



## Energy Audit Report for St. Michael's Church



Site Address	St. Michael's Church, Middleton, M24 1BT
Church Code	624362
Author	Tim Mawby Graduate Consultant
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## 1 Executive Summary

An energy survey of St. Michael's Church, Middleton, M24 1BT 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)
Church – replace fluorescent tubes with LED alternatives.	1,056	£106	£470	4.4	0.3
Church – replace halogen floodlights with LED alternatives.	655	£66	£350	5.3	0.2
Church – replace pendant lamps with LED alternatives.	309	£31	£150	4.8	0.1
Choir Vestry – replace fluorescent tubes with LED alternatives.	45	£4	£20	5.0	<0.1
Vicar's Vestry – replace twin fluorescent tube with a LED alternative.	45	£4	£20	5.0	<0.1
Entrance – replace pendant lamp with a LED alternative.	31	£3	£15	5.0	<0.1
<b>TOTAL SAVINGS</b>	<b>2,141</b>	<b>£214</b>	<b>£1,025</b>	<b>4.8</b>	<b>0.7</b>

The headline messages from the audit are:

- ▲ £1,025 investment in energy reduction measures would achieve an estimated annual saving of 2,141kWh (combined electric and gas).
- ▲ Based on current electricity and gas tariffs, this would result in an annual financial saving of £214.
- ▲ The simple payback period on this investment is 4.8 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 Thursday 16<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. Michael's Church External View**



<b>General Information</b>	
Site Address	St. Michael's Church Middleton M24 1BT
Listed Status	Not Listed
Building Age	Built circa 1890
Floor Area	Approximately 800m <sup>2</sup>
Usage	Typically 12 hours per week

### 3 Energy Procurement Review

Energy bills for gas and electricity 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	123,996
Electricity	6,924

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	800	105	155	48%
Electricity	800	20	9	-55%

The Church is using more Gas than expected. The Church is using less Electricity 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. Wall and roof insulation are not present.

### 5.2 Heating System – Boilers

Heating is provided to the church via 2no. Keston Heat 55 gas condensing boilers (installed in 2013) located in the basement plant room. Both boilers are in good condition and are well-maintained. These are operated using a timer, which is programmed weekly by the church warden. The system has been set to switch on 15 minutes before the scheduled occupancy of the church.

As the boilers are considered to be a relatively new models suitable for the heating demand of the church, no recommendations are made for the replacement of alternative technologies. However, it is recommended that the controls are reviewed regularly to prevent unnecessary usage.

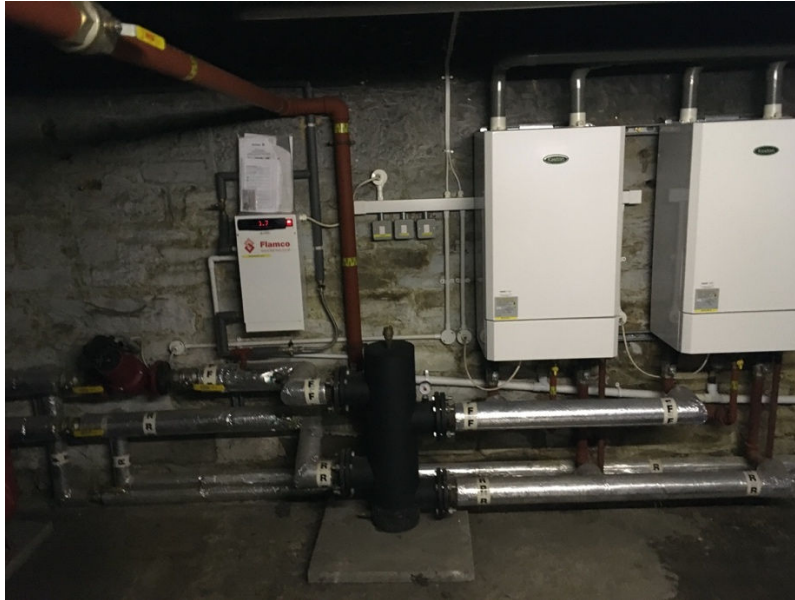
**Photograph 2: Church Boilers**



### 5.3 Heating System – Pipework and Distribution

The heating system 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 Pipework**



### 5.4 Heating System – Heat Emitters

Heating to the church is provided by 22no. cast iron radiators. There are an additional 3no. radiators located throughout the building. These radiators are supplied by heating pipes fixed to the walls. Radiators are typically obstructed by furniture which limits the effectiveness of the heating. It is advised that items are removed from the immediate vicinity to allow for better heat convection in the space.

There are also 3no. wall-mounted electric heaters situated in the choir vestry. Whilst on-site, it was noted that 2no. of these heaters are disconnected, and the other is rarely used.

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: Heat Emitters**



## 5.5 Hot Water System

Hot water is provided to the choir vestry and WC via 2no. electric Triton point of use water heaters. Hot water consumption is considered to be minimal.

**Photograph 6: Electric Point of Use 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

- ▲ 47no. 58W T8 fluorescent tubes – recommended to be replaced with 22W LED alternatives.
- ▲ 7no. 200W halogen floodlights – recommended to be replaced with 50W LED alternatives.
- ▲ 10no. pendant fluorescent lamps – each consisting of 3no. 20W bulbs – recommended to be replaced with 3.5W LED alternatives.

**Photographs 7 & 8:**



### Choir Vestry

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



**Photograph 9: Fluorescent Tubes**



**Vicar's Vestry**

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

**Photograph 12: Twin Fluorescent Tube**



**Entrance**

- ▲ 1no. pendant fluorescent lamp – each consisting of 3no. 20W bulbs – recommended to be replaced with 3.5W 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.

## 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	Church – replace 58W fluorescent tubes with 22W LED alternatives.	1,056	£106	0.3	£470	4.4
Lighting	Church – replace 200W halogen floodlights with 50W LEDs.	655	£66	0.2	£350	5.3
Lighting	Church – replace 3x20W pendant lamps with 3.5W LED alternatives.	309	£31	0.1	£150	4.8
Lighting	Choir Vestry – replace 58W fluorescent tubes with 22W LEDs.	45	£4	<0.1	£20	5.0
Lighting	Vicar’s Vestry – replace twin 58W fluorescent tube with a 22W LEDs.	45	£4	<0.1	£20	5.0
Lighting	Entrance – replace 3x20W pendant lamp with 3.5W LED alternatives.	31	£3	<0.1	£15	5.0
<b>TOTAL ELECTRICITY SAVINGS</b>		<b>2,141</b>	<b>£214</b>	<b>0.7</b>	<b>£1,025</b>	<b>4.8</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>2,141</b>	<b>£214</b>	<b>0.7</b>	<b>£1,025</b>	<b>4.8</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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