

ENERGY: ECONOMIC, ENVIRONMENTAL & EFFICIENCY IMPROVEMENTS





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CATHEDRAL AND CHURCH BUILDINGS DIVISION
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Foreword

Fifth Mark of Mission

**To strive to safeguard the integrity of
creation and sustain and renew the life of the
earth**

This short guidance note aims to give church decision makers useful ideas about some relatively easy steps which will cut their use of electricity and gas, and their utility bills.

Heating and lighting are the biggest elements of most churches' 'carbon footprint' so cutting energy use helps us care for creation. Think Energy for Mission! Through financial savings it can also provide funds for further environmental mission or other areas of ministry.

With the global and national transition away from fossil fuel use and onto renewable electricity and heating systems these steps can also help to "future proof" church buildings.

www.churchofengland.org/environment

This note has been prepared by the Energy Working Group of Diocesan Environmental Officers.

1



REDUCING BILLS

- The following simple changes may save your church money and cut your carbon footprint, without costing money.

VAT

- Most churches should be paying VAT at just 5%, and NO Climate Change Levy (CCL).
- The exceptions will be churches who hire their premises out commercially.
- Check that you are not overpaying! Rebates may be obtained to cover the last three years if you have overpaid.
- [HMRC Page](#)¹
- Downloadable [VAT guidance](#)²

Group Buying/Green Tariff

- Energy Contracts: rising prices for electricity and gas are expected.
- Switching to 'green' electricity and gas can help to future proof you against price rises. And it is missional!
- Buying your electricity together with other churches allows a lower price to be negotiated than for an individual contract.
- The Church of England's preferred procurement service, [Parish Buying](#)³, offers an energy basket (100% green electricity and 20% green gas).
- In addition, some Dioceses have their own group buying schemes; e.g. Leeds. Savings of between 5-10% are expected. One suburban church reported a 30% fall in heating expenditure.

Monitoring Bills

- Read the meters regularly (e.g. monthly). The PCC should review utility expenditure annually and consider carbon emissions, efficiency, suppliers and tariff.

User Behaviour

- Are lights switched off when users leave the room?
- Are there clear notices for groups hiring church premises?
- Are thermostats tamper proof?

Floodlights

- If you have them, are they on a timer?
- Could they be on for less hours?
- Are they LED?

2



'SOFT' CHANGES

- Without making big changes to your heating system, you can still have a real impact with simple 'soft' alterations such as the use of cushions, draught- exclusion, and lagging, and better control of heater timings.
- 'Soft' changes reduce expenditure and energy use while increasing comfort levels.
- The 'felt' temperature experienced by human body is equally dependent on the temperatures of the air, and of the surrounding surfaces.

Fabric

- Cushions on wooden pews will increase comfort levels, and you can use banners or wall hangings to cover cold sections of wall and pillars (but check for mould growth if they're against outside walls). Both are examples of insulating surfaces placed between people (who radiate heat) and cold surfaces (walls, floors), which are good acceptors of radiant heat. They are opportunities to take a literally creative approach to insulation!

Radiators and Pipes

- Water filled 'radiators' need to radiate and create convection - so they need to emit heat freely without any form of cover and without immediately adjacent furniture. Fan assisted radiators/heaters have a case which covers the mechanism for safety, and to direct the airflow; they heat by convection. Pipe lagging is a quick win. [Dusting radiators](#) ⁴ will increase their efficiency.

Doorways

- Do your welcome team shut the doors when it is cold?
- If draughts are a problem, could you install a screen? Whilst a permanent screen would require a faculty, a (temporary) mobile poster board could deflect draughts from hitting the back pews in churches when the porch is near the pews and can be moved around to find the optimum location.
- Or could curtains be hung on the inside of a porch? (They will also muffle the noise of latecomers if you have a noisy door!) Draught proofing is a quick win - [click here for advice](#) ⁵.

Optimising Heating Systems

- Optimise your heating system to reduce wastage and cut costs. As a rule of thumb, temperature monitoring in over 50 churches in Lichfield diocese showed the heating should be turned off 30 - 45 minutes before the end of the service. The radiators will still be warm! Continuing to heat until the last person has left will waste money. Making small reductions in the overall heating times will lead to cumulative savings.
- However, you might still not consider it warm enough! Perhaps the heating needs to be turned *on* earlier too. Optimising will involve monitoring the temperature in your church. This can be done by purchasing an inexpensive temperature datalogger, recording how long it takes the temperature to rise and then fall after the heating system is switched off. Then you can adjust so that it is 'warm enough' when required. If you fit a remotely controlled thermostat, you will be able to make adjustments even more easily.

3



'HARD' CHANGES TO HEATING AND LIGHTING SYSTEMS

- Below, we raise some useful questions and general pointers about energy-efficient heating and lighting systems. This short guide cannot cover everything to do with heating, and you should refer to the online guidance on [heating](#)⁶ and [lighting](#)⁷. Every church needs to be taken on a case-by-case basis and will need specific advice, especially if you have historic interiors.

LED Light Bulbs

- LED light bulbs should be bought in bulk and fitted. They are around double the efficiency of low energy CFL bulbs, LEDs are 5 to 6 times more efficient than tungsten bulbs. A study of over 20 churches in London in 2016/17 showed that changing to LED lighting is the most cost-effective way of reducing church energy expenditure and carbon emissions in terms of pounds spent. With a likely lifetime of over ten years, those hard to reach, high up luminaires (fittings requiring ladder access and perhaps contractors) will require effort and expenditure less frequently. Contractors costs vary widely, depending on how much is being changed, (bulbs only / bulbs and luminaires / bulbs, luminaires, rewiring / these plus installing multiple switch banks for efficiency) and access charges. Remember to check that the colour is right for your building. If replacing a lighting system fit 'manual on/automatic off' sensor switches.

Heating

a) Know your heating system

- How old is your boiler? Modern boilers can achieve significantly improved efficiency if used correctly. The efficiency of boilers is likely to deteriorate with age. Does your boiler have the capacity for the number of radiators that are fitted? If you have a temperature monitor (see above), you can use it again now to help you understand your boiler performance. It may show that the set temperature is never obtained.

- As well as monitoring the temperature in the church, the monitor can be placed on the flow and return central heating pipes. On the flow side, a very long pipe heat-up time could indicate a poorly functioning boiler, or one, which is sized too small for the system. If the return temperature is close to the flow temperature, it is too high, so the radiators are not effectively giving heat to the surroundings. This will result in a slow church heat up time. Collecting data will help an engineer to diagnose the problems.
- If your system is inefficient and ineffective get some specialist advice from a heating engineer before commissioning any changes (ask your DAC for names; they may have an advisor or a list of consultants). It's also worth looking at the [ChurchCare heating guidance](#)⁶.

b) Heating the people and not the building

- Is hot air rising to the roof the best way of heating your congregation? Could you install more targeted heat sources? Sometimes electric individually controlled under pew heaters work well for smaller services.
- Is underfloor heating a possibility? This solution is better for more frequently used buildings and needs to be balanced against heritage impact. A heated mat can be a cheaper localised alternative. Some Victorian churches retain pipework in floor trenches that can be re-used.
- Background heating which keeps the church at a low constant temperature, with extra heating for services (possibly electric) is an option. This temperature can be up to 12°C depending on building characteristics and how often your church is used during the week and for what sort of activities.
- Look at the [ChurchCare guidance](#)⁸.

c) Future proof your heating

- Do you have a replacement policy for when your heating system fails? Rather than replacing like for like and continuing to rely on fossil fuels for many decades, obtain Renewable Energy advice now. Don't wait for a crisis in your climate!
- Recent data showing the acceleration of climate change shows that heating must move away from gas to meet the UK's net zero target of CO₂ emissions by 2050. From 2025 all new homes in the UK will be built with renewable/electric heating, not gas or oil. The Church of England has also committed to reducing its carbon footprint by 2050. Will your church make the transition to an electric future when you next consider replacing the boiler?

d) What are the renewable/electric heating options?

- **Electric radiators**
- **Under pew electric heaters**, as discussed above.
- **Radiant IR** electric heaters emit radiant infrared heat. There are several types, the crudest being the traditional glowing bar suspended from above. Modern far infrared flat panels emit invisible radiation—heat only. They can be disguised as artwork, or printed with a photograph of the wall they are on so they merge into the background. Although electricity is currently around four times more expensive than gas per kWh, the length of time radiant IR heaters need to be on for is much less, plus capital costs are lower and electrical equipment often has a lifetime greater than many boilers.
- **Air Source Heat Pumps** take heat from the air and concentrate it, transferring it into water that circulates in your heating system. The system is driven with an electric pump.

- **Ground Source Heat Pumps**, which take heat from the ground, concentrate it and transfer it into water that circulates in your radiator system. A large area with shallow trenches, a small area with deep boreholes, or the water from an underground aquifer or nearby lake can be used to gather the heat. More cost effective for high occupancy buildings.
[NB Heat pumps deliver water at a lower temperature than conventional boilers and are most effective in highly insulated buildings and/or if the heat is delivered at a low level or close to occupants]
- **Biomass Boiler**, efficient modern systems burning wood chip or pellets may be appropriate for high occupancy churches with staff to maintain them, but are unsuited to urban environments due to nitrous oxide emission. Seek expert advice as to which heating system would be most suitable for your church building and the requirements for the mission and ministry of your congregation.

e) Zoning

- If installing a new boiler or other new heating system, can it be zoned so that only the parts of the building required for each event are heated?



4

ADVICE

Conservation and Humidity Control

- If your church suffers from condensation or damp, or has historic interiors including paintings, wall paintings, fragile woodwork such as a rood screen, or a historic pipe organ, you will need humidity control advice. Rapid heating (more than 2°C per hour) can cause damage to materials that are sensitive to changes in humidity. The [Churchcare](#)⁹ website gives multiple categories of advice .

Eco Church

- [Eco Church](#)¹⁰ is an award programme rewarding your church for environmental actions. The website has an easy to use survey, comprehensive ideas, advice and links on how to improve, which can be accessed without registering for the scheme. It is a proven way to help churches engage with multiple issues including buildings, lifestyle, churchyards and wildlife and community. It is designed to make it easy to obtain a bronze award!

Evangelism!

Could your church start a community energy project and engage with those who don't have enough capital or property for their own solar panels? You can offer your church building as a partner for local groups through the PowerPaired programme or become a Co-Operative. Be inspired by the [St John's Sunshine Project](#)¹¹ or [Powered Up North London's work with St Anne's Highgate](#)¹².

Further Information

- Please refer to the online guidance on [heating](#)⁶ and [lighting](#)⁷.
- Many dioceses have environment officers. They can advise you on green projects to reduce your environmental impact and put you in touch with other churches that have similar experiences. Find your Diocesan Environmental Officer [here](#)¹³.
- Dioceses also have Heating Advisors as members of the DAC – they should be contacted before any changes to a heating system are contemplated
- Some dioceses have energy audit schemes, ask your DAC or Diocesan Environment Officer, and look on Parish Buying [here](#)¹⁴.

HYPERLINKS

1. <https://www.gov.uk/vat-charities/what-qualifies-for-relief>
2. [http://www.churcheslegislation.org.uk/files/publications/VAT_Guide - November 2012.pdf](http://www.churcheslegislation.org.uk/files/publications/VAT_Guide_-_November_2012.pdf)
3. <https://www.parishbuying.org.uk/>
4. <https://www.bestheating.com/info/how-to-clean-a-radiator-2/>
5. <https://historicengland.org.uk/images-books/publications/eehb-draught-proofing-windows-doors>
6. <https://www.churchofengland.org/more/church-resources/churchcare/advice-and-guidance-church-buildings/heating>
7. <https://www.churchofengland.org/more/church-resources/churchcare/advice-and-guidance-church-buildings/lighting>
8. https://www.churchofengland.org/sites/default/files/2018-12/CCB_Under-floor-heating.pdf
9. <https://www.churchofengland.org/more/church-resources/churchcare/advice-and-guidance-church-buildings>
10. <https://ecochurch.arocha.org.uk/>
11. <http://www.stjohnssunshine.org.uk/>
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13. <https://www.churchofengland.org/more/policy-and-thinking/our-views/environment-and-climate-change/deo-map>
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