



Non-Technical Summary

University of Liverpool Energy Centres



Report produced for University of Liverpool Energy Company Limited

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1.0 INTRODUCTION

1.1 Site Address

University of Liverpool Energy Company Limited
ULEC Energy Centres,
Ashton Street,
Liverpool
L69 7ZX

1.2 Operational Location

Site Grid Reference: SJ 35839 90499

1.3 Description

There are two buildings that make up the site located approximately 1km to the east of Liverpool city centre. Access to the site is via Ashton Street which runs in a north-south direction connecting West Derby Street with Brownlow Hill. The facility is situated in a highly urbanised area with hospitals, museums, university buildings and halls of residences surrounding it. This permit application only considers the two Energy Centres operated by University of Liverpool Energy Company Ltd (hereon referred to as ULEC) on Ashton Street.

1.4 Plans

Reference Drawing: ULEC_Site_Location_Plan
ULEC_Site_Layout_Plan

1.5 Permits and Licences

ULEC currently hold no environmental permits for the Energy Centre operations on Ashton Street and are seeking to obtain a bespoke installation permit to operate a number of gas fired boilers and CHP engines. ULEC does however hold a GHG Emissions permit which is verified annually through the UK Emissions Trading Scheme, regulated by the Environment Agency.

1.6 Planning

There is full planning permission for the operations covered by this application, issued by Liverpool City Council under references 08F/0688 issued on 10th March 2008 and 12F/2799 issued on 13th February 2013. These serve the two separate buildings that house the boilers and CHP for which an environmental permit is being sought for their operation.

1.7 Reason for Application

ULEC is seeking permission to operate a pair of Energy Centres that house three natural gas fired boilers and three natural gas fired combined heat and power (CHP) engines which provide heat and power to nearby University of Liverpool campus buildings.

ULEC undertook enhanced pre-application advice with the Environment Agency (EA) in January 2022 in which the EA advised that the CHP units fall under Tranche B and therefore require consenting immediately, whereas the boilers fall under Tranche A and require consenting by

January 2025. Given that the aggregated thermal input of all appliances is approximately 65MW, it was determined that the most efficient and cost-effective permitting route was to apply for a permit now, covering all appliances. Therefore, this application is for a Part A installation permit under Part A(1) (a) of the Environmental Permitting Regulations *“Burning any fuel in an appliance with a rated thermal input of 50 or more megawatts”*.

2.0 PROPOSED OPERATIONS

2.1 Site Operations

ULEC is seeking permission to operate 3No. natural gas fired boilers and 3No. natural gas fired combined heat and power (CHP) engines, all of which are housed across two, immediately neighbouring Energy Centres. The boilers each have a net thermal input rating of 15MW. Two of the CHP engines have a net thermal input rating of 4.5MW whilst the third has a net thermal input rating of 11MW.

2.2 Aggregation

The boilers operate as backups to the CHPs and it is extremely unlikely that all 6 appliances would ever be operational at the same time. However, there are no physical or software constraints on the appliances so all appliances could theoretically be operational concurrently. Therefore, the aggregated net thermal input rating of the appliances at the Energy Centres is 65MW.

2.3 Operational Procedure

The CHP and boilers supply heat and electricity to the main campus buildings of the University of Liverpool. The CHP engines produce electricity via the combustion of gas which in turn generates heat as a by-product. This heat will be harnessed and transferred into useable energy for hot water which is then piped across the campus via plate heat exchangers. The operation of the boilers and CHP plant will follow demand to some extent and as such, the CHP plants will be operating at full load in times of high demand e.g. winter and reduced loads in periods of low demand e.g. summer. One of the boilers runs more often than the others, providing additional heat where required. The remaining two boilers are back-up for use in times of plant failure or in the extreme scenario that more heat is demanded than can be provided by the CHP engines and other boiler. Energy Centre 1 (NEC 1) is the most southerly of the two Energy Centres and houses the CHP engine which has a net thermal input rating of 11MW and the three boilers. This Energy Centre is a modern purpose-built building. The CHP engine and boiler plants in this building emit their exhaust gases through individual chimney stacks that are 48m high. Energy Centre 2 (NEC 2) houses the two CHP engines with net thermal input ratings of 4.5MW. This Energy Centre is a former boiler house. Each appliance in this building emits their exhaust gases through individual chimney stacks that are 29m high.

The natural gas which is combusted in the boilers will be piped directly onto site from three gas mains via gas boosters.

The operational layout of the facility is shown in the site layout plan (Document Reference: ULEC_Site_Layout_Plan).

2.4 Directly Associated Activities

The associated activities with the Energy Centres and boiler and CHP operations are:

- Water pumps
- Gas boosters
- Pressurisation units
- Plate Heat Exchangers

- Side stream filtration
- Water softening
- Engine cell ventilation

2.5 Operational Hours

The CHP engines and boilers are capable of operating 24 hours a day, 365 days a year i.e. 8,760 hours a year. The CHPs operate as the lead heat and electricity source with the boilers operating as back-ups.

2.6 Technical Standards and Control Measures

ULEC operate to industry best standards. A documented list of technical standards that the site will be operating under is provided for the site in Annex A.

2.7 Considerations of Article 14 of the Energy Efficiency Directive

The Energy Centres are already in operation, with Energy Centre 1 put into operation in 2009 and Energy Centre 2 in 2014. Section 1.7 above describes the reason for the application being submitted now. The Energy Centres provide heat and power to the district heat network that serves the main campus of the University of Liverpool via plate heat exchangers.

Prior to ULEC installing these appliances, studies concluded that the most appropriate technological solution for delivering heating and power to the network was considered to be gas fired CHPs. It had been determined that the heat from the CHPs supplying the district heating network will provide a cost effective and carbon reduction solution to provide heat and power to the University of Liverpool campus.

The high efficiency co-generation CHPs primary purpose is to provide heat and power to the district heating network. The primary energy source to the district heating system utilises the three CHPs and is topped up by the use of boiler plant during periods of high heat loads. The size of the CHPs is such that the economic and CO₂ benefit is maximised, when compared to the alternative heating and power installations which could have been utilised.

As such, it is considered that Article 14 of the Energy Efficiency Directive has been considered.

3.0 ENVIRONMENTAL IMPACT AND MITIGATION MEASURES

All facilities have an impact on the environment around them. An Environmental Risk Assessment has been undertaken to include all operations on site (document reference EPR-B02 - Environmental Risk Assessment). The nearest Natura 2000 (SAC or SPA) site is the Mersey Narrows & North Wirral Foreshore SPA which is located approximately 3km west of the site. Mersey Narrows Site of Special Scientific Interest (SSSI) which is located approximately 3km to the west of the site. ULEC will be employing process management and monitoring techniques which will mitigate the environmental impact within the sections listed below:

3.1 Air Quality

The site has undertaken a full Air Quality Impact Assessment (EPR-A03).

3.2 Odour

Odour is not considered an issue at this facility. Any odour issues detected will be investigated to determine the source. Should the source be found to be from the Energy Centres then remedial work will be carried out to stop the odour. Any complaints from third parties will be investigated following the complaints procedure.

3.3 Noise

There are human receptors within metres of the facilities in the way of university campus buildings. However, given that the boilers and CHPs are housed within buildings, noise is not considered a potential issue within this permit application.

3.4 Flora and Fauna

The nearest Natura 2000 (SAC or SPA) site is the Mersey Narrows & North Wirral Foreshore SPA which is located approximately 3km west of the site.

3.5 Groundwater

The site is situated outside any Groundwater Source Protection Zones.

3.6 Surface Water

All activities take place within the Energy Centre buildings. Rainfall captured by building guttering will be directed to the ground and into the rainwater pipe drainage before entering a mains drain.

3.7 Sensitive Receptors

There are university campus buildings (i.e. sensitive human receptors) within 20m of the site boundary.

ANNEX A – TECHNICAL STANDARDS SUMMARY

WRM Ltd are acting consultants for ULEC who have commissioned WRM to produce a list of Technical Standards that the site will be working to during the operational lifetime of the Energy Centres.

ULEC combust natural gas in three natural gas fired boilers and three natural gas fired CHP engines to generate heat and electricity for use across the university campus. The table below presents a list of technical documents, with reference, for the process of combustion. These documents have been utilised in order to put this permit variation application together and will continue to be in use as point of reference during the operational life of the permitted site. Documents have been sourced from both regulatory bodies and industry led organisations.

Large Combustion Plant - Technical Standards	
Technical Guidance Note	Document Reference
Develop a management system: environmental permits	DEFRA and EA Guidance
Controlling and monitor emissions for your environmental permit	DEFRA and EA Guidance
Risk assessments for your environmental permit	DEFRA and EA Guidance
General guide to pollution prevention	EA Pollution Prevention Guidance
H1 EA overview of Environmental Risk Assessments for Permits	EA Pollution Prevention Guidance
H1 annex A- Amenity and accident risks from installations and waste operations	EA Pollution Prevention Guidance
Industrial Emissions Directive	EU Directive
Best Available Techniques (BAT) Reference Document for Large Combustion Plants	EU Directive



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