be adjusted to ensure optimum air supply stoichiometry.</p>

BATc Requirement	BATc Details	Specific Measure
		<p>The combustion chamber has been designed to increase turbulence. The size of the combustion chamber ensures that the minimum (2 seconds over 850 °C) residence time for the flue gas is achieved, in accordance with the Industrial Emissions Directive’s requirements.</p>
<p>BAT 15. In order to improve the overall environmental performance of the incineration plant and to reduce emissions to air, BAT is to set up and implement procedures for the adjustment of the plant’s settings, e.g. through the advanced control system (see description in Section 2.1), as and when needed and practicable, based on the characterisation and control of the waste (see BAT 11).</p>		<p>The facility is designed in such a way that considered the BAT requirements associated with MSW. As outlined in section 3.2.2.1 of the Waste Incineration BREF, the emissions to consider from the incineration of MSW are; hydrogen chloride, hydrogen fluoride, dust, nitrogen oxides, ammonia, TVOC, carbon monoxide, PCDD/F, PCBs and PAHs, mercury, heavy metals and cadmium and thallium. The plant was originally designed with abatement systems and emission limits for all of these substances, as detailed in the original permit application.</p> <p>The CEMS feeds live emissions data to the plant’s advanced control system to ensure that emissions are compliant with the EP by adjusting the combustion control process and flue gas treatment systems. This includes regulating air flows, waste feed and chemical dosing rates.</p> <p>There is therefore process controls in place across the Site to accommodate requirements associated with MSW.</p>
<p>BAT 17. In order to reduce emissions to air and, where relevant, to water from the incineration plant, BAT is to ensure that the FGC system and the wastewater treatment plant are appropriately designed (e.g. considering the maximum flow rate and pollutant concentrations), operated within their design range, and maintained so as to ensure optimal availability.</p>		<p>The Site’s existing flue gas treatment system employs selective non-catalytic reduction (SNCR) for secondary abatement of oxides of nitrogen (NOx) and a double dry system, using calcium hydroxide as a reagent with two stages of injection and reaction, for acidic gases. Activated carbon is employed for abatement of dioxin and furans and mercury and a two-stage bag filter system is employed for particulate control. This existing flue gas treatment system set up is typical and represents BAT for MSW incineration.</p> <p>Wastewater discharged from the Site comprises excess cooling water, purged from the cooling towers combined with excess rainwaters.</p>

BATc Requirement	BATc Details	Specific Measure
		Therefore, it is not considered that the addition of MSW for incineration will affect the composition or nature of the waters being discharged.
<p>BAT 21. In order to prevent or reduce diffuse emissions from the incineration plant, including odour emissions, BAT is to:</p> <ul style="list-style-type: none"> <li>• store solid and bulk pasty wastes that are odorous and/or prone to releasing volatile substances in enclosed buildings under controlled sub-atmospheric pressure and use the extracted air as combustion air for incineration or send it to another suitable abatement system in the case of a risk of explosion;</li> <li>• store liquid wastes in tanks under appropriate controlled pressure and duct the tank vents to the combustion air feed or to another suitable abatement system;</li> <li>• control the risk of odour during complete shutdown periods when no incineration capacity is available, e.g. by: <ul style="list-style-type: none"> <li>○ sending the vented or extracted air to an alternative abatement system, e.g. a wet</li> </ul> </li> </ul>		<p>The acceptance of MSW has the potential to effect diffuse emissions of odour from the facility's operations.</p> <p>Please refer to the Odour Impact Assessment and Updated Odour Management Plan in Sections 5 and 6 of this application respectively for an assessment of odour impact following the proposed change to accept MSW and information on measures employed at the Site to prevent and reduce diffuse odour emissions.</p>

BATc Requirement	BATc Details	Specific Measure
<p>scrubber, a fixed adsorption bed;</p> <ul style="list-style-type: none"> <li>○ minimising the amount of waste in storage, e.g. by interrupting, reducing or transferring waste deliveries, as a part of waste stream management (see BAT 9);</li> <li>○ storing waste in properly sealed bales.</li> </ul>		

**Table 2 BAT for Operational Change for APCR to be Recovered**

BAT Requirement		Specific Measure
<p>BAT 1. In order to improve the overall environmental performance, BAT is to elaborate and implement an environmental management system (EMS) that incorporates all of the following features:</p>	<p>(xxiii) a residues management plan including measures aiming to:</p> <ul style="list-style-type: none"> <li>(a) minimise the generation of residues;</li> <li>(b) optimise the reuse, regeneration, recycling of, and/or energy recovery from the residues;</li> <li>(c) ensure the proper disposal of residues</li> </ul>	<p>As detailed in the Non-Technical Summary in Section 1 of this variation application, APCR is recovered from the facility. As it stands, however, the Site’s approved Operating Techniques makes reference to APCR being sent to landfill following pre-treatment. This change represents an optimisation of the onwards management of this waste stream in accordance with the Site’s Residue Management Plan measures.</p>

## 4.0 CONCLUSION

As detailed in the original EP application for the Site, the facility was designed with the relevant BAT requirements for municipal solid waste (MSW) in mind, due to the materials accepted for combustion being derived from (or similar in nature to) MSW. This assessment has reviewed BATc as described in the 2019 Waste Incineration BREF relevant to the proposed acceptance of MSW and management of APCR. The assessment demonstrates that BAT will be employed in the acceptance and incineration of MSW and APCR management.

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