

Emissions to Air Statement

Emissions to air

The equipment selected for this energy generation scheme is all operated on Natural Gas. The new equipment displaces natural gas demands on a range of consumer properties..

The Energy Centre will be required to comply with the medium combustion plant directive (MCPD) which defines the emission limits for gas fired boiler and CHP generating plant.

Gas fired steam generating equipment shall be selected to operate within the limits of oxides of nitrogen (NOx): no greater than 100mg/kwh

Gas fired combined heat and power generating equipment shall be selected to operate within the limits of oxides of nitrogen (NOx): no greater than 250mg/kwh.

We have undertaken a D1 calculation which typically provides a conservative estimate of chimney height, this will be refined in the flue dispersion modelling.

The D1 calculation indicates a chimney height of 27m, we believe with detailed modelling this will be reduced to a height circa 1.7m above the existing Octagon house building and will as such result in a chimney height of 25.5m as indicated in our planning drawings.

Under the Medium Combustion Plant Directive (MCPD) an Environmental permit is required to operate and will be issued by the Environmental Agency; they will routinely inspect the site and its operation to ensure the operator is complying with the regulations and permit. Emissions from the CHP and boiler plant are monitored annually. In addition, a comprehensive sampling and measurement campaign will have to be undertaken bi-annually by an independent third party.

Odour

We do not anticipate any technology included as part of this project to introduce an odour nuisance.

Flue gasses will be adequately dispersed and no other processes generate an odour.

Annex to Emissions to Air Statement

Summary of D1 calculation

All emissions through flues within 3 x stack diameter		(Select even if already correct)								
Ambient Temperature	10.0 °C	Heat sources through same flue: CHP ☒ Boiler ☒								
Temperature of discharge gases (T _d)	°C									
Discharge Massic Flow Rate (Total)	kg/hr									
Density of Air at T _d	1.29 kg/m ³									
Discharge volume flow rate (V)	m ³ /s									
Pollution Index	m³/s	(Min 50, Max 10 ⁷)								
Heat Released (Q)	2.93 MW									
Momentum	152.38 m⁴/s²	(Min 1, Max 2100)								
Discharge Stack Height (U_b) Q<1MW		Discharge Stack Height (U_b) Q>1MW								
a = -1.11 - 0.19 logQ	-1.20	a = -0.84 - 0.1 expQ ^{0.31}	-0.94							
b = 0.49 + 0.005 logQ	0.49	b = 0.46 + 0.011 expQ ^{0.32}	0.51							
U _b = 10 ^a x Pi ^b	m	U _b = 10 ^a x Pi ^b	m							
Min U _b = 1.95*Q ^{0.19}	2.39 m	Min U _b = 1.95*Q ^{0.19}	1.70 m							
U_b	1.70 m									
Uncorrected Stack Height (U_m)										
Discharge Momentum (per stack)	152.38 m ⁴ /s ²									
x = -3.7 + (log(M)) ^{0.9}	-1.68									
y = 5.9 - 0.624 x log(M)	4.54									
z = 4.24 - 9.7 x log(M) + 1.47 x ((log(M)) ²) - 0.07	-10.66									
logUm = x + (y * logPi + z) ^{0.5}	#NUM!									
U _m	m									
Min U _m	4.10 m									
U_m	4.10 m									
Final Discharge Stack Height (C)	C = H _m + (1 - (H _m /T _m)) x [U + (T _m - U) x (1 - A ^{U/H_m))]}									
Distance to check for nearby buildings (5U _m)	20.48 m									
Buildings within 5U	Height (H) m	Width (B) m	K	T	H _m	T _m	U _m	U _b	U	A
Octagon House	23.80	50.00	23.80	59.5	23.80	59.5	4.096	1.700	1.700	2.41
Manchester Campus	15.00	42.00	15.00	37.5						
Building 3			0.00	0						
Building 4			0.00	0						
Building 5			0.00	0						
Building 6			0.00	0						
Building 7			0.00	0						
Building 8			0.00	0						
Building 9			0.00	0						
Building 10			0.00	0						
Height of tallest adjacent area to which there is general access (ie ground level, roof areas or adjacent openable windows)					0.00 m					
Corrected Chimney Height (C)	26.93 m									
Final Chimney Height	27 m									