



A BRIEF GUIDE TO BIOMASS BOILERS

Introduction

This is one of a series of short guidance notes on the technologies which can help the Church move towards net zero carbon. It has been written on a pro-bono basis by [Briar Associates](#), on behalf of the Cathedral and Churches Buildings Division, with input from the Diocesan Environment Officers Energy Group.

What is a biomass boiler?

A biomass boiler provides heat and hot water, like any other boiler, but by burning either wood chips or wood pellets. They 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.

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 cannot be installed if you are in an [Air Quality Management Area](#).

Fuel types

Biomass boilers can be fuelled by wood chips or wood pellets, with wood chip being cheaper than wood pellet but taking more room to store for the same amount of energy.

The most ecologically sound way to get the 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 the chips for their biomass plants from their own woodlands.) Suppliers will provide details on where their product has been sourced.

Fuel should be sourced from an independently verifiable legal and sustainable source as defined in this government [guidance](#). 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](#).

Wood chip is usually used for larger systems and in general requires a larger storage facility.

A pellet system can allow for a more automated delivery and ordering system as they can be stored in silo and tank systems, which can be monitored to automate re-ordering.

The storage and delivery systems are key to a successful biomass installation. Fuel needs to be stored properly – the lower the moisture content, the less fuel is consumed per kW of heat generated.

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 some 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 such as ash removal, and ensuring the pellet feed system doesn't block. You need to think through could can reliably fulfil this role at your church.

For an intermittently used church, it may be possible to install a system that also heats other buildings, for example an adjacent church hall or school.

There needs to be sufficient space for the biomass boiler, its fuel store and associated equipment. A biomass boiler 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 wood 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 forms of heating 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.



Above: 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. Biomass systems are often integrated into old existing systems and sometimes this integration is not carried out correctly. In addition, these boilers require a different type of maintenance and, in some circumstances, the correct training has not been carried out and 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 it is incorrectly sized, both of which can lead to poor system performance and even system failure. In addition poor quality wood fuel or wood fuel 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](#).

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](#).

Permissions

Depending on the size of the installation, it is highly likely that planning permission will be required for a biomass boiler installation, along with building regulations approval. Faculty permission will also be required.

The hopper 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) is due to end on 31st March 2021, although in certain circumstances this can be extended. It is due to be replaced in 2022 by a new Clean Heat Grant, which will be a grant of up to £4,000. The government is currently consulting on this and details are awaited.

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.