

SITE DETAILS

Name Cedar Falls
Postcode PE11 2UA

BOILER DETAILS

Manufacturer	Model	Capacity	Number of boilers
ETA	PEK 220	220	1

FLUE EMISSIONS CALCULATIONS

The following calculations were carried out using:-

Boiler capacity:

Height of stack above ground:

Diameter of stack:

Height of buildings within

39.5 m from stack

Emission rate PM₁₀

Emission rate PM_{2.5}

Emission rate NO_x

PM₁₀ annual mean concentration at post code

PM_{2.5} annual mean concentration at post code

NO_x annual mean concentration at post code

NO_x hourly mean concentration at post code

220	kW
7.9	m
300	mm
7.3	m
9	g/GJ
9	g/GJ
60	g/GJ
14.8228	µg/m ³
0 9.842	µg/m ³
0 11.7277	µg/m ³
11.7277	µg/m ³

Results

Effective stack height	0.96	m
Stack diameter	300	mm

	PM10	PM2.5	Annual Mean NOX	Hourly Mean NOX
Emission rate, g/s	0.00198	0.00198	0.0132	0.0132
Background concentration, µg m ⁻³	14.8228	9.842	11.7277	11.7277
Background adjusted emission rate g/s	0.000115	0.000131	0.000467	0.002991
Threshold emission rates for above effective stack height and diameter, g/s	0.000800	0.002100	0.002100	0.008000

Executive Summary

The table above shows the threshold emission rates determined for each pollutant metric. In each case the background adjusted emission rate is less than the threshold rate and so more detailed assessment is not required

Calculations

Effective stack height

$$C = 1.6 (U - H)$$

where:

C = effective stack height

U = actual stack height

7.9

H = height of tallest building within 5 x stack height

7.3

C =	0.96
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PM10 Background

$$E_a = E / (32 - G)$$

Where

E_a = background adjusted emissions rate (g/s)

E = emissions rate (g/s)

0.00198

G = annual average background concentration (ug/m³)

14.8228

$$E = \text{Boiler emissions (g/GJ)} \times 10^{-6} \times \text{Boiler net thermal input capacity}$$

Boiler emissions

9

10⁻⁶

0.000001

Boiler capacity

220

Emissions rate (g/s)

0.00198

PM10 E _a =	0.00011527
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PM2.5 Background

$$E_a = E / (25 - G)$$

Where

E_a = background adjusted emissions rate (g/s)

E = emissions rate (g/s)

0.00198

G = annual average background concentration (ug/m³)

9.842

$$E = \text{Boiler emissions (g/GJ)} \times 10^{-6} \times \text{Boiler net thermal input capacity}$$

Boiler emissions

9

10⁻⁶

0.000001

Boiler capacity

220

Emissions rate (g/s)

0.00198

PM2.5 E _a =	0.00013062
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Nox Background (annual mean)

$$E_a = E / (40 - G)$$

Where

E_a = background adjusted emissions rate (g/s)

E = emissions rate (g/s)

0.0132

G = annual average background concentration (ug/m3)

11.7277

$$E = \text{Boiler emissions (g/GJ)} \times 10^{-6} \times \text{Boiler net thermal input capacity}$$

Boiler emissions

60

10^{-6}

0.000001

Boiler capacity

220

Emissions rate (g/s)

0.0132

Annual	NOx E_a =	0.00046689
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Nox Background (hourly mean)

$$E_a = 40E / (200 - 2G)$$

Where

E_a = background adjusted emissions rate (g/s)

E = emissions rate (g/s)

0.0132

G = annual average background concentration (ug/m3)

11.7277

$$E = \text{Boiler emissions (g/GJ)} \times 10^{-6} \times \text{Boiler net thermal input capacity}$$

Boiler emissions

60

10^{-6}

0.000001

Boiler capacity

220

Emissions rate (g/s)

0.0132

Hourly	NOx E_a =	0.00299075
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Compiled by



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Checked by



17/05/2018

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CIBSE LOW CARBON CONSULTANT

Approved for Low Carbon Building Operations to comply with the Building regulations and the EPBD in the United Kingdom

Approved for Low Carbon Building Design to comply with the Building regulations and the EPBD in the United Kingdom

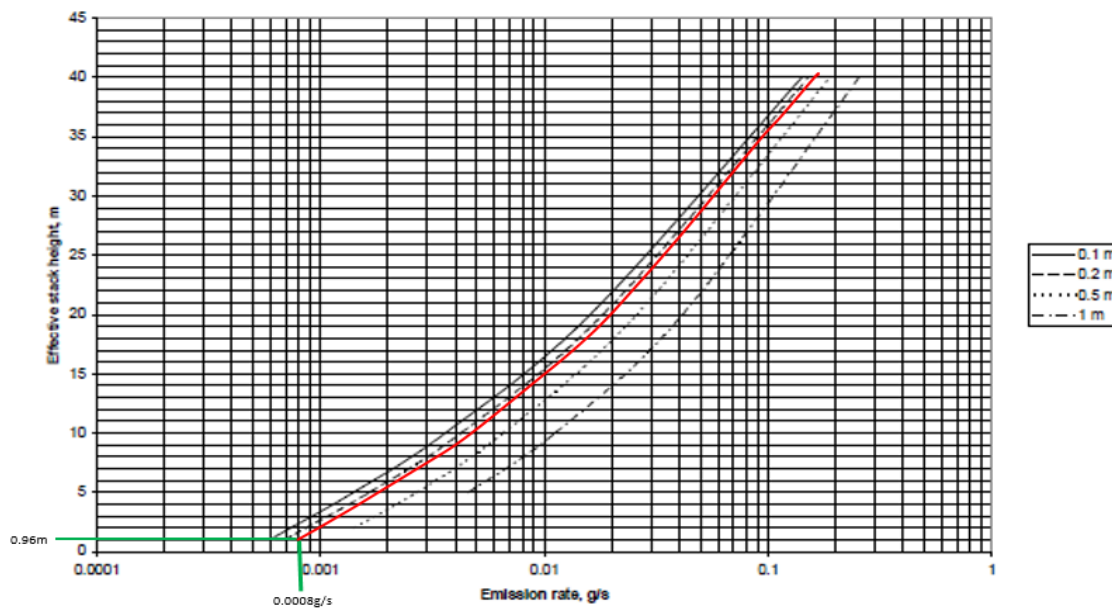
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Appendix - Threshold Emissions Rates Nomographs

PM10 – nomograph at figure 3.1

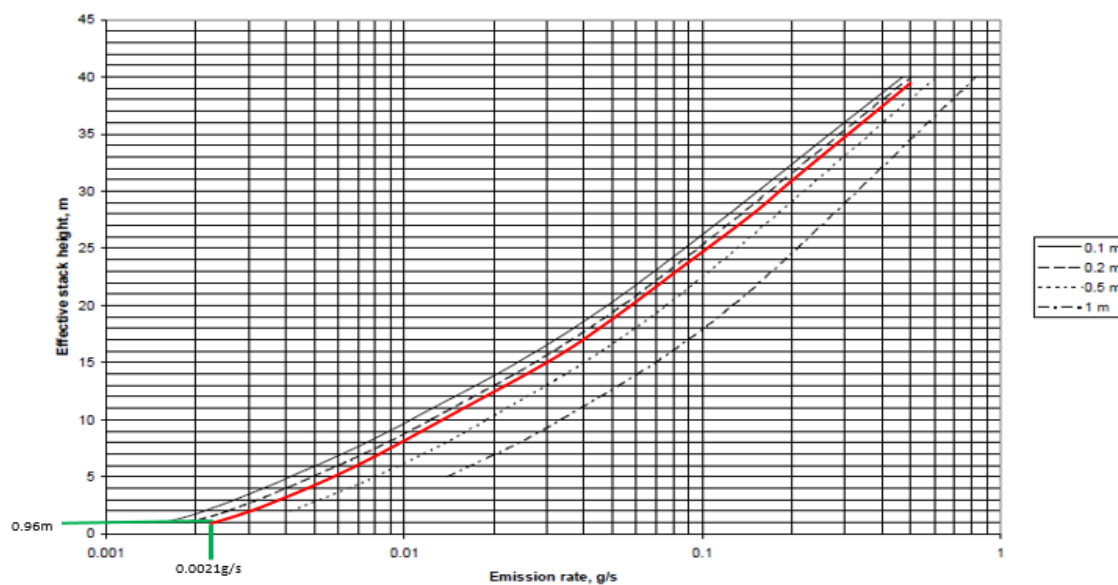
Figure 3.1: Particulate emissions necessary to give a 90th percentile of 24 hour mean ground level concentrations of $1 \mu\text{g m}^{-3}$



PM10 threshold emissions Result: 0.0008 g/s

PM2.5 and annual mean NOx – nomograph at figure 3.2

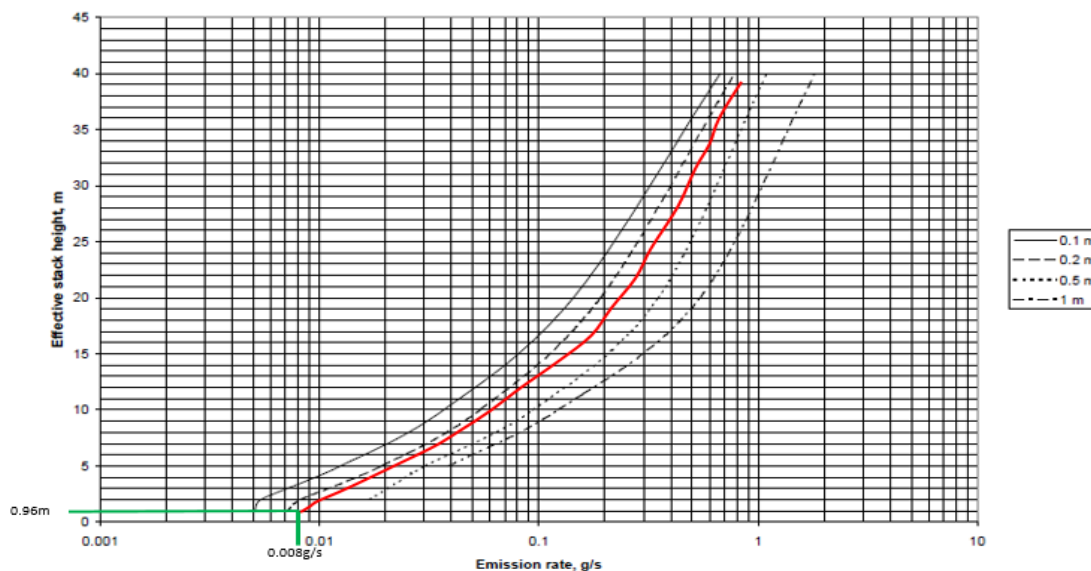
Figure 3.2: Emissions necessary to give an annual mean ground level concentration of $1 \mu\text{g m}^{-3}$ of oxides of nitrogen or particulate matter



PM2.5 and annual mean NOx Result: 0.0021 g/s

Hourly mean NO_x – nomograph at figure 3.3

Figure 3.3: Emissions of oxides of nitrogen that will give a 99.8th percentile hourly mean concentration of 40 µg m⁻³



Hourly mean NO_x Result: 0.008 g/s

Summary

This emissions screening assessment has been undertaken based on the calculation methodology and threshold emissions rates published within 'Technical Guidance: Screening assessment for biomass boilers' prepared by AEA Energy and Environment for DEFRA and the Devolved Administrations.

Sources of data are:

Biomass boiler emissions rates – Boiler RHI emissions certificate, boiler emissions testing undertaken by BLT research and Testing

Background concentrations of NO_x, PM₁₀ and PM_{2.5} - DEFRA published Local Air Quality Management data for use with air quality assessments (<https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2015>)

Boiler manufacturer recommendations of flue diameter

On street measurement of surrounding building heights

'Background adjusted emissions rates' have been calculated. These are all below the 'threshold emissions rates' specified for the proposed stack height and diameter and therefore it is concluded that a more detailed assessment of air quality impact from the proposed biomass installation is not required.

