



A BRIEF GUIDE TO BIOMASS BOILERS

Introduction

The Church of England's General Synod has set new targets for all parts of the church to work to become carbon 'net zero' by 2030, please see the [net zero declaration](#) for further information. This is one of a series of short guidance notes on the technologies which can help the Church move towards net zero carbon.

This guidance was originally written on a pro-bono basis by [Briar Associates](#), on behalf of the Church of England Churches and Cathedrals Division, with input from the Diocesan Environment Energy Group.

A biomass boiler provides heat and hot water and can be connected to existing heating systems. Biomass boilers have been around for many years and can be considered a mature technology. Systems provide an on-site form of renewable energy. They come in a variety of sizes suitable for different thermal loads and are designed to operate using two different types of fuel, wood chip or wood pellet.

They are probably more suited when a property is off the gas grid and electric heating is not viable; providing a decarbonised alternative to buildings that are currently using oil boilers. The wood chips/pellets should be from a sustainable source. Biomass boilers are regulated by the Clean Air Act. Where a local authority has designated a Smoke Control Area, biomass boilers must be approved as an 'exempt appliance' [Air Quality Management Area](#).

Fuel types

Biomass boilers can be fuelled by different organic materials, but the most common fuels are wood chip, wood pellets or logs. Logs are more suited to smaller installations this is more labour intensive but offers a cheaper fuel source. Wood chip is cheaper than wood pellet but is usually for larger systems and requires a larger storage facility than a comparable sized pellet system, for the same amount of energy.

Wood chip and pellet systems allow for automated delivery, even ordering. Both fuels can be stored in storage systems which can be monitored to automate re-ordering.

Storage and delivery systems are an important consideration for a successful biomass installation. Fuel needs to be stored properly. Moisture content of the fuel is crucial and will impact the reliability and efficiency of the system.

The most ecologically sound way to get chips or pellets is by using waste wood product which has not been treated, forest residues are a really good source of this. (The [National Trust](#), for example, source some of their woodchip for their biomass plants from their own woodlands.) Suppliers will provide details on where their product has been sourced.

Fuel should be sourced from a supplier registered with the Biomass Suppliers List (BSL), administered by Ofgem. It demonstrates that the fuel you are using your biomass boilers meets approved sustainability criteria. This is also a requirement if the installation is receiving a Renewable Heat Incentive (RHI) payment. The fuel must come from a supplier who is using authorised fuel as detailed in the following [guidance](#).

When would you consider biomass?

Most biomass systems are installed in off grid scenarios, quite often where heavy fuel oil is currently the only alternative. However there are systems installed where mains gas is available, and the owners have decided that they would rather run a biomass installation.

Biomass systems are best suited to buildings that are regularly occupied and have somebody available to carry out day to day maintenance, for example ash removal, or ensuring the pellet feed system doesn't block. For an intermittently used church, it may be possible to install a system that also heats other buildings like an adjacent church hall or school.

There needs to be sufficient space for the biomass boiler, its fuel store and associated equipment. A biomass system will take up more space than a gas alternative purely because of the requirement to have a quantity of fuel stored on site, so you will need to consider where an installation can be fitted in to an existing building or site.

It is worth noting that the fuel is delivered automatically from the store to the boiler in a closed automatic system, and so both elements need to be located together.

Biomass fuel needs to be delivered to site, much like heavy fuel oil, so there needs to be a suitable road access to the fuel store at all times.

A biomass boiler, whilst burning wood rather than oil or gas, is still burning a fuel and releasing carbon dioxide. It is also still a form of space heating, which can be inefficient compared to heating approaches which localise heating where the people are, such as pew and panel heaters. Before considering biomass, a full options appraisal is recommended. Our [heating guidance](#) can help you with this.

Installations – good and bad

Biomass boilers have been successfully installed in a variety of businesses, schools, shops, churches, hotels and houses, including stately homes and [National Trust properties](#). The key to a successful, efficient system is to have it designed so it is fit for purpose. You should consult experts on the best solution, they will ensure it is sized correctly and suits the use and thermal load of the building. In addition, biomass boilers should be maintained correctly and use the correct fuel which has the right moisture content for that system.



Tatham Fells, Good Shepherd Church: biomass boiler, hopper, and wood pellets

Biomass boilers have suffered an amount of bad press over the last few years. Some installations have failed, and this is due to many reasons but more often than not due to poor design, poor installation and poor maintenance. Biomass systems are often integrated into old existing systems and sometimes this integration is poorly designed and carried out. In addition, these boilers require a different level of maintenance, in some cases, the correct training has not been carried out for existing staff or maintenance engineers are not aware of the correct maintenance regime.

There have also been installations carried out where the quality of the equipment is poor or not fit for purpose, or is incorrectly sized, both of which can lead to poor system performance and even system failure. In addition, [poor quality](#) wood fuel, though this is less common if acquired via a BSL registered supplier. wood fuel with the incorrect moisture content, particularly with a high moisture content will also burn less well and lead to problems in the biomass boilers leading to system failure.

The key to a successful installation is to have a correctly sized quality biomass installation running on properly sourced fuel, and well-maintained. A useful guide on how to plan a biomass installation can be found [here](#).

Permissions

Most installations are likely to require planning permission along with building regulations approval. Faculty permission will also be required. The hopper or fuel store if external can be intrusive, and so thought should be given about whether and how to shield it from view when applying for faculty and planning permission.

What government funding is available?

The [Non-Domestic Renewable Heat Incentive](#) (RHI) a government environmental programme that provides financial incentives to increase the uptake of renewable heat by businesses, the public sector and non-profit organisations. Eligible installations received quarterly payments over 20 years based on the amount of heat generated. **This scheme ended on 31st March 2022**, although in certain circumstances boilers previously registered for the scheme can be relocated and reinstalled at different sites and still receive RHI payments. It was replaced in 2022 by a new Clean Heat Grant, which issues grants of up to £10,000.

Useful case studies

Read about a [biomass system installed at a religious retreat](#). And you can watch this [short BBC programme about the installation](#). You can also read about the [National Trust's biomass programme](#).

Suggested first steps

Ask your DAC if they have a heating advisor you can speak to, to help decide if biomass is appropriate for you. You should complete an options appraisal, considering the different heating options. Read our [full heating guidance online](#), which can help you.

An independent energy audit can be a good place to start, to put a project like this in the context of all the changes you could make. Parish Buying offers energy audits, as do some dioceses.