Heating Options for your building

THE CHURCH OF ENGLAND
DIOCESE OF DURHAM

This guidance has been put together to help you as a church identify the right type of heating for your building. Ideally you should be doing this when your heating is working reasonably well as you then have the time to fully identify the best system for your building(s). However even if you are going through this because your heating system has just failed, it is important that you work through each step to ensure you end up with the system that you need.

Before you start on any heating project it is important to identify the need. This might sound like a little strange as you will probably think that the need is obvious "we want a warm building to use", but quite often the need is not as straight forward as that. In order to consider the heating options that we need for a building we need to consider the 5W's.

- **Who?** – Who are the people that will use your building? Is it just the congregation on a Sunday morning or do other people use the building?
- **What?** – What are the activities that will be undertaken in the building e.g. worship, toddler group, keep fit, office work?
- **When?** – When is the building used and for how long?
- **Where?** – Where needs to be heated in the building at certain times?
- **Which?** – Which types of heating are going to work best for different parts of the building?

Once you know your heating needs you are in a much better position to start thinking about the type of heating that you need. We will go through the different types later in this guidance but the below are the steps that you should go through. Developing an effective heating system is going to take some time so you should start the process at least 6 months (preferably longer) before you want the system to be installed and be prepared that contractors can usually be booked up for many months in advance.

1. Gather a small project team together from the PCC and wider congregation. This is too big a task for one person to manage effectively. A group of 3-5 is probably about the right size. An odd number always helps with decisions.
2. Contact the DAC Secretary who will be able to share any up-to-date advice and help you with your faculty application when you get to that stage.
3. Contact a reputable heating consultant. Unless the project team have sufficient technical knowledge to be able to manage this themselves.
    - A heating consultant will be able to assess the building, your needs and produce a detailed options appraisal. They will do the same role your church architect will do but focused on heating. Your church architect may be able to recommend one or contact the DAC Secretary.
    - Get an Energy Audit. The most basic energy audits can cost around £500. In the process a relevant specialist will audit the building and make recommendations as the most appropriate heating systems available.
    - Avoid using heating companies and contractors at this stage. They rarely give impartial advice as they will want to sell you, their products. If you do go direct to contractors make sure you get quotes from enough so that you can compare the full range of options.

4. Consider all the options

    - Take time to consider all the heating options available. Don't be tempted to automatically rule things out because of preconceived ideas around cost and practicalities.
    - Think about the building itself. Can it be improved / changed to make it easier to heat, such as adding insulation? Do you need to do complete smaller tasks to ensure that it is water-tight and draughtproof?
    - Would installing solar panels and/or battery storage make the longer term running costs lower?

5. Appraise each option. You can seek advise from a heating consultant to do this with you.

    - How well does each system fit your needs, now, and in the future.
    - Can the system adapt to changing uses?
    - Is the option physically feasible?
    - Can the building and services physically accommodate the system. For example, if you don't have pews then under-pew heaters aren't feasible. Do you have wall paintings or memorials that restrict fixings?
    - Is one option more efficient than the current one?
    - Do the options reduce the carbon footprint of the church?
    - How easy can the option be maintained?
    - How much will it cost? This should encompass not only initial installation but the cost over the lifetime of the system. You may find that more efficient systems will pay themselves off in savings. Consider costs over 5 and 10 years.

6. Seek DAC informal Advice. It is always better to obtain the thoughts of the DAC once you know roughly which direction you are heading. It can save you a lot of time later if the DAC understand your plans and are able to provide feedback before you begin producing all of the faculty documents. A separate guidance document gives you details of how to apply for a heating faculty.

7. Develop your proposal. Obtain detailed quotes for your chosen system. Liaise with your church architect to ensure that what is planned will work for your building in terms of location of heating units, cable runs, etc. At this stage it is useful to contact your insurer to discuss any requirements that they might have for particular heating systems, to ensure that you remain fully covered.

8. This is the point at which you will want to consider funding for your project. Do you have a heating fund and will it be big enough for your project? Are you going to run a fund-raising event, gift day, etc.? Do you need to apply for grants? (Separate guidance is available on this as it is important to understand which grants might be suitable and the application process for each of them)

9. Produce a heating proposal and submit for faculty approval.

10. Installation of your heating system. This must not happen until you have received the faculty from the Chancellor and you have all the funding in place. Most grant providers will not provide funding for a project that has already been started.

Seek professional advice!

Whilst a competent project team can do a lot of the work it is important that you do seek professional advice. Your architect and a heating consultant will have done similar projects before and be aware of some of the potential issues. They will also have Professional Indemnity insurance if the advice they give is incorrect!

The next few pages will give you an overview of the different types of heating systems that are available.

Choosing the types of heating which are suitable.

There are basically two heating principles and you will need to decide which of those will work for the various parts of your buildings.

Heating spaces or Heating people

Heating Spaces

This is the model of heating that we have used for over a century in most buildings of our buildings. We create a lot of heat in one part of the building (a boiler) and try to move that heat to all other parts of the building (pipes & radiators). This principle worked really well when we had access to low cost (or even free) fuel which in many Durham churches was coal. As we moved towards oil and gas the costs were still relatively low in comparison to our costs today. This model may work in some situations but most of the time we end up wasting the majority of the heat that we put into the building and it doesn't actually end up making the users warm.

Church buildings have a large thermal mass and once you get them warm, they will output heat into the space really well, however the issue is actually getting them warm which takes a very long time. If you are able to get a church warm then you will need a much lower amount of energy to maintain that temperature. However, most parishes do not have the resources to maintain heat in a building all of the time and use a model of heating the air in our buildings for a short period of time and then leaving the building to go cold.

Therefore, if you are going to use most of the space most of the time then a space heating system is the best for you. However how many of us actually fall into this category?

Heating People

This is a model of heating that allows us to be most efficient with our heating and as a result use less energy which saves money and produces less carbon. The idea is that we focus the heating where the people are so that they feel comfortable and don't waste energy. Some people heating systems will heat the space eventually but the focus of the heat sources is on the people rather than the spaces.

Damp!

One thing that is often misunderstood is the relationship between heating and damp in buildings. Damp problems are a result of high relative humidity and changes in the levels of humidity. To avoid damp you need to ensure that water is not getting into the building through roof and walls; and maintain a consistent level of humidity.

Warmer air can contain more water vapour and therefore heating the building for a short period allows moisture in the fabric to pass into the air. When the heating goes off this damp air touches the cold fabric of the building and condenses causing damp on the surfaces. It could therefore be argued that the heating model we use in most of our churches actually encourages damp rather than preventing it.

The important thing is to maintain a consistent humidity level and this is much easier to do if the temperature remains the same all of the time. Hence for conservation purposes it is usually suggested that a constant temperature is maintained throughout the year. Therefore, an unheated building should not have huge problems with damp unless there are large changes in the humidity as a result of external changes. We also need to remember that our older church buildings were unheated for the majority of their existence.

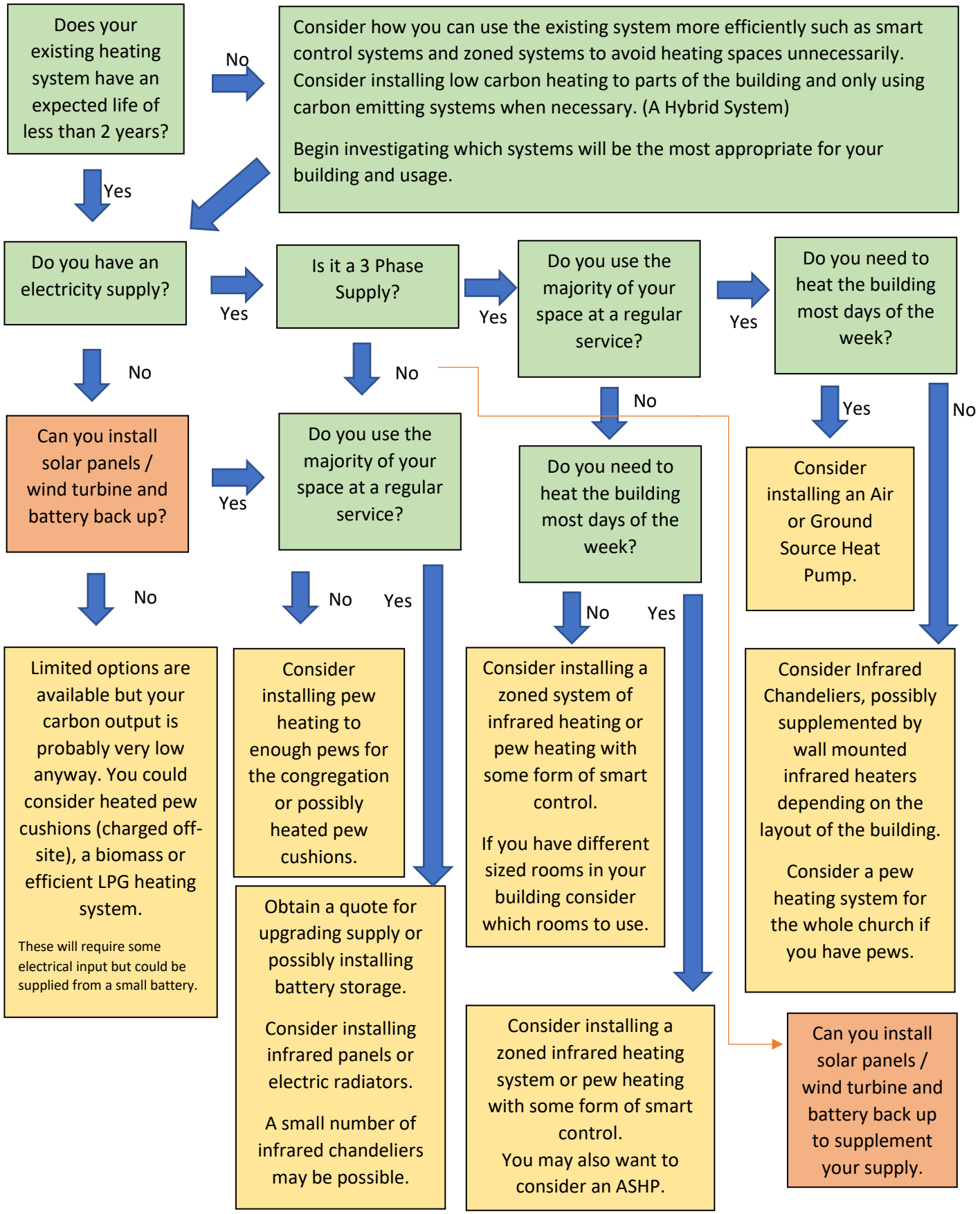
The Diocese of St Albans has carried out some research into damp in their church buildings, the findings can be found at What actually causes damp in our churches - The Diocese of St Albans .

How much heat do you need?

The mistake that is often made is that people assume that the size of the boiler matches the heat requirements of the building. This is rarely the case as boilers are often oversized. Originally most heating contractors just used their experience and considered a boiler in a similar building as being about right and then increasing it a bit "just to be safe". Over the years boilers have often been replaced with a slightly larger one, "just to be safe!" Therefore, it is important that your heating engineer actually calculates the heating requirements of the building so that the system can be designed to meet that actual heating need.

Heating replacement flow chart

The purpose of this is help you identify the type of low carbon heating systems that may be suitable for your church. Please note that this is a simplified processed and decisions will be different for every church.



Traditional Gas Heating Systems

Whilst we would not encourage a church to consider only a gas heating system, if you have a gas heating system that is working well and the building is only heated for short periods, then it may not make sense to replace the boiler immediately. However, it is important that you have a plan in place for the occasion when the boiler fails and a simple repair is not possible.

One way to manage the transition to another system is to look at developing a hybrid system as a way of phasing in a new lower carbon system.

For example, imagine that you have a church building that has a seating capacity of 150 but the regular congregation is perhaps only 30 people and perhaps you only actually get 12 people at the mid-week communion service. It would seem that it would make much more sense just to heat part of the building for those services and retain the gas heating system for use when you have funerals, school services and at festival services. How you choose to heat the people will depend on the situation in your particular church and you can explore other options later in this guidance document.

Another example might be a church which has a relatively large congregation which requires the full heating of the Nave, but during the week only the vestry and an area at the rear of the nave are used for prayer meetings and a toddler group. Rather than heating the whole building every time, it makes more sense just to heat the parts of the building being used. If the spaces are self-contained you may be able to zone the existing system so that it only heats the parts of the building being used. Alternatively, it might be more efficient to install an electrical based heating system to those areas.

In both of the examples above the supplementary heating systems could provide back up if the heating failed and can be added to over time in various phases to ultimately provide a low carbon system for the whole building.

Heating controls – if neither of the above examples are relevant to your church one simple change that can make a difference is improving the heating controls so that the heating is not on full when it doesn't need to be. This could be installing something as simple as a 7 day timer so that different time periods can be set each day or perhaps installing a programmable thermostat so that different temperatures can be set for different times of the day and different activities. For example, if you have a church hall that is used by lots of different groups, you probably don't need the same temperature during the keep fit class as you do during a baby and toddler group.

If you have an internet connection to the building the installation of a Smart Thermostat is a really good investment as it learns how you building heats up and therefore only puts the heating on at the time needed for the building to be at the right temperature for a service or meeting. Another advantage is that they can be controlled remotely so that you can check the temperature in the building and adjust the heating schedule without having to visit the building. Most smart thermostats also link to weather forecasts to allow them to take account of cold or warm external temperatures and adjust the heating accordingly.

Another way to get the best out of a heating system is to get your heating engineer to check that the flow and return temperatures are set correctly and they may suggest a variable speed pump which allows greater control over the flow rates around the building.

With any water-based heating system it is important that the temperature of the hot water is maintained until it gets to where it is needed, therefore it is important that heating pipes and valves in the boiler house and under the floor are insulated to avoid the heat being lost to spaces that you do not need to heat.

If you were to decide that a gas heating system was the best system for you building it is important that you have actually understood the advantages and disadvantages of different systems as well as the actual costs of each type so that you can clearly justify why this is the only viable option for your building. For example, a pew heating system for a full church may be a similar cost to a new gas boiler and provide more flexible heating.

Heat Pumps

There are a number of different types heat pumps available and they all work using the same principles which is basically drawing heat from an external source and using a small amount of electrical energy to create a larger amount of heat. They in effect do the reverse of a fridge.

Air, water and ground source heat pumps all work in a similar way and generally output heat via a water-based system connected to emitters. Air to air source heat pumps work in a slightly different way in which they output warm air into a space.

We will look at the different types in more detail over the next few pages but some key points are listed below.

- Heat pumps are ideal when you want to maintain a minimum temperature inside the building, this may be because the building is in use most of the time or due to the sensitive nature of the building fabric a constant temperature is required to maintain humidity levels.
- Heat pumps work at a lower temperature than a traditional gas or oil system and therefore the heat emitters (radiators) that you have may not be able to output sufficient heat at this lower temperature. You can test out the suitability of your current system by reducing the boiler temperature to about 50^{o} C and seeing if they are able to output sufficient heat into the space. If they don't give out sufficient heat then you know that you would need to upgrade your heating system.
- Some newer heat pumps are able to output water at temperatures at similar temperatures to boilers and could therefore be used as a straight swap for a oil or gas boiler. However, the efficiency of these higher temperature heat pumps tends to be significantly less than a normal heat pump.
- As heat pumps output at a similar temperature as most underfloor heating systems require, they are a good way of heating using this system.
- To be able to design an effective heat-pump based system it is good to understand how the building heats up and cools down. You can obtain simple data loggers that you can leave in parts of the building and will allow you to monitor temperatures over a longer period of time. This will help a heating engineer design the most efficient system. It is always good to engage a heating consultant quite a long time before you actually need the new system so that they have time to fully understand the heating needs of the building.
- The government is currently offering grants to support the replacement of a gas/oil boiler with a heat pump, however these grants are limited to heat pump capacities of 45KW which is unlikely to be sufficient for most churches, however may be appropriate for some church halls or meeting rooms which have a separate heating system.

Ground Source Heat Pumps

Ground source heat pumps (GSHPs) use the natural warmth stored in the ground to provide efficient heating and hot water. They are one of the most eco-friendly alternatives to traditional boilers.

What is a Ground Source Heat Pump?

- A **GSHP** extracts heat from the ground using buried pipes filled with a fluid (usually water mixed with antifreeze).
- The pump compresses this low-grade heat into a higher temperature, which can then be used for **central heating, underfloor heating, and hot water**.

How Do They Work?

- **Horizontal loop system**: Pipes are laid in trenches about 1–2 meters deep. Best if you have a large area that can be excavated
- **Vertical borehole system**: Pipes are installed in deep boreholes (up to 100m). Ideal for smaller plots with limited space, but unlikely to be suitable for churches with burials in their churchyards.
- The ground maintains a fairly stable temperature year-round, making GSHPs reliable even in winter.

Benefits

- **High efficiency**: GSHPs can deliver 3–4 units of heat for every 1 unit of electricity used.
- **Low carbon**: Cuts reliance on fossil fuels and reduces emissions.
- **Stable performance**: Ground temperature is more consistent than air, so efficiency doesn't drop in cold weather.
- **Long lifespan**: Underground pipework can last 50+ years, while the pump unit itself lasts around 20–25 years.

Considerations

- **Installation cost**: Likely to be over £100k in total depending on system type and the existing heating system.
- **Space requirements**: Horizontal systems need significant land area; vertical boreholes require drilling.
- **Disruption**: Installation involves excavation or drilling, which can be invasive.
- **Permissions**: May require planning consent depending on location and property type.

Is It Right for You?

- Best suited for **churches or halls with outdoor space** or land available for trenches/boreholes.
- Works well with **underfloor heating or low-temperature radiators**.
- Ideal for buildings planning long-term investment in sustainable heating.

Internal heat pump unit that draws heat from ground

Pipes being laid in a trench

Please click here for a case study

Air Source Heat Pumps

Air source heat pumps (ASHPs) are energy-efficient systems that extract heat from the outside air—even in cold weather—to warm your home and provide hot water. They're a low-carbon alternative to traditional boilers.

What Is an Air Source Heat Pump?

- An **ASHP** uses a refrigeration cycle (like a fridge in reverse) to absorb heat from the air and transfer it indoors.
- It runs on electricity but delivers **3–4 times more heat energy** than it consumes, making it highly efficient and therefore potentially cheaper than a gas based system.

How Do They Work?

- The **outdoor unit** draws in air and extracts heat using a refrigerant.
- This heat is compressed and transferred to your **indoor heating system**—radiators, underfloor heating, or a hot water tank.
- Works even when outside temperatures drop to **-15°C**, though efficiency may reduce slightly.

Benefits

- **Lower carbon footprint**: Switching from a gas boiler will reduce emissions significantly especially if you are on a green electricity tariff or generate some of your own electricity from Solar PV.
- **Energy savings**: Can cut heating bills, especially if replacing electric or oil systems.
- **Easy installation**: No need for groundworks—just an outdoor unit and indoor connections.

Considerations

- **Upfront cost**: This depends on the size of the system and the need to replace parts of the heating system.
- **Efficiency depends on insulation**: Best suited for well-insulated buildings but can be used in any building.
- **Radiator upgrades**: May need larger radiators or underfloor heating to work optimally.
- **Noise**: Outdoor unit produces a low hum and therefor the placement of this needs to be considered.

Example of units outside a church

It may be necessary to add acoustic screening if the unit is likely to be located close to neighbouring properties.

Please click here for a case study

Air to Air Source Heat Pump

Air-to-air heat pumps are efficient systems that heat your building in winter and cool it in summer by transferring heat between indoor and outdoor air. They're ideal for buildings without radiators or underfloor heating.

What Is an Air-to-Air Heat Pump?

- An **air-to-air heat pump (ASHP A2A)** extracts heat from the outside air and delivers it directly into your building as warm air.
- In summer, it can reverse the process to act as an **air conditioner**, however most churches would not need this option and this would obviously increase your energy costs and carbon output.

How Do They Work?

- The **outdoor unit** absorbs heat from the air using refrigerant coils.
- This heat is compressed and sent to **indoor air units** (like wall-mounted blowers), which release warm air into rooms.
- In cooling mode, the system reverses to remove heat from indoors and expel it outside.

Benefits

- **Dual function**: Provides both heating and cooling if this is needed.
- **Lower running costs**: More efficient than electric heaters or portable air conditioners.
- **Quick installation**: No need for radiators or plumbing—just indoor air units and an outdoor fan.

Considerations

- **No hot water**: Unlike air-to-water systems, it doesn't heat water for toilets and kitchens.
- **Upfront cost**: Typically **£3,000–£30,000+**, depending on system size and number of indoor units.
- **Best for open-plan spaces**: Works well in spaces where warm air can circulate freely. However, as with any air-based system a tall building will take a long time to warm all of the air effectively.
- **May need a backup heating source in very cold weather.**

Outside unit can be screened by planting

Example of internal blower unit

Please click here for a case study

Water Source Heat Pumps

Water source heat pumps (WSHPs) use heat energy from rivers, lakes, or groundwater to provide efficient heating and cooling for buildings. They are highly sustainable, but require access to a suitable water source. Therefore, it is unlikely to be suitable for most churches.

What is a Water Source Heat Pump?

- A **water source heat pump** extracts heat from natural water sources (like rivers, lakes, or aquifers) and transfers it into your home for heating and hot water.
- Even when water is cold, it contains usable heat energy that can be captured and upgraded by the pump.

How Do They Work?

- **Closed loop system**: Pipes filled with antifreeze solution are submerged in a water source. Heat is absorbed and transferred to the pump.
- **Open loop system**: Water is drawn directly from the source, passed through the pump to extract heat, and then returned.
- Both systems use electricity to power a compressor, but they deliver more heat energy than the electricity consumed, making them efficient.

Benefits

- **Energy efficiency**: Can reduce heating bills compared to traditional boilers.
- **Low carbon**: Cuts greenhouse gas emissions, supporting sustainability goals.
- **Reliable**: Water temperatures are more stable than air, so performance is consistent year-round.
- **Versatile**: Can provide both heating and cooling depending on system design.

Considerations

- **Location**: You need access to a suitable water source (lake, river, well, or aquifer).
- **Installation cost**: This will vary considerably but is likely to be in excess of £100k
- **Permissions**: May require environmental or local authority approval for water use.
- **Space**: Requires pipework or pumping infrastructure, which may not suit all properties.

Case Studies

Examples of case studies are given at the end of each section, however lots more are available on the Church of England website.

Net Zero Carbon and Environmental case studies | The Church of England

We currently have a number of churches in the diocese who will shortly be installing low carbon heating systems and once they are in place and have been used for a period of time we will be producing local case studies at churches that you will also easily be able to visit.

As these are produced they will be added to the Diocesan Website.

If your church has positive (and negative) experiences of different systems please let us know so that this information can be shared.

Pew Heating

Pew heating is a specialised system designed to warm church congregations directly at the pews, making large, cold spaces more comfortable and energy-efficient. It works by discreetly installing heaters under or within pews, providing gentle radiant heat to occupants without wasting energy heating the entire building.

What is Pew Heating?

- **Definition:** A heating solution for churches and chapels that warms people directly at their seats rather than the surrounding air.
- **Purpose:** Keeps congregations comfortable during services while reducing energy costs.
- **Design:** Heaters are installed under pews or integrated into pew seating, often invisible to the eye.

Types of Pew Heating

- **Under-Pew Heaters:**
  - Mounted beneath pews, usually electric radiant panels.
  - Heat occupants directly, not the air.
- **Integrated Heated Seats:**
  - Systems built into pew cushions or seating surfaces.
  - Provide localized warmth when someone sits down.
- **Radiant Panels:**
  - Infrared panels fitted under pews.
  - Efficient for large, draughty spaces.

Benefits

- **Energy Efficiency:** Only heats occupied areas, avoiding the high cost of warming vast church interiors.
- **Quick Warm-Up:** Systems can be switched on just 10–15 minutes before a service.
- **Silent Operation:** No disruptive noise during worship.
- **Discreet Design:** Black finish or hidden installation makes them visually unobtrusive.
- **Eco-Friendly:** Lower carbon footprint compared to traditional gas or oil heating.
- **Low Cost:** Each unit is low in cost and it is possible to just install heaters to a small area of pews initially and then to expand the system as need / finances allow.

Considerations

- **Installation:**
  - Fixed to pew backs or seats.
  - Some models use brackets or feet if no rear support is available.
- **Control:**
  - Simple timer switches or thermostats.
  - Can be zoned to heat only specific pews.
- **Capacity:**
  - Typically designed for small to medium congregations.
  - Works best in historic or large churches where central heating is inefficient.

Please click here for a case study

Infrared Heating

Infrared heating in churches provides direct warmth to people, furniture, and building fabric rather than just the air. This makes it highly efficient for large, draughty, historic spaces where traditional heating struggles, while also helping preserve architecture and reduce energy costs.

What is Infrared Heating?

- **Definition:** A system that emits infrared radiation, warming people and objects directly.
- **Difference from Traditional Heating:** Instead of heating the air (which quickly escapes in large, cold buildings), infrared warms surfaces and occupants, creating lasting comfort.

Why Churches Benefit

- **Large, Draughty Spaces:** High ceilings and poor insulation make air-based heating inefficient.
- **Historic Preservation:** No bulky radiators or ductwork; discreet panels protect heritage interiors.
- **Energy Efficiency:** Up to 72% of church energy use is heating; infrared reduces waste.
- **Moisture Control:** Helps prevent condensation, protecting artwork, wood, and stone.
- **Carbon Reduction:** Electric infrared can run on renewable tariffs, lowering emissions.

Types of Infrared Systems

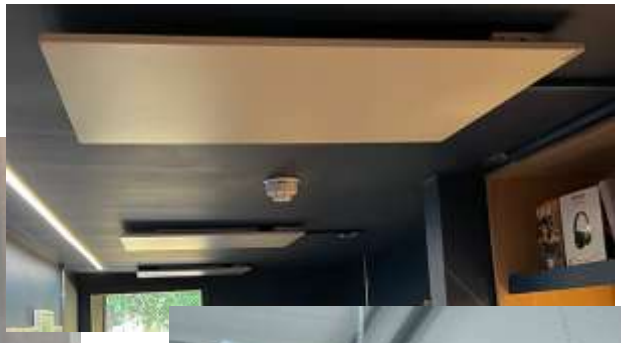
- **Far Infrared Panels:** Mounted on walls or ceilings, invisible and silent.
- **Halo Infrared Chandeliers:** Designed for heritage interiors, blending with architecture.
- **Warm Glow Heaters:** Provide gentle radiant warmth with minimal glare.
- **Outdoor Infrared Units:** Weatherproof heaters for porches or carol services.

Benefits

- **Quick Warm-Up:** Effective within minutes, ideal for intermittent use (services, concerts).
- **Silent & Discreet:** No fan noise, no visible disruption to interiors.
- **Low Maintenance:** Long lifespan, minimal servicing compared to boilers.
- **Flexible Installation:** Can be zoned to heat only occupied areas.

Considerations

- **Insurance:** Switching from gas/oil to infrared may affect cover; consult your provider.
- **Controls:** Timers and thermostats allow precise scheduling.
- **Cost:** Lower running costs than gas/oil, but initial installation varies by system size.
- **Renewables:** Works well alongside solar PV or green electricity tariffs.



Please click here for an infrared panel case study.

Please click here for an infrared chandelier case study.

Biomass Boilers

Biomass boilers in churches use wood pellets or chips instead of gas or oil to provide heating. They are a renewable, lower-carbon option but require significant space, upfront investment, and a reliable fuel supply.

What is a Biomass Boiler?

- **Definition:** A central heating system that burns natural materials (usually wood pellets or chips) to produce heat for radiators, underfloor heating, or hot water.
- **Renewable Aspect:** Biomass is considered *low carbon* because the carbon released during burning was absorbed while the trees grew. However, it is not zero-carbon like solar or wind.

Why Consider Biomass in Churches?

- **Lower Carbon Footprint:** Compared to oil or gas, biomass reduces emissions if fuel is sourced sustainably.
- **Alignment with Net Zero Goals:** Many dioceses encourage renewable heating options to meet the Church of England's 2030 net zero target.
- **Fuel Flexibility:** Can use pellets, chips, or logs depending on supply and boiler type.
- **Potential Grants:** Schemes like the UK Boiler Upgrade Scheme may support installation costs.

Benefits

- **Eco-Friendly:** Supports sustainable woodland management and reduces reliance on fossil fuels.
- **Stable Fuel Costs:** Wood pellets and chips can be cheaper and less volatile than oil or gas.
- **Scalable:** Suitable for large spaces like churches where high heat demand exists.

Considerations

- **Space Requirements:** Biomass boilers and fuel storage need significant room—often more than traditional boilers.
- **Capital Costs:** Installation is expensive compared to conventional systems.
- **Fuel Supply:** Requires consistent, local, and sustainable sourcing of pellets or chips.
- **Maintenance:** Regular cleaning and ash removal are necessary.
- **Regulation:** Planning permission and faculty approval may be required for historic buildings.

Example of a biomass boiler

Click here for a Biomass case study

Electric Boilers

Electric boilers in churches provide heating and hot water using electricity instead of gas or oil. They are compact, quiet, but running costs depend heavily on electricity tariffs.

What is an Electric Boiler?

- **Definition:** A unit that heats water using electric heating elements rather than burning fuel.
- **Use in Churches:** Supplies hot water for radiators, underfloor heating, or direct hot water taps.
- **Alternative to Gas/Oil:** Ideal where gas supply is unavailable or undesirable.

Why Consider Electric Boilers?

- **Carbon Neutral Potential:** When paired with renewable electricity tariffs, they can be a low-carbon solution.
- **Compact Design:** Smaller footprint than biomass or oil boilers, useful in space-restricted vestries.
- **Quiet Operation:** No combustion noise, suitable for worship settings.
- **Ease of Installation:** No flues or fuel tanks required, reducing disruption in historic buildings.

Key Benefits

- **Quick Replacement:** Can potentially replace a gas or oil boiler on a like for like basis.
- **Low Maintenance:** Few moving parts, no fuel deliveries, and minimal servicing.
- **Safety:** No combustion gases, reducing risk of leaks or fumes.

Practical Considerations

- **Running Costs:** Electricity is often more expensive per kWh than gas; tariffs matter.
- **Power Supply:** Requires sufficient electrical capacity; older churches may need upgrades.
- **Heating Demand:** Best suited for smaller churches or those with intermittent use.
- **Controls:** Timers and zoning can help reduce costs by heating only occupied areas.

Please note that there are other types of electrical heating such as electric convector heaters, ceramic panel heaters and modern storage heaters. Some of these may be particularly suitable for smaller spaces within the church building that require heating separately.

Electrical Supply, Solar PV & Battery Storage

For most of these installations you will find that your electrical load is likely to increase significantly and, in many situations, this will be above the current capacity of your supply.

To increase your supply, you could increase the supply capacity into the building, install solar panels or install battery storage. You will need to speak with your heating engineer/ consultant who will be able to advise on the best route.

If you have a 60amp single phase supply this could take a load of approximately 14KW, whereas an 80amp 3 phase supply could supply a load of approximately 57KW. (Always get capacity check by a professional)

If you do increase your electrical supply please check with your supplier if the Standing Charge will increase as larger capacity supplies can carry very high standing charges.

Summary

1. Key principles for planning heating for churches

- **Protect the fabric:** Rapid temperature swings and very high temperatures can damage historic materials. A steady background temperature and controlled boosts are usually best.
- **Zoning:** Heat people, not empty space — use separate zones for nave, chancel, side rooms, and vestry.
- **Ventilation & moisture control:** Heating must be balanced with ventilation to avoid condensation and damp.
- **Compatibility with heritage features:** Cable & pipe runs, floor/fabric intervention must be carefully planned.

2. Controls, zoning & operation

- Fit programmable thermostats and time controls to avoid heating empty spaces.
- Use thermostatic radiator valves (TRVs) where radiators are used and consider wireless zone controls for flexibility.
- Consider a low background temperature for fabric and scheduled boosts prior to services.

3. Insulation & draught-proofing (first steps)

- Simple measures (draught-proofing doors, insulating the roof/loft, heavy curtains for doorways) often deliver the best cost-to-benefit.
- Improving the fabric reduces system size and operating costs; always investigate 'quick wins' before replacing major plant.

4. Maintenance checklist (annual or seasonal)

- Service boilers annually by a Gas Safe / competent engineer.
- Flush and balance wet systems every 5–10 years (or as recommended).
- Check and maintain controls, valves, and any external plant (heat pump condensers, flues).
- Ensure all electrical systems are tested every 5 years.
- Keep records of maintenance.

5. Decision checklist for parishes

1. Do a usage and occupancy audit (When is the building used, which parts and by how many people?).
2. Investigate insulation, draught-proofing and low-cost measures first.
3. Commission a fabric and heating feasibility or survey from a building-services engineer with heritage experience.
4. Get your heating engineer / consultant to calculate the heat loss of the building so that you know how much heat is required to heat the building.
5. Consider split solutions: low-level radiant for people + low background heat for fabric.
6. Evaluate whole-life cost (capital + running costs + carbon) and funding options.

6. Funding & where to get help

- Local church trusts, national heritage bodies and some government schemes may offer grants for some types of work as well as grants that may be available from the Church or England. Please click here
- Specialist consultants and contractors experienced with historic places of worship are recommended.

7. Further resources

Advice on heating and energy efficiency for historic places of worship can be found on the Church of England website. https://www.churchofengland.org/resources/churchcare/advice-and-guidance-church-buildings/heating

- Further general guidance can be found on the diocesan website.
  Church Buildings Resources - Diocese of Durham
- For further advice please contact The Buildings for Mission Secretary or Diocesan Environmental Officer.

Permissions and Regulations

Many adaptions to the church heating system will most likely require faculty permission. This includes the like-for-like replacement of a fossil fuel boiler.

With every faculty application the DAC will need to see that the PCC has followed the guidance laid out in the Church Buildings Council Guidance, as briefly detailed above. Most importantly this includes demonstrating the Churches' needs and that all the options have been considered. The preferred format for demonstrating this is found in the CBC guidance and is linked above. Simply stating 'all options have been explored' will not be accepted and does not show due regard.

With the climate crisis and the Church of England target of reaching carbon net-zero by 2030, applicants should, by default, explore reducing their carbon emissions. The DAC will expect this to be taken into consideration in the application paperwork. This does not mean that every fossil fuel heating system will not be recommended by the DAC, each case is taken on its own merits. The emphasis is on the need and the best option to meet that need.

A separate document is available that explains the process for seeking faculty permission for a new heating system.

Conclusion

As far as the diocese is concerned our focus is on helping parishes to develop plans to reach net zero, that can be instigated at the relevant time. What we want to avoid is churches who have not having considered options for heating and then finding themselves in a panic when the heating fails on a Sunday in January!
For many churches now is the time to consider the options and gather information, so that they are in a better position to make a decision when they need to.

Moving forward we need to following the following steps:

1) Look at ways in which you can reduce the amount of heat leaving the building through draught proofing; insulating the roof and walls where possible; insulating pipes in boiler houses, under floors, etc. when possible.
2) Consider which parts of the building need heating at different times of the week. Can you add more effective heating systems to part of your building and create a hybrid system? This potentially is a way of moving to sustainable heating system in a manageable and phased way.
3) Develop a plan for heating all of the church buildings/rooms that can be implemented when needed. If this plan is in place, then should the heating fail, you will simply need to update quotes and submit your faculty.

One final thing to consider is that generally carbon output is linked to energy use and that energy use comes at a significant cost. If we can reduce our energy use, it saves us money and ultimately reduces carbon at the same time.

Finally

If your heating does fail and you have not got your plans fully developed, then you may want to consider a temporary heating solution to give you time to get your plans in place. Information on this can be found at https://www.churchofengland.org/media/30314

1. Heating principles - https://www.churchofengland.org/media/23486
2. Heating perspectives - https://www.churchofengland.org/media/23286
3. Heating approaches - https://www.churchofengland.org/media/25067
4. Heating checklist - https://www.churchofengland.org/media/24282
5. Heating pitfalls - https://www.churchofengland.org/media/24282
6. Options appraisals - https://www.churchofengland.org/media/24963
7. Heating Permissions - https://www.churchofengland.org/media/29262
8. Temporary Heating Solutions - https://www.churchofengland.org/media/30314