

HEATING IN CHURCHES – A GUIDANCE NOTE FOR PARISHES

The purpose of this document is to provide parishes with information on installing a new heating system in a church. It discusses how to assess the heating requirements for your church, possible improvements, what systems are available and where to go for help and advice.

Introduction

In an ideal world a church would have a constant low level background heat to help protect its fabric and furnishings. It also needs to provide a comfortable environment for its users, who may require a more flexible heating arrangement, depending on how the building is used. How do you therefore decide what is the best way to heat your church? Like many projects there is no “one size fits all” solution and each building will have its own particular requirements. The final solution will be a balance between several factors such as cost, comfort, use and the architectural and historical significance of your church.

I. Assessing your current and future needs

In order to be able to decide on which heating system is best for your church, you need to think carefully about how you use it. For example, is it only used once or twice a week for services or are there people in it every day of the week? Will your requirements change in the near future if you have other projects in the pipeline, like those that involve increased community use or opening hours as part of a grant award? Do you have different heating requirements in different areas? Or perhaps your current heating system has failed and you need a new one? Whatever the reason, try not to rush into installing a new system which may later prove inappropriate and costly. An initial assessment of how you use your building could help save you time and money in the long term and will better inform any briefs or tender documents that you put together when seeking quotes from suitably qualified heating engineers.

a) How often is your church used?

This will have a major influence on your choice of heating system. If your church is used infrequently (perhaps only once or twice a month) and you do not have a lot of money to spend, then you will only want to heat your church when a service or event is being held. This will keep running costs down and you can choose a system that will heat the building quickly when you need it, but does not necessarily have the lowest carbon emissions. On the other hand, if you have a well used building (maybe every day or several times a week), then not only will you be looking to keep running and installation costs down, but also to minimise carbon emissions.

Will your heating requirements change in the near future? If so, are you anticipating an increase or decrease in building use? It makes sense to try and “future proof” your building wherever possible. This means designing your heating system to be flexible enough to adapt to changes in use without having to go through a major refit or new

installation. Having a system that incorporates things like individual thermostatically controlled radiators and timers, will give you maximum flexibility when heating different areas at different times and with different temperature requirements. Try to think a minimum of 5 to 10 years ahead if possible. If you are installing a new heating system as part of a larger grant assisted project, then the people giving you the money (the Heritage Lottery Fund for example) will usually be expecting your church to have a minimum life of 10 years.

b) Comfort Levels

Ask the people that use your church how comfortable they find the temperature and atmosphere over a range of activities. For example, someone who is cleaning will require a lot less background heat (if any) than a worshipper who is primarily sitting down during the service. Don't forget visitors either. A warm building is more welcoming, even if there is only a little background heat and visitors may be more inclined to stay, especially if the church is well presented with a range of information leaflets or gifts for sale.

Try to find out whether the comfort levels of the users change during the course of the day and the year. For example, if your church is in an open sunny position, it may get a lot of natural heating during the day or throughout the summer months. This may mean that you only require supplementary heating at certain times of the day during spring and autumn and none at all during the summer months. Even if your church is in a sheltered or shady position, you may still be able to take advantage of natural daily temperature changes to reduce the amount of overall heating you use.

c) Are there some areas of the church that are used more than others?

Perhaps you have parish offices in the church? Occupants of offices are generally sedentary and more likely to feel the cold than those moving about. These areas will therefore need more heating than other areas of the church that are less well used. It may well therefore be an idea to think about "zone" heating so that different areas of the church can be heated separately. Taking things a step further, you may even want to consider different heat sources for different areas. For example, pew heating could be used during services to boost individual comfort levels in conjunction with a standard gas boiler and radiator system for wider building heating.

d) Your current heating system

A common complaint about a church's heating system is that worshippers just aren't warm enough during a service. If so, try to find out why. Is the heating on but nobody is feeling it? If so, this could indicate a problem with the system itself (eg. old inefficient boiler, not enough radiators, heat going to the wrong areas, needs servicing, etc) or is something reducing the heat getting to the worshippers (eg. drafty windows and doors, heat going into the roof, etc). Critically review your current heating system to try and find out what isn't working well (or not at all) and what external factors could be affecting it. A good starting point is to look at the comments in your last quinquennial inspection report which should contain a section on your heating system.

2. Is there anything that you can do straightaway to improve things?

A review of your current heating arrangements may reveal that you don't actually need a new heating system, but should just improve the one you've already got. For example, a heating system can become inefficient with age if not regularly serviced and maintained. Simple things like regularly bleeding radiators helps to prevent a build up of air in the system and ensures they emit as much heat as possible. Or seasonally adjusting the boiler

thermostat and hot water tank thermostat settings to save energy (and money). Perhaps only parts of your heating system need replacing (eg. your boiler is in good condition but you need new radiators or vice-versa). Obviously it is less expensive to replace worn or broken parts than to have a completely new system.

If your current heating system is in good working order but the warmth is not reaching people “on the ground”, then it could be disappearing into the roof space. This is a common problem with high-roofed building as hot air rises. A possible solution is to install fans in the roof space to direct the warm air back to ground level. Other simple solutions are blocking drafts coming in through poorly fitting doors by using curtains or draft excluders, making sure window cracks are repaired and providing worshippers with cushions to sit on or even blankets for knees! Also, don’t forget to check any window, wall and floor vents as these may be stuck in the open position.

Also remember that it is just as important to ventilate your building (to prevent a build up of moisture) as it is to heat it. You therefore need to balance these two requirements to achieve a comfortable atmosphere for users and the building itself. A possible solution is to have the vents closed when the building is in use and open when not. Alternately, some kind of “trickle” ventilation could be employed (if your vents have this facility) to achieve the correct balance of internal comfort with a reduction in moisture build up.

3. Heating systems

A heating system has several main parts - the energy source (gas, electric, oil, etc), the means by which the energy is converted into heat (boiler, heat-exchanger, etc) and the heat emitter (radiator, electric fire, etc). You therefore need to think carefully about which of these combinations will work for your particular church and under what conditions. For example, a city centre church may have a gas boiler with individual thermostatically controlled radiators which are set to come on at certain times of the day when the building is being used. A rural church may not have access to a gas supply and will therefore need another energy source such as electricity. Here the heating system may not be used more than once a week, so night storage heaters may be more appropriate. They can be switched on the day/night before a service to give out their heat the following day. Even though an electric heating system is traditionally more expensive to run than a gas one, a church may be able to take advantage of a night-time tariff to charge the storage heaters. This type of system also has the advantage of being relatively inexpensive to install.

The following list is a *brief* overview of the main types of heating systems and their advantages and disadvantages. More in-depth information is available from the organisations listed in the *Resources* section at the end of this guidance note:

Electric

- An electricity supply is available in almost all locations (rural and urban)
- Most often used with night-storage heaters as a heating system
- Gives a quick response if used to power hot air (convector) and radiant heaters
- Can also be used to heat portable oil filled radiators
- Can be the most efficient and cost effective system for small churches that are not in constant use
- Installation costs are low
- Running costs can be high for a medium or large church

- Not usually regarded as a renewable energy source, although some utility companies now use some renewable energies (eg, wind power) to generate a portion of the electricity they sell

Gas

- A natural mains gas supply is usually available in most urban areas
- Most often used with a boiler and radiator system, although some hot air heaters can be powered directly by gas
- Installation costs can be low to medium depending on the size of the system
- Generally less expensive to run than an electrical and oil heating system (although this will depend on usage)
- It is not a renewable energy source

Oil

- Most often used with a boiler and radiator system
- Installation costs can be low to medium depending on the size of the system
- Can be expensive to run especially if used continuously
- Needs to be delivered to site
- A storage tank with protective enclosure (bund) will be needed
- It is not a renewable energy source

Biomass

- Is an extremely efficient energy source
- Can be used in boilers and stoves
- Needs to be delivered to site
- Storage facilities required
- Installation costs are medium to high (this may be reduced with the benefit of grants) but running costs are generally low
- Possibility of a grant through the Renewable Heat Incentive (RHI) Scheme
- Boilers require a hopper feed system which needs regular attention
- Woodburning stoves are a possible option in small rural churches
- It is a renewable energy source

Air source heat pumps

- Absorb heat from the outside air which can be used to provide heating and hot water
- Pump units are usually mounted on an external wall or on the ground
- Perform better with underfloor or warm air heating than radiators
- Buildings need to be well insulated to maximise the efficiency of the system
- Installation and running costs are medium
- Work best when running all the time to provide steady background heat
- Difficult to increase temperatures on demand
- It is a renewable energy source

Ground source heat pumps

- Use pipes buried in the ground to extract heat which is then used to heat radiators, underfloor or warm air heating systems and hot water
- Perform better with underfloor or warm air heating than radiators
- Buildings need to be well insulated to maximise the efficiency of the system
- Require extensive ground preparation (and space unless using bore holes)
- Installation costs are quite high but running costs can be low to medium
- Work best when running all the time so can provide steady background heat
- Difficult to increase temperatures on demand
- It is a renewable energy source

4. Additional energy sources

You may also be able to take advantage of solar energy to reduce your electricity and hot water usage. Photovoltaic (PV) panels generate electricity which can be used to provide lighting. Thermal solar panels provide hot water. Both these systems can be used in conjunction with other heating systems to help reduce your overall energy usage. If you generate more electricity than you use, you may be able to sell it back to the grid which can then offset the cost of any additional heating or electricity you may require.

Solar photovoltaic panels

- Need a sunny roof (eg. south or west facing) for the panels although they can sometimes be used in a ground level array
- Installation costs can be medium to high (cost of panels)
- Running costs are very low
- Only used to generate electricity so you will need an additional energy source for a heating system
- May be able to take advantage of a feed-in-tariff when generating surplus electricity for your needs
- May need planning permission especially if highly visible or on a listed building
- It is a renewable energy source

Solar thermal panels

- Need a sunny roof (eg. south or west facing) to put them on, although they can sometimes be located on a wall
- Installation costs are low
- Running costs are low
- Only used to heat water so you will require an additional energy source in winter for your hot water and heating needs
- May need planning permission especially if highly visible or on a listed building
- It is a renewable energy source

5. Other Considerations

A heating system can damage a historic building if not properly designed. Consider the impact this may have on the historic fabric of your church and its contents and try to reduce this. Write a Statement of Significance or conduct an impact assessment to highlight possible problem areas and what can be done to reduce any potential damage. Both of these documents are useful to include with a faculty application and will show the DAC that you have carefully considered all options.

Rapid heating and cooling of historic buildings can cause problems with the fabric and contents in extreme cases. Try to make sure that any sensitive items are not sited close to any heat sources (eg. radiators) and that any moisture generated by the system itself (and the users of the building) is dissipated to prevent problems with condensation. Good ventilation is key.

Is there any sensitive archaeology that may be affected by a new heating system? This will be particularly important if you are thinking about a ground source heat pump installation as the ground will need to be free from burials and other hidden archaeology (eg. remains of previous buildings, crypts, etc). The siting of things like radiators, storage heaters, water pipes, etc, may also impact on walls, floors, memorials, etc, so it is important to ascertain whether there are any internal archaeological considerations as well.

6. Consultations

Once you have a basic idea of what your heating requirements are and what heating systems are available (see *Resources* section), think about getting some professional advice. As a first step, speak to your DAC Secretary about your proposals. Most DACs have a heating specialist on the panel who may be able to make a site visit to discuss your particular requirements.

Always use a suitably qualified heating specialist/engineer. This is particularly important if you are planning a large project and have an architecturally and historically significant church. Make sure they have worked with historic buildings before (preferably churches) and understand the particular needs of these types of buildings. The *Resources* section has information on the various professional bodies that heating engineers belong to and where you can search for suitably qualified individuals.

If your church is listed or in a Conservation Area and the proposed works will affect the building fabric or character of your church (eg. adding PV panels to a roof), you should also speak to your Local Planning Authority as planning permission may be required in addition to a faculty.

If your project is a small one or you are replacing like-for-like equipment, you may prefer to use someone who has done work for you before or comes with a personal recommendation from another parish. Ask your DAC Secretary if any similar projects have been done in the diocese recently and then speak to or visit those parishes.

Remember that you should always have a contract in place for large projects and obtain a minimum of three quotations for smaller projects.

RESOURCES

The following websites contain useful information on choosing the right heating system, renewable energy sources, energy efficiency and how to find heating professionals.

Church of England (CofE)

The CoE have produced a range of comprehensive guidance notes on planning and implementing a new heating system, renewable energy sources, energy efficiency and environmental sustainability. These can be viewed and/or downloaded from their main website at: www.churchofengland.org.

The Diocese of London (CoE)

The Diocese of London has produced a series of *Knowledge Base articles* on heating in churches and renewable energy sources, These articles can be accessed via the main website at: www.london.anglican.org.

Energy Savings Trust

This organisation gives energy saving advice on a range of subjects including renewable heat and electricity. Go to: www.energysavingtrust.org.uk

Non-domestic Renewable Heat Incentive (RHI)

The non-domestic Renewable Heat Incentive (RHI) helps businesses, public sector and non-profit organisations meet the cost of installing renewable heat technologies. Information can be found at: www.gov.uk.

Eco Church

The Eco Church website has a range of resources to help churches address environmental issues. The website can be found at: www.ecochurch.arocha.org.uk.

Centre for Alternative Technology (CAT)

CAT in Machynlleth is an education and visitor centre demonstrating practical solutions for sustainability. It covers all aspects of green living such as renewable energy, energy efficiency, environmental building, eco-sanitation, woodland management and organic growing. The centre is open throughout the year (check website for dates and times) and the website has many downloadable resources: www.cat.org.uk.

Historic England (HE)

HE has a dedicated section on their website for making changes to places of worship. Although the website gives good sound practical advice, be aware that the legislative process regarding building permissions (fauly and planning) is different in England from Wales in some respects. The main website can be found at: www.historicengland.org.uk.

The Chartered Institution of Building Services Engineers (CIBSE)

CIBSE maintains a register of consultants working in the building services industry. You can search for professionals in the field of heating, lighting, energy, etc, who work with a variety of different types of buildings (such as historic buildings). www.cibse.org.

Chartered Institute of Plumbing and Heating Engineering (CIPHE)

You can search for suitably qualified plumbing and heating engineers on the CIPHE website. www.ciphe.org.uk.

Association of Plumbing and Heating Contractors (AHPC)

APHC is a trade body for the plumbing and heating industry in England and Wales. You can search for approved plumbing and heating installers in your area from their main website: www.ciphe.org.uk.

Gas Engineers

A list of gas engineers who are registered to work safely and legally on boilers, cookers, fires and all other gas appliances, can be found at the Gas Safe Register website. www.gassaferegister.co.uk.

Electricians

All electricians should be suitably qualified and be registered with the NICEIC or ECA.

www.niceic.com

www.eca.co.uk

Biomass and Solid Fuel Heating

HETAS is the official body recognised by the UK Government to approve biomass and solid fuel domestic heating appliances, fuels and services including the registration of competent installers and servicing businesses. www.hetas.co.uk

Tina Andrew
Church Conservation and Support Manager
Church in Wales
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