CASE STUDY
GRADE I-LISTED CHURCH REDUCES EMISSIONS WITH PV PANELS AND AN AIR SOURCE HEAT PUMP

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

Key Points

- An air source heat pump makes good use of the electricity produced renewably onsite by the church's solar PV panels to provide under-floor heating.
- A hybrid approach works well here; combining the heat pump with a back-up boiler for the coldest days
- With installation of a central heating system at the heart of a re-ordering programme, the church is able to provide a space for a range of community activities.

1 The PV panels on the South Aisle roof are not visible from ground level. The air source heat pump can be spotted behind the church.

2 Community space in the nave is heated by air source heat pump powered under-floor heating. A supplementary oil-fuelled central heating system is a back-up for the coldest days.

3 Thick theatre curtains help to reduce draughts, enabling the nave to be used and heated separately.

The context

St Helena's is a Grade I-listed church in the small village of South Scarle. There is a strong sense of community in the village, which is reflected in the way that the church building is used, and in how this project was approached.

Although services are still held in the building, use for other activities is frequent and the church is managed on a day-to-day basis by the South Scarle Community Committee.

For more information visit the church's website, or see its entry on the Church Heritage Record.

The need for change

St Helena's previously relied on electric under-pew heaters, which worked effectively by heating people, but not empty space.

However, in order to benefit further from a wide range of community activities, a major re-ordering was embarked upon. The work involved the removal of pews, in turn necessitating the introduction of a new heating system.

What were the options?

- As an early adopter of solar energy technology in 2012, the church has benefitted from low electricity bills, with 16 panels sitting on the South Aisle roof.

- With the solar panel installation already in place and with reduced financial returns on excess electricity sales, St Helena's decided to utilise the generated electricity as effectively as possible for heating.
- The re-ordering meant that the electric **pew heaters** could no longer be used.
- With the desire for a flexible space in mind and the building in regular use throughout the week, other direct heaters, such as **radiant panel heaters**, were rejected in favour of a system that could provide 'background' space heating.
- An **air source heat pump** was chosen as a low maintenance heating solution which run on electricity.
- The church is not on the gas grid, so, as a back up for colder winter days, an **oil boiler** was also fitted.

What was done?

- As part of the re-ordering, **under-floor heating** was added in the nave, with an 11kW **air source heat** pump installed to power it.
- This system provides background heating all year round, though use of an **oil boiler** and **radiators** is still required during cold spells.
- **Thick theatre curtains** were also installed in the church to separate the nave and bell tower from the chancel, so that draughts are reduced and the building remains as energy efficient as possible.

How well does it work?

The new installation has been very effective. The church is kept at a constant temperature and the congregation, as well as community groups, are more comfortable.

With the curtains, the nave can now be used as a separate, smaller space, which can be efficiently heated independently.

Despite increased use of the building, carbon emissions are kept low by the use of an electric powered heat pump, with electricity generated renewably from the solar panels.

The hybrid solution is a pragmatic compromise. Although still incurring emissions, it works for the context of this church as the most reasonable solution. The decision avoided higher installation and running costs of a higher-output air source heat pump, which could have operated independently in all weather conditions.

How much did it cost?

The PV panels were installed ten years ago, with the principle costs covered by a variety of grants.

The underfloor heating and air source heat pump were installed as part of the major reordering project, which also included new radiators and an oil boiler.

Overall, this cost more than £120,000. Fortunately the church benefitted from FCC Communities Foundation (WREN) and Biffa Award funding—which is restricted to community projects.

As a result of the community engagement, including hosting activities and events in the building, there is now a shared responsibility for the utility bills, with the church only paying 25%.

"Engage a very good architect and heating advisor that can visualise the dream. Always involve the local community along the way by having updates during the work."

Florence Baldwin, Churchwarden