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**ENDLESS ENERGY LIMITED**

**ENDLESS ENERGY FACILITY**

**COST BENEFIT ASSESSMENT**

**SEPTEMBER 2018**

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## APPENDICES

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Appendix 2	Heat Load Opportunities Assessment
Appendix 3	Email correspondence re. potential heatload opportunities
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## **1 INTRODUCTION**

- 1.1.1 This Cost Benefit Assessment (CBA) has been prepared by Wardell Armstrong LLP on behalf of Endless Energy Ltd. It supports an application for an Environmental Permit for the Endless Energy Facility at Keighley, Yorkshire.
- 1.1.2 The proposed facility at Keighley, is listed as an installation as defined in Schedule 7 and 8 of the Environmental Permitting Regulations 2016 (EPR) which requires a CBA to be carried out for certain activities carried out as listed in Part 2 of Schedule 1 of the EPR.
- 1.1.3 In March 2015, the Energy Efficiency Directive was implemented in England and Wales via the Environmental Permitting Regulations. The Regulations require operators of certain Installations carrying out combustion activities to carry out a CBA where opportunities for 'Good Quality CHP' schemes (or high efficiency co-generation) are identified. The aim of the scheme is to achieve at least a 10% saving in primary energy consumption.
- 1.1.4 This report satisfies the Environment Agency's requirements for a CHP-ready assessment and CBA and has been prepared in accordance with Environment Agency guidance<sup>1</sup>.

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<sup>1</sup> Draft Article 14 Guidance V0.9, April 2015 and CHP Ready Guidance for Combustion and Energy from Waste Power Plants, v1.0 February 2013

## **2 REQUIREMENTS TO DEMONSTRATE CHP-R FOR ENERGY RECOVERY FACILITIES**

2.1.1 The proposed facility satisfies the CHP ready requirements as defined in the Environment Agency's "CHP Ready Guidance for Combustion and Energy from Waste Power Plants" v1.0 February 2013.

2.1.2 The six requirements as set out in the guidance are:

- Requirement 1: Plant, Plant Location and Potential Heat Loads;
- Requirement 2: Identification of 'CHP Envelope';
- Requirement 3: Operation of Plant with the Identified Heat Load;
- Requirement 4: Technical Provisions and Space Requirements;
- Requirement 5: Integration of CHP and Carbon Capture; and
- Requirement 6: Economics of CHP-R.

2.1.3 The CHP-R assessment is provided in Appendix 1 and demonstrates that the proposed facility is CHP ready.

### **3 COST BENEFIT ASSESSMENT STEPWISE SUMMARY**

- 3.1.1 A cost benefit analysis (CBA) has been completed in accordance with Environment Agency Guidance, Draft Article 14 April 2015 V0.9.
  
- 3.1.2 The proposed facility has a net thermal input of 49MW and is therefore considered to fall under the type refence 14,5(a) “New thermal electricity generation installation with a total aggregated net thermal input of more than 20MW (e.g. power station or energy from waste plant)”.
  
- 3.1.3 Figure 1 below transposes Diagram 1 from the EA guidance setting out the five potential steps in an assessment. Further commentary against each of the five steps is provided in the following sections of this report.

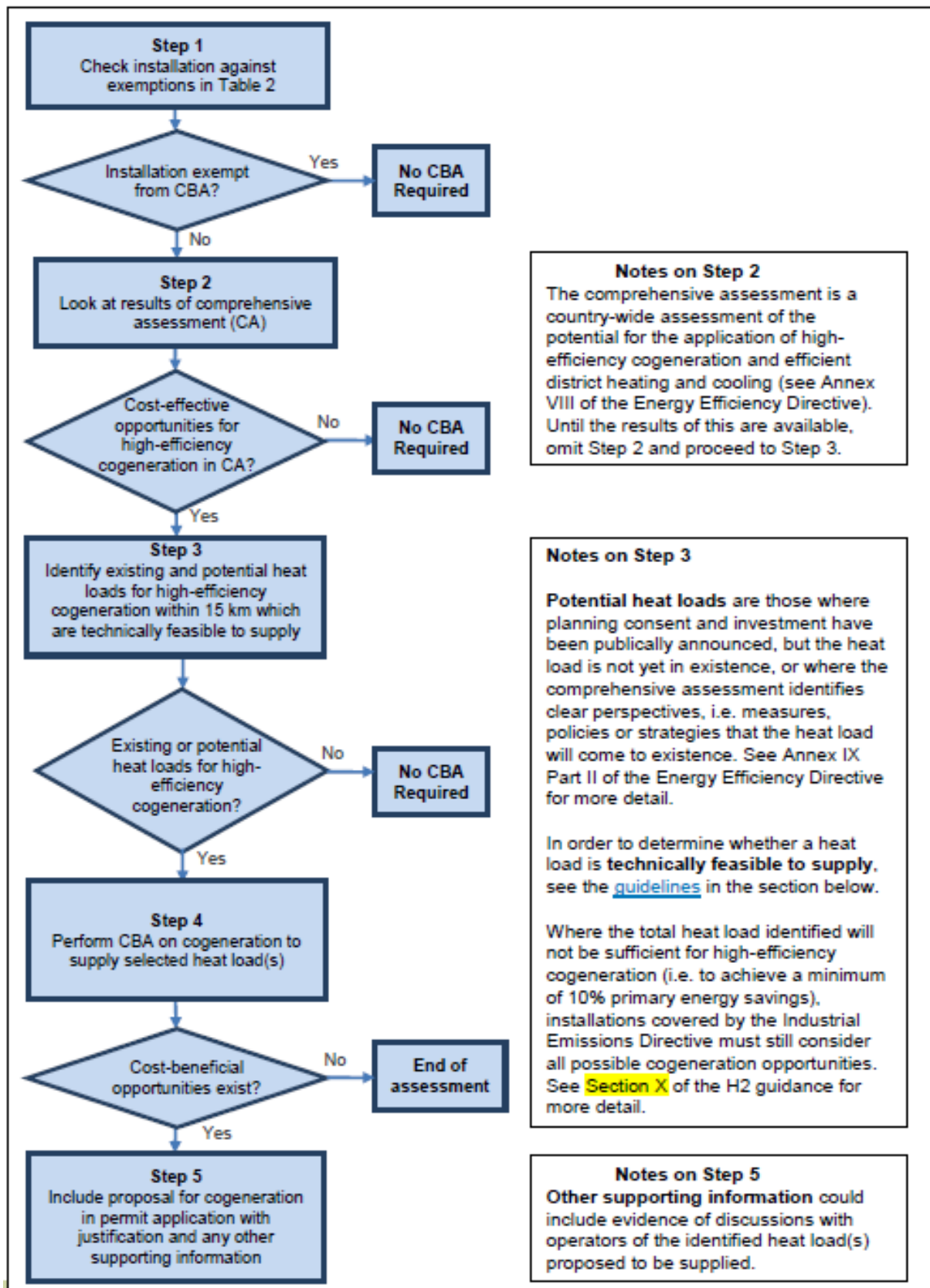


Figure 1: Diagram 1 of the Environment Agency Guidance for CBA

#### 4 CBA EXEMPTIONS (STEP 1 OF THE CBA)

4.1.1 Comparing the installation against the criteria listed in Section 2 of the Article 14 Guidance, the installation does not fit any criteria in Article 14 Table 2 (CBA exempt installations). The exemptions are shown in Figure 2, below.

Type of thermal electricity generating installation
(a) those peak load and back-up electricity generating installations which are planned to operate under 1 500 operating hours per year as a rolling average over a period of five years, based on a verification procedure established by the Member States ensuring that this exemption criterion is met; (N.B. this will be the Environment Agency's verification procedure for limited operating hours for Large Combustion Plants)
(b) nuclear power installations;
(c) installations that need to be located close to a geological storage site approved under Directive 2009/31/EC.

**Figure 2: 14,5(a) Exemptions Table 2 of Article 14**

4.1.2 The other tables in this Section of the Guidance do not follow the exemption pathway dictated by Diagram 1 and are not applicable either.

#### 5 COMPREHENSIVE ASSESSMENT (STEP 2 OF THE CBA)

5.1.1 The National Comprehensive Assessment (NCA) of the Potential for Combined Heat and Power and District Heating and Cooling in the UK report compiled by Ricardo Environment and Energy for DECC (final issue 3) has been consulted to establish the potential in the region for the supply of heat loads by the facility.

5.1.2 The results of the NCA demonstrate that there is significant potential in the region to supply heat loads given the levels of heat use in the Aire Valley region of Yorkshire, as can be seen in Figure 2 below; therefore, the assessment moved to Step 3.

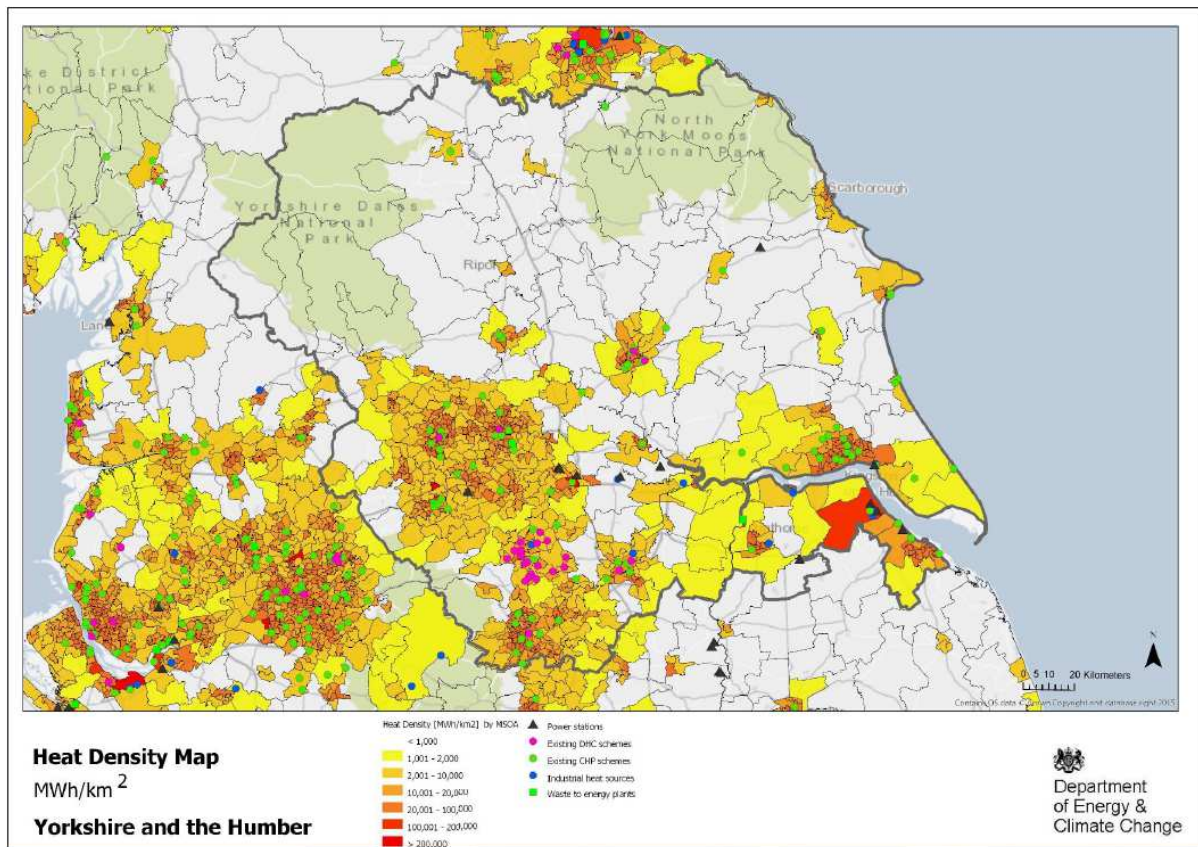


Figure 2: Yorkshire and Humber Heat Density Map

## 6 IDENTIFICATION OF POTENTIAL HEAT LOADS (STEP 3 OF THE CBA)

6.1.1 Within 15km (a radius suggested within Article 14) of the installation a number of potential heat loads were identified however, the distance between the installation and heat user is a significant factor in efficiency and benefit. Bearing this in mind, potential heat loads beyond a distance of 10.5km were discounted due to losses of heat energy and overall complexity.

6.1.2 Further information on the exercise to identify and assess the potential of these heat loads is given in the Heat Load Opportunities Assessment report, included as Appendix 2. This assessment of potential heat loads was carried out using DECC's UK CHP Development Map, National Heat Map, CHPA's District Heating Installation Map and other sources, as recommended by the Guidance.



6.1.3 A number of premises for potential heat loads were identified by the assessment, the heat loads were contacted in two rounds of emails (copies of email correspondence are included as Appendix 3).

6.1.4 The first round of potential heat loads contacted are shown in Table 6:1, within a 5.5km radius of the site.

Table 6:1 Sites Within 5.5 Km					
Name of Establishment	Address	Sector	Floor Space m <sup>2</sup>	Floor Space x kw/m <sup>2</sup>	Distance
Alston Retail Park Netto Unit 6a	Bradford Rd, Keighley BD21 4AG	Retail	1,045.65	259,321.2	1.1km
The Leisure Centre	Victoria Park, Keighley, BD21 3JN	Sports	Not published	Unknown	1.6
Royd Ings Road Retail Park	Royd Ings Ave, Keighley	Retail	No Result Found	Unknown	1.6
Ingrow Bridge Business Park Unit 1	Keighley BD21 5EF	Retail	1,557.42	358,206.6	3
Ingrow Bridge Business Park Unit 2	Keighley BD21 5EF	Retail	4,481.81	1,030,816.3	3
Ingrow Bridge Business Park Unit 3	Keighley BD21 5EF	Retail	1,044.22	240,170.6	3
Premier Inn Bingley	502 Bradford Rd, Bingley, Keighley BD20 5NG	Hotel	2,296.46	918,584	2.7

6.1.5 No responses were received from these sites and a second round of emails was sent to the potential heat loads located between 5.5km and 10.5km radius of the site installation as listed below in Table 6:2.

Table 6:2. Sites Within 5.5 Km – 10.5 Km					
Name of Establishment	Address	Sector	Floor Space m <sup>2</sup>	Floor Space x kw/m <sup>2</sup>	Distance
Etap Hotel	Etap Hotel, Prince Court, Canal Road, Bradford, West Yorkshire, BD1 4SB	Hotel	Not published	Unknown	10.3
Midland Hotel	Forster Square, Cheapside, Bradford BD1 4HU	Hotel	Not published	Unknown	10.9
Bradford Teaching Hospitals	Duckworth Ln, Bradford BD9 6RJ	Healthcare	Not published	Unknown	8.11
Royal Bradford Infirmary	Duckworth Ln, Bradford BD9 6RJ	Healthcare	Not published	Unknown	8.11
Nuffield Health Fitness & Wellbeing Centre	Cottingley Manor, Cottingley New Road, Bingley, West Yorkshire, BD16 1TZ	Sports	3,897.60	1,750,022.4	5.8
Mercare Bradford Hotel	Bradford Rd, Bingley BD16 1TU	Hotel	Not published	Unknown	5.8
Laurel Bank Care Home	Main St, Wilsden, Bradford BD15 0JR	Healthcare	Cannot be found	Unknown	6
Nuffield Gym	The White Cross Hotel, Otley Rd, Guiseley, Leeds LS20 8LY	Sports/fitness	Not published	Unknown	10.34

**Table 6:2. Sites Within 5.5 Km – 10.5 Km**

Name of Establishment	Address	Sector	Floor Space m <sup>2</sup>	Floor Space x kw/m <sup>2</sup>	Distance
White Cross Hotel	Otley Rd, Guiseley, Leeds LS20 8LY	Hotel	Not published	Unknown	10.25
Nuffield Gym	2 Otley Rd, Baildon, Shipley BD17	Health/fitness	Cannot be found	Unknown	8.3
Hotel Ibis	Salts Mill Road, Shipley, West Yorkshire, BD18 3ST	Hotel	Not published	Unknown	7.8
Bradford District Care NHS	New Mill, Victoria Rd, Saltaire, Shipley, Bradford BD18 3LD	Healthcare	3,123.65	1,536,835.8	6.7
Shipley Hospital	98 Kirkgate, Shipley BD18 3LT	Healthcare	Not published	Unknown	7.4
Nuffield Health Fitness & Wellbeing Centre	Cottingley Manor, Cottingley New Road, Bingley, West Yorkshire, BD16 1TZ	Health/fitness	3,897.60	Unknown 1,750,022.4	Unknown
Bupa Nursing Home	Bradford Rd, Bingley BD16 1TX	Healthcare	Cannot be found	Unknown	5.9
Airedale General Hospital	Skipton Rd, Steeton, Keighley BD20 6TD	Healthcare	Not published	Unknown	6.31
Royd Hill Nursing Home	Sutton Ln, Sutton-in-Craven, Keighley BD20 7AJ	Healthcare	Cannot be found	Unknown	7.3
Sutton Hall and Lodge Orchard Care Home	Cornmill Walk, Sutton Ln, Sutton-in-Craven, Keighley BD20 7AJ	Healthcare	Cannot be found	Unknown	7.45
Lynfield Mount Hospital	Daisy Hill Lane, Bradford	Healthcare	Not published	Unknown	8.3
Bradford Royal Infirmary	Duckworth Ln, Bradford BD9 6RJ	Healthcare	Not published	Unknown	8
Zara Sports Centre	Thorn Ln, Bingley Rd, Bradford BD9 6NA	Sports/fitness	Cannot be found	Unknown	7.28
Stoney Ridge Special Care Unit	6 Stoney Ridge Rd, Bingley BD16 1UJ	Healthcare	Not published	Unknown	Unknown
Yorkshire Ambulance Service	7 Northside Rd, Bradford BD7 2AY	Healthcare/transport	Not published	Unknown	9.73

6.1.6 One tentative positive expression was received in relation to the heat load opportunity. The response came from Bradford District Care NHS Trust with regards to two sites:

- Stoney Ridge Special Care Unit (BD16 1UJ); and
- Lynfield Mount Hospital (BD18 3LD);

6.1.7 As the assessment has identified a suitable heat load for high-efficiency cogeneration and a positive response to the enquiry for offtake, the assessment continued to Step 4.

## **7 COST BENEFIT ASSESSMENT TO SUPPLY HEAT LOAD (STEP 4 OF THE CBA)**

- 7.1.1 A cost benefit assessment has been completed in accordance with Environment Agency guidance. The spreadsheet is included as Appendix 4.
- 7.1.2 The assessment shows that the potential heatload is not presently financially viable.

## **8 CONCLUSION (STEP 5 OF THE CBA)**

- 8.1.1 The facility has been assessed and can be considered to be CHP ready.
- 8.1.2 Numerous potential heatload opportunities have been identified and were contacted.
- 8.1.3 To date, only a single heatload opportunity has indicated interest in using heat from the facility. The CBA concluded that this opportunity is unlikely to be financially viable at this time.
- 8.1.4 Endless Energy will continue to review the heat load opportunities during the construction and operational phases of the development.

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