Energy Audit Report for St. James & St. Bede

Site Address	St James & St Bede, NE8 3HE
Church Code	613072
Author	Tim Mawby Graduate Consultant
Date	11th December 2019
Version	1.0

1 Executive Summary

An energy survey of St. James & St. Bede and St. Edmund, NE8 3HE 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 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 Measure	Annual Energy Savings (kWh)	Annual Cost Savings (£)	Estimated Capital Cost	Payback Period (Years)	Annual Carbon Savings (Tonnes CO2e)
Ensure that the pipes are properly insulated (estimated 3% saving)	651	£32	£100	3.1	0.1
Set a timer on the heating for regular events (estimated 10% saving)	2,170	£108	£0	Immediate	0.5
Church - replace the 58W fluorescent tubes with 22W LEDs	808	£127	£480	3.8	0.3
Church - replace twin fluorescent tubes with 22W alternatives	135	£21	£80	3.8	<0.1
Workshop - replace twin 70W T8 fluorescent tube with 22W LED alternatives	539	£85	£240	2.8	0.2
Workshop - 25W spotlights, replace these with 3.5W LEDs	141	£22	£35	1.6	<0.1
Workshop - replace 36W compact fluorescent tubes with 7.5W LEDs	107	£17	£40	2.4	<0.1
Entrance - replace compact fluorescent 36W lights with 7.5W alternatives	53	£8	£20	2.5	<0.1
Office - replace the twin 58W T8 fluorescent tube with 22W LEDs	67	£10	£40	4.0	<0.1
Vestry - replace the twin 70W fluorescent tubes with 22W LEDs	90	£14	£40	2.9	<0.1
St Hilde - replace the twin 70W fluorescent tubes with 22W LEDs	90	£14	£40	2.9	<0.1
St Hilde - replace the 100W halogen wall lights with 3.5W alternatives	181	£28	£10	0.4	0.1

WC - replace 36W compact fluorescent lights with 7.5W LEDs	107	£17	£40	2.4	<0.1
Kitchen - replace twin T8 58W bulbs with 22W LED alternatives	270	£42	£160	3.8	0.1
TOTALS	**5,409**	**£484**	**£1,325**	**2.7**	**1.4**

The headline messages from the audit are:

- £1,325 investment in energy reduction measures would achieve an estimated annual saving of 5,409kWh (combined electric and gas).
- Based on current electricity and gas tariffs, this would result in an annual financial saving of £484.
- The simple payback period on this investment is 2.7 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 Monday 9th 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. James & St. Bede Church External View

General Information	
Site Address	St. James & St. Bede, 70 Medway Crescent Gateshead NE8 3SN
Listed Status	Not a Listed building
Building Age	Built in 1898
Floor Area	460
Usage	Typically 18 hours per week

3 Energy Procurement Review

Energy bills for gas and electricity have been supplied and have been reviewed against the current market rates for energy.

3.1 Electricity

Day Rate	15.76 p/kWh

3.2 Gas

Rate	4.99 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	28,912
Electricity	8,943

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	460	105	275	160%
Electricity	460	20	19	-5%

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 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 reasonably good state of repair. As such, no recommendations have been made in this area.

5.2 Heating System – Boilers

Heating is provided to the Church through a Baxi Platinum Combination boiler that is stored in the Vestry; the timer is not used on the boiler it is just switched on when needed – recommend that the timer is used as this can save 10%.

There is a second boiler which is located in the cleaners' closet, this is a Baxi gas combination boiler (photograph 2) and it heats the other parts of the building including the offices and WC. There is no timer on this boiler either, so it is recommended that this is implemented, to make sure that it is only used when necessary.

It is recommended that the client explores the possibility of installing an air source heat pump heating system in order to move towards the goal of decarbonising energy consumption

Photograph 2: Church Boiler

5.3 Heating System – Pipework and Distribution

The heating systems' plant room pipework is generally good, but the pipes are not insulated (photograph 3), so it is recommended that proper insulation is installed which can save around 3% on the heating bill.

Photograph 3: Heating Pipework

5.4 Heating System – Heat Emitters

Various wall mounted radiators are used to heat the church, there are 21no. in total and these radiators are supplied by heating pipes fixed to the walls. There is 1 iron radiator in the cleaners' closet (photograph 4), 7 radiators in the Church area, in the workshop there are 3 cased radiators and 1 iron radiator, in the entrance there are 2 cased radiators, in the vestry there is 1 iron radiator, in the WC there are 4 cased radiators (photograph 5) and in the St. Hilde room there are 2 covered radiators.

Photographs 4 and 5: Various Radiators

5.5 Hot Water System

Hot water is provided to the kitchen though a Lincat electric water heater (photograph 6). There is also an electric water heater in the St Hilde room, a supreme 140 (photograph 7), but this is rarely used

Photograph 6 and 7: Electric Water Heaters

5.6 Lighting

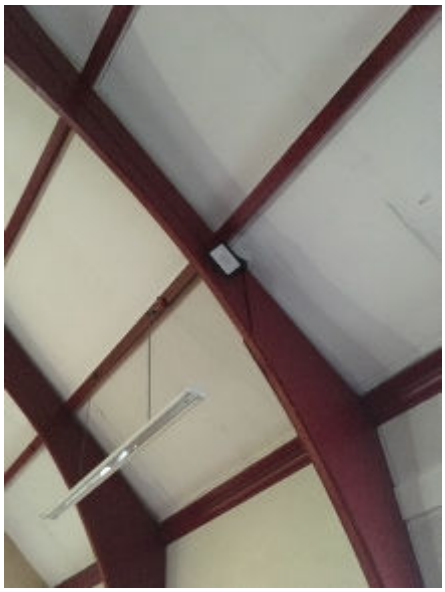
There is no lighting control system, motion detectors or daylight dimming controls. All light fittings are controlled via manual on/off switches, in a panel in the office.

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

Main Church

- There are 6no. of 4 tube 58W T8 fluorescent tubes – recommend replacing these with 24 22W LED alternatives
- There are also 2no. twin 58W T8 fluorescent tubes – recommend replacing these with 4 LED 22W LD alternatives
- There are 2no. LED flood lights
- The Church is also lit by 14no. LED spots at 9.7W each

Photograph 8: Church lighting- LED flood light and Fluorescent Tube



Kitchen

- 4no. twin T8 58W fluorescent tubes (photograph 9) – recommend replacing these with 22W LED alternatives

Photograph 9: Kitchen Lighting- Fluorescent tubes

Entrance

- 2no. 36W compact fluorescent tube – recommend replacing this with two 7.5W LED alternatives.

Workshop

- 6no. twin 70W T8 fluorescent tubes (photograph 10) – recommend replacing these with 22W LED alternatives.

- 7no. 25W spots – recommend replacing these with 3.5W alternatives.

- 4no. 36W compact fluorescent tubes (photograph 11) – recommend replacing these with 7.5W LED alternatives.

Photograph 10 and 11: Workshop lighting- Fluorescent Tubes and Compact Fluorescent Lamps

Vestry

- 1no. twin T8 70W fluorescent tube – recommend replacing this with 22W LED alternatives.

Office

- 1no. twin T8 58W fluorescent tube – recommend replacing this with 22W LED alternatives.

St Hilde

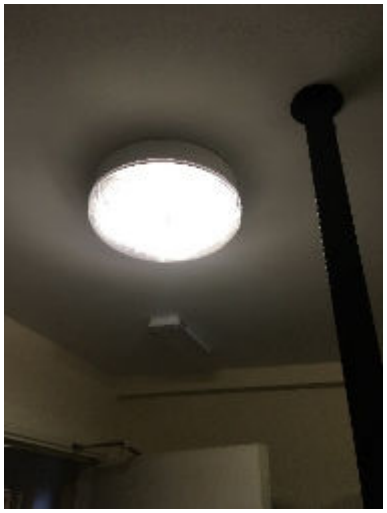
- 2no. twin T8 70W fluorescent tubes (photograph 12) – recommend replacing these with 22W alternatives.
- 2no. wall lights, 100W halogen (photograph 13) – recommend replacing these with 3.5W alternatives

Photographs 12 abd 13: St. Hilde Room Light Fittings

WC

- 4no. 36W compact fluorescent (photograph 14) – recommended to be replaced with a 7.5 LED alternative.

Photograph 14: Compact Fluorescent Lamps



5.6 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)		
Heating	Ensure that the pipes are properly insulated (estimated 3% saving)	651	£32	0.1	£100	3.1
Heating	Set a timer on the heating for regular events (estimated 10% saving)	2,170	£108	0.5	£0	Immediate
Lighting	Church - replace the 58W fluorescent tubes with 22W LEDs	808	£127	0.3	£480	3.8
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Lighting	Vestry - replace the twin 70W fluorescent tubes with 22W LEDs	90	£14	<0.1	£40	2.9
Lighting	St Hilde - replace the twin 70W fluorescent tubes with 22W LEDs	90	£14	<0.1	£40	2.9
Lighting	St Hilde - replace the 100W halogen wall lights with 3.5W alternatives	181	£28	0.1	£10	0.4
Lighting	WC - replace 36W compact fluorescent lights with 7.5W LEDs	107	£17	<0.1	£40	2.4
Lighting	Kitchen - replace twin T8 58W bulbs with 22W LED alternatives	270	£42	0.1	£160	3.8
TOTAL ELECTRICITY SAVINGS		**2,588**	**£344**	**0.8**	**£1,225**	**3.6**
TOTAL GAS SAVINGS		**2,821**	**£140**	**0.6**	**£100**	**0.7**
GRAND TOTAL		**5,409**	**£484**	**1.4**	**£1,325**	**2.7**

7 Assumptions

7.1 Assumptions

- The lighting costs excludes labour, installation and access which will require the confirmation of a specialist lighting contractor.
- Average cost of electricity at 15.76/kWh.
- Average cost of gas at 4.99p/kWh.
- Electricity carbon emission rate of 0.31598 kgCO_2/kWh.
- Natural Gas carbon emission rate of 0.20776 kgCO_2/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 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,

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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