



Environmental Risk Assessment

University of Liverpool Energy Company



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1.0 INTRODUCTION

This Environmental Risk Assessment has been produced in support of a bespoke Part A installation environmental permit application for the operation of a pair of Energy Centres at the University of Liverpool. The Energy Centre consists of three combined heat and power (CHP) units and three natural gas fired boilers with an aggregated thermal input of c.65MW. This document provides a full environmental risk assessment for the proposed installation. This document has been produced in conjunction with the following documents:

- EPR-A01 Non-Technical Summary
- EPR-B01 Environmental Management System
- EPR-A02 Air Quality Impact Assessment
- EPR-B04 Emissions Management and Monitoring Plan

1.1 Reason for Application

The operation of energy centres consisting of three CHP units and three natural gas fired boilers with an aggregated thermal input of C.65MW. The heat and power produced by the CHP units and three natural gas fired boilers will be used to supply the main campus buildings at the University of Liverpool.

1.2 Assessment Process

The Guidance “*Risk assessments for your environmental permit*” produced by the Environment Agency and DEFRA outlines a five-step process for assessing the site activity and the risk to local amenity to successfully produce an Environmental Risk Assessment:

1. Identify and consider risks for your site, and the sources of the risks.
2. Identify the receptors (people, animals, property and anything else that could be affected by the hazard) at risk from your site.
3. Identify the possible pathways from the sources of the risks to the receptors.
4. Assess risks relevant to your specific activity and check they’re acceptable and can be screened out.
5. State what you’ll do to control risks if they’re too high.

This risk assessment will identify the potential human and environmental impacts that could result from the operation of the CHPs and boilers. Risk assessments will be carried out for the following hazards:

- Odour;
- Emissions;
- Visible plumes;
- Noise;
- Fire.

Sector Guidance Note 2.8¹ page 76, point 8, states that there should be an accident plan in place which identifies the likelihood of consequences of accidents and also identifies the actions required to prevent accidents and mitigate any consequences. Assessment of potential accidents at the facility and the consequential effects on sensitive receptors have been accounted for in this document.

¹ Environment Agency. Guidance for the Recovery and Disposal of Hazardous and Non Hazardous Waste. Sector Guidance Note S5.06

2.0 ENVIRONMENTAL MANAGEMENT

P = Possibility C = Consequence M = Magnitude

Pollutant Model			Judgement				Action	
Source	Pathway	Receptor	P	C	M	Justification of Magnitude	Risk Management	Residual Risk
Emissions – Air pollutants.	Aerial dispersion.	Staff, local residents and nearby protected sites.	Med	Med	Med	<p>Med – results from combustion of natural gas.</p> <p>Each boiler has measures in place to limit release of NO_x. The boilers have been converted to low-NO_x burners.</p> <p>Incomplete combustion causes risk of elevated emissions (eg. during start-up and shut down).</p> <p>CHPs have engine management/control systems</p>	<ul style="list-style-type: none"> Each appliance and stack shall be associated with a written maintenance schedule and operated in accordance with the manufacturer's instructions. The appliances shall be serviced annually by a trained service engineer. Detailed air quality monitoring has been undertaken as part of this permit application. The results can be seen in the air quality impact assessment submitted as part of this application. Staff operating and maintaining the boiler shall receive appropriate training and instructions from the boiler manufacturer. Staff shall be aware of how to identify and mitigate elevated or abnormal pollution emissions. 	Low

Pollutant Model			Judgement				Action	
Source	Pathway	Receptor	P	C	M	Justification of Magnitude	Risk Management	Residual Risk
						which control the temperatures of the cylinders which in turn controls the NOx emissions.	<ul style="list-style-type: none"> The pipes through which the fuel is transported to site shall be maintained to prevent the escape of unburnt natural gas. Good quality feedwater to ensure impurities do not lead to sediment or corrosion, thereby reducing boiler efficiency. The appliance stack heights are sufficient to prevent emissions influencing ground-level air pollution concentrations. 	

Pollutant Model			Judgement				Action	
Source	Pathway	Receptor	P	C	M	Justification of Magnitude	Risk Management	Residual Risk
Emissions from boilers - dust	Aerial dispersion	Staff, local residents and nearby protected sites.	Low	Low	Low	Low – The boilers are fuelled by natural gas which contains trace amounts of particulates.	<ul style="list-style-type: none"> Continuing use of natural gas as fuel. Regular servicing of the appliances by a trained operative as per the manufacturer’s instructions. 	Low

Pollutant Model			Judgement				Action	
Source	Pathway	Receptor	P	C	M	Justification of Magnitude	Risk Management	Residual Risk
Emissions from boilers – NO _x	Aerial dispersion	Staff, local residents and nearby protected sites.	Med	Med	Med	Med – There is potential for workers to be regularly exposed to NO _x .	<ul style="list-style-type: none"> Fuel/air mix will be set up at installation to ensure boiler operates efficiently and does not regularly cycle on and off. Boilers utilise Rationtronic 6000 burner controller which continually samples products of combustion and trims the burner as required. Boilers have already been converted to low-NO_x burners. Boilers only operate at periods of high demand or as required when CHPs are not operational. Regular servicing of the boilers by a trained operative as per the manufacturer’s instructions. Appropriate stack height to allow for dispersion. 	Low

Pollutant Model			Judgement				Action	
Source	Pathway	Receptor	P	C	M	Justification of Magnitude	Risk Management	Residual Risk
Emissions from boilers – CO	Aerial dispersion	Staff, local residents and nearby protected sites.	Low	Low	Low	Low – The boiler operate efficiently.	<ul style="list-style-type: none"> The boiler and stack are associated with a written maintenance schedule and in accordance with the manufacturer’s instructions. The boiler shall be serviced annually by a trained service engineer. Fuel/air mix will be set up at installation to ensure boiler operates efficiently and does not regularly cycle on and off. Boilers utilise Rationtronic 6000 burner controller which continually samples products of combustion and trims the burner as required. Boilers only operate at periods of high demand or as required when CHPs are not operational. Appropriate stack height to allow for dispersion. 	Low

Pollutant Model			Judgement				Action	
Source	Pathway	Receptor	P	C	M	Justification of Magnitude	Risk Management	Residual Risk
Emissions from boilers- SO ₂	Aerial dispersion	Staff, local residents and nearby protected sites.	Low	Low	Low	Low - The boilers are fuelled by natural gas which contains trace amounts of sulphur.	<ul style="list-style-type: none"> The boiler and stack are associated with a written maintenance schedule and in accordance with the manufacturer's instructions. The boiler shall be serviced annually by a trained service engineer. Fuel/air mix will be set up at installation to ensure boiler operates efficiently and does not regularly cycle on and off. Boilers utilise Rationtronic 6000 burner controller which continually samples products of combustion and trims the burner as required. Boilers only operate at periods of high demand or as required when CHPs are not operational. Appropriate stack height to allow for dispersion. 	Low
Emissions from CHPs - NO _x	Aerial dispersion	Staff, local residents and nearby protected sites.	Med	Med	Med	Med - There is potential for workers to be regularly exposed to NO _x .	<ul style="list-style-type: none"> NO_x emissions from engines controlled by engine management system which controls the temperatures of the cylinders which in turn control the NO_x emissions. 	Low

Pollutant Model			Judgement				Action	
Source	Pathway	Receptor	P	C	M	Justification of Magnitude	Risk Management	Residual Risk
							<ul style="list-style-type: none"> This control system notifies the operators on site in the event of a fault or out of range values and shuts the appliance down. The CHP and stack are associated with a written maintenance schedule and in accordance with the manufacturer’s instructions. The boiler shall be serviced annually by a trained service engineer. 	
Emissions from CHPs – CO	Aerial dispersion	Staff, local residents and nearby protected sites.	Low	Low	Low	Low – The CHPs operate efficiently.	<ul style="list-style-type: none"> CO emissions from engines controlled by engine management system which controls the temperatures of the cylinders This control system notifies the operators on site in the event of a fault or out of range values and shuts the appliance down. The CHP and stack are associated with a written maintenance schedule and in accordance with the manufacturer’s instructions. The boiler shall be serviced annually by a trained service engineer. 	Low

Pollutant Model			Judgement				Action	
Source	Pathway	Receptor	P	C	M	Justification of Magnitude	Risk Management	Residual Risk
Noise from boilers and CHP units	Aerial dispersion.	Local Residents, Employees	Low	Med	Low	Low – Equipment generates very low levels of noise. Boilers and CHP are housed within the Energy Centre buildings.	<ul style="list-style-type: none"> Regular maintenance of boilers and associated plant & machinery. The CHP shall be associated with a written maintenance schedule in accordance with the manufacturer’s instructions. The CHP shall be serviced annually by a trained service engineer. The Energy Centres were built to be within Local Authority limits and are regularly tested. 	Low
Natural gas leak	Aerial dispersion	Staff and local residents	Low	Med	Low	Low – few opportunities for release of natural gas.	<ul style="list-style-type: none"> Natural gas transported to site directly through underground pipes. All pipework is inspected regularly and maintained by a trained operative when required. Should a leak be detected, the affected boiler/CHP will shut down. 	Low
Water leak	Spillage	Staff and local residents	Low	Low	Low	Low – few opportunities for release of water.	<ul style="list-style-type: none"> All pipework is inspected regularly and maintained by a trained operative when required. If a leak is detected, boilers will be shut down until resolved. 	Low

Pollutant Model			Judgement				Action	
Source	Pathway	Receptor	P	C	M	Justification of Magnitude	Risk Management	Residual Risk
Fire on site	Aerial dispersion	Staff and local residents	Med	Med	Low	Med - Fires can be deliberate or accidental.	<ul style="list-style-type: none"> Follow manufacturer guidance and instructions on boiler maintenance. Follow manufacturers guidance and instructions on boiler operation. Regular plant servicing. Automatic sprinkler system in the building. 	Low
P = Possibility C = Consequence M = Magnitude								

3.0 ACCIDENT MANAGEMENT

3.1 Emergency Contacts

Emergency Services	999
Local Police	101
Environment Agency Hotline	0800 807 060
Electricity Supplier	SSE
Local Authority	Liverpool City Council
Waste Supplier	United Utilities
Gas Supplier	Gazprom
Gas Network	Cadent
Sewerage Undertaker	United Utilities
Fuel Supplier	N/A

3.2 Company Contact (Out of Hours)

Campus Security
0151 794 2000

3.3 Environmental Accident Management Plan

Pollutant Model			Judgement				Action	
Source	Pathway	Receptor	P	C	M	Justification of Magnitude	Consequences	Actions to be taken
Plant Failure (dust release)	Dust transferred to the environment via aerial dispersion.	Environment	Low	Med	Low	Low - Very little likelihood of occurrence. Only natural gas used as a fuel and all equipment subject maintenance regime.	Dust deposited in the local environment.	<ul style="list-style-type: none"> Stem release if possible. Inform site manager. Monitor release and prevent damage to environment. Monitor external areas to ensure no further contamination. Record the incident. Inform Local Authority or Environment Agency if necessary. Review Operations and Management System.
Severe Weather	Flooding Wind damage Ice/frost	Plant & Equipment Site Conditions	Low	Med	Low	Low - Flooding unlikely due to location of site and existing drainage system already present on site. All plant securely fixed with some housed inside a building.	Damage to plant and equipment	<ul style="list-style-type: none"> Cease operations if required. Assess damage. Mitigate any pollution caused. Inform site manager. Inform Local Authority or Environment Agency if necessary. Repair damage. Record incident.

Pollutant Model			Judgement				Action	
Source	Pathway	Receptor	P	C	M	Justification of Magnitude	Consequences	Actions to be taken
Arson/ Vandalism	N/A	Plant & Equipment Site Conditions	Low	Med	Low	Low - Site to be as secure as possible. Perimeter of site is fenced. All plant to be locked when not manned. All doors and gates locked outside working hours. The site has no public access. CCTV with remove access and recording capabilities in place on site.	Damage to equipment Fire Litter	<ul style="list-style-type: none"> Assess damage. Mitigate any damage/pollution caused (following fire plan). Inform site management. Inform Police. Inform Local Authority if required. Record incident. Review site security.
Fire	Spread from source of ignition	Site buildings Local Residents	Low	Med	Med	Med - No ignition sources permitted near flammable material. Fuel must be stored to prevent fire.	Fire could spread to site buildings and potentially to neighbouring sites, subject to wind direction and strength. Potential for severe damage to property and potential loss of life from fire/smoke inhalation.	<ul style="list-style-type: none"> Raise alarm on site. Call 999. Ensure personnel are alerted evacuated and accounted for from danger area, following the fire evacuation plan. If safe, switch off electricity/fuel supplies. Inform site management. Liaise and follow instructions of emergency team making them aware of any hazards on site. Any fire water treated/disposed of appropriately.
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