



Energy Audit and Survey Report

Holy Trinity Church, Reading



"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 Holy Trinity Church, Reading 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.

Holy Trinity Church, Reading is Grade 2 listed parish church in an urban town environment dating back to 1826. The main reason for its listing is the Pugin chancel screen within the church. There is both gas and electricity supplied to the site although the church currently uses oil for its main heating.

The church has already installed LED lighting throughout (with the exception of the vestry) and is currently at design stage of the replacement of its oil fired blown hot air heating system with a new gas fired radiator-based system. This will have a major impact on its energy use all will be a considerable improvement in the churches carbon footprint and contribution to local air pollution.

The church has a number of ways in which is can be more energy efficient. Our key recommendations have been summarised in the table below, but the main element of this report is to provide guidance on how the current gas heating proposals could be improved.

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?
Replace vestry lights for LED	52	£7	£310	42.12	List B	
Install draught proofing on external doors	1,364	£47	£800	17.20	List B	
Replace existing single glazed windows to rear vestry and lower hall	3,410	£116	£3,200	27.52	List 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 14.6p/kWh and 3.41p/kWh for electricity and mains gas respectively.

If all measures were implemented this would save the church £170 per year.



2. Introduction

This report is provided to the PCC of Holy Trinity Church, Reading 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.

An energy survey of the Holy Trinity Church, Reading, Oxford Road, Reading, RG1 7NE was completed on the 5th September 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.

Holy Trinity Church, Reading	
Gross Internal Floor Area	Not known
Listed Status	Grade II
Typical Congregation Size	Approx. 20 for Anglican, 100+ for Romanian

The church typically used for 6 hours per week for the following activities

Services	4 hours per week
Meetings and Church Groups	2 hours per week
Community Use	0 hour 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 Holy Trinity Church, Reading and have been reviewed against the current market rates for energy.

The current electricity rates are:

Single / Blended Rate	14.19p/kWh	In line with current market rates
Standing Charge	29.03p/day	N/A

The current gas rates are:

Single / Blended Rate	3.41p/kWh	In line with current market rates
Standing Charge	29.15p/day	N/A

The above review has highlighted that the current rates being paid are in line with current market levels and the organisation can be confident it is receiving good rates and should continue with their current procurement practices.

For future renewals, we would therefore 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.

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	100% charged / not charged / reduced % rate charged	The correct CCL rate is being applied.

The above review confirmed that the correct taxation and levy rates are being charged.



4. Energy Usage Details

Holy Trinity Church, Reading uses 1,723 kWh/year of electricity, costing in the region of £245 per year, and 235kWh/year. The church also uses oil at the moment, the quantity of which is unknown but this is shortly about to change to gas.

This data has been taken from the annual statements provided by the suppliers of the site. Holy Trinity Church, Reading has one main electricity meter, serial number E12Z110308. There is one gas meter serving the site, serial number E016K04682D2.

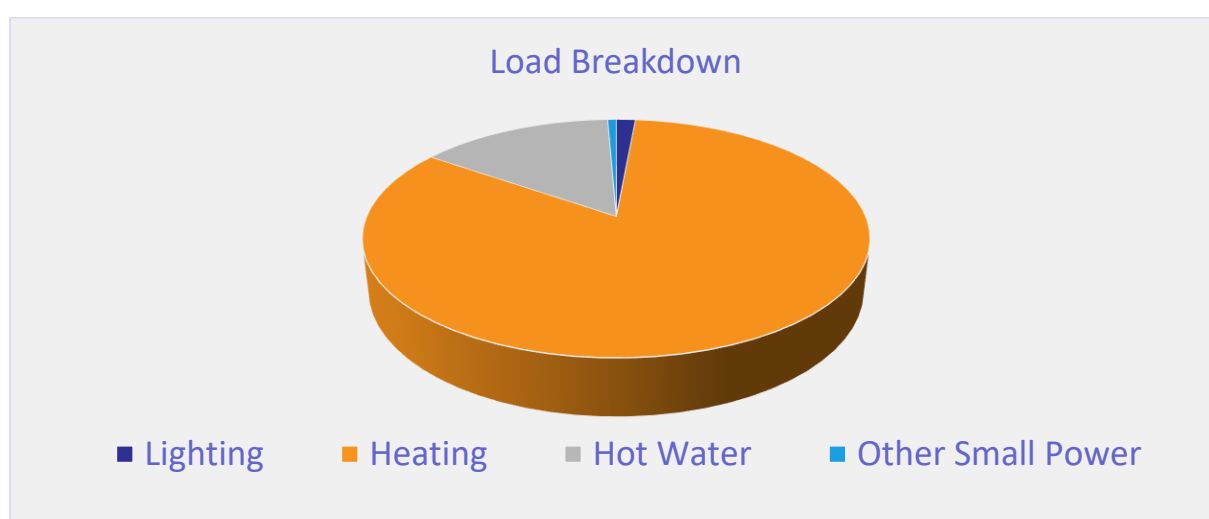
Utility	Meter Serial	Type	Pulsed output
Electricity – Church	E12Z110308	3 phase 100A	Yes – Full AMR
Gas – Church	E016K04682D2	MDK16	Yes, Full Smart Meter

All the meters are AMR connected and as such energy profile for the entire energy usage should be possible.

4.1 Energy Profiling

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

Service	Description	Estimated Proportion of Usage
Lighting	All LED lighting except vestry	1%
Heating	Currently oil fired blown warm air heater, planning to change to gas boiler with radiators	83%
Hot Water	Small separate combi boiler providing hot water	15%
Other Small Power	Sound systems, alarms, kitchen appliances and the like	1%



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



5. Energy Saving Recommendations

5.1 Lighting (fittings)

Almost all the lighting within the church has been recently converted to new LED fittings. The only lights which have not been converted are the three fluorescent T8 5ft lights in the vestry and it is recommended that these are also changed.

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/>

5.2 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 into 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

5.3 Other Fabric Measures



There are some relative standard windows to the rear rooms (corridor, lower meeting room etc.) within the building and it was noted that these windows are current timber single glazed windows what could be draughty and have poor thermal performance. It is recommended that these windows are upgraded to new double-glazed timber windows with espagnolette locking. This will not only reduce the amount of energy required for heating but also notable improve the comfort within the rooms.



6. Notes on New Heating Proposals

The new heating proposals were reviewed and examined on site. In general, the proposal to convert to a gas system with radiators is to be welcomed as this represents a move away from the oil usage which is a high carbon and inefficient flue.

It is proposed to have a new 110kW boiler for the system. It is likely at 100kW would be sufficient and instead of having one boiler it would be more efficient and robust to have two 50kW boilers as it is more efficient to run one boiler to 100% of its output than one boiler to 50% of its output. It also means that if one boiler were to fail the church would still have some heating.

All pipework and fittings on the boiler room should be well lagged. All circulation pumps will have to be the latest low energy specification. It is recommended that the system is filled with a Glycol based inhibitor (such as the Fernox Alphi-11 Protector) as this will then mean the system will not need to fire and heat up just to protect itself from freezing (in churches this can account for one third of the energy usage but provide no useful heat to the people as it occurs when the building is not occupied).

The positioning of the radiators within the building requires more careful thought and our initial views are:

- Unit 20 is a 6kW electric overhead air curtain to the Narthex. It is suggest that the Narthex would be better left as an unheated draught lobby and that any overhead unit it located to the rear of the church and use the gas based heating system with a LPHW type of overdoor air heater (such as the LPHW version of <https://www.envirotec.co.uk/product/enviroscreen-es-type-b-air-curtain/>) . Using three of these to the rear of the church would allow for the rear radiators (number 16 and 17) to be removed. Not having 16 and 17 would allow future pew removal or relocation to occur more easily if ever desired in the future. Having these type of heaters to the main body of the church would also mean that more useful heat output would go into heating up the church and as the current proposal is to use entirely passive radiators having some forced air fan heaters will allow for quicker warm up times in the church. These units do make some noise so it is usual for them to be turned off once the doors are closed at the start of the service and then the radiators can maintain the temperature throughout the service. In this way the overdoor air heaters in the internal location would act to be a major heater in warming up and church and a warm air curtain providing a warm welcome.
- Some radiators require some adjustment to their current position as they clash with fixed objects on the church walls or are not well spaces (such as 4 & 5 and 7 & 9). It is noted that further radiators are planned to the priest's vestry.

Once the new heating system is installed it would be prudent for the church to consider moving its Tuesday and Thursday usage to the large downstairs meeting room or the sacristy as these are one a different zone and could be programmed to be heated without having to bring on the heating in the rest of the large church building.



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 - but very little electrical usage so no economic sense
Battery Storage	Yes – but see above
Wind	No – town centre site
Micro-Hydro	No – no water course
Solar Thermal	No – minimal hot water needs
Ground Source Heat Pump	No – difficult site for ground source
Air Source Heat Pump	No – unsuitable for churches fabric
Biomass	No – fuel delivery issues on site and air quality issues in town centre environment.

There is potential for a small PV array on the roof of the church which is hardly visible from the ground. 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. The churches energy consumption is already very small and the consumption during the daytime when the sun is shining is likely to be very low indeed, therefore while technically viable only a very small number of panels (maximum of around 4) would be worth considering if at all.

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. This is a new but fast-growing technology with prices expected to fall substantial over the next 2 to 3 years therefore investment into this may be worth delaying at this stage.



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.

