

# CASE STUDY

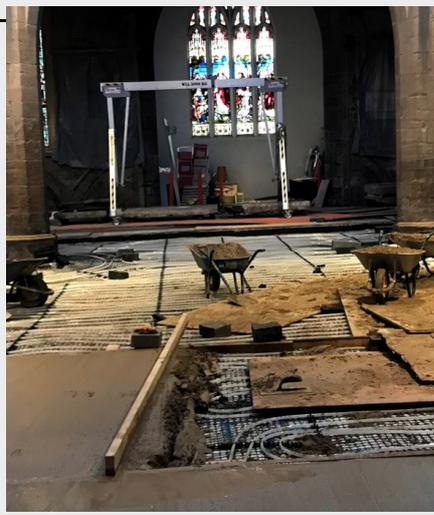
## NEW HEAT PUMPS AND LIGHTING AS PART OF A MAJOR CATHEDRAL REORDERING



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

### Key Points

- For a large, very regularly used building such as Newcastle Cathedral, undertaking a reordering which involved replacing the floor, a heating solution of air-source heat pumps linked to underfloor heating made sense, with efficient gas boilers as a back-up system for the coldest days.
- This heating system, combined with energy efficient LED Lighting, aims to significantly reduce the cathedral's carbon footprint and running costs, whilst creating a warmer welcome.



**1** Air-source heat pumps were fitted on the cathedral's roof, all controlled by the new building management system.

**2** Under-floor heating was installed, with insulated pipes. This system is driven by the air-source heat pumps, with back up efficient gas boilers if needed.

**3** The old lighting system was inadequate. Having now been replaced with LEDs, it is expected that the electricity use will be significantly lower.

### The context

Newcastle Cathedral is a medieval Grade I-listed building in the heart of Newcastle, with a floor plan/extension of approximately 2334m<sup>2</sup>.

The cathedral is open 7 days a week from 8am to 6pm during the week and to 5pm on weekends, with specific regular services and activities on Monday, Wednesday, Saturday and Sunday.

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

### The need for change

The previous heating system in the nave consisted of perimeter radiators which consumed a massive amount of energy without providing a great deal of warmth, as might be expected from old hardware in such a large space. The lighting system was similarly inadequate.

It was apparent that the aged heating and floor were no longer suitable for purpose. There was no level access, and there were a range of other issues. The cathedral decided to embark on a major reordering, aiming to create much better access and a sense of 'radical welcome'.

The [whole cathedral project](#) took over ten years to plan, develop and execute, with heating just one part.

## Watch the case study videos

To find the case study videos for Newcastle Cathedral, [click here](#), or visit [www.churchofengland.org/environment](http://www.churchofengland.org/environment)

## What were the options?

Several types of heating were considered, with affordability being a key consideration in an already high-cost project. The desire to use a green technology with low carbon emissions also played a role in the decision-making process.

As the floor needed replacing anyway, under-floor heating was a good option that would overcome the inefficiencies of perimeter radiators in the large nave. It also comes with the additional benefits of consistent temperature and reduction in condensation.

## What was done?

The whole change project included new flooring; heating; repair to the fabric of the building; new electrical infrastructure; improved security and environmental control; new visitor facilities including an East Entrance, volunteers' centre, toilets and an accessible shower; and re-landscaped grounds which included the transformation of the staff car park into a pleasant space in the heart of the city.

On the heating and lighting specifically:

- Under-floor heating was fitted throughout the nave, while the floor itself was replaced with stone from local quarries. Pipework was insulated to prevent heat loss.
- Air-source heat pumps were fitted on the cathedral's roof, all controlled by the new building management system.
- 4 new boilers were added as a back-up system for use in the winter, should the new heating prove to be insufficient.
- New energy efficient LED lighting was installed throughout.

## How well does it work?

It is still early days for the new system, but the emerging consensus is that the cathedral is now a warmer environment.

The building management system helps to monitor and regulate the temperature inside the building. It can take readings from outside and command heat exchanges to keep a constant temperature inside.

## How much did it cost?

- The cost of the *entire* project was in the region of £6,000,000.
- Much of this came from the National Lottery Heritage Fund, as well as other grants.
- The cathedral anticipates reduced energy bills as a result of the changes, and will be monitoring this carefully.

*“My advice for people who are planning these projects in the future is to actually just go and talk to the users, the people on the ground who are responsible for caring and loving and working with your building, they're the ones who are going to be making this work for you. Just talk to them.”*

Kate Sussams, Chief Operating Officer