



# Energy Audit and Survey Report

## Holy Trinity Church, Seer Green



*"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	10 <sup>th</sup> September 2019	1.0

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## 1. Executive Summary

An energy survey of Holy Trinity Church, Seer 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.

Holy Trinity Church, Seer Green is a Grade II listed Victorian stone and flint parish church. There is both gas and electricity supplied to the site and the boiler was replaced around 4 years ago.

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?
Optimise control settings	5,970	£293	£600	2.05	None	
Change existing lighting for low energy lamps/fittings	1,926	£240	£2,733	11.37	List B / Faculty	



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 timber strip and then Quattro seal draft proofing to historic doors	677	£84	£800	9.47	List B	
Install Endotherm advanced heating fluid into heating system(s)	3,383	£86	£480	5.56	List A	

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

Based on current contracted prices of 12.483p/kWh and 2.554p/kWh for electricity and mains gas respectively.

**If all measures were implemented this would save the church £704 per year.**

## 2. Introduction

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

An energy survey of the Holy Trinity Church, Seer Green, Church Road, Seer Green, Bucks, HP9 2YA was completed on the 28<sup>th</sup> August 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.

<b>Holy Trinity Church, Seer Green</b>	
Gross Internal Floor Area	215 m <sup>2</sup>
Listed Status	Grade II



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The church typically used for 11.5 hours per week for the following activities

Services	8.5 hours per week
Meetings and Church Groups	2 hours per week
Community Use	1 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, Seer Green and have been reviewed against the current market rates for energy.

The current electricity rates are:

<b>Single / Blended Rate</b>	<b>11.939p/kWh</b>	<b>Below current market rates</b>
<b>Standing Charge</b>	19.06/quarter	N/A

The current gas rates are:

<b>Single / Blended Rate</b>	2.554p/kWh	Below current market rates
<b>Standing Charge</b>	£117.21/quarter	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. We would recommend that when the current contracts come to an end 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:

<b>VAT</b>	5% / 20%	The correct VAT rate is being applied for electricity but not for the last gas bill. The organization is understood to be a charity and therefore should be benefiting from only be charged a 5% VAT rate. A VAT declaration should be sent to the supplier to adjust this.
<b>CCL</b>	100% charged / not charged	The correct CCL rate is being applied for electricity but not for 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.
<b>FiT</b>	100% charged	A FiT charge is being applied. It should be checked that this is being charged in accordance with the supply contract.

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 PCC of Holy Trinity Church, Seer Green should send the gas supplier at VAT declaration confirming this.



## 4. Energy Usage Details

Holy Trinity Church, Seer Green uses 12,395 kWh/year of electricity, costing in the region of £1,550 per year, and 39,799kWh/year of gas, costing £1,020.

This data has been taken from the annual energy invoices provided by the suppliers of the site. Holy Trinity Church, Seer Green has one main electricity meter, serial number K77C16024. There is one gas meter serving the site, serial number 8001483S.

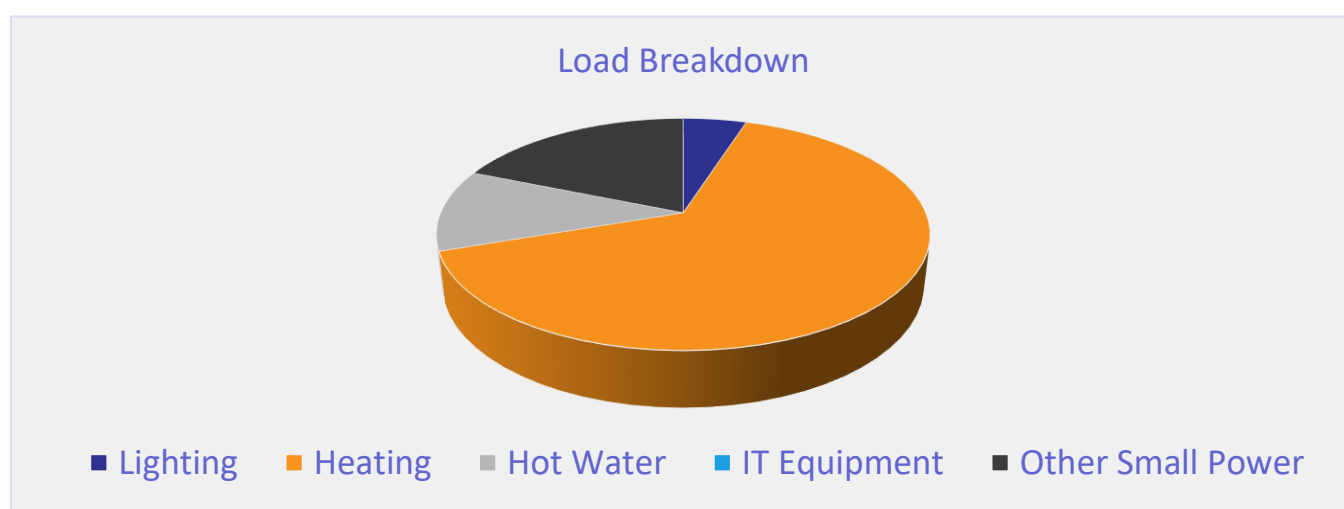
Utility	Meter Serial	Type	Pulsed output	Location
Electricity	K77C16024	1 phase 100A	No pulse or AMR	Behind organ
Gas	8001483S	R5 Meter	No pulse or AMR	External gas meter cupboard

It is recommended that the church consider asking their suppliers to install smart meters 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		5%
Heating		65%
Hot Water		11%
Other Small Power		19%



As can be seen from this data, the heating makes up by far the largest proportion of the energy usage on site. The other significant load is lighting.



## 4.2 Energy Benchmarking

In comparison to national benchmarks for Church energy use Holy Trinity Church, Seer Green uses 188.2% more electricity and 23.4% more heating energy than would be expected for a church of this size.

	Size (m <sup>2</sup> GIA)	Holy Trinity Church, Seer Green use kWh/m <sup>2</sup>	Typical Church use kWh/m <sup>2</sup>	Efficient Church Use kWh/m <sup>2</sup>	Variance from Typical
<b>Holy Trinity Church, Seer Green (elec)</b>	215	57.63	20	10	188.2%
<b>Holy Trinity Church, Seer Green (heating fuel)</b>	215	185.06	150	80	23.4%
<b>TOTAL</b>	215	242.69	170	90	42.8%

The church is over consuming for electricity in quote a significant way. This will be mainly due to the inefficiency lights and a replacement lighting scheme should make a major contribution to the savings.

The heating is over consuming in a minor way and this will be due to the excessive timing set up on the programmer which can be very simply rectified.



## 5. Energy Saving Recommendations

### 5.1 Lighting (fittings)



The lighting makes up a relatively large proportion of the overall electrical load within the building, and all areas are lit by inefficient fittings. The office and vestry have very inefficient fluorescent tube lights, the chancel and nave are lit by highly inefficient PAR38 and Flood lights with 4 pendants. There is one GLS light in the porch and the church hall which is lit has eight T8 quad panel lights. Low energy replacements for these fittings are widely available on the market and it is suggested that the complete fitting (not just the lamp) is replaced. Any new LED fitting would have a much longer life and hence reduce the need to replace the lamps in the ceiling.

It is recommended that all of the fittings, scheduled in Appendix 1, are changed for LED. However, the church may also wish to take the opportunity to improve its lighting rather than just undertake a direct replacement.

A new lighting scheme could involve:

The simple replacement of the office, vestry, WC and church hall lights with new direct replacement LED fittings, a suitable specification would be QVIS fittings, <https://www.qvisled.com/>

The porch light could simply have a replacement LED blub fitted into the existing fitting.

The pendant lights in the nave could be removed, have the wiring and fitting refurbished and fitted with an LED light and then replaced.

The spots and floods within the nave and chancel could all be removed and replaced with LED track spotlights located on top of the wall plate. The use of a track would allow some flexibility for changing the number of lights and their direction easily as well as being a very discrete fitting. Some up-light component on to the roof timbers could provide a nice effect. The colour of the light is very important to consider and something in the region of 3000K would be appropriate for this church. There are many types of track light on the market and one such example would be the JCC Starspot 300K range [https://www.jcc.co.uk/en\\_GB/products/jc14302blk](https://www.jcc.co.uk/en_GB/products/jc14302blk)

To protect the new LED lights from any potential damage from electrical surges from the national grid it is recommended that surge protection unit is installed on the distribution board. Such devices such as <https://www.schneider-electric.com/en/product->





[subcategory/1615-acti9-surge-protection-devices---spds/](#) are widely available from any electrical wholesalers.

All wiring for any new lighting installation should be carried out in FP200Gold cable <https://www.fpcables.co.uk/FP200.html> which is a major improvement on the old Pyro specification.

## 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.

This could be a suitable energy saving measure to fund using the £150 implementation grant available after this audit (see Funding Section later in this report)

## 5.3 Controls

The heating is controlled from a new controller within the office and it is currently set for the church to run from:

06:30 to 09:30 Monday to Friday

05:00 to 10:30 and 17:00 to 19:00 Saturday and Sunday

The main issue is that the timetable type in the settings has been set to be one programme for weekdays and one for weekends. It is recommended that this is change so that the timetable type is set to 'individual days' to allow separate times to be put in for each specific day and then set appropriately. This will avoid the heating having to fire on days such as Saturdays when the church may not be used.

There is a separate zone for the office and vestry area. This is set to run for individual days but these timings do need reviewing as they are currently running for long durations. In the longer term the use of electric panel heaters on a time switch may be a more efficient solution for the office.



## 5.4 Quattro Seal



There is a large main external door in the building. This is a historic timber door on them, but it closes very poorly 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. The main issue is that the hinges create a large gap around the door when it is closed.

It is recommended that a timber strip is carefully cut in and fixed to the stone door surround so the door has something to close up tightly to. Once this is done 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. The base of the door should also have a brush strip fitted to it.

[http://www.theenergysavers.co.uk/application/files/1714/7197/4194/National\\_Trust\\_Case\\_Study.pdf](http://www.theenergysavers.co.uk/application/files/1714/7197/4194/National_Trust_Case_Study.pdf)



## 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
<b>Solar PV</b>	No – very visible roof, no tower roof available
<b>Battery Storage</b>	No – no renewable generation available
<b>Wind</b>	No – unsuitable site
<b>Micro-Hydro</b>	No – no water course
<b>Solar Thermal</b>	No – insufficient hot water needs
<b>Ground Source Heat Pump</b>	No – buried churchyard
<b>Air Source Heat Pump</b>	No – unsuitable fabric and demand profile
<b>Biomass</b>	No – issues with delivery, storage and air pollution

The nature of this church and its usage means that there are unfortunately no renewable energy systems which have good potential at this site and therefore the focus should be on ensuring the most efficient use of the energy which is used and the procurement of energy from green suppliers.



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## 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](http://www.trustforoxfordshire.org.uk) or contact [admin@trustforoxfordshire.org.uk](mailto: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 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
Office	1	4ft Single LED	£4.28	£72.10	16.83
Vestry	2	5ft Single LED	£9.63	£187.40	19.46
WC	1	2D LED 11W	£1.56	£54.55	34.93
Chancel	6	50W LED Flood	£55.54	£547.80	9.86
Chancel	3	R63 LED	£27.70	£64.47	2.33
Nave	8	50W LED Flood	£74.05	£730.40	9.86
Nave	4	AR111 LED	£19.77	£178.16	9.01
Nave	1	R63 LED	£9.23	£21.49	2.33
Porch	1	LED GLS	£4.52	£10.50	2.32
Church hall	8	600 x 600 25W Panel	£34.09	£611.60	17.94

