Energy Audit and Survey Report

All Saints Nursery Hall

PCC of All Saints, Sidmouth

Version Control

Author	Reviewer	Date	Version
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1. Executive Summary

An energy survey of All Saints Nursery Hall 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 and is subsidised from Total Gas & Power, the Parish Buying schemes principal energy suppliers.

All Saints Nursery Hall is used by a third party preschool provider and consists of two open play areas, kitchen, sleep room, WCs and store cupboards. The hall is predominantly lit with LED and has wall mounted convector heaters served by a gas fired boiler. There is both gas and electricity supplied to the site.

The Nursery Hall 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 Nursery Hall in implementing these recommendations over the coming years.

Energy saving recommendation	Estimated Annual Energy Saving (kWh)	Estimated Annual Cost Saving (£)	Estimated capital cost (£)	Simple Payback (years)	Permission needed	CO2 saving (tonnes of CO2e/year)	£/tonne of CO2
Switch electricity (and gas) suppliers to ones which provide 100% renewable (or green gas) supplies	None	None	Nil	N/A	None	N/A	N/A
Install SavaWatt devices on fridges and freezers	280	£41	£100	2.45	None	0.07	£1,397
Install Endotherm advanced heating fluid into heating system(s)	2,258	£78	£240	3.07	None	0.42	£578
Change existing lighting for low energy lamps/fittings	903	£132	£459	3.49	None	0.23	£1,991

Controls optimisation including installing space temperature thermostat	2,656	£154	£700	4.55	None	0.53	£1,325
Fit flow regulators onto existing taps	598	£21	£200	9.65	None	0.11	£1,820
Increased Fan Convector Maintenance	452	£16	£250	15.97	None	0.08	£3,012
Fit 270mm of insulation into the loft	2,258	£78	£4,000	51.09	List A	0.42	£9,637
Consideration of secondary or double glazing	1,129	£39	£5,000	127.72	Faculty	0.21	£24,092

The Church should check any faculty requirements with the DAC Secretary at the Diocese before commencing any works.

Based on current contracted prices of 14.6p/kWh and 3.468p/kWh for electricity and mains gas respectively.

If all measures were implemented this would save the church hall £559 per year.

2. Introduction

This report is provided to the PCC of All Saints to provide them with advice and guidance as to how the Nursery Hall can be improved to be more energy efficient. In doing so the Nursery Hall will also become more cost effective to run and seek to improve the levels of comfort. Where future development plans are known, the recommendations in this report have been aligned with them.

An energy survey of the All Saints Nursery Hall, All Saints Road, Sidmouth EX10 8ES was completed on the 21st January by David Legge. David is an experienced energy auditor with over 10 years' experience in sustainability and energy matters in the built environment. David is a fully qualified ESOS lead assessor with CIBSE, a CIBSE Low Carbon Consultant and a fully qualified ISO50001 lead auditor.

All Saints Nursery Hall	
Gross Internal Floor Area	185 m^2
Listed Status	Unlisted

The Nursery Hall is typically used for 40 hours per week for the following activities

Meetings and Church Groups	Ad hoc use only
Community Use	40 hour per week

There is additional usage over and above these times for ad hoc events

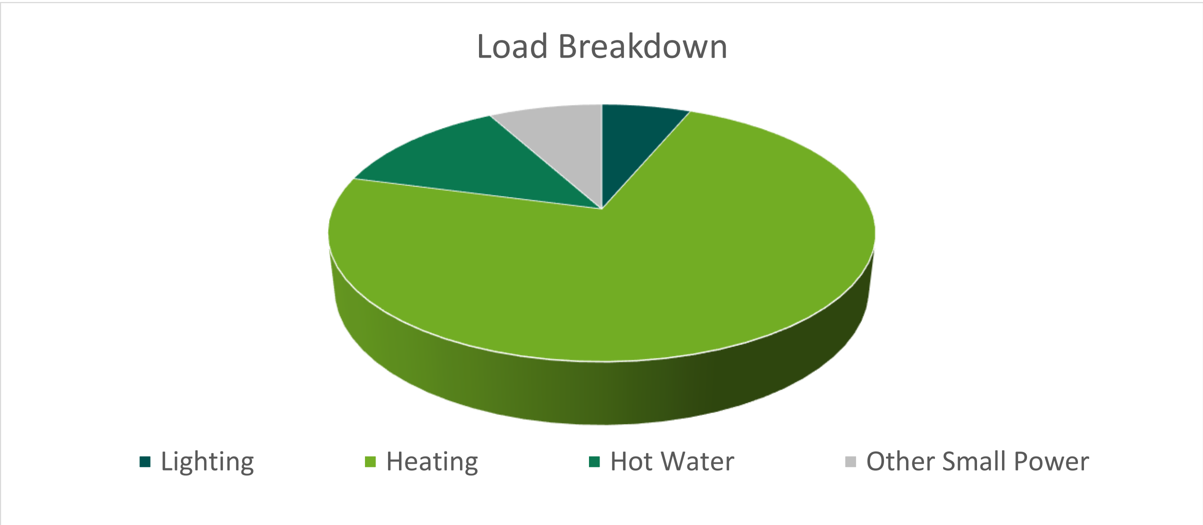
3. Energy Usage Details

All Saints Nursery Hall uses 7,023 kWh/year of electricity, costing in the region of £1,025 per year, and 26,561 kWh/year of gas, costing £921. This data has been taken from a summary of consumption provided by the PCC.

3.1 Energy Profiling

The main energy use within the Nursery Hall can be summarised as follows:

Service	Description	Estimated Proportion of Usage
Lighting	The main areas are lit by efficient LED flat panels. Some of the side rooms are still lit with inefficient T8 fluorescent tube fittings.	6%
Heating	Provided by a gas fired Worcester condensing boiler to fan convectors mounted at high level for safety.	73%
Hot Water	Provided via the gas fired boiler.	13%
Other Small Power	CCTV, alarms, small kitchen appliances, and other plug in loads.	8%



As can be seen from this data, the heating makes up by far the largest proportion of the energy usage on site. The other significant loads are hot water and lighting.

3.2 Energy Benchmarking

In comparison to national benchmarks[1] for Church energy use, All Saints Nursery Hall uses 14% more electricity and 9% less heating energy than would be expected for a church hall of this size. This is due to additional electricity for the fan convector heaters and kitchen as well as longer than typical operating hours.

	Size (m^2 GIA)	All Saints Nursery Hall use kWh/m^2	Typical Church use kWh/m^2	Efficient Church Use kWh/m^2	Variance from Typical
All Saints Nursery Hall (elec)	185	22.89	20	10	14%
All Saints Nursery Hall (heating fuel)	185	136.91	150	80	-9%
TOTAL	185	159.80	170	90	-6%

[1] CofE Shrinking the Footprint – Energy

4. Energy Saving Recommendations (Electricity)

4.1 Lighting (fittings)

The lighting makes up a relatively small overall energy load within the building, and although the main play areas are lit by LED fittings, the ancillary spaces are lit by inefficient T8 fluorescent tube fittings. These fittings are widely available on the market and it is suggested that the complete fitting (not just the lamp) is replaced. Any new LED fitting would have a much longer life and hence reduce the need to replace the lamps in the ceiling.

It is recommended that all of the fittings, scheduled in Appendix 1, are changed for LED.

If all the lights were changed the total capital cost (supplied and fitted) would be £459. The annual cost saving would be £132 resulting in a payback of around 3.49 years. Many of the lights could be self-installed and therefore cost much less than the supply and fit cost above.

4.2 Refrigeration Controls

Within the kitchen there is a domestic refrigeration unit for storage of milk and food. These units run 24/7 and contribute to the baseload electrical consumption of the building.

To reduce the electrical consumption of these appliances it is recommended that they are all fitted with a SavaWatt unit. These units work by automatically detecting the load of the compressor and turning down the power when it is not in full load. This reduces the energy consumption of the refrigeration unit by around 18% while maintaining the cooling of the appliance. It does this by reducing the voltage delivered to the unit when it is idling but allowing the full energy to the unit when it is required.

The supply and installation of these units and further details can only be undertaken by SavaWatt directly http://savawatt.com/. The installation does not cause any significant disruption to operations and can be undertaken during normal operating times.

5. Energy Saving Recommendation (Heating)

5.1 Endotherm Advanced Heating Fluid

In order to improve the efficiency of the heating system further it is recommended that an advanced heating fluid (http://www.endotherm.co.uk/) is added to the heating system.

This fluid is in addition to and complements any existing inhibitors in the heating system and is added in a similar way. The fluid works to improve the ability of the boiler to transfer heat into the heating system and for the radiators and other heating elements to give out their heat into the rooms. It does this by reducing the surface tension of the water and increasing its capacity to transfer and hold heat. Case studies have demonstrated that the addition of this fluid into heating systems reduces heating energy consumptions by over 10% as well as helping the building heat up quicker. Endotherm can be supplied and self-installed.

5.2 Space Temperature Set Point

The hall currently uses a single gas fired condensing boiler to provide heating to wall mounted fan convectors throughout the nursery hall. The boiler is relatively new and whilst the fan convectors are adequate (with some maintenance), the control of the temperature within this space is somewhat lacking. The fan convectors have very basic 'low/high' control for heating and whilst there is a 7 day programmer, there is an override button that staff utilise freely to extend the hours of operation of the heating.

The control for the hall is provided by a wall mounted 7 day programmer near the entrance. This does not match the actual occupation of the space, with the hours set to run from 0700-0900, 1200-1230 and 1530-1630 on weekdays and similarly 0730-0830, 1200-1210 and 1630-1730 on weekends; this should be optimised to more closely match the opening hours of the nursery. .

It is also recommended that a room thermostat is introduced and linked to the fan convectors to better regulate the temperature within the space and that more than one person understands the programmer and how to use them in the event of holidays or other absence. The PCC could consider installing an internet enabled thermostatic and time scheduling controller, such as those on offer from Hive, Nest or tado, offering good flexibility in terms of maintaining or removing a continuous heat as well as programming whilst off-site.

5.3 Fan Convector Maintenance

It was noted during the survey that there was a significant amount of debris on the intake grilles of the fan convectors within the nursery hall. This debris and dust will be impeding the ability of the convector to efficiently heat the space around them.

The convectors should be regularly checked and cleaned as necessary; this can simply be done by using a vacuum cleaner to remove all dust and debris from them.

6. Energy Saving Measures (Building Fabric)

6.1 Roof Insulation

The loft void above the ceiling was not inspected as part of this audit but was reported to have little insulation present. In all cases where there is 100mm or less of insulation within accessible roof spaces it is recommended that insulation be added to prevent heat loss and create a more comfortable environment for the occupants of the building.

The ceiling/roof of a building is the largest contributing area to heat loss from a building as heat rises. The insulation of such spaces can therefore have a dramatic impact on both the efficiency of the heating system and the temperature of the space below. Insulation measures such as this also need to be combined with control measures such as TRV's or room sensors to ensure that the space does not overheat because of the additional insulation.

A free survey and quotation for the supply and installation of insulation to the loft spaces can be arranged through ESOS Energy Ltd (contact Adrian Newton 0117 9309689, adrian@esos-energy.com).

6.2 Consideration of Secondary Glazing

The windows of the current nursery are singled glazed and whilst double glazing could be installed as the building does not carry listed status, there might be concern over aesthetics. Secondary glazing may be of benefit in reducing heat loss from the building, given the high hours of occupancy per week and the fact that staff can use the override button to switch the heating on for longer than the controller allows. Any possible installation would need to be carefully specified, and companies such as https://www.selectaglaze.co.uk/heritage-listed-buildings can provide very discrete and appropriate systems.

7. Saving Recommendations (Water)

7.1 Tap Flow Regulators

The taps to the wash hand basins within the building have been checked as part of the audit and the average flow rate within these has been measured to be 11l/min. The recommended flow rate for hand washing is 4.8l/min and therefore the taps are providing around double the amount of water that is necessary.

The over provision of water for hand washing is not only a source of excessive water use, but in the case of hot water, it is also a source of wasted energy in the heating that has to go into providing the hot water.

The flow rate of the taps can be easily regulated by fitting flow regulators within the taps. It is recommended that flow regulators such as those manufactured by neoperl (http://www.neoperl.net/en/) are fitted into all the viable hand wash basin taps to save on both water and heating of the hot water.

8. Renewable Energy Potential

The potential for the generation of renewable energy on site has been reviewed and the viability noted.

Renewable Energy Type	Viable
Solar PV	No – not sufficient demand, visible roof
Battery Storage	No – no viable PV
Wind	No – no suitable land away from buildings
Micro-Hydro	No – no water course
Solar Thermal	No – insufficient hot water need
Ground Source Heat Pump	No – archaeology in ground and radiator system
Air Source Heat Pump	No – insufficient electricity supply
Biomass	No – not enough heating load as well as air quality issues

Now that the Feed in Tariff scheme has come to an end the installation of solar PV panels in situations where there is not almost full usage of the electricity generated on site is not really viable.

Having reviewed the site it is not considered that there is good viability for any renewables and instead a good clear focus on reducing the energy demand of the building should continue with a targeted approach on reducing the heating energy.

9. 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

10. Faculty Requirements

It must be noted that all works intended to be undertaken should be discussed with the DAC at the Diocese.

Throughout this report we have indicated our view on what category of permission may be needed to undertake the work. This is for guidance only and must be checked prior to proceeding as views of different DACs can differ.

Under the new faculty rules;

List A is for more minor work which 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.

List B is for 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.

11. Report Circulation

In addition to the PCC, this report is also sent to:

1. Your DAC secretary and your DEO, because
    - They maybe be able to offer you help and support with implementing your audit
    - They want to look across all the audits in your diocese to learn what the most common recommendations are.
2. Catherine Ross, the officer in the Cathedral and Church Buildings team centrally who leads on the environment, who wants to learn from all the audits across the country. She will be identifying cost-effective actions churches like yours might be able to make.

Appendix 1 – Schedule of Lighting to be Replaced or Upgraded

Room/Location	Number of Fittings	Recommended Upgrade	Annual Saving (£)	Total Cost (£)	Payback
Church office	3	600 x 600 25W Panel	£110.83	£229.35	2.07
Kitchen	1	5ft Single LED	£10.50	£93.70	8.92
Cot room	1	5ft Single LED	£10.50	£93.70	8.92

Burn hours are assumed to be 1560 hours per year.