

CASE STUDY ELECTRIC HEATING SYSTEM



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

Key Points

- Chalgrove, St Mary (Diocese of Oxford) is one of the first in the country to move to fully electric heating based on far-infra-red radiant panel heaters mounted on the nave ceiling, with electric under-pew heaters in the chancel.
- The radiant panels sit unobtrusively within the rafters of this Grade I-listed church. The under-pew heaters in the otherwise unheated chancel ensure that the choir is kept comfortable whilst reducing fluctuations in temperature that might affect the important wall paintings.



1 The brown rectangles on the nave ceiling are electric far-infra-red radiant panel heaters. They warm the church through a combination of radiant and convective heating. The brown powder-coating was chosen to match the ceiling trusses.

2 The radiant panels on the north and south aisle ceilings are powder-coated off-white to match the walls. They are controlled by a separate set of controls to the nave, allowing the areas to be heated separately.

3 New choir stalls in the chancel house electric pew heaters that warm the user from below. The heaters are turned on for half an hour during the service, to keep the choir comfortable.

The context

St Mary's is a Grade I-listed church in a small village in the Diocese of Oxford.

The church has a C12th nave and south aisle, a C13th north aisle, and a C14th chancel that contains an important cycle of medieval wall-paintings: an important factor in the heating choice. The footprint of the church is c.380m². The floor is tiled. There is no gas connection to the national grid.

In a typical week the church is used on Wednesday and Sunday. The church also hosts weddings and funerals and occasional concerts and events.

For more information visit the church's [website](#) or its entry on the [Church Heritage Record](#).

The need for change

The previous heating system had ceased to be viable: it used ceiling chandelier heaters for which lamps could no longer be sourced. The electricians of the church were also faulty. Changes were required to make the building safe and usable.

What were the options?

The church team considered and ruled out several other types of heating:

- Conventional gas heating: this was not viable as there was no gas supply;
- Underfloor heating: this would have been invasive and expensive, requiring the whole of the tiled floor to be lifted and re-laid;
- A ground-source heat pump: this would have disturbed historic burials;
- An air-source heat pump: this raised concerns about noise, where the ducting would go, and where the plant would be housed.

The church team visited an installation of similar panel heaters and was impressed. They explored their options fully with the company that made the panels to ensure that they would work in an historic church.

A test panel was installed in the church for a period so that the church team could confirm that it was the right choice. The team wanted the panels to warm the congregation and not the building fabric, so while the test panel was in place temperatures were regularly monitored in a range of locations around the church.

The DAC, CBC, national amenity societies and Historic England agreed to the project.

The new heating was installed as part of a major, multi-year project that also saw new electric cabling and lighting installed, the wall paintings restored, and extensive paint removal, plastering and decoration.

What was done?

- 16 x 3kW far-infra-red heating panels on the nave ceiling, on metal fixing brackets, powder-coated in brown to match the ceiling trusses.
- 14 x 2kW far-infra-red heating panels on the aisle ceilings, powder-coated in off-white to match the wall plaster.
- 6 x 2kW under-pew electric heaters.
- 3 heating zones: nave, north aisle and south aisle, plus timers for the chancel heaters.

How well does it work?

In theory these panels should warm by radiant heating alone, i.e. warming the surfaces that the radiation from the panels reaches. Radiant heating is very responsive, requiring little warm-up time, and so uses less energy than conventional space heating. **However**, perhaps because they are mounted so high up, the church team finds that it needs to keep the panels on for longer periods: this makes them more like conventional convective heaters, warming the air of the church, and reduces their efficiency.

When the church had recently been replastered the church team found that they had to run the panels for a long time each day to help the plaster to dry. The heating continues to be run for 3-4 hours on the days the church is used, to reduce the feeling of damp.

The panels max out the church's electrical supply and the nave, north and south aisles need to be phased to turn on at ten-minute intervals to avoid a spike in demand.

The chancel heating is very successful: the under-pew heaters keep the choir comfortable without attempting to warm the whole space. This also limits excessive heating and cooling of the medieval wall paintings. The heaters run for 30 minutes during the service and have an automatic cut-off.

How much did it cost?

The heating system cost c.£40k to install, excluding preparatory electrical works. In summer, the electricity costs £6-9 per week, primarily for lighting. In winter, this rises to £150-£180 per week and c.£200 when there is a wedding, funeral or other event.

[This system] is a resounding yes for our needs because we're a village church, used twice a week.
— Project Leader, St Mary's church, Chalgrove