



Air Quality and Modern Biomass Boilers

2024



Modern biomass boiler systems burn fuel such as wood pellets, chips, logs or waste wood to provide space heating and hot water in both domestic and non-domestic buildings. They can also generate high temperature heat for industrial processes.



Biomass is the largest contributor to low-carbon heat to date in the U.K – representing 60% of all renewable heat generation in 2022.



It provides an estimated 7,449 jobs and contributes an estimated £1,029 million to the economy.



The Government's biomass strategy recognises its importance for both buildings and sectors of industry that are complex to decarbonise.



Biomass is defined as low carbon, in accordance with IPCC methodologies and UK greenhouse gas conversion factors.



Despite these benefits, **support is waning for biomass as an alternative fuel ...**

Due to conflation with more traditional wood heating systems, like open fireplaces, authorities and public bodies are concerned about the particulate emission of wood heat and worry it will undermine the progress towards the UK's 2040 air quality target $10\mu\text{g}/\text{m}^3$ target.

The negative press surrounding air quality and biomass can be a limiting factor to the deployment of biomass boilers.



WHO
recommendation ⁴
 $5\mu\text{g}/\text{m}^3$



UK target
(2040) ³
 $10\mu\text{g}/\text{m}^3$



EU
Law ⁵
 $20\mu\text{g}/\text{m}^3$



Example of DEFRA's campaign material on wood burners and air quality

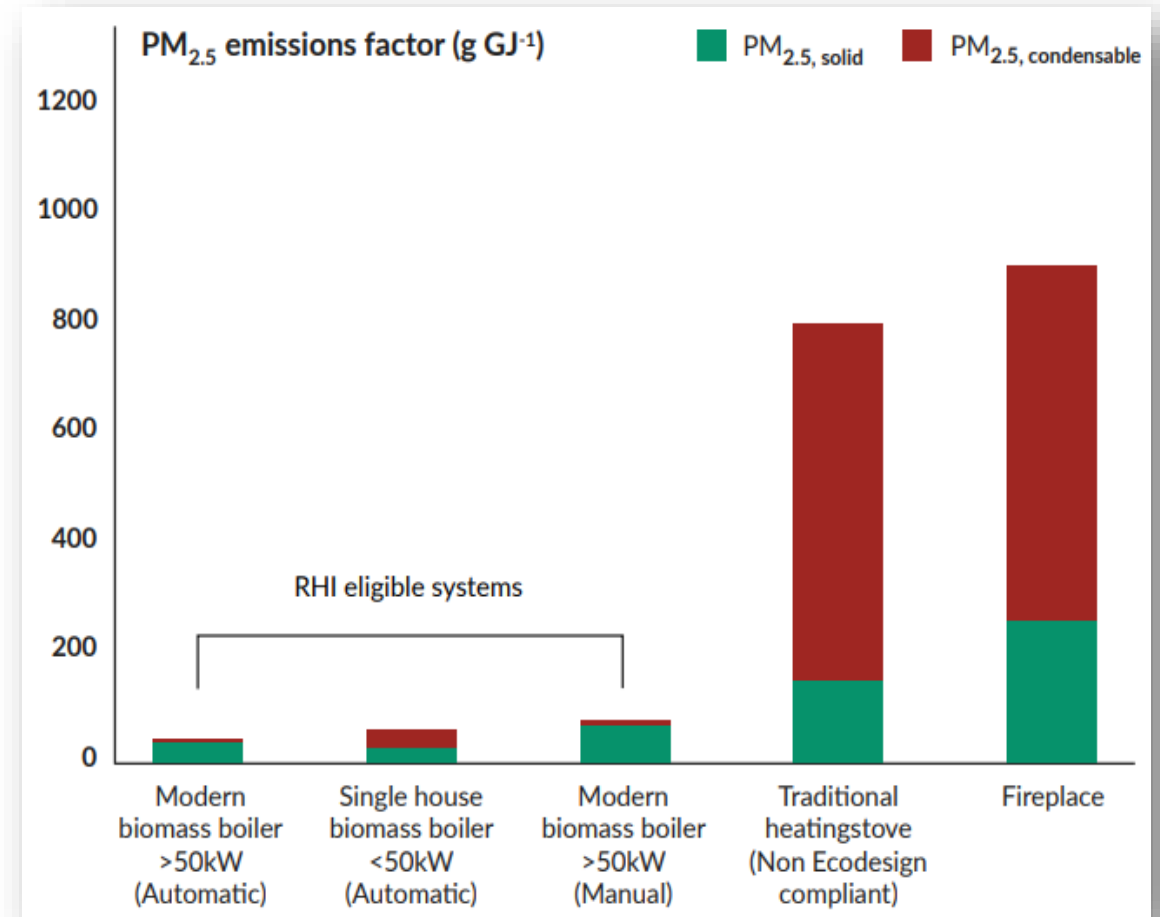


However, not all wood heat is the same ...

- Modern biomass boilers have a radically different emissions profile from traditional wood burning stoves and fireplaces
- The graph here shows solid and condensable PM_{2.5} emission factors by biomass technology type.
- As one can see modern biomass boilers have considerably lower particulate matter emissions than other wood burning systems.

What is PM?

Particulate matter or PM= Airborne particles and droplets, especially less than 2.5 microns in size (PM_{2.5}) or less than 10 microns in size (PM₁₀)



The technological and regulatory contrast means that traditional wood burning and biomass energy are not remotely comparable.

Multiple regulations are in place to ensure biomass does not compromise air quality:

- ✓ Environmental Permitting Programme
- ✓ Industrial Emissions Directive
- ✓ Clean Air Act
- ✓ Large Combustion Plant Directive
- ✓ Renewable Heat Incentive (RHI) and Ecodesign certification for small scale biomass

	Modern Biomass boiler	Wood Burning Stove
Emissions testing	✓	✗
Mandatory annual service	✓	✗
Regulated Fuel	✓	✗

Furthermore, under the RHI biomass boilers are legally required to emit no more than:

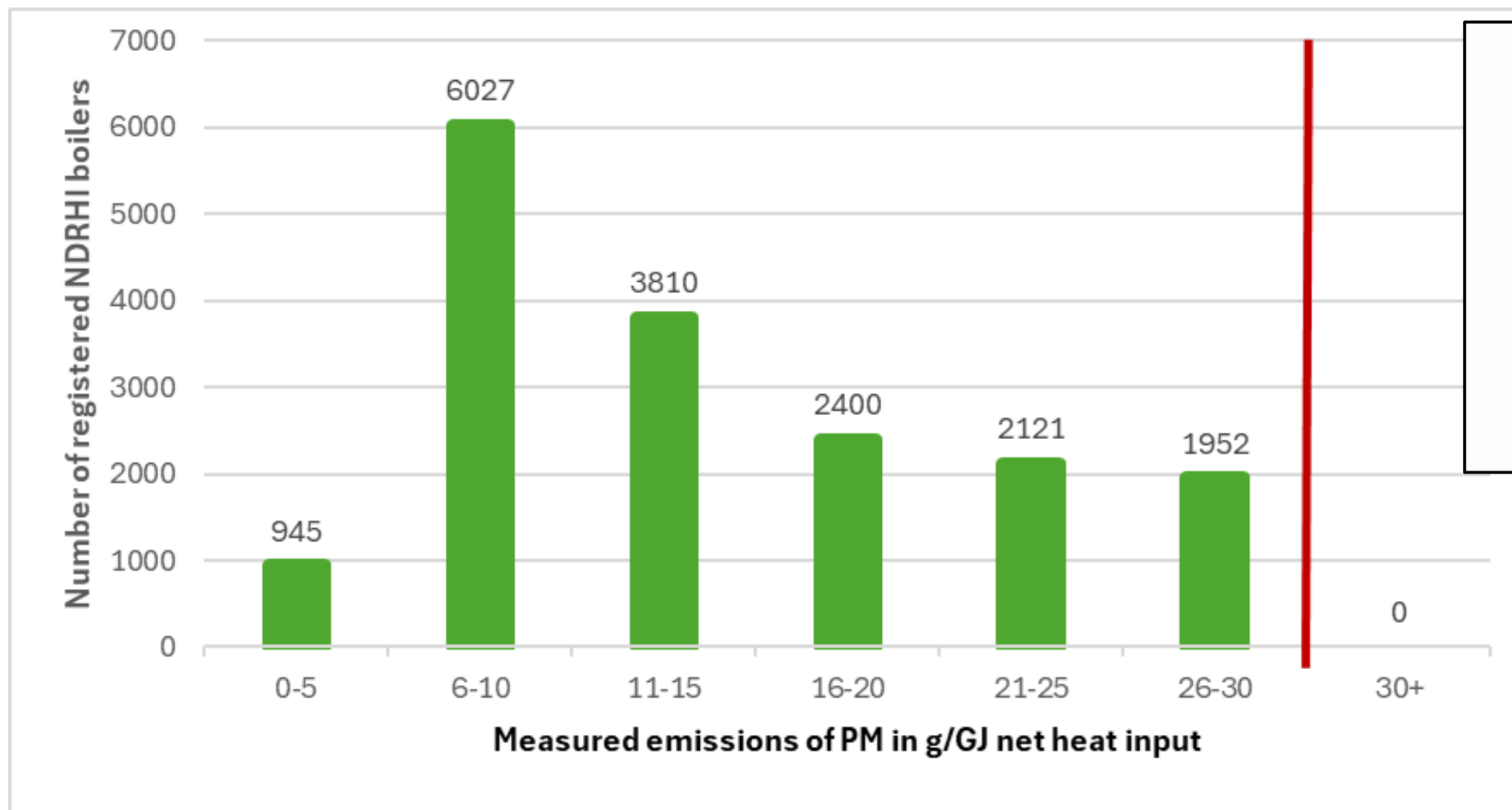
- ☑ 30g PM/GJ
- ☑ 150g NOX/GJ

The following graphs show the PM and NOX emissions of RHI biomass boilers according to boiler emission certificates.



PM Emissions of RHI Biomass Boilers

@reassociation



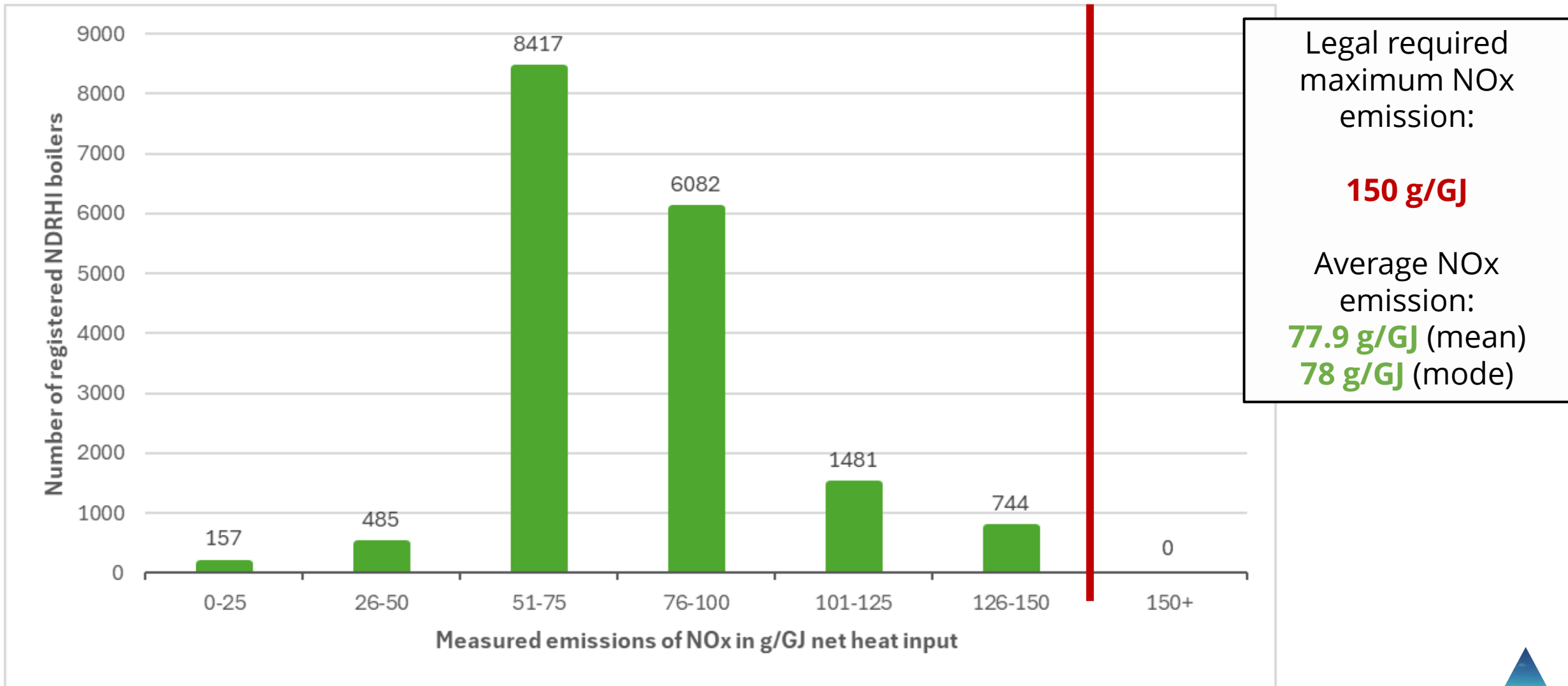
Legal required maximum PM emission:
30 g/GJ
Average PM emission:
14.2 g/GJ (mean)
9.0 g/GJ (mode)

N.B This includes all ND RHI registered biomass boilers aside from those requiring environmental permits



NOx Emissions of RHI Biomass Boilers

@reassociation



N.B This includes all ND RHI registered biomass boilers aside from those requiring environmental permits



- 🔥 As seen in the graphs, the average particulate and nitrous oxide emissions of biomass boilers stands well below the maximum permitted under the RHI scheme.
- 🔥 Emissions from biomass boilers can be reduced even further using modern **Electrostatic Precipitation Technology (ESP)**. This can remove up to 99% of particulates, which means that biomass heat can rival or better gas boilers for PM emissions.
- 🔥 Other innovations are continuing to happen all the time in the sector to reduce emissions further.

Modern biomass boilers are a **sophisticated, well-regulated, low emission** heat source, which can play a valuable role in decarbonising the heat sector.





About the REA

The REA represents a wide variety of organisations, including generators, project developers, fuel and power suppliers, investors, equipment producers and service providers. There are around 500 corporate members of the REA, making it the largest renewable energy trade association in the UK.

The REA has a dedicated member forum focused on a wide range of different renewable and clean technologies. This includes the REA Wood Heat Forum, which represents developers, installers and suppliers of the modern biomass heat industry.

For more information or if you have any questions please get in touch:

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Get in touch

