Energy Audit and Survey Report

St John the Evangelist, Woodley

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

Author	Reviewer	Date	Version
Matt Fulford	David Legge	1st March 2019	1.0

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1. Executive Summary

An energy survey of St John the Evangelist, Woodley 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 John the Evangelist, Woodley is a Grade II listed Victorian parish church on the outskirts of Reading. There is both gas and electricity supplied to the site.

The church as a number of ways in which is 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 existing lighting for low energy lamps/fittings	1,925	£255	£1,385	5.43	List A/B	
Install Endotherm advanced heating fluid into heating system(s)	8,786	£200	£800	3.99	List A	
Insulate exposed pipework and fittings in plantrooms	5,168	£118	£300	2.55	List A	
Optimise control settings	20,673	£552	£600	1.09	List A	
Notify energy suppliers of CCL exempt status	N/A	£748.08	Nil	-	-	

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?
Install thermostatic radiator valves (TRVs)	5,272	£120	£1,320	10.98	List B	
Fit Quattroseal draft proofing to external doors	2,067	£274	£800	2.92	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?
Remove carpet from the top of the heating grilles	N/A	-	-	-	List A/B	

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

Based on current contracted prices of 13.25p/kWh and 2.28p/kWh for electricity and mains gas respectively.

If all measures were implemented this would save the church £1,479 per year. (note this does not include the further saving from the CCL and VAT notification)

2. Introduction

This report is provided to the PCC of St John the Evangelist, Woodley 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 John the Evangelist, Woodley is a Grade II listed Victorian Church on the outskirt of Reading. It has a relative new gas central heating system which is reported to be working well in heating the church and it has already use LED lighting extensive throughout.

An energy survey of the St John the Evangelist, Woodley, Church Road, Woodley, Reading, RG5 4QN 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 John the Evangelist, Woodley	
Gross Internal Floor Area	640 m^2
Listed Status	Grade II

The church typically used for 11 hours per week for the following activities

Services	5 hours per week
Meetings and Church Groups	6 hours per week

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

3. Energy Procurement Review

Energy bills for gas and electricity have been supplied by St John the Evangelist, Woodley and have been reviewed against the current market rates for energy.

The current electricity rates are:

Day Rate	13.25p/kWh	In line with current market rates
Standing Charge	11.073p/day	N/A

The current gas rates are:

Single / Blended Rate	2.28p/kWh	Below current market rates
Standing Charge	2.44p/day	N/A

The above review has highlighted that the current rates being paid are in line or below current market levels and the organisation can be confident it is receiving good rates and should continue with their current procurement practices. In future procurement exercises the church may wish to obtain 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.

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

VAT	5% (electricity and summer gas) / 20% (winter gas)	The church is a charity and therefore should be benefiting from only be charged a 5% VAT rate. The gas usage in the winter shows that the supplier is not aware of this and there a VAT declaration should be sent to the supplier to adjust this.
CCL	100% charged (for winter gas)	As the organisation is being charged the wrong VAT rate, they are also being charged CCL which should not be applied as they are a charitable organisation. Sending the supplier, a VAT declaration will remove this charge.

The above review has highlighted that VAT and CCL are being charged when the organisation is understood to be a charity and have VAT exemption status. As such the church should send the supplier at VAT declaration confirming this. A VAT declaration form can be downloaded from the Total Gas and Power website.

4. Energy Usage Details

St John the Evangelist, Woodley uses 3,830 kWh/year of electricity, costing in the region of £510 per year, and 103,363kWh/year of gas, costing £2,360.

This data has been taken from the annual energy invoices provided by the suppliers of the site. St John the Evangelist, Woodley has one main electricity meter, serial number E13Z012993. There is one gas meter serving the site, serial number A0189607A6.

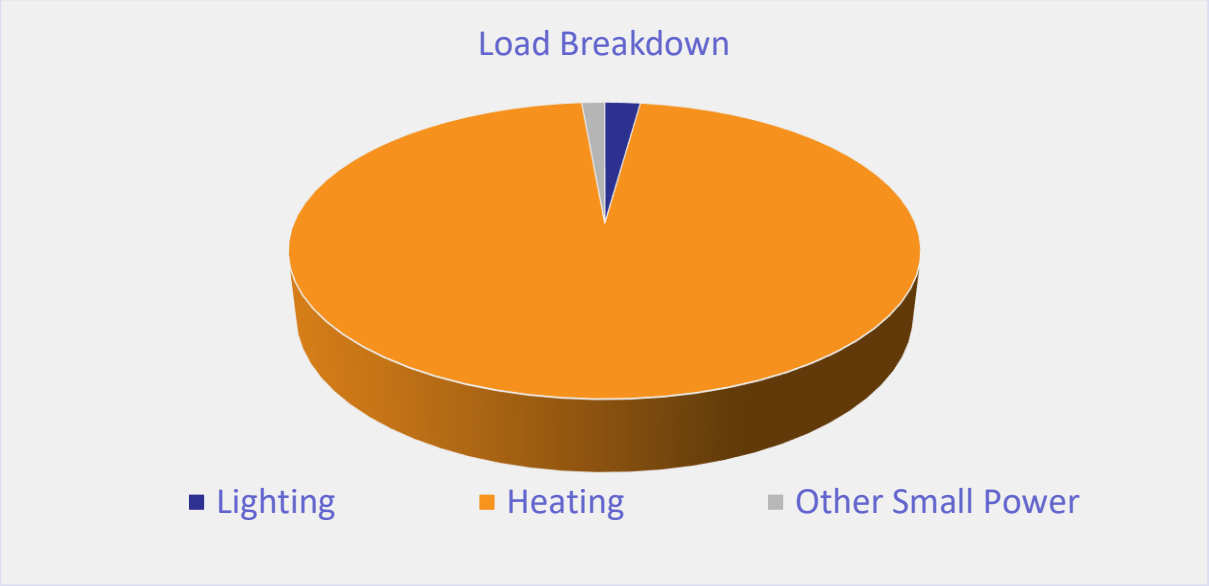
Utility	Meter Serial	Type	Pulsed output	Location
Electricity – Church	E13Z012993	Not known	Not known	Not seen
Gas – Church	A0189607A6	Not known	Not known	Not seen

It may be sensible to ask the suppliers of the site whether they can install smart meters so that the energy usage profile can be viewed and compared against how 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	Mainly Led lighting to the nave and lady chapel, some fluorescent lighting to vestry, store and other areas.	2%
Heating	Gas fired condensing boiler serving heating to radiators within church.	96%
Other Small Power	Other small power usage such as plugged in appliances, music etc.	1%



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

4.2 Energy Benchmarking

In comparison to national benchmarks for Church energy use St John the Evangelist, Woodley uses 70% less electricity but 7.7% more heating energy than would be expected for a church of this size.

	Size (m^2 GIA)	St John the Evangelist, Woodley use kWh/m^2	Typical Church use kWh/m^2	Efficient Church Use kWh/m^2	Variance from Typical
St John the Evangelist, Woodley (elec)	640	5.98	20	10	-70.1%
St John the Evangelist, Woodley (heating fuel)	640	161.50	150	80	+7.7%
TOTAL	640	167.49	170	100	-1.5%

As can be seen, the church is performing very well in terms of electrical consumption and this reflects the low usage and investment in LED lighting. The church performs less well in terms of heating, using slightly more than would be expected , this is due to the church being heated for longer than is required on a daily basis.

5. Energy Saving Recommendations

5.1 Lighting (fittings)

The lighting within the church is already highly efficient in that the bulk of the lighting in the nave and lady chapel is LED spots.

There still remains a few lights which would benefit from being changed to LED within the vestry area and store. All areas are listed in Appendix 1.

There are high level lights to the nave and to the chancel which have G12 CMH fittings within them. It is recommended that LED replacement blubs are used in these fittings such as https://www.ledkia.com/uk/967-buy-g12-led-bulbs

The £150 grant available as part of this process could be usefully used to purchase these LED lamps which could then be self-installed.

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 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.

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 arranges through ESOS Energy Ltd (contact Adrian Newton 0117 9309689, adrian@esos-energy.com).

5.4 Space Temperature Set Point

The current set point within the church is set to between 20 and 21 degrees on the various controllers around the church. The church was noted to be very warm. It is recommended that all the set points are changed to be 19 degrees throughout the whole building as this will provide an efficient yet comfortable temperature for all.

It is also recommended that the setting on the boiler itself is adjusted so that the flow temperature is reduced from its current 82°C to 75°C.

5.5 Controls

The heating controller was checked for the time settings and it was noted be set at 6.30am to 4.30pm on a daily basis with a longer time period for Sundays to cover the services. As the church is locked at 4pm daily and there will be heat retained in the system and the building at the end of the heating period it is recommended that the church is heated to the following times:

Monday to Saturday	– 8am to 3.30pm
Sunday	- 6.360am to 8.30pm

The set point and time adjustments should be able to be carried out on site by a competent member of the church.

5.6 Thermostatic Radiator Valves (TRVs)

The building is heated by radiators and not all of these have thermostatic radiator valves (TRVs) installed on them, particular around the vestry area.

TRV's can be installed on the existing radiator and allow the users of the room to have some element of control over the temperature in the room and prevent over-heating which often leads to situations where the heating is on and the windows are open. It also allows un-used spaces to have the heating in them turned down.

It is recommended that TRVs are installed on all radiators and users advised as to the best way to operate these once they have been installed. TRV's can be supplied and installed by any good heating engineer.

5.7 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.

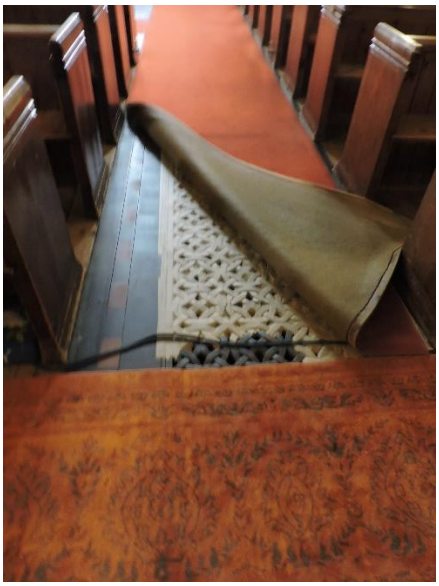
It is recommended that draught proofing is fitted to all external doors. A product called QuattroSeal (see link below) is often used in heritage environments to provide appropriate draught proofing.

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

5.8 Other Heating Advice

The church currently has a successful heating system which is relatively efficient and capable of warming the church to the desire temperature. The church does have reordering plans but there is not any need for the existing heating system to be changed (to underfloor or the like) as part of these plans and such changes are unlikely to improve the efficiencies.

There are floor grilles running through the church which have carpet on top of them. These floor grilles do have hot pipes running through them and opening up the grilles as part of the reordering would increase the amount of heat which can get out and into the church it is therefore recommended that the removal of the carpet is included in reordering plans.



With the other plans for reordering it would be suggested that the hot water needs are met up an electric point of use hot water heater such as the https://www.ariston.com/uk/Electric_Water_Heaters/andrisluxeco . For heating with the new area and also the lady chapel it is recommended that the use of electric panel heaters are considered if the space is to be use for intermittent shorter durations for meetings or small services and there is no need to heat the entire church. High efficiency far infra-red wall panel heaters such as https://www.warm4less.com/product/62/900-watt-platinum-white as worth considering.

6. 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	No – visible roof
Battery Storage	No – no viable PV
Wind	No – no suitable land away from buildings
Micro-Hydro	No – no water course
Solar Thermal	No – insufficient hot water need
Ground Source Heat Pump	No – archaeology in ground and radiator system
Air Source Heat Pump	No – insufficient electricity supply and existing system efficiency is good
Biomass	No – air quality issues

Having reviewed the site it is not considered that there is good viability for any renewables and instead a good clear focus on reducing the energy demand of the building should continue with a targeted approach on reducing the heating energy.

7. 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.

8. 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.

Appendix 1 – Schedule of Lighting to be Replaced or Upgraded

Room/Location	Number of Fittings	Recommended Upgrade	Annual Saving (£)	Total Cost (£)	Payback
Vestry	2	4ft Single LED	£11.46	£144.20	12.58
Vestry WC	1	2D LED 7W	£1.59	£54.55	34.40
Vestry lobby	1	2D LED 7W	£1.59	£54.55	34.40
Store	1	4ft Single LED	£5.04	£72.10	14.31
Nave	90	NO CHANGE			
Nave high level	25	LED G12	£145.90	£262.50	1.80
Lady chapel	14	NO CHANGE			
WC lobby	1	LED GLS	£4.59	£10.50	2.29
Chancel	10	LED G12	£58.36	£105.00	1.80