



# Energy Audit Report for St. James Mission Church



Site Address	St. James Mission Church, Turton, BL7 0PW
Church Code	624388
Author	Tim Mawby Graduate Consultant
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## 1 Executive Summary

An energy survey of St. James Mission Church, Turton, BL7 0PW 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 these 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)
Replace the existing boilers with new condensing gas boilers.	15,750	£473	£16,000	4.7	33.8
Install timers to the heating systems.	2,625	£79	£100	1.3	0.5
Church – replace metal halide with LED alternatives.	2,446	£245	£840	3.4	0.8
Vestry/Storage – replace fluorescent tubes with LED alternatives.	79	£8	£20	2.5	<0.1
School Club – replace CFLs with LED alternatives.	311	£31	£100	3.2	0.1
School Storeroom – replace CFLs with LED alternatives.	62	£6	£20	3.3	<0.1
WC – replace pendant lamps with LED alternatives.	72	£7	£20	2.9	<0.1
Kitchen – replace fluorescent tube with a LED alternative.	39	£4	£10	2.5	<0.1
<b>TOTAL SAVINGS</b>	<b>21,384</b>	<b>£852</b>	<b>£17,110</b>	<b>3.9</b>	<b>20.0</b>

The headline messages from the audit are:

- ▲ £17,110 investment in energy reduction measures would achieve an estimated annual saving of 21,384kWh (combined electric and gas).
- ▲ Based on current electricity and gas tariffs, this would result in an annual financial saving of £852.
- ▲ The simple payback period on this investment is 20.0 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 Tim Mawby on Friday 17<sup>th</sup> January 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. James Mission Church External View**



General Information	
Site Address	St. James Mission Church Turton BL7 0PW
Listed Status	Not listed
Building Age	Built in 1905
Floor Area	Approximately 500m <sup>2</sup>
Usage	Typically 21 hours per week

### 3 Energy Procurement Review

Energy bills for electricity and gas have not been supplied. Estimated market rates for energy have been used to estimate consumption.

#### 3.1 Electricity

Day Rate	10.00 p/kWh
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#### 3.2 Gas

Rate	3.00 p/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.pariahbuying.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	75,300
Electricity	9,680

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	500	105	150	43%
Electricity	500	20	19	5%

The Church is using slightly more Electricity than expected.

The Church is using more Gas than expected.

## 5 Building Performance and Opportunities

The building is well run with proactive on-site 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. All windows contain double-glazing. Wall and roof insulation are not present.

### 5.2 Heating System – Boilers

Heating is provided by 2no. Ideal Concord CX gas fired boilers (installed approximately 30 years ago) located in the basement plant room. One of these boilers serves the ground floor school club, whilst the other serves the first-floor church. Both systems are controlled manually, therefore, it is recommended that timers are installed to reduce the risk of accidentally leaving the systems on whilst the corresponding space is unoccupied. Based on the age of the boilers, it is assumed that the efficiency of the units may have dropped to as little as 60%. As such, it is recommended that the boilers are replaced with high efficiency gas condensing boilers.

It is recommended that the existing gas boilers be replaced with modern alternatives. Additionally, the client may consider exploring the possibility of installing air to water heat pump heating systems in order to move towards the goal of decarbonising energy consumption.

**Photograph 2: Church Boilers**



### 5.3 Heating System – Pipework and Distribution

The heating systems' pipework is in good repair, with well-maintained insulating lagging in good condition. As such, no recommendations have been made in this area.

**Photograph 3: Heating System Pipework**



### 5.4 Heating System – Heat Emitters

Heating to the church is provided via 10no. iron radiators supplied by heating pipes fixed to the walls. There is also a Redring Sunspot 2.25 electric curtain heater situated above the main entrance. Heating to the ground floor school club is provided by 2no. wall-mounted cased-radiators, as well as 2no. wall-mounted gas storage heaters. There are also 2no. cased-radiators in WC areas and another in the school club storeroom.

A range of portable plug-in heaters are also present throughout the building and are used to provide additional heating to the smaller rooms 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 4 & 5: Radiator and Electric Curtain Heater**



## 5.5 Hot Water System

Hot water is provided to the WCs via a Heatrae Sadia Multipoint 15 electric water heater. An Ariston electric water heater provides hot water to the kitchen. Hot water consumption is considered to be minimal.

**Photographs 6 & 7: Water Heaters**



## 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:

### Church

- ▲ 14no. 250W metal halide floodlights – recommended to be replaced with 90W LED alternatives.

**Photograph 8: Metal Halide Floodlights**





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### **Vestry/Storage**

- ▲ 2no. 58W T8 Fluorescent tubes – recommended to be replaced with 22W LED alternatives.

**Photograph 9: Fluorescent Tubes**



### **School Club**

- ▲ 10no. 36W compact fluorescent lamps – recommended to be replaced with 7.5W LED alternatives.

**Photograph 10: Compact Fluorescent Lamps**



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### School Storeroom

- ▲ 2no. 36W compact fluorescent lamps – recommended to be replaced with 7.5W LED alternatives.

### WC

- ▲ 4no. 20W fluorescent pendant lamps – recommended to be replaced with 3.5W LED alternatives.

**Photograph 11: Fluorescent Pendant Lamps**



### Kitchen

- ▲ 1no. 58W T8 fluorescent tube – recommended to be replaced with a 22W LED alternative.

## 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.

## 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> )		
Heating	Replace the existing boilers with new condensing gas boilers (increase 60% to 90% efficiency)	15,750	£473	3.3	£16,000	33.8
Heating	Install timers to the heating systems. (estimated 5% saving)	2,625	£79	0.5	£100	1.3
Lighting	Church – replace 250W metal halide with 90W LED alternatives.	2,446	£245	0.8	£840	3.4
Lighting	Vestry/Storage – replace 58W Fluorescent tubes with 22W LED alternatives.	79	£8	<0.1	£20	2.5
Lighting	School Club – replace 36W CFLs with 7.5W LED alternatives.	311	£31	0.1	£100	3.2
Lighting	School Storeroom – replace 36W CFLs with 7.5W LED alternatives.	62	£6	<0.1	£20	3.3
Lighting	WC – replace 20W pendant lamps with 3.5W LED alternatives.	72	£7	<0.1	£20	2.9
Lighting	Kitchen – replace 58W fluorescent tube with a 22W LED alternative.	39	£4	<0.1	£10	2.5
<b>TOTAL ELECTRICITY SAVINGS</b>		<b>3,009</b>	<b>£301</b>	<b>1.0</b>	<b>£1,010</b>	<b>3.4</b>
<b>TOTAL GAS SAVINGS</b>		<b>18,375</b>	<b>£551</b>	<b>3.8</b>	<b>£16,100</b>	<b>29.2</b>
<b>GRAND TOTAL</b>		<b>21,384</b>	<b>£852</b>	<b>4.8</b>	<b>£17,110</b>	<b>20.0</b>

## 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 10.00p/kWh.
- ▲ Average cost of gas at 3.00p/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.

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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