



Energy Audit Report for St. Nicholas' Church



Site Address	St. Nicholas' Church, Burnage, M19 1PL
Church Code	624168
Author	Tim Mawby Graduate Consultant
Date	17 th December 2019
Version	1.0

Contents

1	Executive Summary	3
2	Church Information.....	4
3	Energy Procurement Review.....	5
3.1	Electricity	5
3.2	Gas.....	5
4	Energy Usage Details	5
4.1	Cost & Consumption	5
4.2	Energy Benchmarking (Based on CofE Shrinking the Footprint – Energy)	5
5	Building Performance and Opportunities.....	6
5.1	Building Envelope	6
5.2	Heating System – Boilers.....	6
5.3	Heating System – Pipework and Distribution.....	6
5.4	Heating System – Heat Emitters	7
5.5	Hot Water System	7
5.6	Lighting.....	8
5.7	Renewables.....	10
6	Potential Saving Opportunities	11
7	Assumptions.....	12
7.1	Assumptions.....	12
7.2	Economic Life.....	12
7.3	Implementation.....	12
7.4	Cumulative Savings and Double Counting	12
8	Funding Sources	12
9	Faculty Requirements	12
10	Limitations	13

1 Executive Summary

An energy survey of St. Nicholas' Church, Kingsway, Burnage, M19 1PL 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 _{2e})
Main Church – replace 100W halogen uplights with 12.5W LED alternatives.	1,911	£191	£140	0.7	0.6
Main Church – replace 200W halogen with 60W LED alternatives.	1,310	£131	£300	2.3	0.4
Main Church – replace 28W CFLs with 7.5W LED alternatives.	160	£16	£50	3.1	0.1
Church Hall – replace 200W halogen floodlights 60W LED alternatives.	874	£87	£200	2.3	0.3
Church Hall - replace 28W CFLs with 7.5W LED alternatives.	256	£26	£80	3.1	0.1
Vestry – replace 28W CFLs with 7.5W LED alternatives.	96	£10	£30	3.0	<0.1
Kitchen – replace 58W T8 twin fluorescent tubes with 22W LED alternatives.	112	£11	£20	1.8	<0.1
Storage Rooms – replace 28W CFLs with 7.5W LED alternatives.	128	£13	£40	3.1	<0.1
Meeting Room – replace 20W fluorescent spotlights with 3.5W LED alternatives.	618	£62	£120	2.0	0.2
Meeting Room – replace 28W CFLs with 7.5W LED alternatives.	96	£10	£30	3.0	<0.1
Corridors – replace 28W CFLs with 7.5W LED alternatives.	384	£38	£120	3.2	0.1
TOTALS	5,945	£595	£1,130	1.9	1.9

The headline messages from the audit are:

- ▲ £1,130 investment in energy reduction measures would achieve an estimated annual saving of 5,945kWh (combined electric and gas).
- ▲ Based on current electricity and gas tariffs, this would result in an annual financial saving of £595.
- ▲ The simple payback period on this investment is 1.9 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 Wednesday 4th December 2019. 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. Nicholas' Church External View



General Information	
Site Address	St. Nicholas' Church, Kingsway, Burnage, M19 1PL
Listed Status	Grade II Listed
Building Age	Built in 1932
Floor Area	Approximately 790m ²
Usage	Typically 30 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
----------	-------------

3.2 Gas

Rate	3.00 p/kWh
------	------------

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	Not Provided
Electricity	Not Provided

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	790	105	Not Provided	Not Provided
Electricity	790	20	Not Provided	Not Provided

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 – Boilers

Heating is provided to the church via 3no. Keston gas condensing boilers (installed in 2018) located in the basement plant room. Each boiler serves a different area; the first serving the rear of the church; another serves the main body of the church, and the last serves the underfloor heating system. The boilers' heating schedule is currently programmed to be active for 40 hours per week. This is currently 10 hours longer than the building is occupied for to allow the building to be heated to the desired temperature for when the demise is scheduled to be occupied. Control panels are located throughout the church, allowing for manual overrides so that the system can be switched on outside of the programmed hours, as well as the changing of the temperature set point.

While the boiler appears to be in good order, and is not at the end of its expected lifetime the client may wish to explore the possibility of installing an air to water heat pump heating system 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' plant room pipework is generally good, with 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 predominantly served via underfloor heating, however there are also 9no. radiators supplied by heating pipes fixed to the walls. There are also 4no. ceiling vents (photograph 5) that provide heating and ventilation to the first-floor meeting room.

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: Church Heat Emitters



5.5 Hot Water System

Hot water is provided to the building via 2no. Optima electric water heaters, serving kitchen and WC areas. There is also a 5-litre Instanta 1000-C electric point of use water heater located in the kitchen. Hot water consumption is considered to be nominal.

Photograph 6: Electric Water Heater



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

- ▲ 14no. 100W halogen uplights – recommended to be replaced with 12.5W LED alternatives.
- ▲ 6no. 200W halogen floodlights – recommended to be replaced with 60W LED alternatives.
- ▲ 5no. 28W compact fluorescent lamps – recommended to be replaced with 7.5W LED alternatives.

Photographs 7, 8 & 9: Church Light Fittings



Church Hall

- ▲ 4no. 200W halogen floodlights – recommended to be replaced with 60W LED alternatives.
- ▲ 8no. 28W compact fluorescent lamps – recommended to be replaced with 7.5W LED alternatives.

Photographs 10 & 11: Church Hall Light Fittings



Vestry

- ▲ 3no. 28W compact fluorescent lamps – recommended to be replaced with 7.5W LED alternatives.

Kitchen

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

Photograph 12: Twin Fluorescent Tube



Storage Rooms

- ▲ 4no. 28W compact fluorescent lamps – recommended to be replaced with 7.5W LED alternatives.

Meeting Room

- ▲ 12no. 20W twin fluorescent spotlights – recommended to be replaced with 3.5W LED alternatives.
- ▲ 3no. 28W compact fluorescent lamps – recommended to be replaced with 7.5W LED alternatives.

Photograph 13: Twin Fluorescent Spotlights



Corridors

- ▲ 12no. 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.

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 ₂)		
Lighting	Main Church – replace 100W halogen uplights with 12.5W LED alternatives.	1,911	£191	0.6	£140	0.7
Lighting	Main Church – replace 200W halogen with 60W LED alternatives.	1,310	£131	0.4	£300	2.3
Lighting	Main Church – replace 28W CFLs with 7.5W LED alternatives.	160	£16	0.1	£50	3.1
Lighting	Church Hall – replace 200W halogen floodlights 60W LED alternatives.	874	£87	0.3	£200	2.3
Lighting	Church Hall - replace 28W CFLs with 7.5W LED alternatives.	256	£26	0.1	£80	3.1
Lighting	Vestry – replace 28W CFLs with 7.5W LED alternatives.	96	£10	<0.1	£30	3.0
Lighting	Kitchen – replace 58W T8 twin fluorescent tubes with 22W LED alternatives.	112	£11	<0.1	£20	1.8
Lighting	Storage Rooms – replace 28W CFLs with 7.5W LED alternatives.	128	£13	<0.1	£40	3.1
Lighting	Meeting Room – replace 20W twin fluorescent spotlights with 3.5W LED alternatives.	618	£62	0.2	£120	2.0
Lighting	Meeting Room – replace 28W CFLs with 7.5W LED alternatives.	96	£10	<0.1	£30	3.0
Lighting	Corridors – replace 28W CFLs with 7.5W LED alternatives.	384	£38	0.1	£120	3.2
TOTAL ELECTRICITY SAVINGS		5,945	£595	1.9	£1,130	1.9
TOTAL GAS SAVINGS		N/A	N/A	N/A	N/A	N/A
GRAND TOTAL		5,945	£595	1.9	£1,130	1.9

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 kgCO₂/kWh.
- ▲ Natural Gas carbon emission rate of 0.20776 kgCO₂/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.

This Report was prepared by ESOS Energy for the sole and exclusive use of the Client and for the specific purpose for which ESOS Energy was instructed. Nothing contained in this Report shall be construed to give any rights or benefits to anyone other than the Client and ESOS Energy, and all duties and responsibilities undertaken are for the sole and exclusive benefit of the Client and not for the benefit of any other party. In particular, ESOS Energy does not intend, without its written consent, for this Report to be disseminated to anyone other than the Client or to be used or relied upon by anyone other than the Client. Use of the Report by any other person is unauthorised and such use is at the sole risk of the user. Anyone using or relying upon this Report, other than the Client, agrees by virtue of its use to indemnify and hold harmless ESOS Energy from and against all claims, losses and damages (of whatsoever nature and howsoever or whensoever arising), arising out of or resulting from the performance of the work by the Consultant.