CASE STUDY
A BIOMASS BOILER ALMOST HALVES THE ENERGY BILLS OF A VILLAGE CHURCH

N.B. This case study considers only one possible approach, which will not be suitable for every church. Always seek professional advice.

Key Points

- Replacing an oil boiler with sustainable biomass made environmental sense (estimated 11 tonnes carbon emissions saved), as well being a more financially beneficial option in the long term.
- By going for a biomass boiler, the church was able to retain its central heating infrastructure, resulting in considerable savings in embodied carbon.

1 A local biofuel supplier delivers UK-sourced, sustainable wood pellets. They are blown through a 28m-long delivery pipe into a storage hopper.

2 The hopper behind the church holds 4 tonnes of wood pellets, enough for 2-3 months of heating needs. An underground automated auger delivers them to the boiler house.

3 The 22kW biomass boiler fits neatly in the original boiler house. The buffer tank holds 800 litres of water to feed the church's wet central heating system.

The context

The Church of the Epiphany, Austwick is a Grade II-listed building in the diocese of Leeds. The village sits on the western boundary of the Yorkshire Dales National Park and only a few miles from the Forest of Bowland Area of Outstanding Natural Beauty.

The need for change

In 2020, the church's oil-fuelled boiler failed and was condemned. In light of the Net Zero Carbon 2030 agenda, they explored renewable energy and low-carbon options for the replacement.

What were the options?

- Air source heat pumps, powered by solar PV panels on the roof were considered, but turned down because of concerns about the capacity such a system would have for heating the building during the winter.

- In addition, there were concerns about the viability of getting permission to install roof panels within the National Park boundaries.
- The existing radiators and pew heaters were still in good condition, so it was decided to simply replace the boiler, while maintaining the same wet central heating system. By doing this, the church also saved 'embodied carbon' resulting from the manufacturing of a new system.

What was done?

- A 22kW biomass boiler was installed in the existing boiler house.
- A wood-pellet hopper was fitted in replacement of the old oil tank, as well as an automated auger to connect it to the boiler.

How well does it work?

The boiler is turned on and off on demand, and the heating can be controlled with a smartphone app. The heating is turned on for two hours each morning and afternoon during the winter, providing background heat for the church, and making it easier to heat the building for services and events.

The result of the work has been very satisfactory and the church has been made to feel comfortable throughout the year.

How much did it cost?

The church's energy bill has been significantly decreased, despite expanded hours of use of the heating system. In the long run, it is expected that these savings may offset the higher capital expense of the biomass boiler, which totalled £21,097 after VAT was reclaimed from the Listed Places of Worship scheme.

The sale of the old oil tank brought in £335. Grants were then received from the All Churches Trust (£1,500) and Garfield Weston Foundation (£5,000), while the remaining £14,262 was raised by the church itself.

The biomass installation met the eligibility criteria for the UK Renewable Heating Incentive scheme (which is now closed), securing payments on renewable fuels for the next 20 years.

"Be aware that renewable heating solutions will be much more expensive than conventional systems—in our case approximately four times. Do lots of research and be prepared to spend a great deal of time."

Giles Bowring, Churchwarden