ESOS-ENERGY
Energy efficient solutions

Energy Efficiency and Zero Carbon Advice

St Mary's Church
2buy2 Church of England Audits

Author	Reviewer	Date	Version
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Contents

1. Executive Summary

An energy survey of St Mary's Church was undertaken by ESOS Energy to provide advice to the church on how it can be more energy efficient and provide a sustainable and comfortable environment to support its continued use. This audit has been provided in conjunction with 2buy2, the Church of England's Parish Buying scheme provider and is subsidised from Total Gas & Power, the Parish Buying schemes principal energy suppliers.

St Mary's Church is a moderate sized, unlisted Victorian church which has been reordered in the past and is now a clear open space that is used daily by the neighbouring school as well as other lettings and church services and events. There is a weekly youth club in the under croft space. There is both gas and electricity supplied to the site and the church is heated by a large blown hot area direct fired gas heater with destratification fans to the ceiling.

The church has a number of ways in which it can be more energy efficient. Our key recommendations have been summarised in the table below and are described in more detail later in this report. It is recommended that this table and the route to net zero carbon are used as the action plan for the church in implementing these recommendations over the coming years.

Energy saving recommendation	Estimated Annual Energy Saving (kWh)	Estimated Annual Cost Saving (£)	Estimated capital cost (£)	Payback (years)	Permission needed	CO2 saving (tonnes of CO2e/year)
Add draught strips to external doors	2,790	£279	£450	1.61	Consult DAC	0.50
Add secondary glazing to selected windows	13,952	£1,395	£4,200	3.01	Faculty	2.51
Change existing lighting for LED fittings	3,600	£1,080	£3,540	3.28	Consult DAC	0.76
Fit 270mm of insulation into the roof space	13,952	£1,395	£6,000	4.30	Consult DAC	2.51
Install a Solar PV array to roof of building	16,619	£4,986	£32,374	6.49	Faculty	3.51
Install an Air-to-Air Source Heat Pump to replace boost heating system	67,716	£2,902	£36,000	12.40	Faculty	11.59
Install PIR motion sensors on selected lighting circuits	19	£6	£78	13.62	List B	0.00
Install a Ground Source Heat Pump to replace background Heating	16,324	£544	£31,000	56.97	Faculty	2.77

The church should check any faculty requirements with the DAC Secretary at the Diocese before commencing any works.

Based on current contracted prices of 30p/kWh and 10p/kWh for electricity and mains gas respectively.

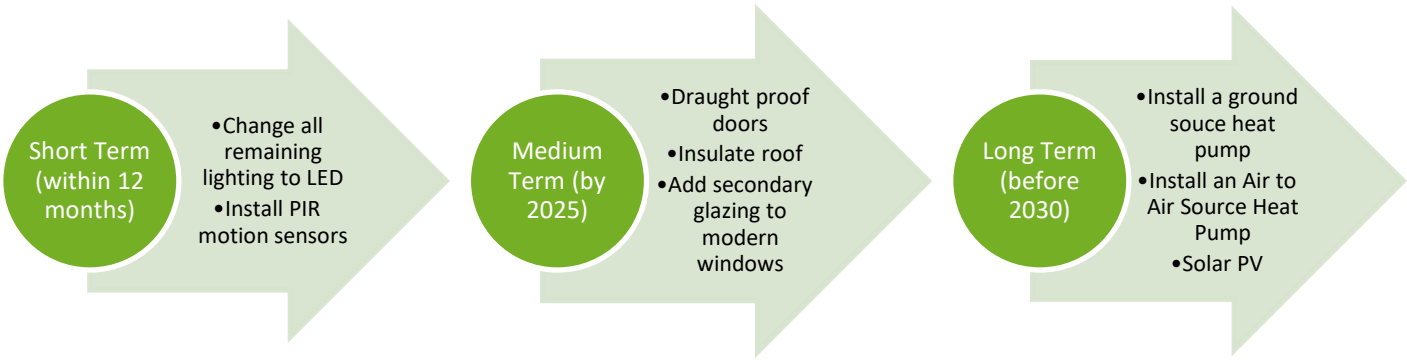
If all measures were implemented this would save the church £12,500 per year and reduce its carbon footprint by 10 tonnes (90%).

2. The Route to Net Zero Carbon

Our government has committed to move towards Net Zero Carbon – the point at which we have reduced emissions as much as we can and then balanced any residual emissions through removal of carbon from the atmosphere. They have done this as part of a worldwide agreement which aims to limit global warming to well under 2 degrees Celsius, with an aim of keeping it below 1.5 degrees Celsius. This will help protect all of us from the impacts of climate change.

In February 2020, the Church of England's General Synod set its own Net Zero Carbon target. The first stage of this target covers energy used by churches, cathedrals, schools, vicarages, other church buildings, as well as emissions caused by reimbursed transport. The target date is 2030.

This church has a clear route to become net zero by 2030 by undertaking the following steps:



3. Introduction

This report is provided to the PCC of St Mary's Church to give them advice and guidance as to how the church can be improved to be more energy efficient. In doing so the church will also become more cost effective to run and seek to improve the levels of comfort. Where future church development and reordering plans are known, the recommendations in this report have been aligned with them.

An energy survey of the St Mary's Church, Bolton Road, Hawkshaw, BL8 4JN, was completed on the 30th of November 2022 by Matt Fulford. Matt is a highly experienced energy auditor with over 15 years' experience in sustainability and energy matters in the built environment. He is a chartered surveyor with RICS and a CIBSE Low Carbon Energy Assessor. He is a Member of the DAC in the Diocese of Gloucester and advises hundreds of churches on energy matters.

St Mary's Church	
Church Code	624213
Gross Internal Floor Area	485 m^2
Listed Status	Unlisted

The church typically used for 24 hours per week for the following activities

Type of Use	Hours Per Week (Typical)	Average Number of Attendees
Services	4 hours per week	20
Meetings and Church Groups	5 hours per week	
Community Use	15 hour per week	

There is additional usage over and above these times for festivals, weddings, funerals, and the like.

4. Energy Procurement Review

Energy bills for gas and electricity have been supplied by St Mary's Church and have been reviewed against the current market rates for energy.

The current electricity rates are:

Day Rate	14.82p/kWh
Night Rate	12.57p/kWh
Standing Charge	26p/day

These costs are significantly below the current market costs which are now supported at a rate of around 32p/kWh.

The current gas rates are:

Single / Blended Rate	3.08p/kWh
Standing Charge	102p/day

A review has also been carried out of the taxation and other levies which are being applied to the bills. These are:

VAT	5%	The correct VAT rate is being applied.
CCL	Not charged except one invoice.	The correct CCL rate is being applied.

The above review confirmed that the correct taxation and levy rates are being charged except one gas invoice from October 2021. If this has not yet been corrected the gas supplier should be notified of the status of the church.

The above review has highlighted that VAT and CCL are being charged. The church is a charity and therefore can claim VAT exemption status. As such the PCC should send the supplier at VAT declaration confirming this and check all supplies on other sites. VAT declarations are available from the suppliers' websites and can usually be found by typing the supplier's name followed by "VAT Declaration Certificate" into most website search engines.

5. Energy Usage Details

St Mary's Church uses 4,900 kWh/year of electricity, costing in the region of £1,474 per year, and 139,500 kWh/year of gas, costing £13,952. The total carbon emissions associated with this energy use are 26 CO_2e tonnes/year.

This data has been taken from the annual energy invoices provided by the suppliers of the site. St Mary's Church has one main electricity meter, serial number A06M07390. There is one gas meter serving the site.

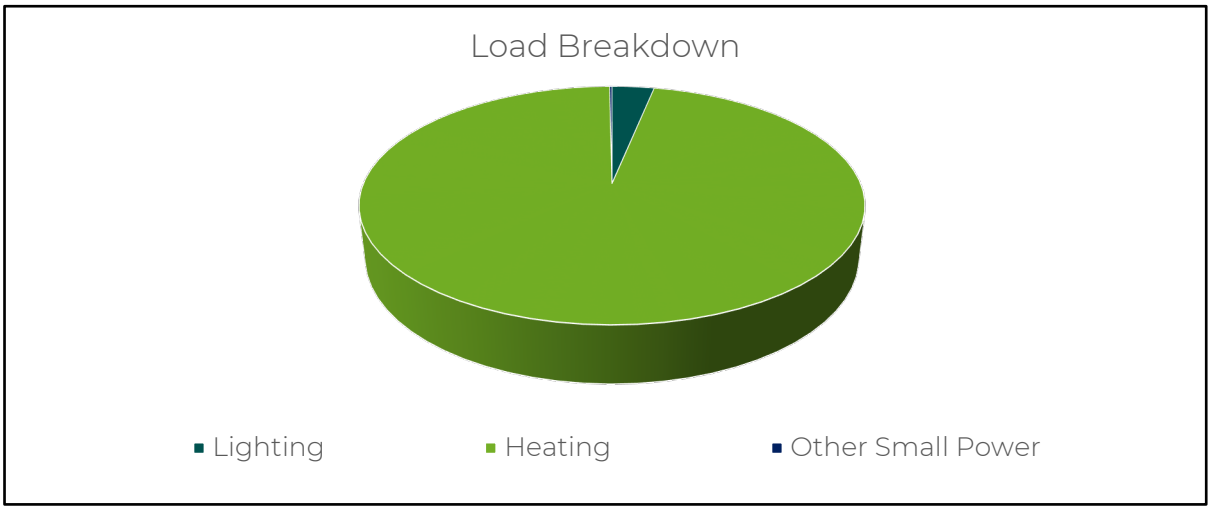
Utility	Meter Serial	Type	Pulsed output	Location
Electricity	A06M07390	3 phase 100A	Yes	Cellar

The meter is AMR connected and as such energy profile for the entire energy usage should be possible. Half hour meter data has been provided for the purpose of this report and this has been used to verify the data.

5.1 Energy Profiling

The main energy consuming plant can be summarised as follows:

Service	Estimated Proportion of Usage
Lighting	3.2%
Heating	96.6%
Other Small Power	0.2%



As can been seen from this data, the heating makes up by far the largest proportion of the energy usage on site.

5.2 Energy Benchmarking

In comparison to national benchmarks for church energy use St Mary's Church uses 49% less electricity and 92% more heating energy than would be expected for a church of this size.

	Size (m^2 GIA)	Annual Energy Usage (kWh)	Actual kWh/m^2	Benchmark kWh/m^2	Variance from Benchmark
St Mary's Church (elec)	485	4,913	10.13	20.00	-49%
St Mary's Church (gas)	485	139,524	287.68	150.00	92%
TOTAL	**485**	**144,437**	**297.81**	**170.00**	**75%**

6. Efficient / Low Carbon Heating Strategy

The energy used for heating a church typically makes up around 80% to 90% of the overall energy consumption. Putting in place a heating strategy that is energy efficient and low carbon is, therefore, of the highest priority

The Church of England is in the process of reviewing its heating guidelines. The process has already established some principles for heating that can help churches as they seek an acceptable combination of comfort, conservation, affordability, and environmental care. The principles can be found at https://www.churchofengland.org/sites/default/files/2020-04/CBC%20Heating%20guidance%20principles%20FINAL%20issued.pdf

As the principles make clear, every church's strategy will be unique to it, informed by many factors, including the nature of its usage, the system it's starting from, the conservation needs of the building, and the resources available. The strategies in this audit are designed specifically for your church.

Our recommendations on heating generally fall within three major areas. Firstly, for all churches we make recommendations that will help to reduce energy wastage and, as a starting point, to optimise the system that you already have

Secondly, we recommend options for many churches that focus on heating people rather than the full volume of the church. Some of the changes that can help with this will be 'soft' changes – others will relate to the heating system itself.

Finally, we make recommendations about moving away from fossil fuels. Moves away from fossil fuels are key to cutting emissions. For most churches, this will involve moving from gas, oil or LPG to electricity. Electricity currently creates carbon emissions around the same level as mains gas, but the carbon emissions associated with it are reducing rapidly as the UK builds more renewable energy and decommissions its remaining oil and coal fired power stations. Mains gas does have some potential to reduce its carbon content through the use of bio gas and hydrogen but these are less developed solutions and will be unable to deliver 'zero carbon mains gas'. Some local areas may also be considering the option of district heating networks.

While moving away from fossil fuels may not always be possible, as the principles state, "churches should be expected to have at least carefully considered the option of moving away from fossil-fuel based heating (gas and oil boilers) towards electric-based heating." And if such options are not viable now, the churches "can try to be ready for a future retro-fit when technology and the grid has progressed."

The current blown gas heater provides the church with a large amount of hot air which rises to the ceiling and then uses the destratification fans to blow this back down. This creates very larger temperature fluctuations which is less than ideal for the organ and the comfort levels are not high. It is initially recommended that insulation be added to the flat section at the top of ceiling so that the temperature of the air being blown back down is increased.

The current heating system is at the end of its life. To provide improved comfort and a more stable heating system it is recommended that consideration is given to installing an under floor heating system. This could be installed to the exposed floor joists from the cellar below. Insulation can then be added below so that the insulation benefits both the church floor above

and the cellar youth club below. This underfloor heating system could be heated from a ground source heat pump (or air to water source heat pump) located to the rear of the church in the open un-buried, church field space. This is likely to provide a good level of background heating to the church but is likely to prove to be insufficient to boost the internal temperature of the building for events. To further reduce the heat loss, as well as adding insulation to the ceiling and to the floor, the doors should be draught proofed, and consideration given to the installation of secondary glazing to the side nave windows. An air to air source heat pump could then be installed to provide the boost to the further heat the space. PV panels could be considered to be installed to the rear (south facing) roof of this unlisted church.

The various options for a decarbonised heating solution have been reviewed in the table below.

Decarbonized Heating Viability	Feasibility	Notes:
Air to Water Source Heat Pump	Yes	Would be viable but ground source would be more efficient
Air to Air Source Heat Pump	Yes	To provide boost
Water Source Heat Pump	No	No water source locally
Ground Source Heat Pump	Yes	Ground available outside, underfloor to nave floor, accessible from cellar
Under Pew Electric Heating Panels	No	No fixed pews
Electric Panel Heaters (to provide supplemental heating only)	Yes	To kitchen / WC areas
Over door air heater (to provide a warm welcome at the door)	Yes	To main entrance door
Overhead Infra-Red Heaters	No	Visual intrusion to the church would do harm, least preferred heating source due to comfort
Heated chair cushions	No	Other solutions preferred

The recommendation is therefore that the church consider installing a ground source heat pump, and air-to-air source hear pump, and electric panels. As described below.

6.1 Install Electric Panel Heaters

Electric panel heaters can provide additional heating to areas where there are no pews. Suitable electric panel heaters would be far-infrared panels. These heaters have a strong radiative effect (where heat is reflected to people from the surface) as well as a light convective effect (where air is warmed and moves around to heat the general space). For this reason, these heaters tend to provide a relatively instant sense of heat and comfort within a specific space and only need to be on for short periods of time. The heating effect spreads out from the panel by up to 3 meters, although this is reduced by people and furniture. This means that these heaters provide a useful source of supplementary heating or primary heating for some well-defined areas but are not very well suited to providing a complete heating solution for a church without other forms of heating (such as under pew). As these heaters warm up almost instantly, this reduces the amount of preheating required before each use of the building and can make electric heating cost competitive with gas. It also means that areas using this form of heating can rapidly and economically be brought into used for short or unplanned meetings if needed.

It is recommended that the PCC consider installing supplementary electrical panel heaters in the kitchen and WCs on a time delay switch and remove the existing radiators.

These can be purchased widely and fitted by any competent electrician. It is recommended that they are fitted with a time delay switch so they cannot be left on accidently after use.

If you would like to discuss panel heaters with a church in the diocese that already makes use of them, please contact the diocese.

Electric panel heater installed behind an altar

6.2 Install an Overdoor Heater

In order to achieve the sense of a 'warm welcome' into the church an over door air heater could be provided. This would also help to provide warmth to the entrance of the church. Such an over door unit must be sized to cover the whole width of the door.

A variety of overdoor air heaters are available on the market and can be installed by an electrician. The heaters that will cover the entire width of the door tend to be larger output units, which will require a dedicated electrical cable of the correct size run to them. The church should resist the temptation to reduce the size and output of the heater to avoid running a new cable, as the output from smaller heaters and of those with insufficient width tends to be disappointing.

6.3 Air to Air Source Heat Pumps

Air-to-Air Source Heat Pumps (AASHP) work by having an external unit which sucks air in and extracts the heat from it. The pumps concentrate this heat and put it into a refrigeration gas (in the same way as a fridge or freezer works). This refrigeration gas is then piped inside the

building in a small pipe where is it then allowed to expand in an internal unit with a fan. This heat is then blown out into the space. This system is identical to an air conditioning system, but it works in reverse to heat the space. As warm air is blown into the space this type of system can heat spaces from cold relatively quickly. Air-to-Air Source Heat Pumps provide around 4.5 units of heat for every 1 unit of electricity used in the heat pump; they therefore have a Coefficient of Performance (CoP) of 4.5.

AASHPs require the installation of external units which look like air conditioning modules in well ventilated external locations. These external units will need an electricity supply and pipework running from them to the heating system. They will also need a drain nearby as the back of the units can build up moisture, which condenses and sometimes freezes on the coils. The larger units do create some low-level noise and therefore the location and baffling of the units may need to be considered carefully.

Examples of external units for ASHP comprising of three smaller 3kW units and two larger 10kW units.

Internal units come in a variety of styles. The most appropriate internal units for most churches are floor mounted units which look very similar to a fan convector heater.

FUA-A - Under ceiling cassette air conditioning unit

Unique under ceiling cassettes for high rooms with solid ceilings or false ceilings with a shallow void. Suitable for all types of commercial applications.

The FUA-A range provides comfortable heating and cooling even for rooms with high ceilings and has individual louvre control flexibility to suit every room layout.

FTXM-R - Wall mount air conditioning unit

Attractive, wall mounted design with perfect indoor air quality. 2 area motion detection sensor: air flow is sent to a zone other than where the person is located at that moment; if no people are detected, the unit will automatically switch over to the energy-efficient setting.

FVXM - Floor Mount Air Conditioning Unit

Designed to fit rooms of any size and shape, it blends well with the interior due to the new design which incorporates more flowing lines and softer edges. These units are ideal when it is not possible to fit a high level wall mount unit for aesthetic or practical reasons.

They are suitable for a wide range of applications including domestic, small to medium offices and commercial uses.

All these units do have a fan element within them and therefore a small amount of fan noise is emitted. This tends to be less than a fan convector heater on a boiler-based system and similar to the noise from a fridge or freezer. Air conditioning units are commonplace in hotel rooms, indicating that the noise is low enough even to be suitable for sleeping environments.

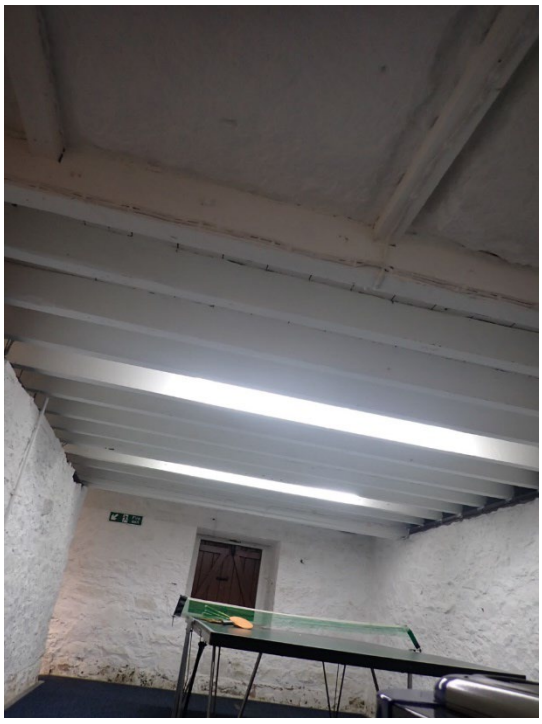
A case study of a church which has installed such a solution is available at 5. Air-source heat pumps at Hethel Church - All Saints Church, Hethel - A Church Near You

6.4 Ground Source Heat Pumps

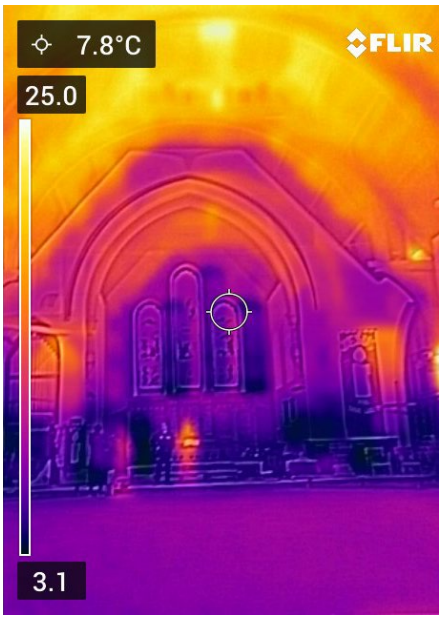
A new ground source heat pump is likely to require a heating capacity of around 20kW which is sized on the basis of the maximum output that could be achieved from an underfloor heating system. This could be installed in the area of ground to the rear of the church which is an un-buried field area. As heat pumps operate on a low temperature basis it would be well suited to an underfloor heating system. 3 phase electrical power may also be required to power the units. The installation will involve drilling large boreholes into the ground using heavy equipment, so disturbance of the ground is involved.

Good local renewable companies can be contacted for further detailed assessment of heat pumps and quotes.

There are currently government incentives available for installing ground source heat pumps, but these are subject to future change and adaption so should be reviewed at the time of implementation.



The costs within this report exclude the costs of the underfloor heating system itself which would be part of a wider refurbishment consideration. Any under floor heating system could be installed on trays fixed between the existing floor joists of the church which are accessible from the cellar underneath. There should be insulation added under these trays which would significantly help with heat loss from the floor of the church and within the youth club area below. The floor is currently a cold surface of the church and significantly contributes to the poor levels of thermal comfort which is why underfloor heating and/or insulation would be very valuable.



7. Energy Saving Recommendations

In addition to having a revise heating strategy there are also a number of other measures that can be taken to reduce the amount of energy used within the church.

7.1 New LED Lighting

The lighting makes up a relatively small overall energy proportion of the electricity used within the church. There are some areas of the building which have had efficient LED lights installed but there still remains a large number of inefficient fluorescent, 2D, and SON fittings within the kitchen, WC, nave, chancel, and cellar.

It is recommended that the fittings scheduled in Appendix 1 are all changed for LED. There are a vast number of specifications of LED lights on the market, but it is recommended that any LED light should come with branded chips and drivers and offer a 5 year warranty. An example of such a range of fittings is available from http://www.qvisled.com/

If all the lights were changed on a simple "like for like" the total capital cost (supplied and fitted) would be £3,500. The annual cost saving would be £1,100 resulting in a payback of around 3 years. This estimate includes for the supply of the lights, the labour to install them and the access required. It does not include for any upgrade to the wiring or a new lighting design both of which the church may wish to consider. Guidance on lighting, produced by Historic England for churches, can be found at https://historicengland.org.uk/advice/caring-for-heritage/places-of-worship/making-changes-to-your-place-of-worship/advice-by-topic/lighting/

7.2 Lighting Controls (Internal)

There are several lights which currently remain on all the time in areas such as the kitchen, vestry, and toilets. Some of these areas are only used occasionally and for a short amount of time so that, in actuality, the light does not need to remain on constantly. There are also spaces which benefit from a good amount of natural daylight coming in through the windows, such that artificial lighting is not required for much use during the year.

It is recommended that a motion sensor is installed on these specific lighting circuits so that the lights come on only when movement is detected in the space and turn off approximately two to five minutes after the last movement has been detected (note that the duration of the time lag after which the light goes off needs to be considered alongside the type of light that is fitted. LED lights are much more suited to being switched off after only a short duration than some fluorescent lights). These movement sensors, commonly called PIRs, also have light sensors

integrated into them so they can be used to make sure that the light does not come on if there is already sufficient daylight in the space.

Your existing electrician or any NICEIC registered electrical contractor can install PIR sensors onto existing lighting circuits. This can be carried out without significant disruption to the use of the space.

7.3 Draught Proof External Doors

There are a number of external doors in the church. The timber doors do not close tightly against the timber surround and hence a large amount of cold air is coming into the church around the side and base of these doors.

It is recommended that the draughtproofing around the door is improved and draught strips are added. This could be achieved in a number of ways:

For timber doors that close onto a timber frame a product called QuattroSeal (see link below) is often used in heritage environments to provide appropriate draught proofing.

http://www.theenergysavers.co.uk/application/files/1714/7197/4194/National_Trust_Case_Study.pdf

Simple measures such as having a 'sausage dog' style draught excluder laid along the base of a door (it needs to be sufficiently heavy to stay in place), using plasticine of the right colour to fill gaps where daylight can be seen, and putting painted fridge magnets over large keyholes can all be simple DIY measures which are effective.

7.4 Secondary Glazing and Replace Windows

The windows to the side nave are single glazed with metal frames a. It is not possible or desirable to change the windows due to the historical nature and aesthetics of the building. Given that these windows have a simpler surround and are not primary or important windows within the church, they would be suitable to have secondary glazing installed.

The introduction of secondary glazing would considerably reduce the heat loss through the existing windows and improve both thermal comfort and noise levels, as well as providing added security. The secondary glazing would also act as a means of protection against damage from ball games or other activities which could occur inside the church.

Any possible installation would need to be carefully specified, and companies such as https://www.selectaglaze.co.uk/heritage-listed-buildings or https://www.stormwindows.co.uk/ can provide very discrete and appropriate systems for all types of spaces.

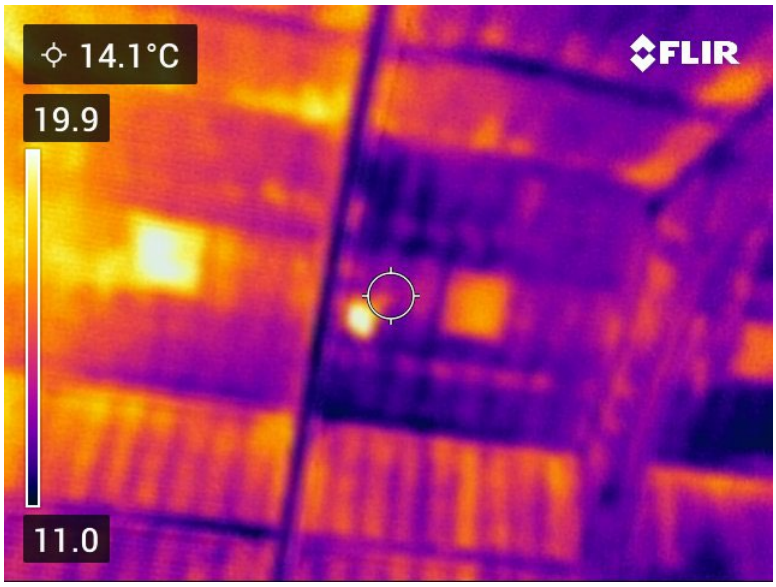
The windows of the kitchen/WC area are relatively modern but are singled glazed with timber frames and as such are very poor in terms of thermal quality. In addition, many of the openings do not close well against the frames and excessive cold air is being let into the space.

The introduction of new double glazed units would considerably reduce the heat loss from the building and improve thermal comfort. This measure would be costly and disruptive to install but could be considered as part of a refurbishment programme. The use of high quality windows will also reduce external noise transfer and provide added security. To enhance heat ingress in particularly cold areas, double glazing with low emissivity (Low-E) glass could be selected as this allows more solar gain than standard double glazing.

It is therefore recommended to replace these windows with new double glazed windows with wooden/aluminium/uPVC casements set into the existing surrounds. It is suggested that any window installation is undertaken by a FENSA Approved Installer www.fensa.org.uk

7.5 Insulation to Roof

The loft void above the ceiling was inspected with a thermal imaging camera as part of this audit and found to have little or no insulation present. In all cases where there is 100mm or less of insulation within accessible roof spaces it is recommended that insulation be added to prevent heat loss and create a more comfortable environment for the occupants of the building.



Because heat rises, the ceiling/roof of a building is the largest contributing area to heat loss from a building. The insulation of such spaces can therefore have a dramatic impact on both the efficiency of the heating system and the temperature of the space below.

A free survey and quotation for the supply and installation of insulation to the loft spaces can be arranged through ESOS Energy Ltd (contact Adrian Newton 0117 9309689, adrian@esos-energy.com).

8. Renewable Energy Potential

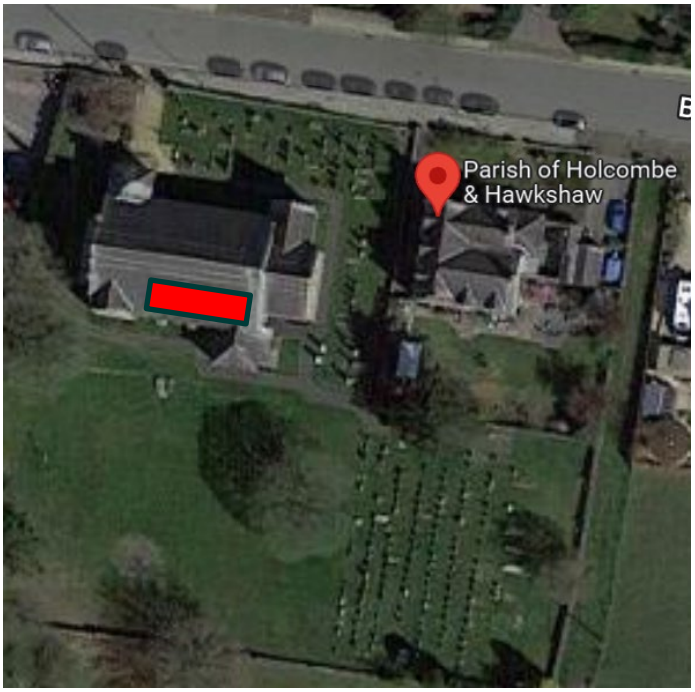
The potential for the generation of renewable energy on site has been reviewed and the viability noted.

8.1 Solar PV

Renewable Energy Type	Viable
Solar PV	Yes - To rear south elevation of unlisted church used daily
Battery Storage	Yes

Now that the Feed in Tariff scheme has come to an end the installation of solar PV panels in situations where there is not almost full usage of the electricity generated on site is not really viable.

There is potential for a small PV array on the roof of the south facing roof. The current arrangements around solar panels mean that to be financially viable the building on which they are mounted needs to consume the vast majority of the energy that they produce. As the church has regular day time use from the school and other activities PV panels would be a viable measure to consider.



Battery Storage is not strictly a renewable energy solution, but battery storage does however provide a means of storing energy generated from solar PV on site to be able to be used at peak times or later into the day when the PV is no longer generating. It therefore extends the usefulness of the existing PV system particularly in this sort of church.

9. Funding Sources

There are a variety of charitable grants for churches undertaking works and a comprehensive list of available grants is available on this Parish Resources page:
https://www.parishresources.org.uk/resources-for-treasurers/funding/

10. Faculty Requirements

It must be noted that all works intended to be undertaken should be discussed with the DAC at the Diocese.

Throughout this report we have indicated our view on what category of permission may be needed to undertake the work. This is for guidance only and must be checked prior to proceeding as views of different DACs can differ.

Under the new faculty rules;

List A is for more minor work which can be undertaken without the need for consultation and would include changing of light bulbs within existing fittings, repair and maintenance works to heating and electrical systems and repairs to the building which do not affect the historic fabric.

List B is for works which can be undertaken without a faculty but must be consulted on with permission sought from the Archdeacon through the DAC. This includes works of adaptation (but not substantial addition or replacement) of heating and electrical systems and also the replacement of existing boilers so long at the same pipe work, fuel source and flues are used. It can also be used to replace heating controls.

All other works will be subject to a full faculty.

Works which affect the external appearance of the church will also require planning permission (but not listed building consent) from the local authority and this will be required for items such as PV installations.

11. Offsetting

As you take action to reduce your emissions, you may also wish to offset those that you cannot yet reduce. If you would like to engage in offsetting, it is important to use a reputable scheme. The Church of England recommends Climate Stewards, which has a simple calculator that can help you to work out how much you would need to offset. https://www.climatestewards.org/

Climate Stewards encourages people to 'reduce what you can and offset the rest' as part of your journey to Net Zero carbon emissions. They provide training and resources to help you understand climate change and its impacts, and to calculate the carbon footprint from your activities including travel, energy, expenditure, and food. Their online carbon calculators for individuals and smaller organisations are free to use, and they provide bespoke carbon footprint audits for larger organisations.

Having reduced as much of your organisation's carbon footprint as you can, there will always be unavoidable emissions from your work and travel. Carbon offsetting allows you to compensate for the negative impact of your carbon emissions by funding projects which take an equivalent amount of CO_2 out of the atmosphere. These either involve locking up ('sequestrating') CO_2 as trees grow or reducing emissions by using low-carbon technology such as fuel-efficient cookstoves or water filters.

Climate Stewards has a close relationship with all their project partners in Ghana, Uganda, Kenya, Tanzania, Nepal, and Peru. They work closely with them to design, develop, implement and monitor projects which will not only mitigate carbon, but also bring tangible benefits to the local community - including improved health, savings in time and money previously spent on buying or collecting fuel, and improvements in local biodiversity. Each project is assessed using their Seal of Approval protocol which enables us to assess and monitor carbon mitigation and ensure robust, sustainable, and transparent partnerships.

Appendix 1 – Schedule of Lighting to be Replaced or Upgraded

Room/Location	Number of Fittings	Recommended Upgrade	Annual Saving (£)	Total Cost (£)	Payback
Kitchen and WC	3	2D LED 11W	£40	£176	4.36
Vestry	1	LED GLS	£6	£12	1.92
Nave	8	50W LED Flood	£575	£960	1.67
Chancel	2	50W LED Flood	£144	£240	1.67
Vestry WC	2	2D LED 11W	£35	£118	3.35
Cellar	15	5ft Single LED	£249	£1,317	5.29
Cellar	4	2D LED 11W	£30	£235	7.73