

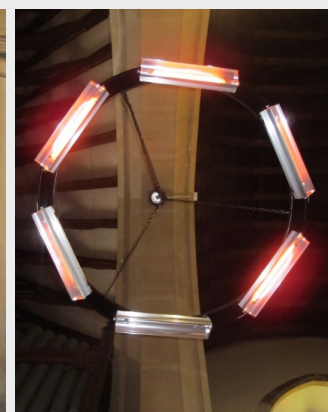
# CASE STUDY CHANDELIER-MOUNTED INFRA-RED ELECTRIC HEATERS



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

## Key Points

- Chandelier-mounted infra-red heaters are a form of electric heating suitable for certain churches.
- Electric heating methods which deliver heat close to the congregation offer advantages to churches, such as this one, which are heated for short periods; less preheating is required.
- The flexibility of the controls allows just those areas which are needed to be heated.
- The combination of these factors reduces overall energy use, lowering the carbon footprint. When combined with 100% 'green' renewable electricity, such a system is 'net zero carbon'.



**1** Church exterior of medieval St Catherine's, Preston-next-Faversham. The church needed an effective heating system suited to its pattern of use, which is around 5 hours per week.

**2** Seven infra-red chandelier heaters were installed, hanging from the midpoints of the arches. They heat people sitting in the pews, rather than the whole space.

**3** Each heater has six emitters, which can be turned on and off in pairs, giving flexibility. When switched on, the elements glow.

## The context

St Catherine's, Preston-next-Faversham is a Grade II\* mediaeval church dating from around 1100, with a chancel dating from the 1280s and Victorian aisles and arches. The church is in light use: in 2019, Sunday services were held at 8 and 9.30am, with another meeting on Tuesdays, giving around 5 hours use per week.

For more information visit the church's entry on the [Church Heritage Record](#) and [A Church Near You](#).

Infra-red chandelier heating such as this in a listed church can be controversial, due to the appearance and the glow. There are often objections on aesthetic grounds. In this case, the faculty proceedings were unopposed, and approval was sought and given.

## The need for change

It was heated by an oil-fired boiler supplying a network of cast-iron radiators. The boiler required replacement. In addition, the 2 inch diameter pipework between radiators was installed above floor level, forming trip hazards at entry to each pew.

Given the usage pattern above, a heating method which could flexibly heat just part of the space for small congregations, rather than space heating the whole volume, was sought.

## What were the options?

**Gas boiler:** Rejected for environmental considerations and because there was no gas supply. Retention of the existing radiator network, fired by any kind of boiler, would not solve the problem of all the pipework being surface-mounted, leaving in place the many trip hazards.

**Heat Pump:** The surrounding churchyard contains burials so is unsuitable for ground source heat pump piping, and the hours of use are too low to justify the expenditure for a GSHP. An Air Source Heat Pump would not be suitable for a building with such low hours of use; ASHPs (when combined with radiators or underfloor heating) operate well when used for long periods at a lower temperature than an oil/gas boiler.

**Underfloor heating:** UFH is generally also suitable for regularly-used buildings, as it has a long heat-up time. This church also has some rare mediaeval floor tiles in the chancel which should not be disturbed. UFH can be very expensive with a starting estimate of £1,000 per m<sup>2</sup> of floor space.

**Electric under-pew heaters:** This option would have been viable but would have required access under the pews to install cabling, making the installation somewhat more complex.

**Electric wall or ceiling mounted radiant panels:** There are few suitable places to mount panels on the lower walls due to windows and memorials. The roof beams are closely spaced precluding installation of panels between the beams. Also, angles are steep resulting in a ceiling height which would reduce the effectiveness of an installation.

**Chandelier heaters:** This option was settled on as both feasible and affordable, and relatively low-carbon.

## What was done?

In 2019, seven infra-red chandelier heaters, each holding six elements of approximately 1kW output each, were installed, suspended from the midpoints of the arches. They are located approximately 3m overhead.

These are short wave infra-red heaters (the kind that glows) rather than far-infra-red heaters (that don't).

[See here.](#) Both types of infra-red heaters are very responsive and, within a short time of turning on, emit a safe radiation which warms surfaces, rather than heating the air.

The plan is to remove the obsolete cast iron radiators and pipework.

## How well does it work?

In late 2021, the system was reported to be working well and the congregation were comfortable.

The six elements in each ring are switchable in pairs (one electrical phase for each) allowing a degree of flexibility and control. St Catherine's use only a third of the elements for midweek services, when attendance is small. For choir practice, they normally use the single unit near where the choir stand. Those elements closest to the west wall are rarely used, as these were found to be too close to the wall and also over a passageway rather than over seating. For main services in winter, all the heaters are used.

Sitting under the centre of a ring, at the focus of six heaters, can be uncomfortably hot. However, all six elements are rarely used at the same time, and people simply move to other pews when necessary.

When on, the elements emit an orange glow. Aesthetically, they are somewhat comparable to lighting chandeliers, although it would be very unusual for lighting chandeliers to be lit by strip-lighting in a church.

## How much did it cost?

Heating installation £35k (£828 per heating element) plus £6k to upgrade to a three phase electricity supply.

Operating costs have reduced, from £1770 for oil in 2018 (plus repairs and maintenance) to £1010 for electricity in 2020.

*"The system is great. It is so nice to be able to take your coat off in church! We use only the heating elements that are necessary, and we've had no complaints about aesthetics."*

Hilary Tulett, Churchwarden