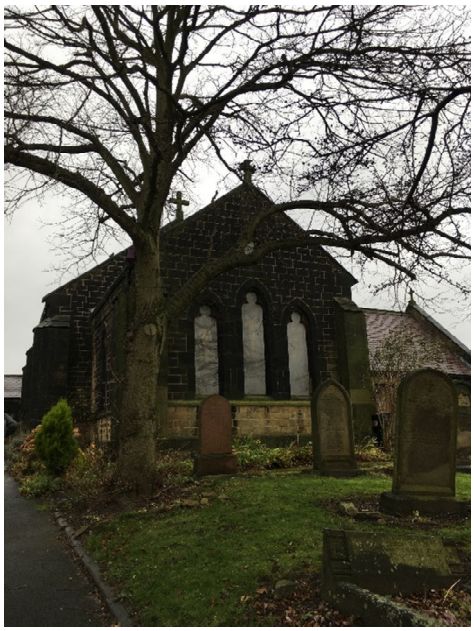
Energy Audit Report for St. Albans Church



Site Address	St. Albans Church, Windy Nook, NE10 9SL
Church Code	613075
Author	Tim Mawby Graduate Consultant
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Version	1.0

Contents

1 Executive Summary

An energy survey St. Albans Church, Church Row Windy Nook, Gateshead, NE10 9SL 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 CO_2e)
Add insulating lagging to heating pipework (estimated 3% saving)	1,791	£38	£100	2.6	0.4
Chapel – replace 16no. 500W halogen spots with 60W alternative	5,492	£730	£800	1.1	1.7
Chapel – replace 12no. 60W fluorescent tubes with 22W LED alternative	562	£75	£240	3.2	0.2
Chapel – replace 3no. 150W up-lights with 12.5W LED alternatives	322	£43	£30	0.7	0.1
WC – replace 2no. 36W compact fluorescents with 7.5W alternatives	66	£9	£20	2.2	<0.1
Kitchen – replace 70W fluorescent tube with 22W alternative	38	£5	£20	4.0	<0.1
Vestry - replace 70W fluorescent tube with 22W alternative	38	£5	£20	4.0	<0.1
Entrance – replace 36W compact fluorescent with 7.5W alternative	28	£4	£10	2.5	<0.1
GRAND TOTAL	**8,337**	**£909**	**£1,240**	**1.4**	**2.4**

The headline messages from the audit are:

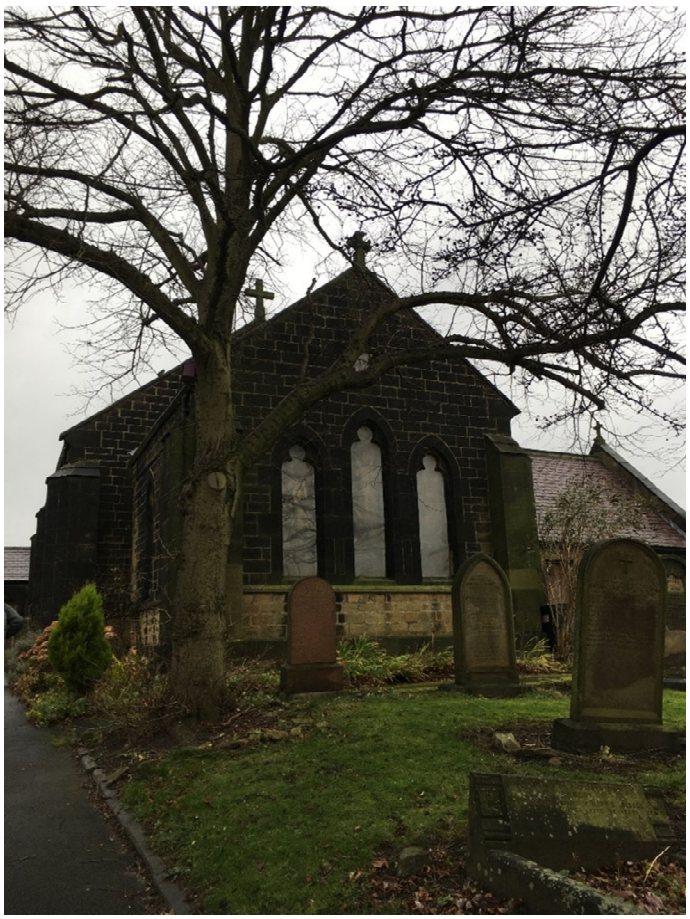
- £1,240 investment in energy reduction measures would achieve an estimated annual saving of 8,337kWh (combined electric and gas).
- Based on current electricity and gas tariffs, this would result in an annual financial saving of £909.
- The simple payback period on this investment is 2.4 years.

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 10th 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. Albans' Church External View



General Information	
Site Address	St. Alban's Church Church Row Windy Nook Gateshead NE10 9SL
Listed Status	Grade 2 Listed
Building Age	Built in 1842
Floor Area	265 sqm
Usage	Typically 15 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	13.29 p/kWh

3.2 Gas

Rate	2.11 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.

It is unclear if the Church already procure energy through the CofE Parish Buying scheme, 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	64,593
Electricity	3,008

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	265	105	244	132%
Electricity	265	20	11	-45%

The building is using more gas than expected. The building 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

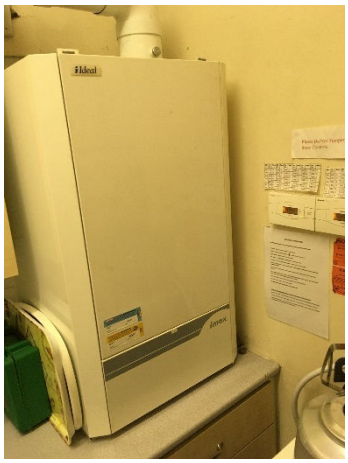
From visual inspection, the majority of the building envelope appears to be in a reasonably good state of repair, however there is no roof or wall insulation.

5.2 Heating System – Boilers

Heating is provided to the building by an Ideal imax condensing boiler, that is located in the kitchen and is relatively new (installation data could not be confirmed). The boiler is operated by multiple wall mounted control panels found in the kitchen and the main church. The boiler is on a timer function which is set at 18 degrees for 23 hours per week and it is set at 10 degrees for the rest of the time. There is an override on the boiler so it can also be turned on when needed outside of set periods.

While the boiler appears to be in good order, and is not at the end of it's expected lifetime the client may wish to explore the possibility of installing an air source heat pump heating system in order to move towards the goal of decarbonising energy consumption.

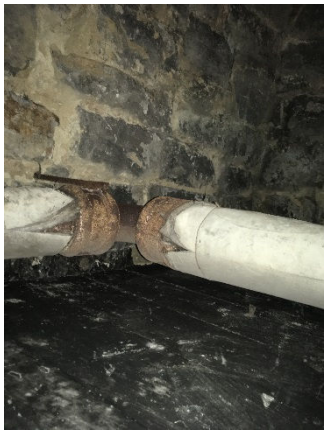
Photograph 2: Ideal Imax Boiler

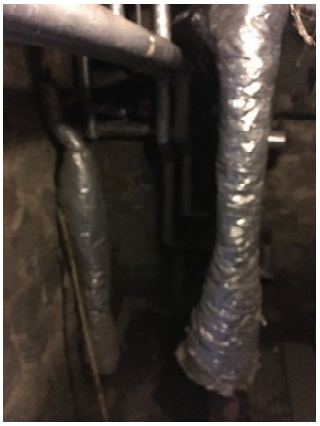


5.3 Heating System – Pipework and Distribution

The heating system pipework in the basement plant room has been insulated but it is worn in places. It is recommended that this is replaced as there is potential for significant heat loss into the basement plant room.

Photographs 3 & 4: Boiler Pipework





5.4 Heating System – Heat Emitters

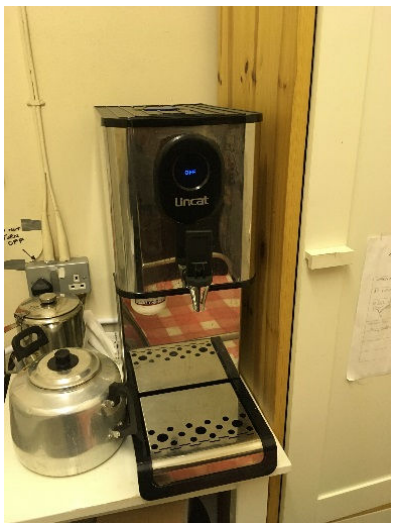
Heating to the church is served via 8no. wall-mounted radiators. These radiators are supplied by heating pipework fixed to the walls. Radiators are obstructed by furniture which limits the effectiveness of the heating. It is advised that items are removed from the immediate vicinity to allow for better heat convection in the space.

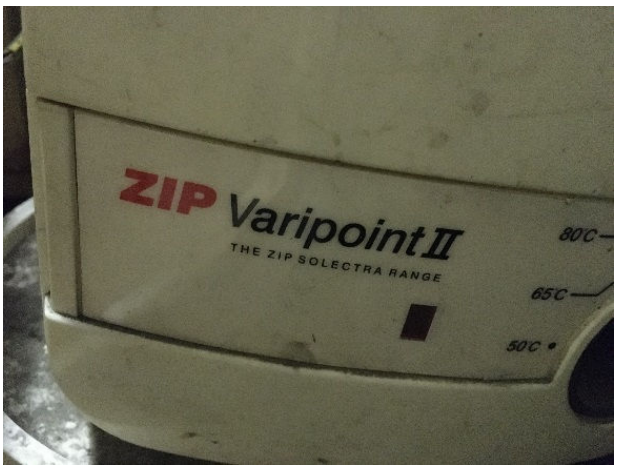
A range of portable plug-in heaters are also present throughout the building and are used to provide additional heating to the smaller rooms when required. This can be an ineffective, inefficient and poorly controlled means of providing space heating, and can easily be left on when unoccupied. It is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

5.5 Hot Water System

Hot water is supplied through an electric Lincat point water heater (photograph 6) and an electric zip Varipoint heater (photograph 7). Hot water usage is believed to be nominal.

Photographs 6 & 7: Electric Water Heaters





5.6 Lighting

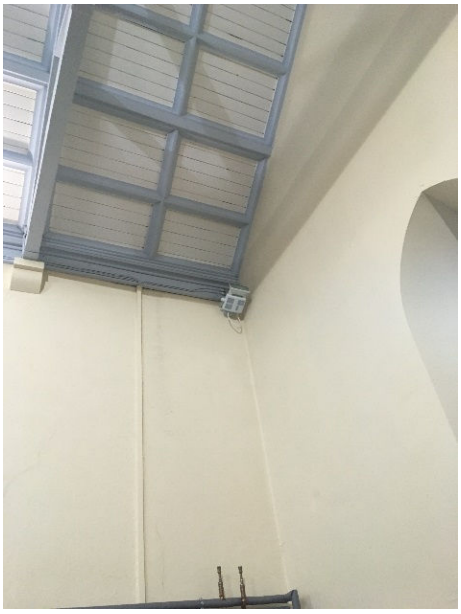
There is no lighting control system, motion detectors or daylight dimming controls. All light fittings are controlled via manual on/off switches.

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

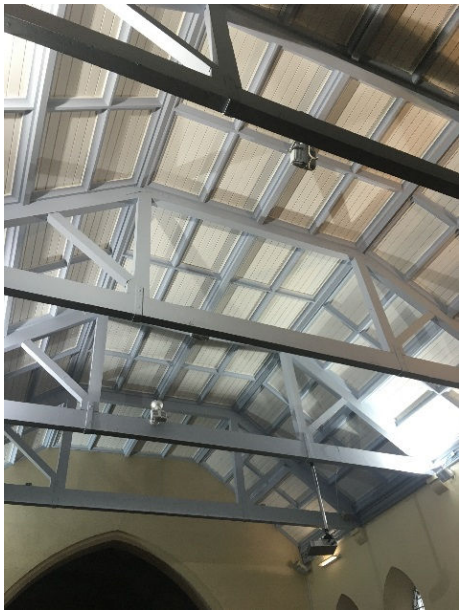
Chapel

- 16no. 500W halogen spotlights – recommended to be replaced with 60W LED alternatives.
- 6no. twin T8 fluorescent tubes 60W– recommended to be replaced with 22W LED alternatives.
- 3no. 150W halogen lights – recommended to be replaced with 25W LED alternatives.

Photograph 8: Halogen Spotlightss



Photograph 9: Halogen Uplights



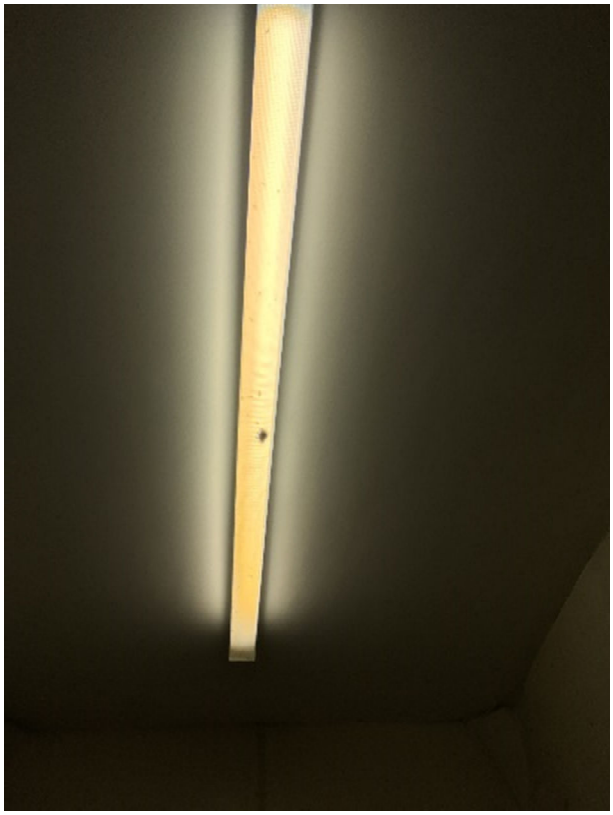
Vestry

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

Kitchen

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

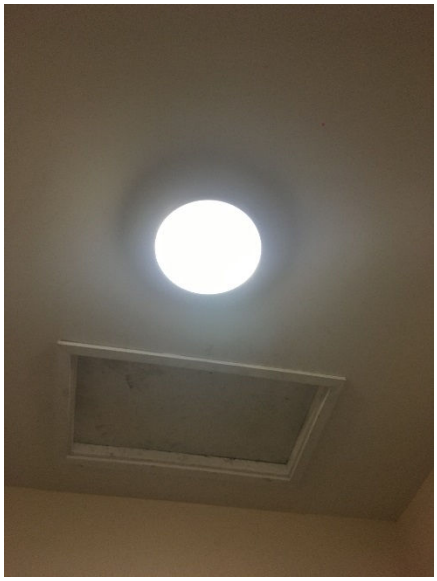
Photograph 10: T8 fluorescent tube



WC

- 2no. Compact fluorescent light (36W) – recommended to be replaced with 7.5W LED alternatives.

Photograph 11: Compact fluorescent light



Entrance

- 1no. Compact fluorescent light (36W) – recommended to be replaced with a 7.5W 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_2)		
Heating	Install insulating lagging to exposed and worn heating pipework (estimated 3% saving)	1,791	£38	0.4	£100	2.6
Lighting	Chapel – replace 500W halogen spots with 60W alternatives	5,492	£730	1.7	£800	1.1
Lighting	Chapel – replace 60W fluorescent tubes with 22W LED alternatives	562	£75	0.2	£240	3.2
Lighting	Chapel – replace 150W up-lights with 12.5W LED alternatives	322	£43	0.1	£30	0.7
Lighting	WC – replace 36W compact fluorescent lights with 7.5W alternatives	66	£9	<0.1	£20	2.2
Lighting	Kitchen – replace 70W fluorescent tube with 22W alternative	38	£5	<0.1	£20	4.0
Lighting	Vestry – replace 70W fluorescent tube with 22W alternative	38	£5	<0.1	£20	4.0
Lighting	Entrance – replace 36W compact fluorescent light with 7.5W alternative	28	£4	<0.1	£10	2.5
TOTAL ELECTRICITY SAVINGS		**6,546**	**£871**	**2.0**	**£1,140**	**1.3**
TOTAL GAS SAVINGS		**1,791**	**£38**	**0.4**	**£100**	**2.6**
GRAND TOTAL		**8,337**	**£909**	**2.4**	**£1,240**	**1.4**

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 13.29p/kWh.
- Average cost of gas at 2.11p/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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