Energy Efficiency and Zero Carbon Advice

St John's, Whitchurch
Diocese of Oxford

Author	Reviewer	Date	Version
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1. Executive Summary

An energy survey of St John's 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's was built in the 13th century, with some additions later on. There is electricity only supplied to the site which provides under pew heating and LED lighting throughout. Overall, the church can be held up as an excellent example of the improvements that can be carried out to create a zero carbon church.

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 (years)	Permission needed	CO2 saving (tonnes of CO2e/year)
Switch electricity suppliers to ones which provide 100% renewable supplies	None	None	Nil	N/A	None	N/A
Consider install Electric Vehicle Charging Points	0	N/A	£1,250	0.00	Faculty	-
Install a Solar PV array to roof of building (assumed 100% of energy generated used in church and hall)	7,399	£930	£9,384*	10.09	Faculty	2.14

*cost is for PV installation and excludes cost of running cable between church and hall.

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

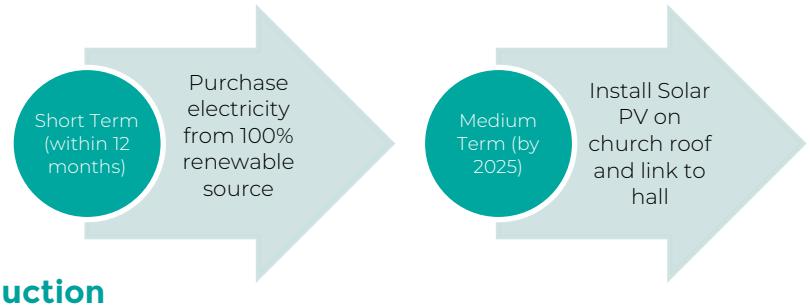
Based on current contracted prices of 12.57p/kWh for electricity.

If all measures were implemented this would save the church £930 per year.

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. Furthermore, the Diocese of Oxford has also declared a climate emergency and has an ambition to be carbon neutral by 2035 and has recently implemented a policy that will not allow the replacement of oil heating systems.

This church has a clear route to become net zero by 2025 by undertaking the following steps:



3. Introduction

This report is provided to the PCC of St John's 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 John's, Church Lane, Whitchurch, Bucks HP22 4JZ was completed on the 17th July 2020 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's	
Church Code	627706
Gross Internal Floor Area	486 m^2
Listed Status	Grade II*

The church typically used for 2 hours per week for the following activities

Type of Use	Hours Per Week (Typical)	Average Number of Attendees
Services	2 hours per week	60
Meetings and Church Groups	0 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.

4. Energy Procurement Review

Energy bills for electricity have been supplied by St John's and have been reviewed against the current market rates for energy.

The current electricity rates are:

Day Rate	11.59p/kWh	In line with current market rates
Night Rate	13.67p/kWh	In line with current market rates
Meter Charges	p/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.

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	Not charged	The correct CCL rate is being applied.

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

5. Energy Usage Details

St John's uses 6,020kWh/year of electricity, costing in the region of £756.59 per year. The church hall next door uses 6,803kWh/year costing in the region of £1,060 per year.

This data has been taken from the annual energy invoices provided by the suppliers of the site. St John's has one main electricity meter, serial number K07W530017.

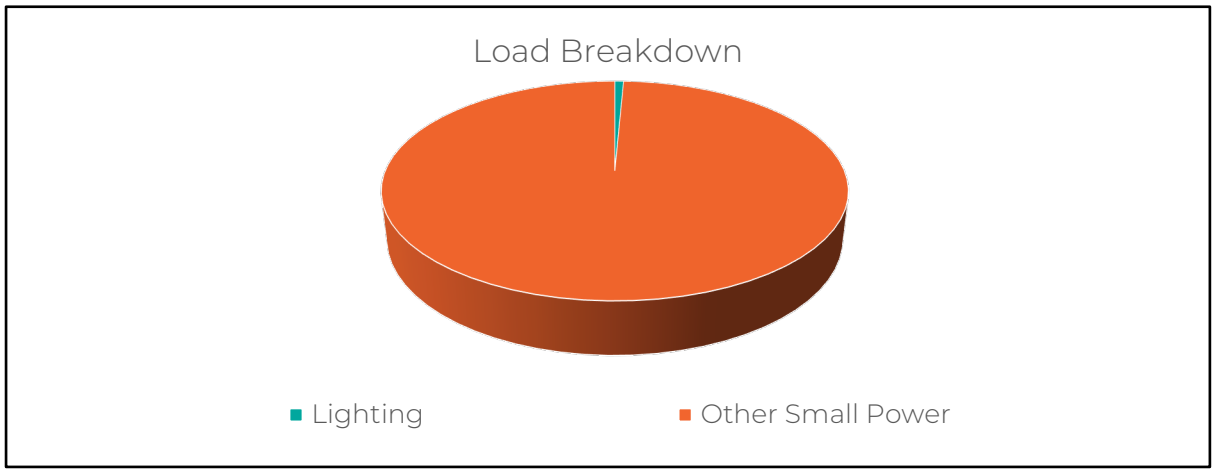
Utility	Meter Serial	Type	Pulsed output	Location
Electricity – Church	K07W530017	Elster A1140	Full AMR Connected	Rear kitchen area

The meter is AMR connected and as such energy profile for the entire energy usage should be possible.

5.1 Energy Profiling

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

Service	Description	Estimated Proportion of Usage
Lighting	Use for LED lamps in the church	3%
Other Small Power	Electric pew heaters,	97%



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

5.2 Energy Benchmarking

In comparison to national benchmarks for Church energy use St John's uses 93% less energy than would be expected for a church of this size. This highly efficient position is a reflection of the wise choice to install electric under pew heaters used only when the church is occupied and to retrofit LED lighting.

	Size (m^2 GIA)	St John's use kWh/m^2	Typical Church use kWh/m^2	Efficient Church Use kWh/m^2	Variance from Typical
St John's (elec)	486	6,020	12.39	20.00	-38%
St John's (heating fuel)	486	0	0.00	150.00	-100%
TOTAL	486	6,020	12.39	170.00	-93%

6. Efficient / Low Carbon Heating Strategy

The church already has a very efficient electric under pew heating strategy where the heaters are used for services only. Within the new, well insulated, parish hall which is next door to the church there is an air source heat pump to provide heating and this too is highly efficient. As such, the church should be commended for its positive actions and used as an example in the diocese of how a church can be made highly efficient and where air source heat pumps can be used effectively.

7. Energy Saving Recommendations

Having review the church and the church hall there are no further energy efficiency measures which would be recommended at this time which reflects the highly efficient position that they are currently in.

7.1 EV Charging Points

The church hall has a car park to the front of it which serves the church 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 boundary wall of the church hall to allow visitors to charge their electric car.

Installing a unit such as a Rolec Securi-Charge http://www.rolecserv.com/ev-charging/news/view/Robust-EV-Charging-With-Rolecs-SecuriCharge-EV-Wall-Unit-Coin-Token-PAYG would allow the organisation control over who is allowed to use the unit with a key operated system. Or given the type of use of the building and control over the usage of the car park as a whole a simple 32 amp type 2 wall pod type charger may be most suitable and these are widely available through many suppliers such as http://www.rolecserv.com/ev-charging/product/EV-Charging-Points-For-The-Home.

Because of the parish office within the building the church as be considered as a place of work and as such installation grants are available through the work place charging scheme https://www.gov.uk/government/publications/workplace-charging-scheme-guidance-for-applicants-installers-and-manufacturers which will fund 75% of the installation cost up to £500.

8. 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 - Large south facing nave roof entirely hidden by parapet. Could feed ASHP to parish hall next door.
Wind	No – no suitable land away from buildings
Battery Storage	Yes– could be used in conjunction with the PV
Micro-Hydro	No – no water course
Solar Thermal	No – insufficient hot water need
Biomass	No – not enough heating load as well as air quality issues
Air Source Heat Pump	No – Already installed in Parish Hall
Ground Source Heat Pump	No – archaeology in ground and radiator system

There is potential for a PV array on the roof of the South Aisle. 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 church uses a very small amount of electricity and therefore any PV installation that would serve just the church would not be financially viable. There is a new church hall next-door and it would be feasible to run a sub0mains cable from the church to the hall so that both buildings came off one electricity supply into which the PV system fed. The church hall has regular day time use and is heated by and air source heat pump and therefore has a regular consistent electrical demand which would mean that a solar PV installation was viable. The Hall itself does not have a suitable south facing roof on which it could install its own PV panels and therefore the only way that it could use on site renewables is to connect to a PV array on the church. A sub mains cable would need to run across the church yard which would be an activity which would need to be well planned with archaeological considerations but as the trench would not need to be deep and would only need to be very narrow to accommodate the width of an armoured cable, these can be minimised.

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. Such a system would be of a considerable benefit to this arrangement in helping to balance the profile between generation time and time of demand.

9. 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. This may be best used for part fund further studies into a PV installation

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.

10. 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.

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