TECHNICAL NOTE

TO	Thorncliffe Building Supplies Ltd	**FROM**	Bureau Veritas UK Limited
DATE	19.05.2026	**VERSION**	1.1
REFERENCE	C31947390	**AUTHOR/REVIEWER**	Benjamin Earnshaw / Emma Haymer
SUBJECT	Biomass Boiler Emissions Screening Report		

INTRODUCTION

Biomass burning can lead to an increase in PM emissions and compared to conventional gas-burning, can also result in an increase in the overall NO_x emissions. A screening assessment of these emissions is critical to understanding the impact on nearby receptors.

PURPOSE

This technical note provides a biomass boiler screening assessment to assess emissions associated with the operation of a biomass boiler at Thorncliffe Building Supplies Ltd (Unit 7 and 9, Queensway Industrial Estate, Wrexham, LL13 8YR). The assessment has been prompted following concerns on the potential impact of biomass boiler emissions on nearby receptors, at residential areas and Gwenfro Community Primary School.

We have used the latest version of the Biomass Emissions Screening Tool to calculate the emission rate from the boiler. If the emissions from the boiler cannot be screened our using the Biomass Emissions Screening Tool, this indicates further assessment is required.

METHODOLOGY

BIOMASS EMISSIONS SCREENING TOOL (BEST)

The latest version of the Biomass Emissions Screening Tool[1] is used to calculate the target emission rate at the site location.

This Excel tool has been developed to help determine the maximum emission rate (in grams per second) from a combustion installation for which a risk of exceedance of the relevant air quality objective is unlikely. Therefore, the methodology consists of comparing the actual maximum emission rate for pollutants against the Target Emission Rate calculated by the tool.

BEST data requirements for Target Emission Rate calculation:

- Stack internal diameter.
- Actual stack height above ground level.
- Actual NO_x and PM_{10} maximum emission rates.
- Height of nearby buildings, which may prevent good dispersion of the plume.

[1] https://laqm.defra.gov.uk/air-quality/air-quality-assessment/biomass-emissions-screening/

- NO_2 and PM_{10} background concentrations around the installation.

The building height criteria for the tool is the 'Height of the tallest building within 5 stack heights of the stack' as such the nearby school is out of the range required for this criterion. The stack height is 7.5 m and the school is more than 37m away from the stack, with the closest edge of the school building at 45 m as shown below in Figure 1 (Map data © Google Maps. Used for reference purposes in this report).

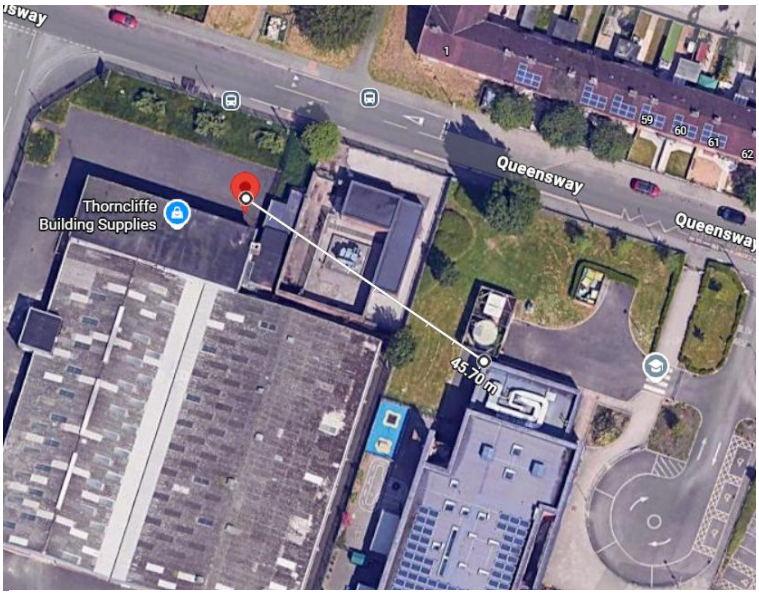


Figure 1. Distance between stack location and Gwenfro Community Primary School building (© Google Maps)

EMISSION RATE CALCULATIONS

The the actual emission rate from the ETA eHack240 was calculated using first principles.

The Non-Domestic Renewable Heat Incentive Emissions Certificate has testing reports for the ETA eHack 120 and ETA eHack 240 plant. The chipped wood heating boiler located at the site (ETA eHack 200) is within the type-testing range of the tested plants to which the certificate applies. For the purpose of the assessment, surrogate data from the ETA eHack 240 plant has been used.

Table 1.Plant Testing Certificate Measured Emissions

Emission Type	Plant	Installation Capacity (kW)	Measured emissions of PM in g/GJ net heat input
PM	ETA eHack 240	238,0	8
NOx	ETA eHack 240	238,0	51

SCAIL TOOL

The Simple Calculation of Atmospheric Impact Limits (SCAIL) tool[2] was used for the NO_x 1-hour objective following the calculation of the actual emission rates. The model provides an estimate of the amount of nitrogen deposited on a

[2] https://www.scail.ceh.ac.uk/

habitat from the combustion source. This value can then be used to assess whether impact limits for the habitats are exceeded or not. The input data includes 11 receptors, 6 located within the school area, 4 residential receptors and one Site of Special Scientific Interest (SSSI).

DATA PROCESSING

Figure 2. PM10 Emissions from Biomass Combustion Stacks (Annual & 24-hour)

PM_{10} Emissions from Biomass Combustion Stacks (Individual Installations)	Additional Comments/Information
The target emissions of PM_{10} in g/s from biomass combustion source emissions are calculated for your given stack details. Greater emission rates may result in exceedance of the 24-hour objective for PM_{10} in England, Wales and Northern Ireland or the annual mean objective in Scotland.	

Enter required information in Yellow Cells
Resulting Emission in Red Bold

Building height	6.5	m
Stack diameter	0.3	m
Stack height	7.457	m
Location	Rest of UK	
PM_{10} Annual mean background concentration (include roadside contribution at relevant receptors)	9.592086	$\mu g/m^3$
Calculated Effective stack height	1.6	m
Target Emission Rate	0.0177	g/s

If the maximum stack emission rate is less than the target above then it is not likely that the most stringent objective for PM_{10} will be exceeded. If your emissions are greater then please refer to LAQM.TG(16) for further advice.

Figure 3. NOx Emissions from Biomass Combustion Stacks (Annual)

NO_x Emissions from Biomass Combustion Stacks (Individual Installations) - Annual Mean NO_2 Objective	Additional Comments/Information
The target emissions of NO_x in g/s from biomass combustion source emissions are calculated for your given stack details. Greater emission rates may result in exceedance of the annual mean objective for NO_2.	
Enter required information in Yellow Cells Resulting Emission in Red Bold	
Building height: 6.5 m Stack diameter: 0.3 m Stack height: 7.457 m	
Location: Rest of UK	
NO_2 Annual mean background concentration (include roadside contribution at relevant receptors): 6.306835 $\mu g/m^3$	
Calculated Effective stack height: 1.6 m	
Target Emission Rate: 0.0772 g/s	
If the maximum stack emission rate is less than the target above then it is not likely that the annual mean objective for NO_2 will be exceeded. If your emissions are greater then please refer to LAQM.TG(16) for further advice.	

Figure 4. NOx Emissions from Biomass Combustion Stacks (1-hour)

NO_x Emissions from Biomass Combustion Stacks (Individual Installations) - 1-Hour Mean NO_2 Objective	Additional Comments/Information
The target emissions of NO_x in g/s from biomass combustion source emissions are calculated for your given stack details. Greater emission rates may result in exceedance of the 1-hour mean objective for NO_2.	
Enter required information in Yellow Cells Resulting Emission in Red Bold	
Building height: 6.5 m Stack diameter: 0.3 m Stack height: 7.457 m	
Location: Rest of UK	
NO_2 Annual mean background concentration (include roadside contribution at relevant receptors): 6.306835 $\mu g/m^3$	
Calculated Effective stack height: 1.6 m	
Target Emission Rate: 0.0348 g/s	
If the maximum stack emission rate is less than the target above then it is not likely that the 1-hour mean objective for NO_2 will be exceeded. If your emissions are greater then please refer to LAQM.TG(16) for further advice.	

Table 2. Emission Calculations - Input Data

Criterion	Value	Unit	Data Source
Combustion Process	Boiler Wood Fuel		
Fuel Type	Wood Chip		
Thermal Input	0.238	MW	2022-0627EN0000000169V.0103.55.093018-005
Operational Hours per year	8760	h	
Efficiency	96%	%	2022-06-27EN0000000169V.0103.55.093018-005
Electrical Output	0.22848	MW	
Discharge Diameter	300	mm	
Discharge Height	7.457	m	Flue height
Exhaust Conditions			
Actual O_2	8	%	Assumed
Temperature	130	C	2022-06-27EN0000000169V.0103.55.093018-005
Ref O_2	13	%	EcoDesign Directive
Emission Concentrations		@ ref% O_2	
NO_x	200	mg/m^3	Innasol Super Power Technical report
CO	500	mg/m^3	Innasol Super Power Technical report
PM	40	mg/m^3	Innasol Super Power Technical report

N.B. All data sources are located in Appendix A.

RESULTS

Table 3. Target and Actual Emission Rates

Pollutant & Objective	Target Emission Rate (g/s)	Actual Emission Rate (g/s) ETA eHack 240
PM_{10} (Individual installations) Annual & 24-hour	0.0177	0.00772
NO^x (Individual installations) Annual	0.0772	0.03860
NO^x (Individual installations) 1-hour	0.0348	0.03860

COMMENTARY

The actual emission rates are well below the target emission rates for both pollutant annual objectives, and for the PM_{10} 24-hour objective.

The actual emission rate is slightly higher than the target emission rate for the NO^x 1-hour objective.

Due to the NO_x 1-hour actual emission rate exceeding the target emission rate, the SCAIL combustion tool was used to assess the impact from the combustion plant.

The SCAIL tool output states the **process contribution of NO_x/NO_2 (ug m^{-3}) is <0.1.** This is a key output from the modelling screening tool; it is the contribution from the process itself with no background concentrations added. SCAIL input data and outputs are attached in the Appendix A.

Assumptions have been made in the calculations that do not fully reflect the practical operations of the assessed biomass boiler:

- The actual emission rates are calculated for the ETA eHack 240, which has a 19.1% larger thermal input than the ETA eHack 200 biomass boiler.
- All the emissions calculations were completed with the plant operating at max input, this is practically unlikely when operating the biomass boiler.

The regulatory compliance of the ETA eHack biomass boiler is designed to meet the requirements of:

- Ecodesign Directive 2009/125/EC
- EU Ecodesign Regulation 2015/1189

Typical regulatory emission limits for biomass boilers are:

Pollutant	**Limit**
Carbon monoxide	≤ 500 mg/m^3
Organic gaseous carbon	≤ 20 mg/m^3
Particulate matter	≤ 40 mg/m^3
Nitrogen oxides	≤ 200 mg/m^3

The ETA eHack system typically operates **well within these regulatory thresholds**.

CLOSING STATEMENT

The actual emission rates do not exceed the target emission rates for annual objectives of PM_{10} and NO_x, and for the 24-hour PM objective for the biomass boiler.

For the NO_x 1-hour objective, supplementary SCAIL modelling and evidence from regulatory compliance documents indicates this difference is negligible and further assessment of the installation is not necessary.

APPENDIX A

INNASOL SUPER POWER TECHNICAL REPORT & OFGEM EMISSIONS CERTIFICATE

Key screenshots of information to support the production of this technical note are below, the full report can be provided if necessary.

Non-Domestic Renewable Heat Incentive

1. TEST HOUSE	
a) Name and address of the testing laboratory that has carried out the required tests and issued this certificate * *if different, include details of both	HBLFA Francisco Josephinum Wieselburg HB LF A BLT Wieselburg Francisco Josephinum Wieselburg, Rottenhauser Strage 1 blt@josephinum.at, http://blt.josephinum.at 3250
b) Name and signature of the person authorised by the testing laboratory to issue the certificate	Name: Franz HANDLER (For the test institut [redacted] Signature: Name: RATHBAUER Josef (For [redacted] Signature:
c) Date of issue of this certificate, together with certificate reference number for this certificate *Please see Note A	Date: 04/08/2020 Certificate reference number: BLT 0277/20 Optional: reference number of original test report on which this certificate is based.
Plant 1: ETA eHack 120 Plant 2: ETA eHack 240	BLT Test report, approval no: 004/18 BLT Test report, approval no: 041/19
Type-tested boilers (2g): ETA eHack 140 (family member) ETA eHack 150 (family member) ETA eHack 160 (family member) ETA eHack 170 (family member) ETA eHack 180 (family member) ETA eHack 200 (family member) ETA eHack 220 (family member)	BLT reference number: 0230/19 BLT reference number: 0230/19 BLT reference number: 0230/19 BLT reference number: 0230/19 BLT reference number: 0230/19 BLT reference number: 0230/19 BLT reference number: 0230/19

d) If the testing laboratory that has carried out the required tests is accredited to BS EN ISO/IEC 17025: 2005, date of accreditation and accreditation number (if testing conducted on or after 24 September 2013, the testing laboratory must be BS EN Isonec 17025.•2005 accredited at the time of testing)	Date: 21/02/2019 Initial date of accreditation: 01/09/1998 Accreditation number: A 0112 Federal Ministry for Digital and Economic Affairs Division 1/12 - Accreditation Body

2. PLANT - Please see Note B	Plant [1]	Plant 2
a) Name of the plant tested	ETA eHack 120	ETA eh-lack 240
b) Model of the plant tested* *Please ensure this is the same as in the manufacturer's documentation and boiler nameplate	Chipped wood heating boiler ETA eHack 120	Chipped wood heating boiler ETA eHack 240
c) Manufacturer of the plant tested	ETA Heiztechnik GmbH Gewerbepark 1 AT 4716 Hofkirchen	
d) Installation capacity* of the tested plant in kilowatts (kW) *The total installed peak heat output capacity	119,9	238,0
e) Is the plant a manuaJLy stokedz natural draught plant? (without a fan providing forced or induced draught)	no	no

1 The type-testing approach enables testing laboratories to provide assurance that all boilers in a given range meet the air quality requirements, without needing to specifically test each boiler.

f) (i) Date the plant was tested* (ii) Please confirm that NOX and PM have been tested on the same occasion *This is in reference to the emissions testing for PM and NOx, not any wider range of tests. A specific date is required. Please provide the date of test performed at 285% of the installation capacity. If more than one mode/ has been tested or testing has been conducted on different dates for different fuels, please list each date with details.	16/11/2017 yes	15/02/2019 yes
g) Please list all the plants in the type-testing range* of the tested plants to which the certificate applies, if any. ' Please include the installation capacity of each model. *This must follow the ratio rules: If the smallest plant in the range is 500kW or less, the largest plant in the range can't be more than double the smallest. If the smallest plant in the range is over 500kW, the largest plant in the range can't be more than 500kW greater than the smallest.	Chipped wood heating boiler ETA eHack 120 (119,9 kW) ETA eHack 140 (139,9 kW) ETA eHack 150 (149,9 kW) ETA el-lack 160 (159,9 kW) ETA eHack 170 (169,9 kW) ETA eHack 180 (179,9 kW) ETA eHack 200 (199,9 kW) ETA eHack 220 (219,9 kW) ETA eHack 240 (238,0 kW)	

3. FUELS	
a) Types of fuels used when testing (Where relevant, the fuel should be classified according to EN303-5, referencing the relevant EN14961 standard for specific classification (superseded by EN ISO 17225). We don't expect broader categories such as beech'.	Wood Chips AI (EN ISO 17225-4:2014)

4. TESTS	
Confirm which requirements the emissions of NOX and PM have been tested in accordance with. Either 4a or 4b must be confirmed to be a valid RHI certificate.	
a) Was the testing carried out in accordance* with all of the provisions relevant to emissions of PM and NOX in either BS EN 303-5:1999 or BS EN 303-5:2012?[2] *It is not a requirement that the tested plant must be within the scope of one of these standards, as long as the test lab can confirm that all of the relevant provisions were followed appropriately	yes (EN 303-5:2012)*)
b) Was the testing carried out in accordance with all of the following requirements? (i) - EN 14792: 2005 in respect of NOX emissions - EN 13284-1:2002 or ISO 9096:2003 in respect of PM emissions3 (ii) emissions of PM represent the average of at least three measurements of emissions of PM, each of at least 30 minutes duration (iii) the value for NOX emissions is derived from the average of measurements made throughout the PM emission tests.	Tested according to 4a Tested according to 4a Tested according to 4a Tested according to 4a
c) Please confirm the plant was tested at 285% of the installation capacity of the plant.	
d) Please confirm the test shows that emissions from the plant were no greater than 30 g/GJ PM and 150 g/GJ NOx.	Yes
e) Measured* emissions of PM in g/GJ net heat input *This average value should be from the test confirmed in 4c Results from partial load tests are not required. This value must be in the specified units. Plant 1: ETA eHack 120 Plant 2: ETA eHack 240	 10 8
f) Measured* emissions of NOX in g/GJ net heat input *This average value should be from the test confirmed in 4c. Results from partial load tests are not required This value must be in the specified units. Plant 1: ETA eHack 120 Plant 2: ETA el-lack 240	 54 51

11. Regulatory Compliance

The ETA eHack biomass boiler is designed to meet the requirements of:

- Ecodesign Directive 2009/125/EC
- EU Ecodesign Regulation 2015/1189

Typical regulatory emission limits for biomass boilers are:

Pollutant	Limit
Carbon monoxide	≤ 500 mg/m³
Organic gaseous carbon	≤ 20 mg/m³
Particulate matter	≤ 40 mg/m³
Nitrogen oxides	≤ 200 mg/m³

The ETA eHack system typically operates **well within these regulatory thresholds**.

Conclusions

The installation of an **ETA eHack 240 kW biomass boiler** provides a highly efficient and environmentally responsible heating solution.

Key conclusions include:

- Net carbon reduction of approximately **78.7 tonnes CO_2 annually**
- High thermal efficiency comparable to modern gas boilers
- Low particulate and gaseous emissions
- Compliance with European Ecodesign environmental standards

The system therefore represents a **significant environmental improvement over conventional fossil-fuel heating systems**.

ECODESIGN DIRECTIVE

https://www.gov.uk/guidance/placing-energy-related-products-on-the-uk-market

Figure 5. Receptors and Key Outputs (Excel)

Met site	BUCK					
Project Notes						
Run Mode	Conservative					
RECEPTORS						
Number	Name	SITE CODE	Habitat Type	xy		
1	School			334971_349636		
2	School 2			334958_349613		
3	School 3			334943_349572		
4	School4			334973_349568		
5	School5			335001_349568		
6	School6			334985_349594		
7	Resi1			335019_349665		
8	Resi2			334963_349683		
9	Resi3			334931_349702		
10	Resi4			334888_349718		
1	Sontley Marsh	31WDJ	SSSI	334037_348294		
INSTALLATIONS						
Number	Name	No. Sources	NOx(t/a)	SO2(t/a)	PM10(t/a)	
1	Throncliffe Wrexham	1	1.3	0.95	0.32	
Concentrations / depositions and critical loads						
For habitat receptors concentrations are expressed as NOx. For human health receptors it is as NO2						
RECEPTOR	NAME	PC NOx/NO2 (ug m-3)	NOx/NO2 Background (ug m-3)	NOx/NO2 PEC (ug m-3)	NOx/NO2 EAL (ug m-3)	% of NOx/NO2 PC to EAL
1	School	0	8.03	8.03	40	0
2	School 2	0	8.03	8.03	40	0
3	School 3	0	8.03	8.03	40	0
4	School4	0	8.03	8.03	40	0
5	School5	0	6.84	6.84	40	0
6	School6	0	8.03	8.03	40	0
7	Resi1	0	6.84	6.84	40	0
8	Resi2	0	8.03	8.03	40	0
9	Resi3	0	8.03	8.03	40	0
10	Resi4	0	8.03	8.03	40	0
11	Sontley Marsh	0	7.46	7.46	30	0

Figure 6. Webpage Output

Country:	Wales
Site Name:	School
Site Code:	N/A
Designation Status:	Human Health Receptor
Distance from Installation (m):	113
Receptor Type:	N/A
Grid Reference:	334971,349636
Met Site:	BUCK
Run Mode:	Conservative
NO2 Limit:	Annual mean
SO2 Limit:	24 hour mean
PM_{10} Limit:	Annual mean

Installation Information

No.	Name	No. of sources	NO_x (t/a)	SO_x (t/a)	NO2 Conc (ug/m3)	SO2 Conc (ug/m3)	Dep N (kg/ha/yr)	Dep Acid (kEq H+/ha/yr)	PM10 Conc (ug/m3)
1	Throncliffe Wrexham	1	1.3	0.95	0.0	0.0	-	-	0.0

Total Depositions/Concentrations and Exceedances

Concentrations/Depositions and Critical Loads/Levels	NO2 Conc (ug/m3)	SO2 Conc (ug/m3)	N Dep. (kg N/ha/yr)	Acid Dep. (kEq H+/ha/yr)	PM10 Conc (ug/m3)
Process Contribution (PC) at receptor edge	0.00	0.0	-	-	0.0
Background concentration at receptor edge	8.03	3.32	-	-	10.99
Predicted Environmental Concentration/Deposition (PEC)	8.0	3.3	-	-	10.99
Environmental Assessment Level or Critical Load / Level	40	125	-	-	40
			ALTERNATIVE CRITICAL LOAD INFO		
USE OWN THRESHOLDS?					
% of relevant standard PC	0.0%	0.0%	-	-	0%
% of relevant standard PEC	20.1%	2.7%	-	-	27%
EXCEEDANCE	32.0	121.7	-	-	29.0

Project Notes

SAVE RESULTS SAVE INPUTS

[Use this Back button. Do not use the browser back button - you could lose all inputs!] BACK