



## Energy Audit Report for St. John the Evangelist



Site Address	St John the Evangelist, Bolton Road, Pendlebury, M27 8XX
Church Code	624142
Author	Ros Harwood, Graduate Consultant
Date	20 <sup>th</sup> February 2020
Version	1.0

# 1 Executive Summary

An energy survey of St John the Evangelist, Bolton Road, Pendlebury, M27 8XX was undertaken by ESOS Energy 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. This audit has been provided in conjunction with 2buy2, the Church of England's Parish Buying scheme provider.

This energy audit has been undertaken by a suitably qualified and experienced energy auditor. Benefits of implementing the opportunities identified in this Report include a reduction in energy costs in the first instance, but could also reduce other costs, increase staff awareness and engagement, and improve comfort and staff satisfaction in the workplace.

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 recommendations over the coming years.

Energy Saving Measure	Annual Energy Savings (kWh)	Annual Cost Savings (£)	Estimated Capital Cost	Payback Period (Years)	Annual Carbon Savings (Tonnes CO <sub>2</sub> e)
Church– replace 28W uplights with 2.5W LEDs	85	£7	£100	14.0	<0.1
Church – replace 100W halogen floodlights with 60W LEDs	266	£23	£400	17.5	<0.1
Copying Room – replace 65W T8 fluorescent tubes with 22W LEDs	36	£3	£20	7.0	<0.1
Kitchen – replace 65W T8 fluorescent tubes with 22W LEDs	18	£2	£10	5.0	<0.1
Toilets - replace 28W CFLs with 7.5W LED alternatives	17	£1	£20	20.0	<0.1
Stairs – replace 28W CFLs with 7.5W LED alternatives	9	£1	£10	10.0	<0.1
Entrances - replace 28W CFLs with 7.5W LED alternatives	17	£1	£20	20.0	<0.1
Entrances – replace 65W T8 fluorescent tubes with 22W LEDs	18	£2	£10	5.0	<0.1
Entrances – replace 100W floodlights with 60W LEDs	33	£3	£50	17.0	<0.1
Clocktower – replace 28W CFLs with 7.5W LED alternatives	17	£2	£20	10.0	<0.1
Cleaning Cupboard – replace 28W CFLs with 7.5W LEDs	9	£1	£10	10.0	<0.1
Vestry – replace 65W T8 tubes and 28W CFLs with 22W and 7.5W LEDs	89	£7	£60	8.5	<0.1
<b>TOTALS</b>	<b>613</b>	<b>£53</b>	<b>£730</b>	<b>14.0</b>	<b>0.8</b>

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The headline messages from the audit are:

- ▲ £730 investment in energy reduction measures would achieve an estimated annual saving of 613kWh (combined electric and gas).
- ▲ Based on current electricity and gas tariffs, this would result in an annual financial saving of £53.
- ▲ The simple payback period on this investment is 14 years.

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

## 2 Church Information

A site survey was undertaken by Ros Harwood on Thursday 20<sup>th</sup> February 2020. The survey was non-invasive (visual only) and entailed a general walk throughout the church areas, including back of house spaces and plant rooms.

**Photograph 1: St John the Evangelist External View**



General Information	
Site Address	St John the Evangelist, Bolton Road, Pendlebury, M27 8XX
Listed Status	Grade II
Building Age	Opened in 1842
Floor Area	450
Usage	8 hours/week

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### 3 Energy Procurement Review

Energy bills for gas and electricity have not been supplied. Current market rates for energy have been used to estimate consumption. Gas bills have been provided by the Client showing that the tariff changes on a monthly basis. For the purposes of this assessment, the average monthly tariff has been calculated.

#### 3.1 Electricity

Day Rate	8.54p/kWh
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#### 3.2 Gas

Rate	1.68p/kWh
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The review has highlighted that there may be opportunities to gain environmental benefits from improved procurement of the energy supplies at this site.

We would therefore recommend that the Church obtains a quotation for its gas and electricity supplies from the CofE Parish Buying scheme (<https://www.parishbuying.org.uk/categories/energy/energy-basket>). This scheme only offers renewably sourced energy and therefore it is an important part of the process of making Churches more sustainable.

### 4 Energy Usage Details

#### 4.1 Cost & Consumption

Energy Type	Annual kWh
Gas	124,107
Electricity	2,942

If not already in place, 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 in use.

#### 4.2 Energy Benchmarking (Based on CofE Shrinking the Footprint – Energy)

Energy Type	Size (Sqm)	Benchmark Energy Use (kWh/Sqm)	Actual Energy Use (kWh/Sqm)	Variance from Benchmark (%)
Gas	450	105	275	162%
Electricity	450	20	7	-65%

The Church using more Gas than expected. The Church is using less Electricity than expected.

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## 5 Building Performance and Opportunities

The building is well run with proactive onsite team in terms of energy conversation with some areas of improvement already being identified. The following sections will highlight where further improvements could potentially be made.

### 5.1 Building Envelope

From visual inspection, the building envelope appears to be in a reasonable state of repair. Wall and roof insulation are not present.

### 5.2 Heating System – Gas Heaters

There is no central boiler providing space heating. Heating is provided to the church via 6no. individual Drugasar gas heaters in the main church and 1no. Drugasar gas heater in the vestry. Each gas heater is vented externally. There is also one portable heater in the vestry. The gas heaters are kept at a minimum of level 2 following advice from an engineer and the temperature is increased up to level 7 one hour before services to allow the building to be heated to the desired temperature for when the demise is scheduled to be occupied. One of the gas heaters is currently not working and needs replacing. Each gas heater is fitted with an individual thermostat to control the temperature. These can be used to manually override if required, to change the temperature or switch off.

The Site contact was unsure of the age of the gas heaters, but given one of the heaters is no longer functioning, the client may wish to explore the possibility of installing a heating system with boilers and installing an air to water heat pump heating system in order to move towards the goal of decarbonising energy consumption.

**Photograph 2: Church Gas Heaters**



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### 5.3 Heating System – Pipework and Distribution

The Drugasar wall gas heaters, work by heating the air directly. They do not heat water and there is no associated pipework. Therefore, there is no requirement for insulating around any pipework.

### 5.4 Heating System – Heat Emitters

Heating to the church is predominantly served via gas heaters supplied by heating pipes fixed to the walls.

A portable plug-in heater is present in the vestry to provide additional heating to the offices when required. This can be an ineffective, inefficient and poorly controlled means of providing space heating, and can easily be left on when unoccupied. It is recommended that a more permanent heating solution be provided to these spaces if and when heating upgrades are undertaken.

**Photographs 3: Portable Heater in Vestry**



### 5.5 Hot Water System

Hot water is provided to the building via a 2.0-2.2kW 1.5L Heatrae Sadia Hotflo 15 water heater located in the kitchen, serving the kitchen and the toilets. Hot water consumption is considered to be nominal.

**Photograph 4: Water Heater**



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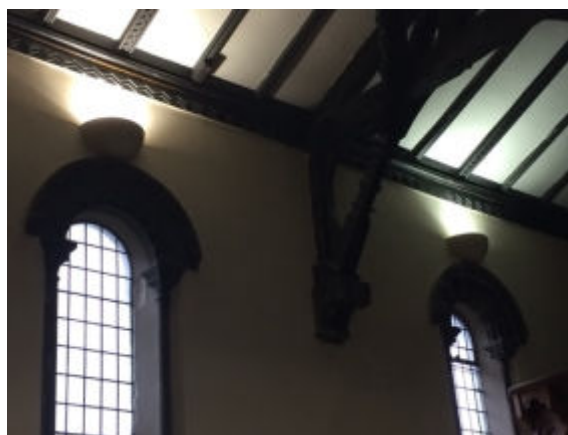
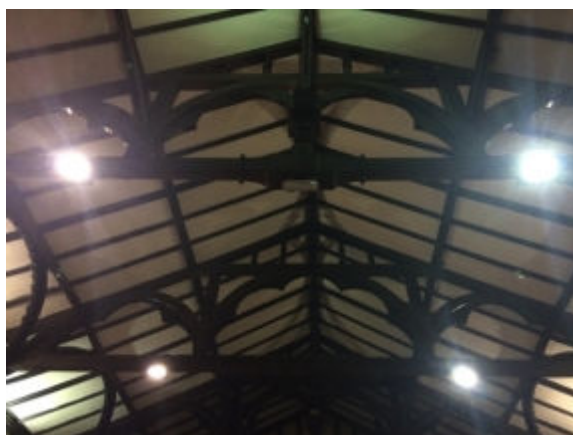
## 5.6 Lighting

There is no lighting control system, motion detectors or daylight dimming controls. All light fittings are controlled via manual on/off switches.

The range of light fittings throughout the church areas are detailed below:

### Main Church

- ▲ 10no. 28W uplighters - recommended to be replaced with 7.5W LED alternatives.
- ▲ 16no. 100W halogen floodlights – recommended to be replaced with 60W LED alternatives.



**Photographs 6 & 7: Church Light Fittings**

### Copying Room

- ▲ 2no. 65W fluorescent T8 tubes – recommended to be replaced with 22W LED alternatives.

**Photographs 8: Fluorescent Tube Light Fittings**



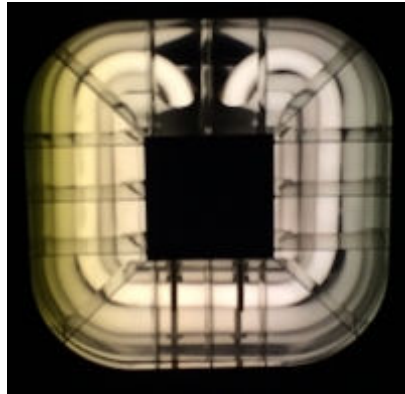
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### Kitchens

- ▲ 1no. 65W fluorescent T8 tubes – recommended to be replaced with a 22W LED alternatives.

### Toilets

- ▲ 2no. 28W compact fluorescent lamps – recommended to be replaced with 7.5W LED alternatives



**Photograph 9: Compact Fluorescent Lamp (CFL)**

### Stairwell

- ▲ 1no. 28W compact fluorescent lamps – recommended to be replaced with 7.5W LED alternatives.

### Entrances

- ▲ 2no. 28W fluorescent lamps – recommended to be replaced with 7.5W LED alternatives.



- ▲ 1no. 65W fluorescent T8 tubes – recommended to be replaced with a 22W LED alternatives.
- ▲ 2no. 100W halogen outdoor floodlights – recommended to be replaced with 60W LED alternatives.

**Photograph 10: Halogen Outdoor Floodlights**



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### **Clocktower**

- ▲ 2no. 28W compact fluorescent lamps – recommended to be replaced with 7.5W LED alternatives.

### **Cleaning Cupboard**

- ▲ 1no. 28W fluorescent lamps – recommended to be replaced with 7.5W LED alternatives.

### **Vestry**

- ▲ 4no. 65W fluorescent T8 tubes – recommended to be replaced with 22W LED alternatives

### **Vestry Toilets**

- ▲ 2no. 28W compact fluorescent lamps – recommended to be replaced with 7.5W LED alternatives

## **5.7 Renewables**

There are currently no renewables on-site. A free desktop survey can be carried out by a specialist solar installer to identify the possibility of installing solar PV panels.

The church is currently considering a retrofit of LED lighting in place of all existing fittings and the fitting of 4kW solar panels with battery system for the church.

## 6 Potential Saving Opportunities

As part of the assessment, we carry out a close inspection of M&E plant and their associated controls, with the aim of identifying any issues that have significant impact on energy consumption and correct building operation. We have reviewed the building and associated HVAC and lighting operations and identified the following potential energy conservation opportunities (ECOs), which should be investigated:

Category	Actions	Potential Annual Savings			Investment (£)	Simple payback (yrs.)
		Elec/Gas (kWh)	Cost (£)	(tCO <sub>2</sub> )		
Lighting	Main Church– replace 28W uplights with 2.5W LED alternatives.	85	£7	<0.1	£100	14.0
Lighting	Main Church – replace 100W halogen floodlights with 60W LEDs	266	£23	<0.1	£400	17.5
Lighting	Copying Room – replace 65W T8 fluorescent tubes with 22W LEDs	36	£3	<0.1	£20	7.0
Lighting	Kitchen – replace 65W T8 fluorescent tubes with 22W LEDs	18	£2	<0.1	£10	5.0
Lighting	Toilets - replace 28W CFLs with 7.5W LED alternatives.	17	£1	<0.1	£20	20.0
Lighting	Stairs – replace 28W fluorescent lamps with 7.5W LED alternatives.	9	£1	<0.1	£10	10.0
Lighting	Entrances - replace 28W fluorescent lamps with 7.5W LED alternatives.	17	£1	<0.1	£20	20.0
Lighting	Entrances – replace 65W T8 fluorescent tubes with 22W LEDs	18	£2	<0.1	£10	5.0
Lighting	Entrances – replace 100W halogen floodlights with 60W LEDs	33	£3	<0.1	£50	17.0
Lighting	Clocktower – replace 28W CFLs with 7.5W LED alternatives.	17	£2	<0.1	£20	10.0
Lighting	Cleaning Cupboard – replace 28W fluorescent lamp with 7.5W LEDs	9	£1	<0.1	£10	10.0
Lighting	Vestry – replace 65W T8 fluorescent tubes with 22W LED alternatives.	72	£6	<0.1	£40	7.0
Lighting	Vestry toilets – replace 28W CFLs with 7.5W LED alternatives.	17	£1	<0.1	£20	20.0
<b>TOTAL ELECTRICITY SAVINGS</b>		<b>613</b>	<b>£53</b>	<b>&lt;0.1</b>	<b>£730</b>	<b>14.0</b>
<b>TOTAL GAS SAVINGS</b>		<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>
<b>GRAND TOTAL</b>		<b>613</b>	<b>£53</b>	<b>&lt;0.1</b>	<b>£730</b>	<b>14.0</b>

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## 7 Assumptions

### 7.1 Assumptions

- ▲ Costs excludes labour, installation and access which will require the confirmation of a specialist contractor.
- ▲ Average cost of electricity at 8.54p/kWh.
- ▲ Average cost of gas at 1.68p/kWh.
- ▲ Electricity carbon emission rate of 0.31598 kgCO<sub>2</sub>/kWh.
- ▲ Natural Gas carbon emission rate of 0.20776 kgCO<sub>2</sub>/kWh.

### 7.2 Economic Life

CIBSE Guide M Appendix 12.A1 gives the economic life of plant common plant items. After this time the maintenance and repair make it economic to replace the asset. There will be energy savings inherent in the new equipment and the need to meet the minimum requirements of the Building Regulations. Some capital plant has long payback periods, when based on energy efficiency alone, but these should be part of an asset replacement programme with only the 'additional' cost of higher than minimum required energy standards being used to calculate ROI.

### 7.3 Implementation

Reviews of Energy Projects and Initiatives are designed to provide a high-level indication of options available clients and will not constitute a recommendation for implementation. Pricing and potential savings are indicative values and will not constitute an offer.

### 7.4 Cumulative Savings and Double Counting

It should be noted that further investigation may rule out some measures as impractical, either physically or financially. Some measures are mutually exclusive and provide diminishing returns if implemented together. For example, if the lighting load is reduced through more efficient lighting, there will be an increase in the heat demand on boilers, as the new lights generate less heat.

Each energy conservation measure is assessed independently at this stage so that they can be fairly compared. An assessment of any overlap will be undertaken once any projects are selected for implementation.

## 8 Funding Sources

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-Nov-2019.pdf>

## 9 Faculty Requirements

It must be noted that all works intended to be undertaken should be discussed with the DAC at the Diocese.

Minor works 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.

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Major 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,

## 10 Limitations

The recommendations contained in this Report represent ESOS Energy's professional opinions, based upon the information listed in the Report, exercising the duty of care required of an experienced Sustainability Consultant.

ESOS Energy obtained, reviewed and evaluated information in preparing this Report from the Client and others. ESOS Energy conclusions, opinions and recommendations has been determined using this information. ESOS Energy does not warrant the accuracy of the information provided to it and will not be responsible for any opinions which ESOS Energy has expressed, or conclusions which it has reached in reliance upon information which is subsequently proven to be inaccurate.

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