

Case study – Replacement Heating

St George's Church, Rugby



What prompted the change?

In 2020 we obtained an energy audit report. Although it didn't match our needs, it began our journey to Net Zero.

We started to look closely at our energy use, taking energy readings before and after services to see just how much gas it took to heat the church. This quickly showed the inefficiency of our heating system and we saw that there were big savings to be made.

What options were considered?

The church is not used every day, and the heat put into the building eventually all ends up heating up the walls and fabric before dissipating to the outside. We identified that we would need a system that would heat us up more quickly. The church had been built with underfloor heating. It had been desperately expensive to run and then stopped working, but it meant that we have a 3 phase electricity supply with 100A fuses allowing up to 70kW of electricity import. To eliminate carbon emissions it was clear that an electrical heating solution was preferred rather than replacing our gas fired system with another gas fired solution.

Initially we explored electric infra-red heating but struggled to find consistent design criteria, and anecdotal experience showed it to be a 'marmite' technology – some love it, some hate it. The risks seemed high.

We thought about air to water heat pumps with new radiators, but the costs would have been high with less efficiency and the system slow to heat up.

Then we discovered air to air heat pumps (similar to air conditioning units). We found that these had the highest efficiency of all heat pump systems, were cheapest, and were the most responsive. If needed, they could be used to cool the church on the hottest summer days.

How did St George's proceed?

We needed to answer the questions of how many kW heat we would need, and whether the units would be too noisy. A member of our congregation did a lot of technical work modelling the behaviour of our church to work out the necessary kW rating that would be required.



We also took advice from the DAC Heating Advisor, and we asked several suppliers to quote. We visited both Desborough Baptist church and Church Lawford church to experience their systems, and we were happy that the noise would not be an issue. But the visits highlighted that we wanted to keep the controls simple so that non-technical people would be able to use them.

We compared four suppliers and selected [Steve Varley Air Conditioning Nationwide Limited](#) as our preferred supplier. We then began the faculty process and were happy to receive approval in early 2023. Unfortunately, it was only at this point that we realised that we also needed planning permission and an acoustic survey.

Nine months and lots of pain later we got our planning permission, and our heat pumps were installed up on the flat roof in February (2024) – just before a cold snap.

Overall, with planning and other costs, six heat pumps have been installed rated at 12kW heat each.

The project cost us £27,000 which was very competitive.



How successful has the new heating been?

First and foremost, the congregation are very happy – lots of positive comments about the temperature and the quietness of the units. You can't hear the roof mounted external units. The internal units are run at full power during the warm up period and then the fans are turned to quiet; this is completely satisfactory. We have taken temperature measurements that show the units are operating as we had predicted.

Comparing our energy consumption over the first month of operation with the same period the previous year we recorded a staggering **85% saving** on the energy consumption of our old gas fired system.



What key lessons would you pass on to other churches who are considering their heating?

Our journey to implementing the preferred solution has been long. We had the interruption from COVID and for much of that time we were in interregnum. We learnt a lot on the way that will make life much easier for those who are following – we are very happy to share details with others.

Our key advice is:

- find a ‘champion’ or a small team who can take the project forward; someone needs to own it.
- Talk to others who have experienced the journey. There is a lot of misinformation around, and it’s easy to get confused. Be willing to ignore advice that seems wrong. Many ‘experts’ don’t understand church heating and only know about fossil-fuel technology. If you are in doubt, ask for the DAC Heating Advisor’s views.
- Measure what your existing heating system does. You can borrow temperature loggers from the Diocesan Office which will give you a starting point in terms of what temperature you need and how much you might save. It may also allow you to make savings with your old heating system whilst working on the project to replace it.



Every journey starts with a first step – take it!

Does the church have any other net zero ideas?

Our heating upgrade is the last step that takes us to net zero. We installed solar panels in 2022, replaced our lights with LED in the same year and made some insulation improvements on our church hall. We currently export more than we import by 2,500kWh per year.

With all these improvements and changing to a renewable electricity tariff with [Octopus](#), we are achieving net zero and producing more renewable energy overall than we use each year!

How can I get more information?

There’s a helpful video from the CofE webinar series explaining the difference between different heat pump types (from about 2 minutes in). <https://www.youtube.com/watch?v=dziURTVfIVY>

If you want to visit the church during service times, then you would receive a warm welcome. If you want to visit at other times, please make prior arrangements. (Contact details available on request.)

Sincere thanks to Phil Hemsley at St George’s Church for making this information available.

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