ESOS-ENERGY
Energy efficient solutions

Energy Audit Report for St Luke's Church Hall

Site Address	St Luke's Church Hall, Wythenshawe, M22 4PT
Church Code	624167
Author	Ros Harwood, Graduate Consultant
Date	21st February 2020
Version	1.0

1 Executive Summary

An energy survey of St Luke's Church Hall, Wythenshawe, M22 4PT 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)
Install insulating lagging on boiler pipework.	1,578	£79	£200	2.5	0.3
Main Hall – replace fluorescent tubes with LED alternatives.	9,123	£1,592	£1,020	1.3	2.9
Main Hall – replace CFLs with LED alternatives.	171	£30	£40	1.3	0.1
Small Hall – replace fluorescent tubes with LED alternatives.	1,073	£187	£120	0.6	0.3
Kitchens - replace fluorescent tubes with LED alternatives.	358	£62	£40	0.6	0.1
Basement - replace CFLs with LED alternatives.	43	£7	£10	1.3	<0.1
Basement – replace halogen spotlights with LED alternatives.	182	£32	£5	0.2	0.1
Storage Rooms – replace CFLs with LED alternatives.	43	£7	£10	1.3	<0.1
Plant Room – replace CFLs with LED alternatives.	43	£7	£10	1.3	<0.1
Corridors – replace fluorescent tubes with LED alternatives.	268	£47	£30	0.6	0.1
Corridors – replace CFLs with LED alternatives.	171	£30	£40	1.3	0.1
Corridors – replace halogen spotlights with LED alternatives.	182	£32	£5	0.2	0.1

Offices – replace twin fluorescent tubes with LED alternatives.	268	£47	£30	0.6	0.1
Toilets – replace fluorescent tubes with LED alternatives.	358	£62	£40	0.6	0.1
Toilets – replace CFLs with LED alternatives.	85	£15	£20	1.3	<0.1
External – replace CFLs with LED alternatives.	85	£15	£20	1.3	<0.1
External – replace halogen floodlights with LED alternatives.	83	£15	£25	1.7	<0.1
TOTALS	**14,103**	**£2,266**	**£1,665**	**0.7**	**4.3**

The headline messages from the audit are:

- £1,665 investment in energy reduction measures would achieve an estimated annual saving of 14,103kWh (combined electric and gas).
- Based on current electricity and gas tariffs, this would result in an annual financial saving of £2,266.
- The simple payback period on this investment is 0.7 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 Ros Harwood on Friday 21st February 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 Luke's Church Hall External View

General Information	
Site Address	St Luke's Church Hall, Brownley Street, Wythenshawe, M22 4PT
Listed Status	Unknown
Building Age	Unknown
Floor Area	620
Usage	Typically 40 hours per week

3 Energy Procurement Review

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

3.1 Electricity

Day Rate	17.45 p/kWh

3.2 Gas

Rate	5.03 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	26,653
Electricity	2,818

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	620	105	43	-60%
Electricity	620	20	5	-75%

The Church is using less Gas and 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 reasonable state of repair. Wall and roof insulation are not present.

5.2 Heating System – Boilers

Heating is provided to the church hall via 2no. Vaillant gas condensing boilers, one located in the basement and one located in the small hall. Each boiler serves a different area; the first serving the main hall and associated rooms; the other serves the small hall, offices and associated rooms. The first boiler's heating schedule is currently programmed at 75 degrees and to turn off at 2.30pm every day, estimated by the Site contact to be 2 to 3 years old. The second boiler is not programmed to a schedule, instead 1-hour boosts are used as required. Control panels are located on each of the boilers. The temperature and the schedule are kept the same, however manual override is possible if required 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 boilers appear to be in good order, 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 & 3: Church Hall Boilers

5.3 Heating System – Pipework and Distribution

The heating systems' pipework is generally good, however there was no insulation lagging on the pipework for either boiler. It is recommended that insulating lagging is fitted to the boilers' pipework to reduce heat loss into the basement and small hall. The heating pipework can be seen in photographs 2 and 3.

5.4 Heating System – Heat Emitters

Heating to the church hall is predominantly served via wall-mounted radiators supplied by heating pipes fixed to the walls. There are 4no. radiators in the main hall, 3no. radiators in the small hall, 3no. radiators in the corridors, 4no. radiators and 1 electric heater in the offices and 1no. radiator in the kitchen. 2no. radiators in the vestry and 1no. radiator in the hallway. Some of the radiators were blocked in the offices and storage rooms. It is recommended that the space around radiators is cleared to improve the efficiency of space heating.

Photographs 4 - 8: Church Heat Emitters

5.5 Hot Water System

Hot water is provided to the building via the 2no. Valliant boilers, serving the kitchens and the toilets. There is also a Swan 2,200W 20-litre electric point of use water heater located in the kitchen. Hot water consumption is considered to be nominal.

Photograph 9: Electric Point-of-Use 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 and community centre areas are detailed below:

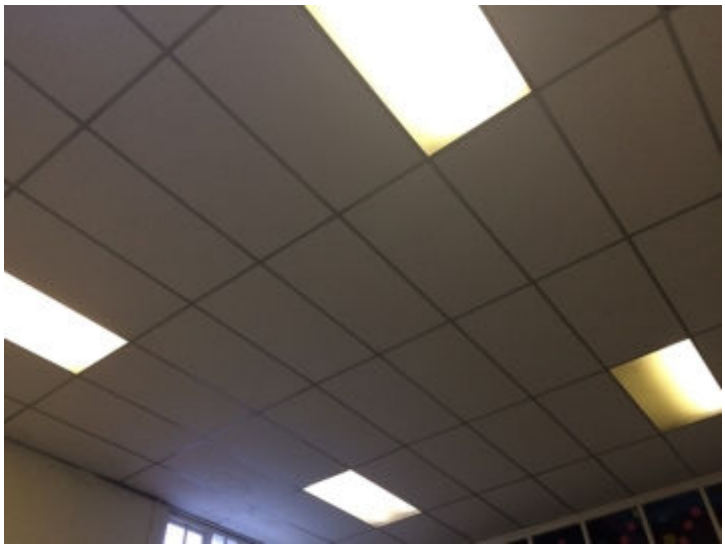
Main Hall

- 102no. 65W fluorescent T8 tubes – recommended to be replaced with 22W LED alternatives.
- 4no. 28W compact fluorescent lamps – recommended to be replaced with 7.5W LED alternatives.

Photographs 10: Main Hall Light Fittings

Small Hall

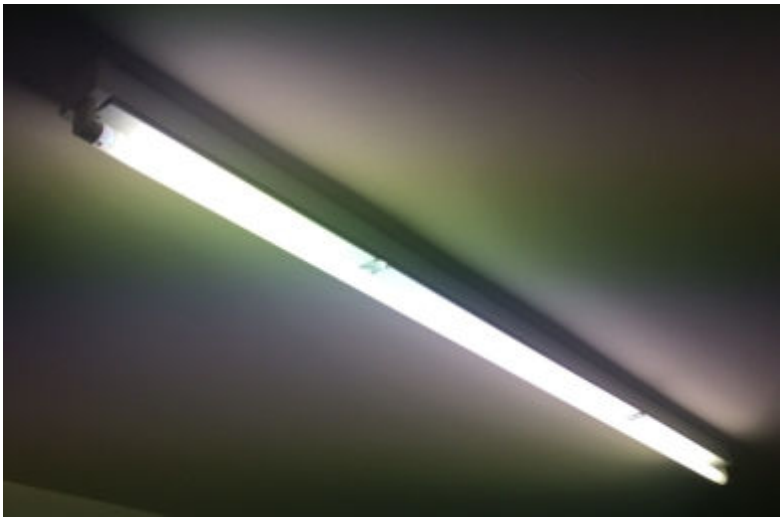
- 12no. 65W fluorescent T8 tubes – recommended to be replaced with 22W LED alternatives.



Photograph 11: Small Hall Light Fittings

Kitchens

- 4no. 65W fluorescent T8 tubes – recommended to be replaced with a 22W LED alternatives.



Photograph 12: Kitchen Light Fittings

Basement

- 1no. 28W compact fluorescent lamp – recommended to be replaced with a 7.5W LED alternative.
- 1no. 100W halogen spotlight – recommended to be replaced with a 12.5W LED alternative.

Photograph 13: Compact Fluorescent Lamp (CFL)

Corridors

- 3no. 65W fluorescent T8 tubes – recommended to be replaced with 22W LED alternatives.
- 4no. 28W compact fluorescent lamps – recommended to be replaced with 7.5W LED alternatives.
- 1no. 100W halogen spotlight – recommended to be replaced with a 12.5W LED alternative.

Offices

- 3no. 65W fluorescent T8 tubes – recommended to be replaced with 22W LED alternatives.

Toilets

- 4no. 65W fluorescent T8 tubes – recommended to be replaced with 22W LED alternatives.
- 2no. 28W compact fluorescent lamps – recommended to be replaced with 7.5W LED alternatives.

Storeroom

- 1no. 28W compact fluorescent lamp – recommended to be replaced with a 7.5W LED alternative.

Plant Room

- 1no. 28W compact fluorescent lamp – recommended to be replaced with a 7.5W LED alternative.

External

- 2no. 28W compact fluorescent lamps – recommended to be replaced with 7.5W LED alternatives.
- 1no. 100W halogen floodlight – recommended to be replaced with a 60W 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 on boiler pipework (estimated 3% saving)	1,578	£79	0.3	£200	2.5
Lighting	Main Hall – replace 65W T8 fluorescent tubes with 22W LED alternatives.	9,123	£1,592	2.9	£1,020	1.3
Lighting	Main Hall – replace 28W CFLs with 7.5W LED alternatives.	171	£30	0.1	£40	1.3
Lighting	Small Hall – replace 65W T8 fluorescent tubes with 22W LED alternatives.	1,073	£187	0.3	£120	0.6
Lighting	Kitchens - replace 65W T8 fluorescent tubes with 22W LED alternatives.	358	£62	0.1	£40	0.6
Lighting	Basement - replace 28W CFLs with 7.5W LED alternatives.	43	£7	<0.1	£10	1.3
Lighting	Basement – replace 100W halogen spotlights with 12.5W LED alternatives.	182	£32	0.1	£5	0.2
Lighting	Storage Rooms – replace 28W CFLs with 7.5W LED alternatives.	43	£7	<0.1	£10	1.3
Lighting	Plant Room – replace 28W CFLs with 7.5W LED alternatives.	43	£7	<0.1	£10	1.3
Lighting	Corridors – replace 65W T8 fluorescent tubes with 22W LED alternatives.	268	£47	0.1	£30	0.6
Lighting	Corridors – replace 28W CFLs with 7.5W LED alternatives.	171	£30	0.1	£40	1.3
Lighting	Corridors – replace 100W halogen spotlights with 12.5W LED alternatives.	182	£32	0.1	£5	0.2

Lighting	Offices – replace 65W twin T8 fluorescent tubes with 22W LED alternatives.	268	£47	0.1	£30	0.6
Lighting	Toilets – replace 65W T8 fluorescent tubes with 22W LED alternatives.	358	£62	0.1	£40	0.6
Lighting	Toilets – replace 28W CFLs with 7.5W LED alternatives.	85	£15	<0.1	£20	1.3
Lighting	External – replace 28W CFLs with 7.5W LED alternatives.	85	£15	<0.1	£20	1.3
Lighting	External – replace 100W halogen floodlights with 60W LED alternatives.	83	£15	<0.1	£25	1.7
TOTAL ELECTRICITY SAVINGS		**12,535**	**£2,187**	**4.0**	**£1,465**	**0.7**
TOTAL GAS SAVINGS		**1,578**	**£79**	**0.3**	**£200**	**2.5**
GRAND TOTAL		**14,103**	**£2,266**	**4.3**	**£1,665**	**0.7**

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 17.45p/kWh.
- Average cost of gas at 5.03p/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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