

REPORT

Boston Alternative Energy Facility

Fuel Availability and Waste Hierarchy Assessment

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1 Introduction

- 1.1.1 This 'Fuel Availability and Waste Hierarchy Assessment' is for the Boston Alternative Energy Facility (the Facility). This report is on behalf of Alternative Use Boston Projects Limited (the Applicant), to support the application for a Development Consent Order (DCO) (the DCO application) that has been made to the Planning Inspectorate under Section 37 of the Planning Act 2008 (the Act).
- 1.1.2 The Facility is a proposed Energy from Waste (EfW) plant that would generate approximately 102 megawatts electric (MWe) (gross) of renewable energy and would deliver approximately 80 MWe (net) to the National Grid. The energy recovery plant would be a thermal treatment facility using refuse derived fuel (RDF) as the feedstock to generate energy. The Facility is proposed to be located approximately 2 km to the south of Boston town centre, Lincolnshire on land as set out in **paragraph 1.3.1**.
- 1.1.3 The Facility constitutes a Nationally Significant Infrastructure Project (NSIP) under the Act by virtue of the Facility requiring the building, commissioning and operating of a generating station with an energy generating capacity greater than 50 MWe. As the Facility is a NSIP, the Applicant is required to make an application for a DCO to the Planning Inspectorate, which will be decided by the Secretary of State.
- 1.1.4 The DCO, if granted, would be known as 'The Boston Alternative Energy Facility Order'.

1.2 The Applicant

- 1.2.1 The Applicant is undertaking the development and securing funding for the Facility. The Applicant is a privately-owned company with core business in Energy from Waste, specifically renewable electricity projects producing "Green Energy".
- 1.2.2 The Applicant has been involved in industrial development at Riverside Industrial Estate, Boston, Lincolnshire since 2004. In March 2005, planning consent was obtained for a Special & Clinical Waste Processing Plant, with conditions discharged and commencement of construction.
- 1.2.3 In 2010, consent was obtained for a 12 MWe Gasification Power Station that would process waste wood (known as Biomass UK No. 3 Ltd) with enabling works carried out during 2013. This facility was sold to Aviva Investors in November 2015, along with the right to develop the facility, and in September 2016 it was transferred to Biomass UK No. 3 Ltd. The Biomass UK No. 3 Ltd facility is entirely separate to the proposed Facility.

1.3 The Application Site

1.3.1 The Application Site covers 26.8 hectares (ha) and is split in to two components: the area containing operational infrastructure for the Facility (the 'Principal Application Site'); and an area containing habitat mitigation works for wading birds (the 'Habitat Mitigation Area'). The Principal Application Site (NGR TF33950 42241) covers 25.3 ha and is neighboured to the west by the Riverside Industrial Estate and to the east by The Haven, a tidal waterway of the River Witham between The Wash and the town of Boston. The A16 public highway is located approximately 1.3 km to the west. The Habitat Mitigation Area covers 1.5 ha and is located approximately 170 m to the south east of the Principal Application Site, encompassing an area of saltmarsh and small creeks at the margins of The Haven. The Application Site is entirely within the administrative area of Boston Borough Council.

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1.3.2 A detailed description of the Application Site location and surroundings is provided in **Chapter 5 Project Description** of the Environmental Statement (ES) (document reference 6.2.5).

1.4 The Proposed Development

1.4.1 The proposed Facility would deliver approximately 80 MWe of renewable energy to the National Grid using RDF as a feedstock into a Thermal Treatment facility generating power via steam turbine engines.

1.4.2 The Facility would comprise the following main elements:

- a wharf and associated infrastructure (including re-baling facility, workshop, transformer pen and welfare facilities);
- a RDF bale contingency storage area, including sealed drainage, with automated crane system for transferring bales;
- conveyor system running in parallel to the wharf between the RDF storage area and the RDF bale shredding plant. Part of the conveyor system is open and part of which is under cover (including thermal cameras);
- bale shredding plant;
- RDF bunker building;
- Thermal Treatment plant comprising three nominal 34 MWe combustion lines (circa 120 megawatts thermal (MWth)) and associated ductwork and piping, transformer pens, diesel generators, three stacks, ash silos and ash transfer network; and air pollution control residues (APCr) silo and transfer network;

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- turbine plant comprising steam turbine generators, make-up water facility and associated piping and ductwork;
- air-cooled condenser structure, transformer pen and associated piping and ductwork;
- Lightweight Aggregate (LWA) manufacturing plant comprising four kiln lines, two filter banks with stacks, storage silos for incoming ash, APCr, and binder material (clay and silt), a dedicated berthing point at the wharf, silt storage and drainage facility, clay storage and drainage facility, LWA workshop, interceptor tank, LWA control room, aggregate storage facility and plant for loading aggregate / offloading clay or silt;
- electrical export infrastructure;
- two carbon dioxide (CO₂) recovery plants and associated infrastructure, including chiller units;
- associated site infrastructure, including site roads, pedestrian routes, car parking, site workshop and storage, security gate, control room with visitor centre and site weighbridge; and
- habitat mitigation works for redshank and other bird species comprising of improvements to the existing habitat through the creation of small features such as pools/scrapes and introduction of small boulders (Habitat Mitigation Works) within the Habitat Mitigation Area.

1.4.3 The construction period for the whole development, including commissioning, is anticipated to be between 46 to 48 months.

1.4.4 The Facility would be designed to operate for an expected period of at least 25 years, after which ongoing operation will be reviewed and if it is not appropriate to continue operation the plant will be decommissioned. The wharf structure would replace a section of the current primary flood defence bank (without impacting on the integrity of the bank) and would form a permanent structure that is not anticipated to be decommissioned.

1.4.5 A detailed description of the Facility is provided within **Chapter 5 Project Description** of the ES (document reference 6.2.5). Note also that **Chapter 5 Project Description** provides further information on the multi-modal approach to transport that is proposed for the Facility, to conform to the requirements of NPS EN-3 paragraph 2.5.25 (*"Government policy encourages multi-modal transport and the IPC should expect materials (fuel and residues) to be transported by water or rail routes where possible. (See Section 5.13 of EN-1 on transport impacts). Applicants should locate new biomass or waste combustion generating stations in the vicinity of existing transport routes wherever possible."*)

1.5 The Purpose and Structure of this Document

1.5.1 This 'Fuel Availability and Waste Hierarchy Assessment' has been prepared to comply with the requirements of paragraphs 5.14.2 and 5.14.3 of NPS EN-1 which require the Facility should ensure:

- *Sustainable waste management is implemented through the "waste hierarchy", which sets out the priorities that must be applied when managing waste; and*
- *Disposal of waste should only be considered where other waste management options are not available or where it is the best overall environmental outcome.*

and paragraphs 2.5.66 and 2.5.67 of NPS EN-3, which indicate that the applicant seeking permission for a waste fuelled power station should:

- *carry out an assessment of the proposed waste combustion generating station that examines the conformity of the scheme with the waste hierarchy and the effect of the scheme on the relevant waste plan or plans where a proposal is likely to involve more than one local authority; and*
- *set out the extent to which the generating station and capacity proposed contributes to the recovery targets set out in relevant strategies and plans, taking into account existing capacity.*

1.5.2 Finally, paragraph 2.5.69 of EN-3 indicates that the results of the assessment of the conformity with the waste hierarchy and the effect on relevant waste plans should be presented in a separate document to accompany the application. It is noted at this point that the Facility is proposing to draw its supply of RDF from a national supply that would be influenced by the market conditions at the time of procuring relevant contracts. Therefore, the assessment of impact on relevant plans has focussed on plans at a National level for the source material; and for the plans affecting the location of the Facility as the destination.

1.5.3 This Assessment constitutes the separate document described in paragraph 2.5.69 of EN-3, to fulfil the requirements summarised above. This document also complements and should be read in conjunction with **Chapter 23 Waste** of the **ES** (document reference 6.2.23). **Chapter 23 Waste** provides more detailed assessment of the impact the Facility has on the existing and predicted waste management capacity in the region (in response to EN-1 paragraph 5.14.6, "*The applicant should set out the arrangements that are proposed for managing any waste produced and prepare a Site Waste Management Plan . The arrangements described and Management Plan should include information on the proposed waste recovery and disposal system for all waste generated by the development,*

and an assessment of the impact of the waste arising from development on the capacity of waste management facilities to deal with other waste arising in the area for at least five years of operation. The applicant should seek to minimise the volume of waste produced and the volume of waste sent for disposal unless it can be demonstrated that this is the best overall environmental outcome”).

- 1.5.4 An assessment of current and future demand for waste treatment capacity has been made which constitutes the ‘fuel assessment’ part of this document.

Scope of Work and Structure of this Document

- 1.5.5 The scope of work is dictated by the requirements of EN-3 and involves three tasks:

- Fuel availability and future waste management capacity requirements;
- Compliance with the waste hierarchy; and
- Effect of the Facility on relevant recovery targets in relevant local waste plans and strategies.

- 1.5.6 The findings of the assessments are summarised and overall conclusions with regard to compliance with the requirements of EN-3 are set out at the end of this document.

- 1.5.7 The structure of the remainder of this report is as follows;

- Section 2 Fuel Availability Assessment;
- Section 3 Waste Hierarchy;
- Section 4 Effect on Recovery Targets and Waste Plans in Waste Plans and Strategies; and
- Section 5 Summary and Conclusions.

2 Fuel Availability Assessment

- 2.1.1 As a precursor to assessing the potential for the Facility to comply with the waste hierarchy, and with relevant planning policies and waste strategies, it is necessary to first determine the availability of suitable RDF which could be used as fuel in the Facility.
- 2.1.2 This assessment is not seeking to specify an exact level of need for the Facility because that is not required by policy, and is constrained by uncertainties associated with the Local Authority Collected Waste (LACW) (i.e. household waste and business waste where collected by the local authority and which is similar in nature and composition) data that is also dependent on various external factors. The assessment below uses publicly available data to come to a reasonable conclusion on the availability of fuels appropriate for combustion in the Facility.

2.2 State of the UK Residual Municipal Waste

- 2.2.1 The UK's total waste arisings are made up of LACW and private sector Commercial and Industrial (C&I) waste. Of this waste, a proportion is recycled or requires special treatment for disposal. The remainder is termed 'residual waste', and a proportion of this waste has a sufficient calorific value for use as refuse derived fuel (RDF).
- 2.2.2 RDF would be sourced for the proposed Facility from the residual waste element (non-recyclable) from materials recycling facilities (MRF). This represents a 13.6 million tonne (Mt) waste market, of which just over three Mt is exported from the UK and most of the remainder is landfilled.
- 2.2.3 There are nine counties which already have no landfill capacity and five English regions are set to run out within the next 10 years (Biffa, 2017).
- 2.2.4 The Environmental Services Association (ESA) is the trade association representing the UK's resource and waste management industry, which is leading the transformation of how the UK's waste is managed. The ESA Report 'UK Residual Waste: 2030 Market Review' warns of a six million tonne per annum gap for waste infrastructure in the UK by 2030. National Infrastructure Assessment; series of recommendations to help put in place the right infrastructure for the transition to a more circular economy.
- 2.2.5 However, it is important to acknowledge counter views. Eunomia's 12th edition of the Residual Waste Infrastructure Review (Eunomia, 2017) forecasts that the UK's supply of treatment capacity will exceed the available quantity of residual

waste in 2020/21. Were all facilities to operate at full capacity, together they would limit the UK's recycling rate to no more than 63%.

2.2.6 The Waste Flow detailed in **Plate 2-1** (Tolvik 2017b) provides a representation of UK Waste Arisings & flow of waste for treatment/disposal of residual waste in the UK. This demonstrates potential availability of residual municipal waste for the Facility.



Plate 2-1 UK Residual Waste Flow Source: Tolvik Analysis 2017

2.2.7 Tolvik was commissioned by The Environmental Services Association (ESA) to undertake an independent review of third party reports and analysis relating to the Residual Waste market in the UK (Tolvik, 2017a). The Tolvik report states that residual waste in the UK is currently presented in three forms:

- Unprocessed "black bag" waste;
- Lightly processed RDF suitable for export to Europe/or use in specific UK Energy from Waste (EfW) facilities requiring fuel of a higher Net Calorific Value (NCV); and
- A refined Solid Recovered Fuel (SRF), prepared to a specification and generally for use in a cement kiln.

- 2.2.8 The report considers that the boundaries between these different presentations of residual waste in the UK are blurred and vary with changing market conditions. Tolvik state that “Assuming the UK continues to track the same path, a maximum Household Waste recycling rate of 55% could be achieved by 2035.” To achieve this, the UK will require a greater degree of legislative and financial intervention.
- 2.2.9 For municipal-like commercial and industrial (C&I) Waste, it is estimated by Tolvik that the current UK recycling rate is approximately 61% with modest scope for recycling rates to increase. Overall, in Tolvik’s opinion, it is unlikely that the UK could achieve the 2035 recycling targets set out in the CEP, and they provide a “Central Scenario” where it is estimated that the tonnage of Residual Waste in the UK will decline modestly from 27.5 Mt in 2017 to 26.5 Mt by 2030.
- 2.2.10 In 2019 Tolvik estimated that residual waste inputs to EfW in the UK represented 45.5% (2018: 41.8%) of the overall UK Residual Waste market. In 2019, the total tonnage of residual waste sent to EfW facilities in the UK exceeded the tonnage sent to landfill for the first time. RDF exports from the UK also declined by around 16% when compared with 2018 (Tolvik, 2020).
- 2.2.11 The Tolvik analysis for the South-East is provided in **Table 2-1** as an example to demonstrate availability (Tolvik, 2018).

Table 2-1 Available Waste – Central Scenario Source: Tolvik Analysis

Available Waste – Central Scenario	2020	2025	2030	2035
Total C&I Waste	3.46	3.61	3.76	3.80
Contracted C&I Waste	1.25	1.32	1.32	1.32
Contracted RDF Export	0.72	0.30	-	-
Available C&I Waste	1.50	1.99	2.44	2.49
Total Residual LACW	4.87	4.71	4.57	4.44
Contracted LACW	4.26	3.52	2.98	2.20
Available LACW	0.60	1.19	1.59	2.24
Total Residual Waste	8.33	8.32	8.32	8.24
Total Contracted Residual Waste	6.22	5.14	4.30	3.52
Total Available Residual Waste	2.10	3.18	4.03	4.72

2.2.12 As shown in **Table 2-1**, 'Total Available Residual Waste' based on a 'Central Scenario' of recycling rate targets, are estimated to be 3.18 Mt in 2025, and of that figure 1.99 Mt is produced by C&I waste producers. Therefore, the current RDF export market conditions indicate that sourcing RDF for the Facility is favourable and it is not anticipated that there is an issue sourcing suitable and sufficient material; and that there's a need for such material to be managed.

2.3 Supply Commitment

2.3.1 The Facility would require the obtaining of contracts to secure adequate fuel supplies and this would be a matter for commercial consideration between the Applicant and the primary fuel supplier. This means that contracts can realistically, only be concluded once the date on which the facility would be commissioned was certain.

2.3.2 Previous decisions (for example the 60 MW Lostock energy from waste generating station) have acknowledged that for merchant facilities, where no contracts of waste have been obtained at the date of the application, the sourcing of fuel for the facility should be a matter of commercial judgment for the operator as it is for existing fossil fuelled electricity generating stations.

2.3.3 Therefore, it is inappropriate to provide definitive information with regard to the origin of the waste fuel for the Facility at this stage, hence commentary on the effect on specific local and regional plans for the source of the waste is not provided. However, as described above in **Section 2.2** it is anticipated that there is adequate residual capacity within the UK for supply.

2.3.4 The Facility has proposed a different approach to routing the supply of waste fuel via ship compared to traditional road movements (see **Chapter 5 Project Description** of the ES (document reference 6.2.5)) and this opens up the potential for receiving fuel supplies from a wider national area. It is considered that the Facility would also be capable of meeting part of the wider need for waste recovery, as well as some of the national need for additional energy generation capacity, the urgent need for which is set out in the Overarching National Policy Statement EN-1 at paragraph 3.1.3.

2.3.5 The primary fuel supplier would secure "letters of intent to supply" from prospective UK supply partners prior to more formalised contracts being put into place. Contracts would be in place to secure volume on a tiered approach with longer term contracts at more preferential commercial terms forming a basis of around 60% of the supply. This supply volume would usually be underpinned by local authority contracts around collection and supply of Municipal Solid Waste

(MSW) to be processed into RDF. A further 25 – 30% of the supply is anticipated to come from shorter term contracts at a higher gate fee with more regional players in the market. Lastly, a small percentage (10%) would come from the spot market. However, these proportions of anticipated supply are approximate and would be dictated by the waste market position.

- 2.3.6 Material will be supplied to the Facility by ship will be delivered baled and then de-baled at the Facility (under the conditions of the Environmental Permitting Regulations (EPR)) prior to the thermal treatment process to recover energy. The ability to supply to the Facility by ship allows for the waste to be procured over a greater distance and will be from across the UK.
- 2.3.7 The primary fuel supplier will aggregate the waste specifications for the different producers to ensure a consistent supply of residual waste according to a waste specification agreed with the operator of the Facility.

2.4 Management of Local Waste

- 2.4.1 There is also potential for the Facility to accept residual household waste from the Slippy Gowt Transfer Station (TS) operated by Lincolnshire County Council (LCC). This receives all of the residual household waste from Boston Borough Council (BBC) and South Holland District Council (SHDC) areas, and some residual household waste from East Lindsey Council area. This waste is bulked at the Slippy Gowt TS then transferred to the North Hykeham facility at Lincoln, which is an EfW incineration facility operated on behalf of LCC. The management of waste in this manner is subject to a specific LCC procurement contract. SHDC, BBC and LCC have raised interest in the potential for the Facility to receive residual household waste from Slippy Gowt TS. However, this would be subject to agreement between the Applicant and the Waste Disposal Authority (LCC) and would need to be in accordance with LCC procurement rules. Given that any change to the management of the local residual waste would need to be subject to a new waste procurement contract, this is not considered further in the wider DCO application.

3 Waste Hierarchy Assessment

3.1 Legislation with Relation to the Waste Hierarchy

- 3.1.1 In terms of waste, UK legislation is underpinned by several international (e.g. European Union (EU)) agreements. Since 1 February 2020, the United Kingdom has withdrawn from the European Union and has become a “third country”, which means it is not part of the EU. The Withdrawal Agreement provides for a transition period ending on 31 December 2020. Until that date, EU law in its entirety applies to and in the United Kingdom.
- 3.1.2 Most EU waste management law was implemented into UK legislation by way of statutory instrument. This means that the relevant legislation will not be automatically or immediately affected by the UK’s exit from the EU as the legislation will remain in place in the UK.
- 3.1.3 The government has decided that at the point at which the UK leaves the EU, all EU legislation which had not already been transposed into UK law will be transferred to UK statute. From then on all the EU environmental legislation will remain in force as part of UK law but (unless the UK has made specific commitments to apply such law as part of negotiating a new arrangement with the EU), it can then be repealed or amended according to the policy drivers of the UK Parliament (or the devolved parliaments where they have power to do so).

Waste Framework Directive

- 3.1.4 The key European legislation is the revised Waste Framework Directive (2008/98/EC) (‘rWFD’), which consolidates several separate waste Directives and amendments. It establishes the basis for the management of wastes across the European Union (EU). It defines certain terms, such as “waste”, “recovery” and “disposal”, to ensure that a uniform approach is taken across the EU.
- 3.1.5 UK legislation is underpinned by several international (e.g. European Union (EU) agreements). Following the 2016 referendum on UK withdrawal from the EU, the UK will continue to be committed to EU agreements until finalisation of the withdrawal agreement and / or until two years after initiation of Article 50 of the Treaty on European Union (TEU). Following withdrawal, the exact nature of amendments to UK legislation which had an origin in EU law will depend on the agreements made with the EU and the extent to which EU measures continue to apply (e.g. achieve trading agreements) as well as the ongoing political agendas of the UK government.



3.1.6 The provisions for the waste hierarchy are provided in the Waste (England & Wales) Regulations 2011 SI 2011 (No. 988).

The Waste (England and Wales) Regulations 2011

3.1.7 The 2011 Waste Regulations transposes the rWFD in England and Wales. In addition, it reduced the fragmentation of waste legislation to some extent and so it streamlines and replaces some waste regulation.

3.1.8 Key provisions in the rWFD were implemented by the Waste Regulations that are particularly relevant to the fuel for the Facility are:

- Waste hierarchy: legal requirement the waste hierarchy for waste prevention and management in legislation and policy (see below).
- Separate collections (private companies): From 1 January 2015: (1) businesses which collect waste paper, metal, plastic or glass need to collect such waste separately; and (2) businesses which collect, transport or receive separately collected waste paper, metal, plastic or glass should ensure that such waste is not mixed with other waste.

The Waste Hierarchy

3.1.9 The Waste Hierarchy is set out at Article 4 of the rWFD and has been implemented by The Waste (England and Wales) Regulations 2011.

3.1.10 The Waste Hierarchy requires the producer/holder of a waste to demonstrate that the priorities identified in **Table 3-1** have been considered in the priority order, to determine the most suitable waste management option for all wastes prior to removal from site.

Table 3-1 The Waste Hierarchy*

Waste Hierarchy	Relevant activity
Prevention	Using less material in design and manufacture, keeping products for longer, re-use, using less hazardous materials.
Preparing for re-use	Checking, cleaning, repairing, refurbishing, whole items or spare parts.
Recycling	Turning waste into a new substance or product, includes composting if it meets quality protocols
Other recovery	Includes anaerobic digestion, incineration with energy recovery, gasification and pyrolysis which produce energy (fuels, heat and power) and materials from waste, some backfilling.
Disposal	Landfill and incineration without energy recovery.

*Table reproduced from Defra website: <https://www.gov.uk/waste-legislation-and-regulations>

3.1.11 It is a legal requirement for waste producers/holders to follow the Waste Hierarchy when making decisions about waste management options. Waste holders must demonstrate the highest possible hierarchical option for their wastes. Lower hierarchical options cannot be justified by cost alone. They require environmental justification over available higher options, for example the location of a site may justify sending waste to a lower hierarchical option (e.g. local landfill), rather than sending it hundreds of miles to the nearest facility that could provide a higher option.

3.2 Application of the Waste Hierarchy

3.2.1 The hierarchy of waste management methods, and the requirements as to how it should be applied, dictates that the waste feedstock for the Facility can only be drawn from residual waste which would otherwise be landfilled and which is not capable, either technically or from the standpoint of economic feasibility (see paragraph 2(2)(b)(ii) of Schedule 2 to the Waste Regulations 2011), of being recycled.

3.2.2 With regard to the RDF being received, the responsibility for compliance with the Waste Hierarchy lies with each of the processors of the RDF for the Facility and how the supply is coordinated by the main RDF supplier.

3.2.3 The waste management facilities that would be used to supply the Facility will have their compliance with the hierarchy regulated and monitored by the Environment Agency (EA) through their respective Environmental Permits/Waste.

3.2.4 The main supplier of RDF fuel to the Facility will:

- ensure that the supply of RDF is derived from materials where all efforts to remove recyclable material from it has already taken place, directly at source by the waste producer, and by a materials recycling facility to ensure that the RDF is only sourced from residual waste;
- ensure that the RDF supplied is within the agreed specification for the Facility;
- only provide the residual waste element (non-recyclable) as fuel for the Facility from licenced materials recycling facilities operating in accordance with an authorisation issued by one of the UK's environmental regulators; and
- cease to take the residual waste element (non-recyclable) from licenced materials recycling facilities for which the Environmental Permit is withdrawn by the EA (or other permit granted by the relevant permitting authority if elsewhere in the UK), or for which the permit is removed for that part of the

treatment facility's operations which are used to produce fuel supplied to the Facility.

- 3.2.5 The above measures will be implemented and controlled through the contracts engaging the main fuel supplier to the Applicant; the environmental authorisations in force for those preparing the RDF from residual waste; and the relevant Environmental Permit and Environmental Management System to be prepared for the operation of the Facility.
- 3.2.6 The waste hierarchy shown in **Table 3-1** identifies that waste treatment involving energy generation is a recovery operation. However, the rWFD confirms that this will be the case subject to it achieving energy recovery efficiency expressed as R1 of 0.65 or more. The recovery efficiency determination would be provided in detail as part of the evidence to support the environmental permit application for the Facility which is now in progress and will be progressed as the DCO application is determined.
- 3.2.7 Under the Waste Framework Directive, an Energy from Waste plant could be classified as either a recovery operation R1 or a disposal operation D10.
- 3.2.8 To be classed as an R1 operation, the process must meet the following criteria:
- The combustion of waste must generate more energy than the consumption of energy by the process itself;
 - The greater part of the waste must be consumed during the operation;
 - The greater amount of the energy generated must be recovered and used (either as heat or electricity); and
 - The waste must replace the use of a source of primary energy.
- 3.2.9 R1 classification can be achieved only where the energy efficiency is equal to or above:
- 0.60 - for installations in operation and permitted before 1st January 2009.
 - 0.65 - for installations permitted after 31st December 2008.
- 3.2.10 The formula used to calculate this value of energy efficiency, "the R1 Energy Efficiency Formula" is:

$$\text{R1 efficiency} = \frac{Ep - (Ef + Ei)}{(0.97 * (Ew + Ef))}$$

3.2.11 In which:

Ep means annual energy produced as heat or electricity. It is calculated with energy in the form of electricity being multiplied by 2.6 and heat produced for commercial use multiplied by 1.1 (GJ/year)

Ef means annual energy input to the system from fuels contributing to the production of steam (GJ/year)

Ew means annual energy contained in the treated waste calculated using the net calorific value of the waste (GJ/year)

Ei means annual energy imported excluding Ew and Ef (GJ/year)

0.97 is a factor accounting for energy losses due to bottom ash and radiation.

It should be noted that this is not a conventional energy efficiency calculation.

3.2.12 The Facility is proposed to be an 'R1' plant and would therefore constitute recovery. Presently, the potential source waste for the RDF is either being recovered elsewhere (either within the UK or overseas); or is being landfilled. Therefore, for the Facility to recover energy from this source RDF represents the most appropriate waste hierarchy option for it.

3.2.13 R1 status represents a performance measure of how well the facility the energy content of the waste, with a more efficient plant representing a higher R1 performance. The proposed facility shall use a conventional steam cycle with multiple preheats for improved cycle efficiency. As high pressure steam is utilised in the turbine, medium and low pressure steam is extracted after it has transferred some energy to the turbine rotor. Two stages of condensing heat exchanger are proposed to preheat condensate, along with a medium pressure passout for the deaerator. These serve to preheat condensate for return to the boiler. In addition, heat in the form of medium pressure steam is exported to the carbon capture facility for utilisation in the process. This serves to further increase the R1 performance of the Facility.

3.3 Processing of Residues

3.3.1 However, it is important not to look at the recovery of energy in isolation as the sole waste hierarchical consideration. The other relevant factor is the management of residues from the Facility.

3.3.2 There is an active market in the UK for the processing of bottom ash into useful secondary recycled products. This is evidenced by the Quality Protocol¹ in place for bottom ash and pulverised fuel ash/furnace bottom ash².

¹ <https://www.gov.uk/government/publications/quality-protocol-pulverised-fuel-ash-pfa-and-furnace-bottom-ash-fba>

² Note that the Environment Agency intends to review the current batch of Quality Protocols. Initial correspondence from the Environment Agency indicates that the Quality Protocol for ash is 6th in line for review.

- 3.3.3 However, the market for the hazardous residues (fly ash and air pollution control residues (APCr)) produced by the abatement process identifies that this is subject to a variety of waste options as demonstrated below, which shows an extract of 2019 hazardous waste data for these residues, derived from the Environment Agency's Hazardous Waste Interrogator (Environment Agency 2020).

Summary

Waste Fate	Tonnes
Incineration without energy recovery	4,213
Landfill	35,031
Long term storage	15,257
Recovery	121,419
Rejected	373
Transfer (D)	991
Transfer (R)	377
Treatment	286,307
Grand Total	463,968

Plate 3-1 Quantity of air pollution control residues and fly ash from thermal waste treatment (Environment Agency 2020)

- 3.3.4 The Facility is proposing to take the bottom ash and the APCr and fly ash and convert these into lightweight aggregate (LWA). The LWA will be manufactured to a standard that meets market specification. Hence, the material will be fully recycled into a product that ceases to be waste.
- 3.3.5 Furthermore, the Facility will process the bottom ash residues prior to the LWA process by crushing and passing via a magnet to remove the ferrous metals. This is only like to recover a small proportion (approximately 0.4% of the overall RDF input), however, it will mean that typically 5,000 tonnes per annum of material will be segregated for recycling, thus providing a higher hierarchical option than landfill.
- 3.3.6 The operation of the LWA plant at the Facility will be covered by an environmental permit which will require that the process conforms to the Best Available Techniques. The manufacturing process for the LWA to a market specification product will be in accordance with the Conditions of the Environmental Permit.
- 3.3.7 The Facility is promoting a higher hierarchical option by recycling into an aggregate product, compared to disposal by landfill or other lower options.

4 Effect on Recovery Targets and Waste Plans and Strategies

4.1 Targets

4.1.1 The rWFD sets out, in Article 11 (2), a minimum target for recycling in that it requires, inter alia, that:

“Member States shall take the necessary measures designed to achieve the following targets:

(a) by 2020, the preparing for re-use and the recycling of waste materials such as at least paper, metal, plastic and glass from households and possibly from other origins as far as these waste streams are similar to waste from households, shall be increased to a minimum of overall 50 % by weight.”

4.1.2 The revised legislative framework on waste in the EU’s Circular Economy Package (CEP) entered into force at the start of July 2018 through Directive (EU) 2018/851 of the European Parliament and of the Council of 30 May 2018, by amending Directive 2008/98/EC on waste (the Waste Framework Directive – see above).

4.1.3 Member states had 24 months to transpose it into national legislation. The implementation of CEP in the UK will be subject to the UK withdrawal agreement. The UK’s own Circular Economy Package was published on 30 July 2020 by the UK, Welsh, Scottish and Northern Ireland governments and is predominantly the same as the European CEP. The government states (at the time of writing) that it is looking to lay legislation in the autumn (of 2020) to transpose the relevant CEP regulations into UK law.

4.1.4 The CEP extends targets for municipal waste recycling. A target of 55 per cent by 2025 will be introduced, with a 60 per cent goal for 2030, then a subsequent 65 per cent target being set for 2035. EU member states are currently working towards a 50 per cent target for 2020.

4.1.5 Additionally, the CEP proposes a binding landfill target to reduce landfill to maximum of 10% of municipal waste by 2035.

4.1.6 The CEP will also provide concrete measures to promote re-use and stimulate industrial symbiosis where one industry’s by-product is reused as another industry’s raw material.

4.1.7 The Facility will only take residual municipal waste which will have previously been subject to either separate collection of recyclate at source (segregated by the

waste producer) in accordance with the respective collection regimes imposed by the local waste collection authority; and further segregation measures by operators of materials recycling facilities. Therefore, the production of RDF from the remaining residual fraction after these recycling measures have taken place will not influence recycling targets.

- 4.1.8 Furthermore, the Facility promotes the requirements of the CEP by providing a recovery solution and diverting material that could otherwise be disposed to landfill.
- 4.1.9 Also, for material that is sent abroad for energy recovery, it promotes the principle of proximity. The estimates of carbon impacts on this are provided in **Chapter 21 Climate Change** of the ES (document reference 6.2.21).
- 4.1.10 There are no recovery targets in the rWFD other than a general requirement in Article 10 that *“Member States shall take the necessary measures to ensure that waste undergoes recovery operations, in accordance with Articles 4 and 13”,* which require compliance with the waste hierarchy and with general principles of protection of human health, the environment and amenity.

4.2 Effect on Waste Plans

- 4.2.1 The National Planning Policy Framework (NPPF), which was updated in February 2019 (Ministry of Housing Communities and Local Government (MHCLG) (2019)), does not contain specific waste policies. In terms of achieving sustainable development, the NPPF identifies that minimising waste and pollution is a fundamental part of the environmental role of the planning system.
- 4.2.2 The NPPF encourages Planning Authorities to prepare Local Plans that, so far as practicable, take account of the contribution that substitute or secondary and recycled materials and minerals waste would make to the supply of materials, before considering extraction of primary materials, whilst aiming to source minerals supplies indigenously. The Facility should therefore have regard to the requirements of the relevant Local Plan in terms of waste management.
- 4.2.3 This is discussed further below in the context of the Lincolnshire Minerals and Waste Local Plan and South-East Lincolnshire Local Plan.
- 4.2.4 Defra published a National Waste Management Plan for England in July 2013 (Defra, 2013a). The key aim of the Waste Management Plan for England was to set a direction towards a zero-waste economy as part of the transition to a sustainable economy. In particular, this means using the “waste hierarchy” (waste prevention, re-use, recycling, recovery and finally disposal as a last option) as a

guide to sustainable waste management

- 4.2.5 The plan identified the measures to be taken to ensure that by 2020 at least 70% by weight of construction and demolition waste is subjected to material recovery.
- 4.2.6 The construction, demolition and excavation sector is the largest contributing sector to the total waste generation. The UK generated 222.9 million tonnes of total waste in 2016. 66.2 million tonnes of this was non-hazardous construction and demolition waste. The Government keeps progress towards the 2020 targets under review by monitoring actual recycling rates and by modelling future recycling. The recovery rate from non-hazardous construction and demolition waste in the UK in 2016 was 91.0%. This already exceeds the 2020 target of recovering at least 70% by weight, of non-hazardous construction and demolition waste (Defra & Government Statistical Service, 2019).
- 4.2.7 Measures will be implemented in a Construction Code of Practice (CoCP) which is secured in a requirement to the DCO, for the Facility to maximise recycling and recovery opportunities during construction and exceed the material recovery targets. An Outline CoCP is submitted with the application (document reference 7.1)

Lincolnshire Minerals and Waste Local Plan (2016)

- 4.2.8 The Lincolnshire Minerals and Waste Local Plan (LMWLP) (LCC, 2016) is made up of two documents – the Core Strategy and Development Management Policies (2016) and Site Locations (2017) documents.
- 4.2.9 The Core Strategy and Development Management Policies (CSDMP) document was adopted in June 2016 and replaced the Lincolnshire Minerals Local Plan (1991) and the Lincolnshire Waste Local Plan (2006) (with the exceptions of Policies WLP2, WLP6 and WLP12). The CSDMP document outlines the future of waste management in the Lincolnshire up to 2031, as well as a guide to future winning and working of materials. The criteria against which waste planning applications are considered are also set out in the CSDMP document.
- 4.2.10 The policies contained within the CSDMP document that are applicable to waste developments are explained in **Chapter 3 Policy and Legislation** of the ES (document reference 6.2.3). They include:
- 4.2.11 **Policy W1: Future requirement for new waste facilities**, which states:

“The County Council will, through the Site Location document, identify locations for a range of new or extended waste management facilities within Lincolnshire

where these are necessary to meet the predicted capacity gaps for waste arisings in the County up to and including 2031.

4.2.12 **Policy W3: Spatial Strategy for New Waste Facilities**, which states:

“Proposals for new waste facilities, including extensions to existing waste facilities, will be permitted in and around the following main urban areas as indicated on the key diagram subject to the criteria of Policy W4:

*Lincoln;
Boston;
Grantham;
Spalding;
Bourne;
Gainsborough;
Louth;
Skegness;
Sleaford; and
Stamford.”*

4.2.13 **Policy W4: Locational Criteria for New Waste Facilities** in and around main urban areas, which states:

“Proposals for new waste facilities, including extensions to existing waste facilities, in and around the main urban areas set out in Policy W3 will be permitted provided that they would be located on:

*previously developed and/or contaminated land; or
existing or planned industrial/employment land and buildings; or
land already in waste management use; or
sites allocated in the Site Locations Document; or
in the case of biological treatment the land identified in Policy W5.*

[...]

Proposals must accord with all relevant Development Management Policies set out in the Plan.”

4.2.14 The Site Locations document was adopted in December 2017 and outlines specific proposals and policies for land provision for waste (and mineral) developments.

4.2.15 The policies contained within the Site Locations document that are applicable to

waste for the Facility include:

4.2.16 **Policy SL3: Waste Site and Area Allocations**, which states:

“Future requirements for new waste facilities in order to meet capacity gaps, in accordance with Policy W1 of the Core Strategy and Development Management Policies document, will be provided through:

[...]

- *the granting of planning permission for waste uses within the following areas where the applicant can demonstrate that the proposal is in accordance with the development plan:*

[...]

Site Reference	Name	Town	Area
WA22-BO	Riverside Industrial Estate	Boston	119 ha

[...]

The allocated site and areas shall be developed in accordance with the Development Briefs in Appendix 1 of this plan.”

4.2.17 The Site Locations Document identifies that the Application Site is located in WA22-BO Riverside Industrial Estate, Boston. The allocation designates land allocated for industrial use, including Resource Recovery Park, Treatment Facility, Waste Transfer, Materials Recycling Facility, Household Waste Recycling Centre, Metal Recycling / End of Life Vehicles, Re-Use Facility, C&D Recycling, Energy Recovery.

4.2.18 Therefore, the criteria for Policies SL3, W1, W2 and W4 are met by the Facility.

4.2.19 **Policy DM1 Presumption in favour of sustainable development** states the following, which has been accounted for as part of the Facility:

“7.22 Waste management is significant in tackling greenhouse gas emissions because the treatment and disposal of waste generates carbon dioxide and methane. Methane emissions from biodegradable waste in landfill accounts for around 40% of all UK methane emissions. This equals about 3% of UK greenhouse gas emissions. Methane is more damaging than carbon dioxide as a greenhouse gas. Waste management therefore has an important role in mitigating the levels of greenhouse gases emitted into the atmosphere.

7.23 The Waste Hierarchy is a key policy objective in terms of mitigating impacts on climate change by focusing on reducing the amount of waste produced, and increasing the amount of waste that is reused, recycled, composted or has energy recovered. This is important in terms of diverting biodegradable waste from landfill and reducing associated methane emissions. In addition, in terms of

maximising the potential for reuse, recycling and recovery of resources, it also helps to minimise the demand for new resources and the greenhouse gases generated in their production.

7.24 Maintaining high recycling rates is therefore a key part of the Council's climate change strategy in order to divert as much biodegradable waste away from landfill as possible to lower methane emissions. The Council will also encourage proposals for new waste technologies/processes which bring about reduced levels of biodegradable waste being disposed of to landfill.

7.25 The objective of minimising impacts on climate change will be focused on carbon reduction/capture measures, efficient use of resources and renewable energy (where practicable and viable), and on minimising traffic generation. It will be important that proposals demonstrate how these factors have been taken into account in their design.

7.26 The objective of reducing greenhouse gas emissions will be achieved by encouraging:

- waste treatment processes that reduce the amount of waste going to landfill (with all waste management facilities being required to provide evidence of how much waste will be diverted from landfill);*
- decentralised, low-carbon/renewable energy generation and carbon reduction measures at new mineral working sites and waste management developments (including landfill gas collection);*
- low carbon energy recovery facilities, such as combined heat and power (CHP), where possible, to be suitably sited in close proximity to suitable potential heat customers to enable the utilisation of the heat produced as an energy source;*
- increased energy efficiency measures in plant, buildings and operations;*
- and*
- good practice in transport related matters to reduce vehicle miles."*

4.2.20 The Facility meets these objective as follows:

- Residual waste is being diverted from landfill (7.22 and 7.24) and energy recovered from it (7.23);
- CO₂ is being directly recovered from the Facility and converted into food-grade CO₂ for industrial use (7.22, 7.23, 7.25 and 7.26);
- The Facility will be built to use its own heat as part of the processes, however, will also be capable of distributing low-grade heat should an external off-site use for it be available (7.25 and 7.26);

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- LWA is being manufactured from residues from the thermal treatment process rather than disposal (7.23, 7.24, 7.25 and 7.26); and
- RDF and LWA are being transported by ship (7.25 and 7.26).

South-East Lincolnshire Local Plan

- 4.2.21 The South-East Lincolnshire Local Plan (SELLP) was adopted in March 2019 (South-East Lincolnshire Joint Strategic Planning Committee, 2019). It was produced jointly by Boston Borough Council (BBC), Lincolnshire County Council (LCC) and South Holland District Council (SHDC).
- 4.2.22 The SELLP guides development in South East Lincolnshire over the next twenty years and will identify opportunities for growth and will set out clear guidance on what planning applications will be permitted.
- 4.2.23 The SELLP deals with all land use and development issues affecting South East Lincolnshire, except for minerals and waste development – these are covered in the Lincolnshire Minerals and Waste Local Plan (see above).

5 Summary and Conclusions

Fuel Availability

- 5.1.1 It is concluded that there is adequate availability of fuel for the Facility and that this fuel could be sourced by diverting waste from landfill or by reducing the significant amount of RDF which is currently being exported to the continent for energy recovery and which represents a lost opportunity to the UK economy.
- 5.1.2 The operation of the Facility would require contracts to be obtained to secure adequate fuel supplies and this would be a matter for commercial consideration between the Applicant and the primary fuel supplier. This means that contracts can realistically, only be concluded once the date on which the Facility would be commissioned was certain.

Waste Hierarchy

- 5.1.3 A waste hierarchy compliance review in relation to the Facility can be summarised as follows:
- the recovery of energy from residual waste is in accordance with the hierarchy where waste that would otherwise be landfilled and which cannot, for technical and economic reasons be recycled.
 - ferrous metal fraction will be extracted from the bottom ash and this will be removed from site and sent for recycling, which represents a higher waste hierarchical option compared to landfill.
 - the conversion of the residues from the thermal treatment process into lightweight aggregate is a recycling activity and is an elevated hierarchical option compared to landfill or other recovery.
- 5.1.4 Therefore, it is concluded that the operation of the Facility would be in accordance with the waste hierarchy in that it would move the management of the UK's residual municipal wastes, away from landfill and up to recovery in the hierarchy.

Waste Plans and Targets

- 5.1.5 The review of national and local plans and policies that are relevant to the Facility has concluded that the Facility would be compliant with the relevant local plan objectives of the relevant waste planning authorities and will not impact on recycling targets.

Overall Conclusion

- 5.1.6 Having conducted an assessment of the availability of fuel which would be suitable for use at the Facility, it is concluded that large quantities of residual waste

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from which energy could be recovered are either being landfilled in the UK or are being exported to the continent.

- 5.1.7 A review of compliance with the waste hierarchy, with waste policy at national and local levels has concluded that the Facility would be operated in accordance with the requirements of the waste hierarchy and waste policies.
- 5.1.8 The Facility will therefore contribute to national self-sufficiency in energy recovery capacity, and the achievement of targets to reduce the landfilling of waste from which energy could be recovered.

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