



Energy Audit and Survey Report
St Barnabas Church, Emmer Green
Diocese of Oxford



"There is a plan to reduce global carbon emissions to net zero by 2050. The plan will work. It involves all of us. We need to begin now, in our homes and workplaces and churches"

Revd Dr Stephen Croft, Bishop of Oxford

Version Control

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1. Executive Summary

An energy survey of St Barnabas Church, Emmer Green was undertaken by Inspired Efficiency Ltd 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.

St Barnabas Church, Emmer Green is a relatively small and simple unlisted parish church constructed in 1929. It has a church hall (which is the old church building) and a parish centre extension attached to it. There is both gas and electricity supplied to the site.

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 is used as the action plan for the church in implementing these recommendations over the coming years.

Short Term: Energy saving recommendation	Estimated Annual Energy Saving (kWh)	Estimated Annual Cost Saving (£)	Estimated capital cost (£)	Simple Payback (years)	Permission needed	To be actioned by who / when?
Change remaining existing lighting for low energy lamps/fittings	252	£37	£672	18.27	List A	
Install Endotherm advanced heating fluid into heating system(s)	5,941	£206	£760	3.69	List A	
Insulate exposed pipework and fittings in plantrooms	3,495	£121	£500	4.13	List A/B	

Medium Term: Energy saving recommendation	Estimated Annual Energy Saving (kWh)	Estimated Annual Cost Saving (£)	Estimated capital cost (£)	Simple Payback (years)	Permission needed	To be actioned by who / when?
Fit Quattro seal draft proofing to historic doors	1,188	£173	£800	4.61	List B	

Long Term: Energy saving recommendation	Estimated Annual Energy Saving (kWh)	Estimated Annual Cost Saving (£)	Estimated capital cost (£)	Simple Payback (years)	Permission needed	To be actioned by who / when?
Consider fitting small PV system to church hall or parish centre roof.	N/A	-	-	-	Faculty (although may not be required for Hall if outside faculty jurisdiction)	



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

Based on current market prices of 14.6p/kWh and 3.47p/kWh for electricity and mains gas respectively.

If all measures were implemented this would save the church £564 per year.

It was notable that the church is already run very efficiently and opportunities for further savings in the church are limited. The parish centre is a relatively new build and therefore has more inherent efficiencies built in. It is the church hall that should therefore be a greater focus for energy efficiency improvements and upgrading the windows in the hall would be a worthy energy saving measure to consider.



2. Introduction

This report is provided to the PCC of St Barnabas Church, Emmer Green to provide them with 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.

St Barnabas Church, Emmer Green is an unlisted but attractive small parish church built in 1929. It has a modern parish centre extension attached to it which provide kitchen and fellowship space with offices and WC's. There is also a church hall on site which is used extensively by community groups.

An energy survey of the St Barnabas Church, Emmer Green, St Barnabas Road, Emmer Green Reading, RG4 8RA was completed on the 1st March 2019 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 Barnabas Church, Emmer Green	
Gross Internal Floor Area	253 m ²
Listed Status	Unlisted

The church typically used for 5 hours per week for the following activities

Services	5 hours per week
Meetings and Church Groups	Not in church (use of Parish Centre and Church Hall)
Community Use	See above

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



3. Energy Procurement Review

A summary of the energy costs and usage was provided in a useful sheet outlining the quarterly usage and costs for each meter, but as actual copies of bills were not provided, we have been unable to review the current rates and other charges.

If not already, we would recommend that the church obtains a quotation for its gas and electricity supplies from the Diocese Supported parish buying scheme, <http://www.parishbuying.org.uk/energy-basket>. This scheme only offers 100% renewable energy sourced energy and therefore it is an important part of the process of making churches more sustainable.

The church should also check that it is only being charged 5% VAT and it is not being charged for CCL if they are being charged full rate VAT and CCL then they should send the supplier a VAT declaration confirming its charitable status.



4. Energy Usage Details

St Barnabas Church, Emmer Green uses 1,571 kWh/year of electricity, costing in the region of £230 per year, and 69,895kWh/year of gas, costing £2,450. It should be noted that the gas includes both the church and the church hall and given the usage of each it is considered that the church hall is the much larger user of gas.

This data has been taken from the annual energy account summary provided by the church. St Barnabas Church, Emmer Green has one main electricity meter, serial number E14Z026860 (it has separate electricity meters for the church hall and parish centre) . There is one gas meter serving the site (church and church hall), serial number E016K0182317D6.

Utility	Meter Serial	Type	Pulsed output	Location
Electricity – Church	E14Z026860	1 phase 100A	Yes	Within church to side of vestry.
Gas – Church and Hall	E016K0182317D6	GK-G10E	Yes	External gas meter cupboard

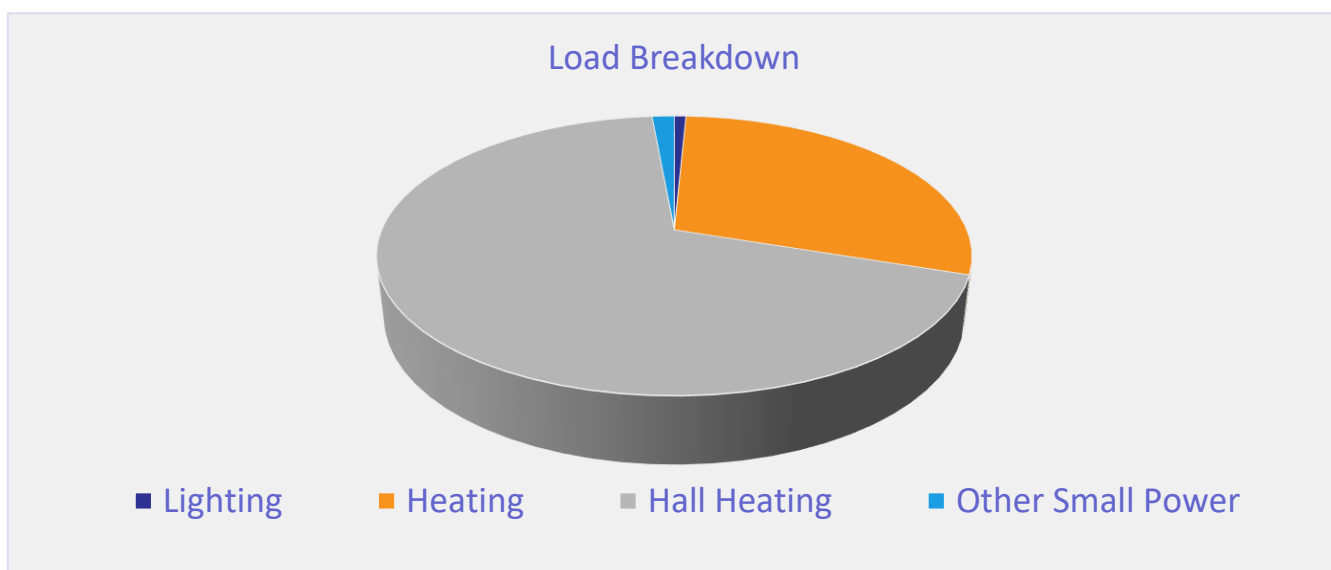
All the meters are AMR connected and as such energy profile for the entire energy usage should be possible. It is recommended that the church consider asking their suppliers for access into the smart meters that have been installed so that the usage can be monitored more closely, and the patterns of usage reviewed against the times the building is used.

4.1 Energy Profiling

The main energy use within the church can be summarised as follows:

Service	Description	Estimated Proportion of Usage
Lighting	Largely LED fitting to the nave with minor other fittings to chancel and vestries.	1%
Heating (Church)	Gas fired heating to heating system within church used only from 5.30am to 11am on a Sunday.	29%
Hall Heating	Gas fired heating to hall used regularly during the week for lettings	68%
Other Small Power	Minor power usage for appliances and supplemental heaters etc.	1%





As can be seen from this data, the heating to the hall makes up by far the largest proportion of the energy usage on site. The other significant load is heating to the church (note the split between these has been estimated and it could be that the hall uses more heating and the church less than is reflected in this split).

4.2 Energy Benchmarking

In comparison to national benchmarks for Church energy use St Barnabas Church, Emmer Green uses 69% less electricity and 45% less heating energy than would be expected for a church of this size.

	Size (m ² GIA)	St Barnabas Church, Emmer Green use kWh/m ²	Typical Church use kWh/m ²	Efficient Church Use kWh/m ²	Variance from Typical
St Barnabas Church, Emmer Green (elec)	253	6.21	20	10	-69%
St Barnabas Church, Emmer Green (gas – church only)	253	82.87	150	80	-45%
TOTAL	253	89.08	170	100	-47.6%

This church is performing very efficiently when compared to benchmarks which is reflecting its low and efficient use and the sound improvements made with the installation of LED lighting.



5. Energy Saving Recommendations

5.1 Lighting (fittings)

The lighting is already efficient in the main nave of the church (and also within the main hall of the church hall and the parish centre).

There still remains a few fittings that could be made more efficient to the chancel, vestries, and entrance to the parish centre

It is recommended that the fittings scheduled in Appendix 1 are all changed for LED.



If all the lights were changed the total capital cost (supplied and fitted) would be £672. The annual cost saving would be £37 resulting in a payback of around 18 years however many of the lights could be easily fitted by a competent person within the church and therefore the costs could be substantially reduced by purchasing the replacement bulbs and self-fitting. The costs of purchasing LED bulbs for the highlighted areas could be an area which could be suitable for applying for using the grant available through this scheme (see the Funding section later in this report)

5.2 Endotherm Advanced Heating Fluid



In order to improve the efficiency of the heating system further it is recommended that an advanced heating fluid (<http://www.endotherm.co.uk/>) is added to the heating system.

This fluid in addition to and complements any existing inhibitors in the heating system and is added in a similar way. The fluid works to improve the ability of the boiler to transfer heat into the heating system and for the radiators and other heating elements to give out their heat into the rooms. It does this by reducing the surface tension of the water and increasing its capacity to transfer and hold heat. Case studies have demonstrated that the addition of this fluid into heating systems reduces heating energy consumptions by over 10% as well as helping the building heat up quicker.

Endotherm can be purchased and self-installed using the link above.



5.3 Insulation of Pipework and Fittings



The pipework within the plant room has the majority of its straight lengths insulated but the more complex shaped pipework fittings, such as valves, have been left uninsulated. These exposed areas of pipework contribute significantly to wasted heat loss from the system and make the plant room unnecessarily warm. The exposed hot surfaces also represent a health and safety risk of burns for those working in the area.

It is recommended that these areas of expose pipework and fittings are insulated with bespoke made flexible insulation jackets. These wrap around the various elements but can be removed and then replaced for any servicing activities.

A free survey and quotation for the supply and installation of insulation of pipework fittings can be arranged through Sustain Ltd contact Margaret Davis, 0117 403 2689, Margaret.Davis@anthesisgroup.com or ESOS Energy Ltd (contact Adrian Newton 0117 9309689, adrian@esos-energy.com).

5.4 Controls

The controls are already well set up to heat the church only between 5.30am and 11am on a Sunday morning for the main service. During the audit odd 5min time zone settings were found within the controller and with the permission of the church these have now been removed to avoid unnecessary short firing of the boiler.



5.5 Quattro Seal



There are a number of external doors in the building. These have the original historic timber doors on them, but these do not close tightly against the stone surround and hence a large amount of cold air is coming in to the church around the side and base of these doors.

It is recommended that draught proofing is fitted to all external doors. 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

5.6 Other Fabric Measures



It is the fabric of the church hall, which is heated far more than the church, which would benefit from some energy efficiency improvements. The external walls would benefit from recladding using insulated panel systems, but the main priority should be for the replacement of the existing single glazed windows with replacement double glazed units which will not only reduce the gas consumption but also improve the comfort for users.



6. Other Recommendations

6.1 Electric Vehicle Charging Points

The church has a car park to the side which serves the church and parish centre and also the frequently used church hall. In order to make a visible statement on the churches mission of stewardship and to facilitate more sustainable transport choices by those both visiting the church and using the hall, the church may wish to consider installing an electric vehicle charging point, probably on the side of the church hall to allow visitors to charge their electric car.

Installing a unit such as a Rolec Securi-Charge <http://www.rolecserve.com/ev-charging/news/view/Robust-EV-Charging-With-Rolecs-SecuriCharge-EV-Wall-Unit-Coin-Token-PAYG> would allow the church to be able to sell tokens or have a coin operated device that would at least cover the costs of the electricity use and could make a small income. As the parish centre may be able to be called a place of work for some users it may be able to benefit from a grant to part cover the installation costs of a charger from <https://www.gov.uk/government/publications/workplace-charging-scheme-guidance-for-applicants-installers-and-manufacturers>



7. Renewable Energy Potential

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

Renewable Energy Type	Viable
Solar PV	Yes – see note below
Battery Storage	Yes
Wind	No – lack of suitable space
Micro-Hydro	No – no water course
Solar Thermal	No – insufficient hot water need on site
Ground Source Heat Pump	No – cost prohibitive given site usage
Air Source Heat Pump	Yes - but little need given current system
Biomass	No – air quality issues and mains gas available

There is a potential for a PV array which could be mounted on the church hall, the parish centre or even the church itself (although this is least favoured given the availability of other more suitable roofs). As the Feed in Tariff scheme has now ended and the usage on site is relatively low the financial viability of any system is weak. It may be that a small array of around 4 panels could be viable to the parish centre and a similar small array to the church hall. Given the very low use by the church it is unlikely that any PV array to this meter would be viable. The use of a small domestic scale battery storage to both the parish centre and church hall would be useful given their usage patterns and allow the system to store some energy during the day and save it for when the buildings are in use later. While technically viable any PV installation should be considered as a low priority and only to be considered once all other energy saving measures have been implemented and as part of a wider mission statement on stewardship.



8. Funding Sources

This audit programme offers each participating church the chance to apply for a grant of up to £150 towards implementing some of the audit's recommendations. An application form is included with this report.

There are a variety of charitable grants for churches undertaking works and a comprehensive list of available grants is available at <https://www.parishresources.org.uk/wp-content/uploads/Charitable-Grants-for-Churches-Jan-2019.pdf>.

Trust for Oxfordshire's Environment (TOE) does have some funds available (over and above the small implementation grants of £150 available through this scheme) to support energy efficiency improvements in community facilities. If your church is used by the wider community, visit www.trustforoxfordshire.org.uk or contact admin@trustforoxfordshire.org.uk to find out if your project is eligible for a grant of up to about £5,000.

9. 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 as 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.



Appendix 1 – Schedule of Lighting to be Replaced or Upgraded

Room/Location	Number of Fittings	Recommended Upgrade	Annual Saving (£)	Total Cost (£)	Payback
Nave	10	NO CHANGE	£-	£-	-
Entrance and prayer room	2	2D LED 7W	£-	£109.10	-
Chancel	1	R50 LED	£5.15	£11.89	2.31
Chancel	4	50W LED Flood	£10.02	£365.20	36.44
Vestry	1	LED GLS	£0.78	£10.50	13.40
Organ vestry	1	LED GLS	£2.30	£10.50	4.56
Church hall	8	NO CHANGE	£-	£-	-
Church hall	3	LED GLS	£6.90	£31.50	4.56
Entrance to parish centre	6	GU10 LED	£11.62	£70.80	6.10
Parish centre	8	NO CHANGE	£-	£-	-
Kitchenette	4	NO CHANGE	£-	£-	-

