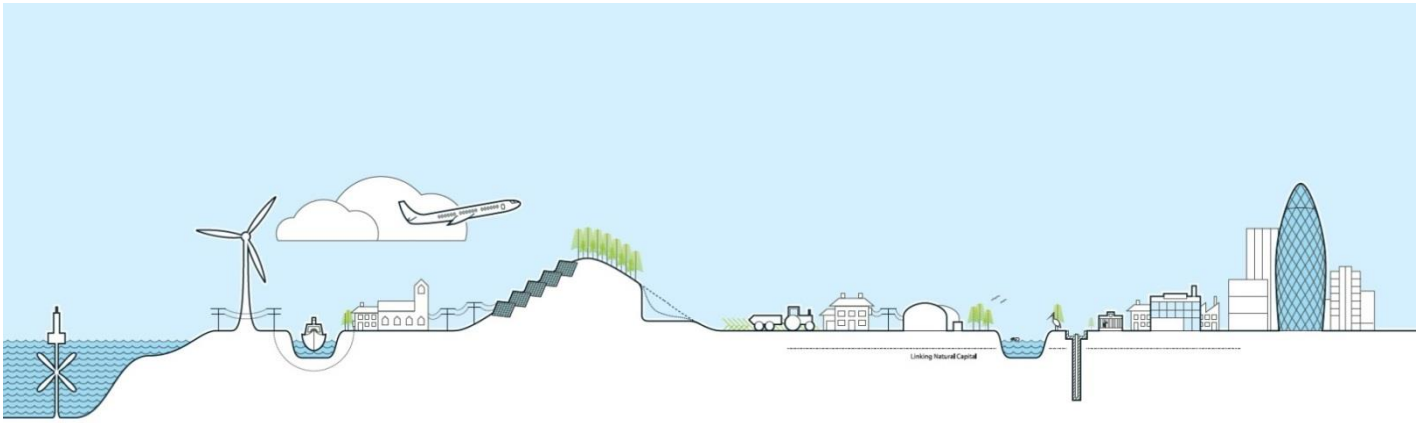
Swadlincote Energy Recovery Facility

Cost Benefit Assessment

January 2024

Prepared By

aardvark
environment matters



Project Quality Control Sheet

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1 Introduction

This Cost-Benefit Assessment (CBA) has been prepared by Aardvark EM Ltd on behalf of R&P Clean Power Ltd, the applicant for an environmental permit for the Swadlincote Energy Recovery Facility (SERF) located at Keith Willshee Way, Swadlincote, DE11 9EN.

The proposed facility is defined as an installation in accordance with Schedule 1 Part 2, Section 5.1 of the Environmental Permitting (England and Wales) Regulations 2016 (EPR), and as a relevant electricity generating installation for the purpose of Schedule 24 of the EPR This requires a CBA "which assesses the cost and benefits of providing for the operation of the installation as a high-efficiency cogeneration installation", to be prepared and submitted with an application for an environmental permit for new electricity generating station..

The CBA has been prepared in accordance with the guidance[1] provided by the Environment Agency as fulfilling the requirement for a CHP-Ready Assessment and associated CBA.

[1] Draft Article 12 Guidance Article 14 Guidance V0.9, April 2015 and CHP Ready Guidance for Combustion and Energy from Water Power Plants, v1.0 2013

2 Cost Benefit Assessment Methodology

2.1 Methodology

The steps taken in completing the CBA are in accordance with those of the Environment Agency Guidance, Draft Article 14 April 2015 V0.9.

The proposed facility has a net thermal input of 67.7MW and is therefore considered to fall under the type reference 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.)”

The draft guidance illustrates the steps as flow chart, and this is replicated in Figure 1 below.

2.2 CHP-Readiness Assessment

In order to demonstrate that the facility is using Best Available Techniques, it is required to demonstrate that it is ‘CHP Ready’. This is verified by an assessment that considers the following six requirements:

- Requirement 1 – Plant, Plant Location and Potential Heat Loads
- Requirement 2 – Identification of the CHP Envelope
- Requirement 3 – Operation of the plant with the Identified Heat Loads
- Requirement 4 – Technical Provisions and space requirement
- Requirement 5 – Integration of CHP and Carbon Capture, and
- Requirement 6 – Economics of CHP-R

The CHP-R Assessment is provided as Appendix 1 to this document.

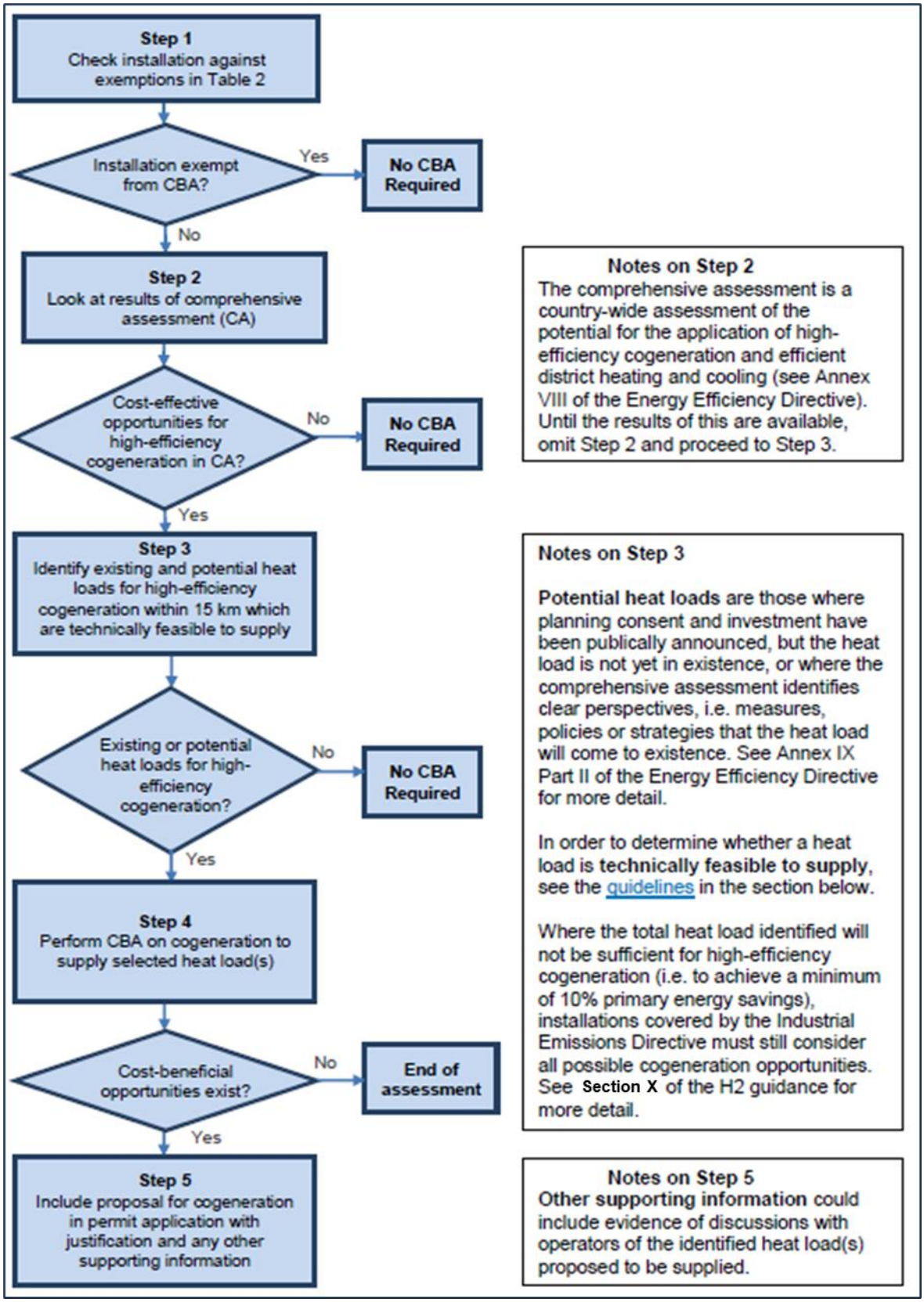

Figure 1: Draft CBA Flow Chart

3 Cost Benefit Assessment

3.1 Step 1 – Exemptions

The installation does not fit any criteria listed in Section 2 of the Article 14 Table 2 to be considered a CBA exempt installation.

3.2 Step 2 – Comprehensive Assessment

The National Comprehensive Assessment (NCA) of the Potential for Combined Heat and Power and District Heating and Cooling in the UK (produced by Ricardo Environment and Energy for DECC) is the reference document to fulfil the requirements of the NCA for the purposes of the Energy Efficiency Directive (EED). This report is referred to here to establish the potential in the region for the supply of heat loads by the facility. The results of the NCA demonstrate that there is sufficient potential in the region to supply heat loads, given the levels of heat use in the West Midlands Region.

Figure 2 Illustrates this potential.

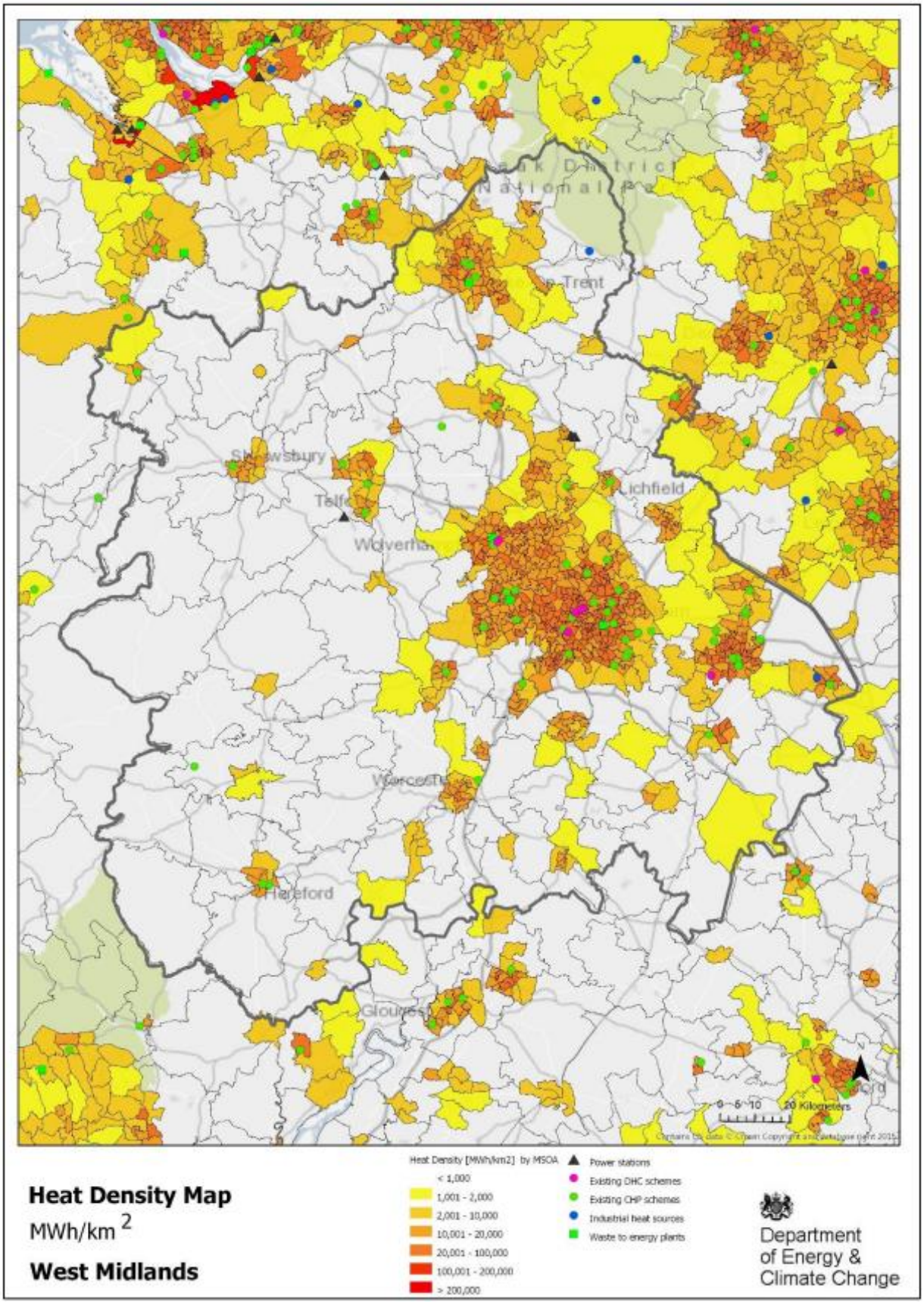

Figure 2: West Midlands Region Heat Density Map

3.3 Step 3 – Identification of Potential Heat Loads

Step 3 of the CBA requires that operators "*identify existing and potential heat loads for high-efficiency cogeneration within 15km which are technically feasible to supply*."

Technical feasibility is assessed based on the following parameters:-

- The feasibility of capturing waste heat in order to supply it to the user
- The compatibility of the heat source (s) and load(s) in terms of temperature and load profiles
- Whether thermal stores or other techniques can be used to match heat source(s) and load(s) which will otherwise have incompatible load profiles
- Whether there is enough demand for heat to allow high-efficiency cogeneration.
- Any adverse environmental effects of recovering heat

Article 14 recommends that heat uses within 15km radius of the installation are identified within the CBA. However, the loss in heat energy over distance, combined with the increasing complexity and cost in connecting a heat source with an end user, potential users are only recommended to be considered up to 10km from the site. The EA recommend that this is the particularly the case when the thermal input is less than 300MW_{th}. The thermal input of SERF is 67.7MW_{th}.

Further information on the exercise undertaken to identify heat load opportunities is provided with within the Heat Opportunities report, included as Appendix 2. This assessment was conducted utilising DECC's CHP Development Map, National Heat Map, Local Authority Assessments and other data, as recommended by the guidance.

A feature of the site is that is heavily constrained to the West by existing infrastructure and topographical features that would make heat transmission at the scale envisaged unviable due to the costs and complexities of securing a solution.

Therefore, Table 1 provides details of the results on the heat load assessment and has identified four potential heat loads outside of the constrained area that should be assessed.

Of those assessed, the IVC Brunel facility is located within 2.5km of the site and represents the most attractive potential for heat supply, particularly as heat requirements will not be solely impacted by seasonal temperature variations.

Table 1 - Potential Heat Loads

Map Ref	Site Occupier	Assumed Use Category	Max Demand kW	Min Demand kW	Winter MWh	Spring MWh	Summer MWh	Autumn MWh	Total MWh	Distance (Direct, approx) m
a	Wilshees	Wilshees MRF	810	45	1,774	936	99	1,330	4,139	220
b	Mulbery Logistics	Distribution Centre (in construction)	2,214	27	4,849	2,454	59	3,636	10,998	890
c	Not occupied	New business units	360	20	788	416	44	591	1,840	1,050
d	WestRock Packaging	Distribution	672	4	1,472	741	9	1,104	3,326	740
e	Trelleborg	Trelleborg Manufacturing & Distribution	846	47	1,853	978	103	1,390	4,323	970
f	A H Allen	Steel stockholding	446	3	976	491	6	732	2,204	1,080
g	Keystone Lintels	Distribution	502	3	1,100	553	7	825	2,485	1,120
h	IG masonary Support	Distribution	608	4	1,330	669	8	998	3,006	1,210
i	Various occupiers	Trade counters	810	45	1,774	936	99	1,330	4,139	1,170
j	IVC Brunel (Site 3)	Manufacturing (pharmacetical)	1,344	448	2,943	1,962	981	2,453	8,340	1,290
k	Various occupiers	Trade counters	432	24	946	499	53	710	2,208	1,300
l	Burton & Sourth Derbyshire College	Education	1,188	132	2,602	1,445	289	2,024	6,360	1,300
m	Clipper Logistics	Distribution	1,717	11	3,761	1,892	23	2,821	8,496	1,460
n	IVC Brunel (Site 2)	Manufacturing (pharmacetical)	1,920	640	4,205	2,803	1,402	3,504	11,914	1,610
o	TNT/Restore Records Management	Distribution/Records storage	105	1	231	116	1	173	521	1,740
p	Roger Bullivant	Manufacturing (concrete products)	1,700	340	3,723	2,234	745	2,978	9,680	1,600
q	Jenkins	Distribution	972	6	2,129	1,071	13	1,597	4,809	1,940
r	IVC Brunel (Site 1)	Manufacturing (pharmacetical)	2,880	960	6,307	4,205	2,102	5,256	17,870	2,180
s	Dellner	Manufacturing (Engineering)	1,530	170	3,351	1,862	372	2,606	8,191	2,520
t	Sainsbury's	Retail	1,789	99	3,919	2,068	218	2,939	9,143	2,580
u	Cadley Hill View	Healthcare (residential home)	1,512	504	3,311	2,208	1,104	2,759	9,382	2,690
v	Green Bank Leisure Centre	Green Bank Leisure Centre (includes pool)	1,224	408	2,681	1,787	894	2,234	7,595	2,820
w	South Derbyshire Distric Council	Civic Offices	1,035	58	2,267	1,196	126	1,700	5,289	2,880
x	Police Station	Civic Offices	151	8	331	175	18	248	773	2,900
y	Swadlincote Care Centre	Healthcare (care centre)	981	327	2,148	1,432	716	1,790	6,085	2,940
z	The Pingle Acedemy	Education (Primary and Secondary Schools)	4,620	550	10,118	5,661	1,205	7,588	24,572	2,650
aa	Pennine Way and Church Greasly Infant	Education (Primary School)	932	111	2,042	1,143	243	1,531	4,959	2,470
ab	Lidel	Retail	396	22	867	458	48	650	2,024	3,180
ac	Appleby Glade Ind Estate	Business units (mainly trade counters)	900	90	1,971	1,084	197	1,478	4,730	929
ad	Boardman Road Ind Estate	Business units (mainly engineering)	2,232	124	4,888	2,580	272	3,666	11,406	1,460
ae	Robian and George Holms Way	Business units (mixed)	8,100	450	17,739	9,362	986	13,304	41,391	2,370

3.4 Step 4 – Cost Benefit Assessment to Supply Heat Loads

The costs and benefits of the supply to the IVC Brunel facility has been completed in accordance with the relevant Environment Agency Guidance. As the template provided by the Environment Agency is no longer available, a high level economic assessment has been completed and the spreadsheet from this assessment is included as set out in Appendix 3 (Ref 2354-R004)

This assessment has the following key indicators as in Table 2 and illustrates that serving the potential heat load from BRRF is not presently financially viable.

Table 2 - CBA Key Indicators

Indicator	Value	Assumptions
Capital cost	1,554,375	Including civil, M&E and development costs
Operational Costs	221,300	Including annualised component replacement fund
Net Income	22,500	Revenue from heat sales, less generation income forgone and operating costs
Simple Payback	66.14	Years
IRR	3.35%	
NPV	-1,089,222	EA provides discount rate of competing investment at 17%

4 Conclusion

The facility has been assessed and can be considered to be CHP ready. Whilst the site is constrained by physical features, there are potential heat loads in the area of search that could be connected at the scale of the development. Of these, only one site shows clear potential for a non-seasonal heat load, but the CBA undertaken demonstrated that at the current time this opportunity is unlikely to be financially viable.

As policy in the area of sustainable heat continued to develop, the operator will review on a biannual basis this assessment during the construction and operational phases of the facility.

Whilst not a requirement for facilities of this scale, the plant has also been designed to be carbon capture ready. It is intended that this capability will be retrofitted once the required market mechanisms are in place to make such an investment viable.