Energy Audit and Survey Report

St Mary Magdalene Church, Woodstock

"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	16th April 2020	1.0

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1. Executive Summary

An energy survey of St Mary Magdalene Church, Woodstock 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 Mary Magdalene Church, Woodstock is Grade II* listed parish church dating back to 1172 with substantial Victorian updating. It has recently benefited from a high quality replacement of its heating and lighting in around 2017 with LED lights and a high efficiency boiler. There is both gas and electricity supplied to the site.

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 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.

Energy saving recommendation	Estimated Annual Energy Saving (kWh)	Estimated Annual Cost Saving (£)	Estimated capital cost (£)	Payback	Permission needed	CO2 saving (tonnes of CO2e/year)
Switch electricity and gas suppliers to ones which provide 100% renewable or green gas supplies	None	None	Nil	N/A	None	N/A
Adjust controls to change background heating level and summer time pump running.	Approx. 10%	Notable	Low	Under 1 year	List A	Notable
Install draughtproofing to historic external doors	Approx. 5%	Minor	Low	5 to 10 years	List B	Minor
Consider PV array to south aisle roof	Circa 4,000kWh	Notable	High	Around 10 years	Faculty	Notable
Consider use of heat pump when existing boiler reaches end of life	TBC at time of replacement	TBC	High	TBC	Faculty	TBC

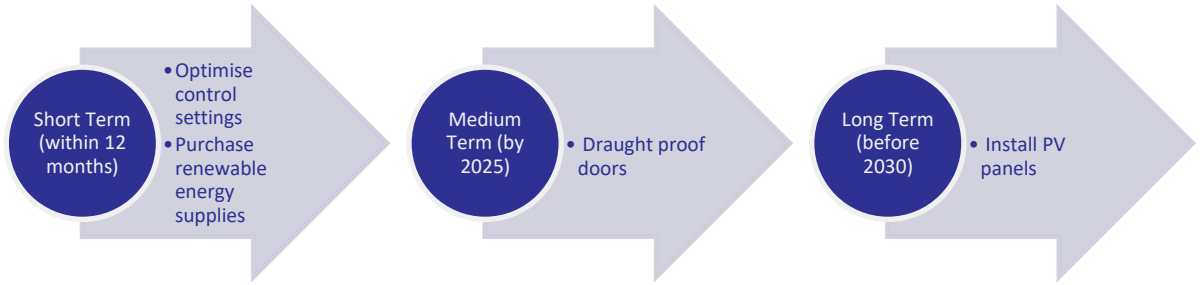
The Church should check any faculty requirements with the DAC Secretary at the Diocese before commencing any works.

No energy bills or usage data have been provided for this audit therefore financial calculations cannot be made.

2. The Route to Net Zero Carbon

The General Synod of the Church of England has indicated that the Church of England should be Net Zero Carbon by 2030. Every church, cathedral, church school and vicarage will therefore need to convert to be a net zero building in the next 10 years.

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 Magdalene Church, Woodstock 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 St Mary Magdalene Church, Woodstock, Park Lane, Woodstock, Oxford, OX20 1SJ was completed on the 8th November 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 Mary Magdalene Church, Woodstock	627292
Gross Internal Floor Area	642 m^2
Listed Status	Grade II*

The church typically used for 26 hours per week for the following activities

Services	12 hours per week
Meetings and Church Groups	4 hours per week
Community Use	10 hour per week

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

4. Energy Procurement Review

No energy bills have been provided for the purpose of this audit therefore a review of the energy procurement has not been possible.

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.

The PC should also check that it is only be charged 5% VAT and not be charged for CCL as the PCC is a charity and has VAT exemption status. If 20% VAT or CCL is being charged the PCC of St Mary Magdalene Church, Woodstock should send the supplier at VAT declaration confirming this.

5. Energy Usage Details

No energy bills or usage data has been provided as part of this audit therefore a review and benchmark of the current consumption has not been possible.

6. Energy Saving Recommendations

6.1 Lighting

The lighting has been recently changed to LED around 2 years ago. The installation is considered to be very good and church should be commended and used as an example of a good quality LED installation.

6.2 Controls

The heating system uses two Remeha Quinta 45 gas condensing boilers to serve a system of mainly larger perimeter radiators. This is currently controlled in a way that delivers background heat at 12°C constantly and heats the building up to 18°C for services. There is also no summer hold off temperature set within the controls so the pump will run constantly.

Background heating is generally discouraged within churches especially those with light use. Given the nature and usage of this church, the complete avoidance of background heating may be considered as undesirable but it should at least be lowered to a level of 10°C. A summer hold off level when the outside air temperature reaches 15°C should also be programmed in, so that the pump and other aspects of the heating system do not run when the outside temperature is warm enough for the heating not to be required.

6.3 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

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 – non-visible roof over south aisle
Battery Storage	Yes – in conjunction with above 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	Potentially using a radial drilling technique but only when existing boilers reach end of life
Air Source Heat Pump	Potentially as an alternative option to ground source heat pump
Biomass	No – not enough heating load as well as air quality issues

There is potential for a small PV array on the roof of the South Aisle which is non-visible. 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 likely to be 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 6 to 8) 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.

As the boilers have been recently installed they should last for another 15 to 20 years. At this point consideration should begiven to the use of heat pump technology and avoid the use of gas. The use of either air source or ground source (using a radial drilling technique to avoid disturbing any archaeology) could both be viable but would need to be review at the point in the future when this becomes more relevant.

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 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.