Biomass Emissions Screening Tool (Version 7)

This Excel tool has been developed to help local authorities determine the maximum emission rate (in grammes per second) from a biomass combustion installation for which a risk of exceedance of the relevant air quality objective is unlikely.

The methodology consists of comparing, for each biomass installation identified (using Table 7.4 in LAQM.TG(16)), the actual maximum emission rate for pollutants against the Target Emission Rate calculated by the tool. If the actual emission rate is greater than the Target Emission Rate, then the local authority should proceed to further assessment of the installation, based on detailed dispersion modelling.

The tool is based on a series of nomograms developed as part of previous versions of LAQM Technical Guidance, but which are still considered relevant.

In order to use this tool, local authorities will need to gather the following information for each biomass installation requiring screening:

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

Procedure for using the Calculator:

1. Select the appropriate tool for the pollutant and application;
2. Insert the height of the highest building within a distance of 5 times the stack height;
3. Insert the diameter and height of the discharge stack;
4. Select the location of the development (Scotland or Rest of UK); and
5. Insert the annual mean background concentration of the relevant pollutant. The background concentration should take account of nearby roads or other local sources if there is potential for relevant public exposure.

The installations to which the calculator may be applied is limited by a number of factors, which are explained in the “Limitations” tab.

Further information with regards to screening biomass emissions is provided within LAQM.TG(16), available at

https://laqm.defra.gov.uk/technical-guidance/index.html

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Either select the relevant sheet you require or use the links below (Jump to Tool column) to go directly to the relevant tool.

Pollutant	Objective Year	Average Period	Source Type	Jump to Tool
PM_{10}	2004 & 2010	24-Hour / Annual	Biomass Combustion (Individual)	GO
NO_2	2005 & 2010	Annual	Biomass Combustion (Individual)	GO
NO_2	2005 & 2010	1-Hour	Biomass Combustion (Individual)	GO
$PM_{2.5}$	2020	Annual	Biomass Combustion (Individual)	GO
PM_{10}	2004 & 2010	24-Hour / Annual	Biomass Combustion (Combined)	GO

If you require further information or support in using the Biomass Calculator Screening Tool, then please contact the LAQM Support Helpdesk.

Web: https://laqm.defra.gov.uk/
Telephone: +44 (0)800 032 7953
Email: LAQMHelpdesk@uk.bureauveritas.com

The LAQM Support Helpdesk is operated by Bureau Veritas UK, part of the Bureau Veritas Group.

v7, released April 2017

Limitations

The nomograms on which this calculator is based were developed for:

1. Biomass combustion installations in the range of 50kW to 20MW thermal input;
2. Installations with stack diameters in the range 0.1-1m;
3. A limited range of effective stack heights, dependent on the stack diameter shown in Table 1;
4. Discharge velocities shown in Table 1 – the calculator should not be used for discharge velocities less than those shown in Table 1 and will be conservative for higher velocities;
5. Discharge temperatures of 100ºC – the calculator should not be used for lower discharge temperatures and will be conservative for higher discharge temperatures;
6. Flat terrain.

For larger biomass combustion installations, with discharge velocities greater than 10m/s, it may be appropriate to use the Industrial Emissions Screening Tool.

Table 1: Applicable range of effective stack heights and stack discharge velocities

Stack Diameter, m	Stack Height Range, m	Discharge Velocities, m/s
0.1	1-40	1.3
0.2	1-40	1.9
0.5	2-40	3
1	5-40	4.2

PM_{10} Emissions from Biomass Combustion Stacks (Individual Installations)

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	8	m
Stack diameter	0.2	m
Stack height	9	m
Location	Rest of UK	
PM_{10} Annual mean background concentration (include roadside contribution at relevant receptors)	9.654357	$\mu g/m^3$
Calculated Effective stack height	1.7	m
Target Emission Rate	**0.0179**	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.

Additional Comments/Information

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NO_x Emissions from Biomass Combustion Stacks (Individual Installations) - Annual Mean NO_2 Objective

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	8	m
Stack diameter	0.2	m
Stack height	9	m
Location	Rest of UK	
NO_2 Annual mean background concentration (include roadside contribution at relevant receptors)	5.073555	$\mu g/m^3$
Calculated Effective stack height	1.7	m
Target Emission Rate	**0.0817**	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.

Additional Comments/Information

BUREAU VERITAS

NO_x Emissions from Biomass Combustion Stacks (Individual Installations) - 1-Hour Mean NO_2 Objective

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	8	m
Stack diameter	0.2	m
Stack height	9	m
Location	Rest of UK	
NO_2 Annual mean background concentration (include roadside contribution at relevant receptors)	5.073555	$\mu g/m^3$
Calculated Effective stack height	1.7	m
Target Emission Rate	**0.0358**	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.

Additional Comments/Information

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PM_{10} Emissions from Biomass Combustion Stacks (Combined Installations)

The annual emissions from a 500m × 500m square (the threshold emissions density) that may give rise to an exceedance of the annual mean objective (in Scotland) / 24-hour mean objective (Rest of UK) for PM_{10} for a particular background concentration.

Enter required information in Yellow Cells
Resulting Emission in Red Bold

Location	Rest of UK	
Area Type	Village	
PM_{10} Annual mean background concentration (include roadside contribution at relevant receptors)	17	
Threshold Emission Density	**9550**	kg/year

If the emissions density is less than the Threshold Emissions Density, then it is not likely that the most stringent objective for PM_{10} will be exceeded. If it exceeds the Threshold Emissions Density, then the authority should proceed to detailed dispersion modelling and/or monitoring - please refer to LAQM.TG(16) for further advice.

Additional Comments/Information

Note, for the purpose of this tool, the following is typically assumed for Area Type:

- Village ~ 1km^2
- Small Town ~ 4km^2
- Large Town ~ 16km^2

Defra Biomass Screening Tool calculations summary for proposed biomass boiler installation at Low Newbiggin House, YO21 TQ

Revised 15/04/2024

Emission Rates produced from Biomass Boilers	PM10 g/s	NOx g/s
GF175	**0.01682**	**0.0343**

GF175 Stack Coordinates	Nearest Grid reference		Background concentrations for 2023			
Easting = 485189	E	N	PM10	NOx	NO2	Data set Line no
Northing = 485189	485500	506500	9.654357	5.073555	4.075798	238

Building height	8	m
Stack diameter	0.2	m
Stack height	9	m

- Heighest building within 45 metres (5 times stack height)

Target Rates from Biomass Screening tool comparison
Emission Rates

	PM10		NO2 (NOx) Annual		NO2 (NOx) 1-hour	
	Target emission	Boiler emission rate	Target emission	Boiler emission rate	Target emission	Boiler emission rate
GF175	0.0318	0.01682	0.0817	0.0343	0.0358	0.0343

Boiler emissions are grater thank calculated target emission rate
Boiler emissions are lower thank calculated target emission rate

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PM 10 Emissions from Biomass Combustion Stacks - Combined installations

The annual emissions from a 500m × 500m square (the threshold emissions density) that may give rise to an exceedance of the annual mean objective (in Scotland) for PM10 for a particular background concentration

Location:	England
Area Type:	Village

PM10 Annual mean background concentration (include roadside contribution at relevant receptors):	17

Threshold Emission Density: **3810** kg/year

Emission Rates	PM10 g/s	PM10 g/hr	Total Hours in year	Estimated (realistic) Annual Use			Max. Emissions (100% runtime)
				%	Run Hours	kg/year	kg/year
GF175	0.01682	**60.552**	9550	42%	4011.0	**242.9**	578.3
					Total:	**242.9**	**578.3**

Installation of proposed biomass boiler GF175 will produce approximately **242.9 kg of PM10 emissions** annualy
The proposed installation have a theoretical capacity to produce up to 578.3 kg/year of PM10 emissions annualy

The local area square (500 m x 500 m) threshold for PM10 is **9550 kg/year**