ESOS-ENERGY
Energy efficient solutions

Energy Efficiency and Zero Carbon Advice

St Mary the Boltons Church, Kensington
PCC of St Mary's Church

Author	Reviewer	Audit Date	Version
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Contents

1. Executive Summary

An energy survey of St Mary the Boltons Church, Kensington was undertaken by Inspired Efficiency 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.

St Mary the Boltons Church, Kensington is a stone built mid Victorian Grade II listed church built in 1850, with adjoining 20th century hall to the east (also listed). There is both gas and electricity supplied to the site.

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 recommendation	Estimated Annual Energy Saving (kWh)	Estimated Annual Cost Saving (£)	Estimated capital cost (£)	Payback (years)	Permission needed	CO2 saving (tonnes of CO2e/year)
Add ceiling insulation. church	10% 7,500	£563	1,450	3	Faculty	1.37
Draughtproofing measures	2% 1,300 gas	£98	£400	4	List B	0.24
Remove wall panelling to west of Children's Room and Office, replace with insulated panelling.	2% 1,300 gas	£98	£2,000	20	Faculty	0.24
Install infra red panel heating in Children's Room	1% 650 gas	£49	£500	10	Faculty	0.12
Purchase Heated Office chair(s)	1% 650 gas	£49	£200 each	4	None	0.12
Install secondary glazing in Children's Room and Office	2% 1,300 gas	£98	12m^2 £6,000	60	Faculty	0.24
Install secondary or double glazing to selected hall rooms	10% of hall gas 3,500	£190	£5,000	25	Faculty	0.64
Replace hall boiler with Air Source Heat Pump	35,000 gas	£1,900	£11,000 [28kW unit]	6	Faculty	1.28

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

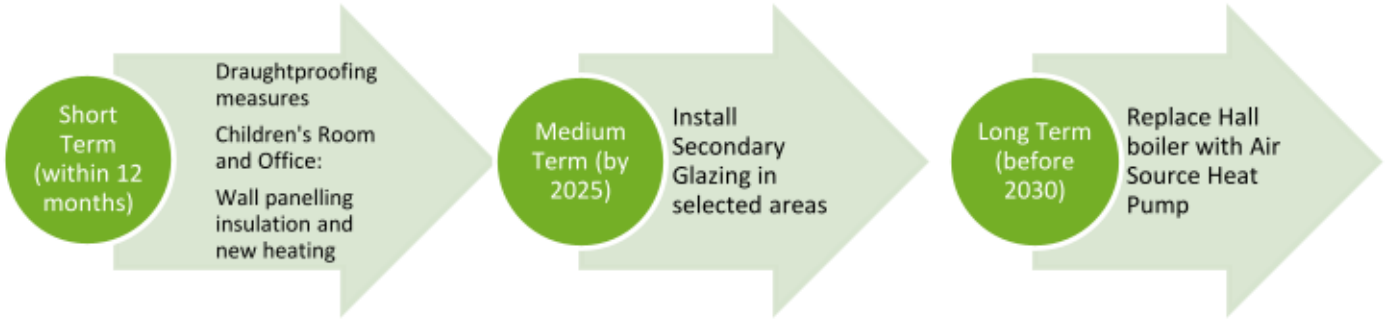
Based on current contracted prices of 22.84p/kWh and 7.5p/kWh for electricity and mains gas respectively.

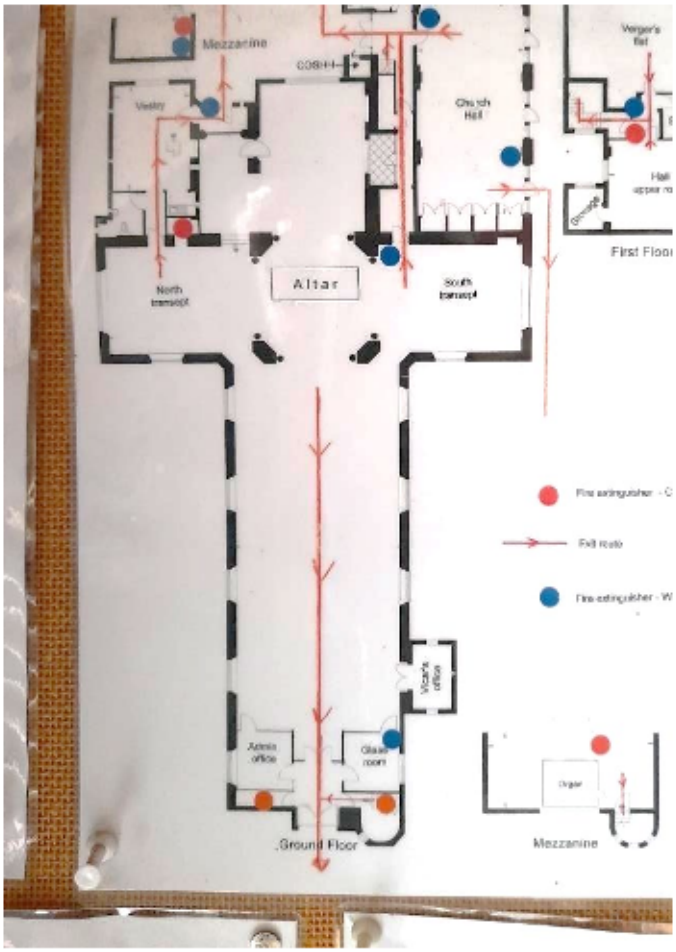
If all measures were implemented this would save the church around £2,500 per year in operating costs.

2. The Route to Net Zero Carbon

The General Synod of the Church of England has indicated that the Church of England should be Net Zero Carbon by 2030. Every church, cathedral, church school and vicarage will therefore need to convert to be a net zero building in the next 10 years.

This church has a clear route to become net zero by 2030 by undertaking the following steps:





3. Introduction

This report is provided to the PCC of St Mary the Boltons Church, Kensington to give them advice and guidance as to how the church can be improved to be more energy efficient. In doing so the church will also become more cost effective to run and with improved levels of comfort. Where future church development and reordering plans are known, the recommendations in this report have been aligned with them.

An energy survey of the St Mary the Boltons Church, Kensington, Bolton's Place, London SW10 9TB was completed on the 6th April 2022 by Dr. Paul Hamley. Paul is an energy auditor with experience of advising churches and small businesses. He is part of the Church Energy Advisors Network developing advice for the Church of England and authored the "Assessing Energy Use in Churches" report for Historic England. He is a CIBSE affiliate member and a Chartered Scientist, with experience of the faculty process gained from chairing the building committee of a Grade I listed church and has been an assessor for EcoCongregation.

The church was represented by Rev Jenny Welsh (Vicar), Dave (Verger) and Jane Elland (Administrator).

St Mary the Boltons Church, Kensington	
Church Code	623183
Gross Internal Floor Area	Church 580 m^2 Hall 290m^2
Listed Status	Grade II in Conservation Area

The church is typically used for 12 hours per week for the following activities

Type of Use	Hours Per Week (Typical)	Average Number of Attendees
Services	6 hours per week	100
Meetings and Church Groups	1 hour per week	20
Community Use	3 hours per week	School use and 4 concerts
Occasional Offices [Annual average]	8 Weddings 6 Funerals 8 Baptisms	100

The hall is in daily use by a nursery from 8am to 6pm (15-20 persons plus around 30 at a time for short sessions in the first floor room. Hall evening use sees approximately 50 people on three evenings per week, plus six hours use on Saturdays for two hire sessions plus one 3 hours hire session on Sundays.

	CHURCH	HALL	SITE
Estimated annual hours of use	620	3,500	4,120
Estimated footfall	16,000	17,000	33,000

4. Energy Procurement Review – Utility Charges

Energy bills for gas and electricity have been supplied by St Mary the Boltons Church, Kensington and have been reviewed against the current market rates for energy.

The current electricity rates are:

Single Rate	22.84p/kWh	In line with current market rates
Standing Charge	35p/day	N/A

Supplier: Ecotricity

The current gas rates are:

Single Rate	7.5p/kWh	In line with current market rates
Standing Charge	50p/day	N/A

Supplier: Pozitiv Energy until November 2022.

A review has also been carried out of the taxation and other levies which are being applied to the bills. These are:

VAT	5%	The correct VAT rate is being applied
CCL	not charged	The correct CCL rate is being applied

The above review confirmed that the correct taxation and levy rates are being charged.

Whenever monthly electricity consumption exceeds 1,000kWh or gas consumption exceeds 4,397kWh (52,000kWh per annum), 20% VAT is charged unless the customer has submitted a VAT declaration form. This should always be done when changing suppliers.

VAT declarations are available from the suppliers website and can usually be found by typing the suppliers name followed by "VAT Declaration Certificate" into most website search engines.

Excess VAT paid can be reclaimed for the past three years.

A detailed explanation is available here: https:// perfect-clarity.com/vat-on-church-utility-bills/#:~:text=There%20is%20no%20VAT%20chargeable%20on%20Church% 20water%20bills

5. Energy Use Details

5.1 Annual Consumption Data

Utility	Annual use / kWh	from	to	Cost
Electricity Whole site	33,041	1/12/18	1/12/19	£4,760
Electricity – Church	7,277			£1,115
Electricity – Hall	14,554			£2,330
Electricity Whole site	Total 21,831	Dec 2019	Dec 2020	Total £3,445
Electricity Whole site	23,835	2/12/20	1/12/21	£4,073
Gas - Church	74,451	31/12/18	30/11/19	£2,584
Gas – Church	67,710	1/11/19	31/10/20	£2,574
Gas – Hall & flat	48,785	31/12/18	30/11/19	£1,401
Gas – Hall & flat	35,076	1/11/19	31/10/20	£1,907
Gas – Whole site	123,236	31/12/18	30/11/19	Total £3,985
Gas – Whole site	102,786	1/11/19	31/10/20	Total £4,481

Electricity:

Whole site consumption dropped by 34% from 2019 to 2020 due to the pandemic. 2021 saw a 9% rise compared to the previous year (still 28% below the pre coronavirus total).

2021 electricity consumption totalled 23,835kWh for the whole site.

Gas:

A 9% reduction in church gas use is seen in 2020 compared to 2019 reflecting reductions of use during the early coronavirus period in April and November 2020, but winter 2019-2020 saw normal gas use.

The flat would have been expected to have an unchanged consumption pattern, but far less hall hires account for the 28% fall in consumption.

5.2 Meter Details

Utility	Meter Serial	Type	Pulsed output	Location
Electricity – Church METER 1	K17D 02788	Elster A1140	Yes	Stairwell, south side of main entrance
Electricity METER 2	Submeter for floodlights		No	Right of main meter above
Electricity METER 3	Submeter for Flat	Single phase Type 52350-N	Yes	Hall Corridor, in cleaning cupboard Left hand meter
Electricity METER 4	Submeter for hall and upper room	Single phase Type 5235 A	Yes	Hall Corridor, in cleaning cupboard Right hand meter
Gas – Church	Was 606596 New meter 2021: M016 K01695 20 D6	Honeywell Bk-G10M	Yes	External wooden cabinet, south side of exterior
Gas – Hall, kitchen, flat, vestry	M016 A13255 01 A6	Schlumberger MDA16	No	External cabinet, by east site boundary wall
	M016 A021901 13 A6			

Several of the meters are AMR connected, so obtaining an energy profile from your supplier for the entire site energy usage should be possible.

5.3 Energy Profiling

The main energy consuming plant can be summarised as follows:

Service	Description	Power kW	Annual Consumption kWh	Estimated Proportion of Usage
Gas Heating	CHURCH Boilers 1,2 2 x Ideal Concord CXA VESTRY Boiler 3 Worcester Greenstar Condensing Combi 25i HALL Boiler 4	100 25	75,000 Boiler 1 + 2 50,000 Boilers 3+4+5	83%

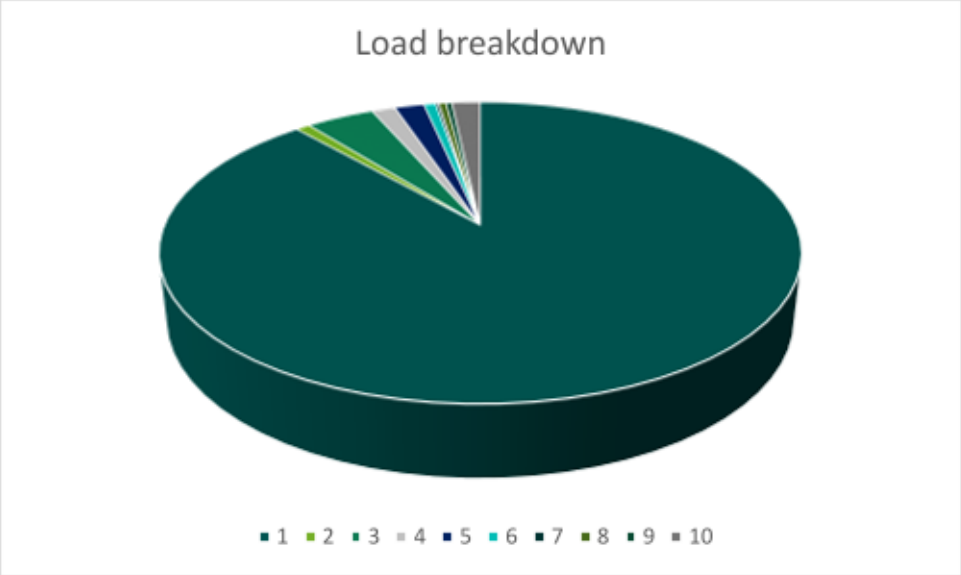
	Worcester Greenstar 28KDi FLAT Boiler 5 Ideal Esprit eco 24	28 24		
Electric heating	Church office oil filled radiator	3	1200	0.8%
Lighting internal	CHURCH (all upgraded to LED in Nave, transepts) Approx 65 spotlights OFFICES VESTRY inc. toilet [3x F58W, 4 pendant, 2 bulkhead] Above areas, 600 hours use Below areas, 3,500 hours use HALL ROOMS FLAT TOTAL (full load)	1420 200 350 920 400 3.3kW	Pre LED estimate 3500 1200 4600	6.2%
Lighting external	LED unit for east window Tower floodlights (Unknown) Average 5 hours use daily = 1825 hours annually	100W 900W	2000	1.3%
Hot Water	Kettles. Kitchen in heavy use Urn 3 uses per week Coffee machine, regular use Dishwasher. Unused	3 2 2 X	750 750 1000	1.7%
Kitchen	Cooker Microwave Fridge	3 1 200W	300 100 600	0.7%
Offices	Church Office, Vicar's Office Workstations x 2 Printer Nursery Workstation Printer	100W 500W 100W 500W	200 20 50 5	0.2%
Sound, music	Sound system	500W	300	0.4%

	Organ	1kW	300	
Small Power	Vacuum cleaners	1.5	500	0.3%
Flat	Estimated use based on UK average household consumption of 3,600kWh p.a.		2,400	1.6%

Annual electricity use estimated at 33,000kWh before installation of LED lighting

2021 consumption 23,835kWh

Unknown factors include the power rating of floodlights and if any further portable electric heaters have been used. Replacement of halogen spotlights by LED units in the chancel and transepts will have caused significant reduction in energy requirement but given the uncertain changes in building use caused by the pandemic it is not possible to make any more accurate estimates. For a heavily used building, where lights are often on, reduction in lighting load is significant.



KEY 1 Gas heating 2 Electric heating 3 Lighting internal 4 Lighting external 5 Hot water

6 Kitchen 7 Offices 8 Sound, music 9 Small power 10 Flat

As can been seen from this data, the heating makes up by far the largest proportion of the energy usage on site. The other significant load is lighting.

5.4 Energy Benchmarking

In comparison to national benchmarks for church energy use[1] St Mary the Boltons Church, Kensington uses 34% less electricity and 8% less heating energy than would be expected for a church of this size. This data just considers the church, not the hall and flat.

	Size (m^2 GIA)	Annual Energy Usage (kWh)	Actual kWh/m^2	Benchmark kWh/m^2	Variance from Benchmark
St Mary the Boltons Church, Kensington (elec)	580	7,277	12.5	19	-34%
St Mary the Boltons Church, Kensington (gas)	580	75,000	129	148	-8.5%
TOTAL	580	82,300	141	167	-15.5%

[1] CofE Shrinking the Footprint – Energy Audit 2013

6. Efficient / Low Carbon Heating Strategy

6.1 Strategy for each Zone

The energy used for heating a church typically makes up around 80% to 90% of the overall energy consumption. Heating also often uses gas as its primary fuel, these are fossil fuels with high carbon emissions and little opportunity to decarbonise in the future. Electricity currently has a carbon emissions around the same level as mains gas but the carbon emissions associated with electricity are reducing rapidly as the UK builds more renewable energy and decommissions it remain coal fired power stations. Mains gas does have some potential to reduce its carbon content through the use of bio gas and hydrogen but these are less developed solutions and will be unable to deliver 'zero carbon mains gas'. It is therefore important to review the use pattern of each area of the building and plan to improve energy efficiency. One way to achieve this is to consider a transition to electrical heating where this represents a more efficient and comfortable solution for churches.

Each zone of the building will be considered separately:

A] The church

B] The Vicar's office

C] The Children's room and Administrator's office

D] The vestry

E] The hall lettable rooms

F] The flat

A] The church

This is currently heated by two Ideal Concord CXA boilers which can deliver around 100kW of heat. They are experiencing age related issues and are to be replaced. The replacement gas boilers are expected to be condensing models offering very high efficiency (95% ?), BUT the efficiency savings will only be realised if they are operated with a water return temperature of 55°C (or slightly lower). This means that the output temperature may have to be lower than the 80°C which has been normal for central heating systems.

An obvious result of lower output temperatures is radiators which are less hot – they will need a longer operating period to deliver the same amount of heat. However, some of this heat is recovered from the waste flue gases, giving an efficiency gain.

As part of the new installation, it is recommended that

i) the system is first flushed to remove any debris
ii) a Magnetic Particle Filter is fitted to catch any magnetic sludge.

B] The Vicar's office

If heating for this room is insufficient, a solution commensurate with the hours and frequency of use and personal preference of the Vicar is suggested. For an occasionally used space, portable electric heating is sufficient. Use of an electrically heated office chair (models retaining at about double the price of standard office chairs) is suggested.

C] The Children's room and Administrators office

Both of these spaces have been created by partitioning the rear bay on each side of the nave.

The administrators office on the north side is described as cold, and a portable oil filled radiator is employed. This provides insufficient heat by radiation unless it is placed immediately adjacent to the administrator, and any convected heat is lost to the ceiling.

It is recommended that for both rooms,

i) the panels infilling the wooden framework forming the west walls is replaced by material of better insulating quality (or that a new layer is added behind).
ii) Secondary double glazing is added from the bottom of the window to the ceiling (this is a rectangular area of about half the total area of the window).

For the office, the external door leading to the entrance should be fully draught proofed. It may also be possible to add ceiling insulation in this space.

For the Children's room, an infra red radiant heating panel would enable this space to be rapidly heated for small meetings of short duration (e.g. between the vicar and visitors).

For the Administrator's office, an electrically heated office chair is suggested.

D] The vestry

This area is assumed to be used sporadically. Currently it is heated by a 2019 installed 25kW boiler. When this boiler eventually requires replacement, it could either be

i) replaced by being joined to the heat pump network envisaged for this end of the building (ideal if the room is to be used more regularly)
ii) replaced by wall mounted infra red radiant panels (ideal for sporadic use).

A location for an external heat pump unit would be between the shed and planting on the right (below) which is outside the existing boiler (the vent can be seen).

E] The hall lettable rooms

The hall area is currently heated by a 28kW boiler with a mechanical timer (suggesting that this model is around 10 years old or more). This area is regularly used throughout the week and evenings. Replacing gas with a "direct" electrical heating method (i.e. 1kW in, 1kW out) will increase costs by a factor of about 3 (ratio of electricity to gas costs per kWh). Replacing with an Air Source Heat Pump will result in costs similar to gas but with much lower carbon footprint.

This is recommended as:

i) the hall area is used intensively each day and most evenings
ii) there is a constant heat demand, ideally suited to a heat pump which offers operational economies over direct electrical heating

A pump could be installed outside of the kitchen wall to the south. This location offers easy pipework connections to the existing system and is shielded from view by a fence and planting in the adjacent gardens. (behind the bush above the path, below right). The existing boiler vent can be seen in the centre of the left hand image.

Quotations should be sought for both an Air to Water Heat Pump (utilising the existing radiator network and connected at the existing boiler location), and Air to Air Heat Pump (external unit located in the same position, requiring replacement of radiators with internal fan units and new refridgerant piping).

F] The flat

This is currently heated by a 24kW boiler. The regular use pattern of the accommodation is also suited to a heat pump. This might either be a unit situated as described above and serving both hall and flat, or alternatively a flat only system located on the flat roof above the hall entrance and toilets. The optimum position will depend on issues such as roof strength, pipework runs and contractors estimates.

The flat roof location may also provide a position for a heat pump to serve the vestry (when the boiler is due for replacement in a decade or so) – if this can be justified by the hours of use of the space (otherwise, direct electrical heating for a sporadically used space is recommended).

6.2 Heat Pump Overview

The technology uses refrigerant fluid to provide heat in a very efficient manner, extracting heat from the air or ground by boiling refrigerant and recovering the heat when the refrigerant is recompressed.

An outdoor unit draws heat energy by cooling a large amount of flowing air by a small amount (about one degree). The amount of energy required to run the pump is less than that of the heat captured – the ratio is called the Coefficient of Performance (CoP). CoP values of around 4 can be achieved by Ground Source pumps and 2 to 2.5 by Air Source units, both types providing water at about 50°C. An Air to Air system pumps refrigerant fluid to internal fan units where the heat is recovered, blowing out warm air, with CoP values of 4 to 5.

Ground Source Heat Pumps [GSHP] require either a sufficient area of land to lay subsurface pipes (not enough church land is available), or a borehole. Large heat requirements for the site may make this option unviable if the heat stored in the ground becomes depleted.

Air to Water Source Heat Pumps [AWSHP] have COP values between 2 and 3, which are weather dependent. They are least efficient when required to deliver large amounts of heat when the air is cold, so are incompatible with heating a church once a week from cold, but ideal for regularly used buildings.

Heat pumps generally deliver water at around 55°C (although there are higher temperature ones on the market which require more energy to run); thus are compatible with a building which is regularly used and can be supplied with constant, medium heat, rather than a full power heat up on Sunday mornings.

Approximate system sizings and costs

	Floor area/ m^2	Volume/ m^3	Heat Required kW	Heat Pump Capital cost/£	Heat Pump input/ kW	Annual heating Hours	Annual operating cost AWSHP £	Annual cost AASHP £
A] church	515	5150	170	68,000	68 / 43	350	5,317	3,323
D] vestry	64	380	13	5,200	5 / 3	150	167	100
E] hall	300	900	30	12,000	12/ 7.5	2,400	6,434	4,021
F] flat	50	150	5	2,000	2/1	2,400	1,072	536
						TOTAL heat pump cost	12,990	7,980
Current electricity cost						24,000kWh 22.34p/kWh	5,362	
Current gas cost						102,786kWh 7.5p/kWh	7,709	
Current total cost							13,071	

The heat pump input figures are for the two different types of pump; ASHP/ AASHP

Air to water (with radiators): CoP figure of 2.5 has been used.

Air to water (with new internal fan units): CoP figure of 4 has been used.

Using Air to Water Source Heat Pumps connecting to the existing radiators for the *whole* site in the future would result in higher operating costs (based on current rates) of £12,990 (pumps) plus £5,362 other site electric costs.

Using Air to Air Heat Pumps (requiring new internal fan units to replace radiators, capital costs similar) would require £7,980 (pumps) plus £5,362.

6.3 Heating Recommendation

With the church receiving new gas boilers in 2022, and the vestry in occasional use best suited to an occasional heating method, the hall and flat should be fitted with a heat pump system.

An air to air system (offering internal fan units blowing directly heated air) offers greater efficiency and lower operating costs than an air to water system (using the existing radiators).

The church is encouraged to seek detailed quotations for installers for each system.

6.4 Fuel Supply

Whilst there are plans to add hydrogen to the network, and "green" gas from anaerobic digestion; some suppliers offering up to 20% "green gas" tariffs, the majority of the gas supply will continue to be fossil fuel for the next decade. The economics of hydrogen production and the need to replace some pipework make full decarbonisation of gas unlikely.

With the main church gas boilers due to be replaced, the church is recommended to find a supplier via a group purchasing scheme which offers a percentage of renewable gas.

7. Improve the Existing Heating System

As the existing heating system is being retained for the church, it is recommended that measures are taken to improve its efficiency, this should include:

7.1 Clean the Existing Heating System

Before the new boilers are commissioned, the existing radiator and pipework network should be thoroughly cleaned. Magnetic sludge can build up and this will prevent the proper and efficient operation of the system by reducing the ability of the boiler to heat up the water and reducing the output of the radiators. It is similar to how scale build up can adversely affect kettles and showers.

Removal of this sludge from the system is done by using a chemical clean and/or power flush procedure where cleaning chemicals are put into the system which is then turned on and run through a filter consisting of high power magnetics to remove the sludge.

The cleaning of a heating system can be carried out by any competent heating engineer and typically increases the efficiency of a system by between 10 to 15%. This can dramatically improve comfort for the congregation.

8. Energy Saving Recommendations

In addition to having a revised heating strategy there are also a number of other measures that can be taken to reduce the amount of energy used within the church.

8.1 New LED Lighting

Most lighting, including all that in the nave and transepts has been changed to LED. Other areas are lit by a mixture of early LED bulbs, Bulkhead CFL units and T8 fluorescent strips. When the latter require replacement, it is recommended that the whole unit is replaced by either LED strip lighting or a row of LED units.

8.2 Lighting Controls (Internal)

Lights in areas such as toilets and corridors, especially in the hall are used for a short amount of time and as such, the light does not need to remain on constantly. There are also spaces which benefit from a good amount of natural daylight coming in through the windows where artificial lighting is not required for much of the year during the day.

It is recommended that a motion sensor is installed on these specific lighting circuits so that the lights come on only when movement is detected in the space and turn off approximately two to five minutes after the last movement has been detected (note that the duration of the time lag after which the light goes off needs to be consider alongside the type of light that is fitted. LED lights are much more suited to being switched off after only a short duration than some fluorescent lights). These movement sensors (commonly called PIRs) also have light sensors integrated into them so they can be used to make sure that the light does not come on if there is already sufficient daylight in the space.

Your existing electrician or any NICEIC registered electrical contractor can install PIR sensors onto existing lighting circuits. This can be carried out without significant disruption to the use of the space.

8.3 External Lighting Controls

For efficient operation and to reduce light pollution and nuisance to neighbours it is generally recommended that external floodlighting is turned off between 11pm and 6am unless required for specific purposes.

8.4 Power Management Settings on Computers

It is recommended that all computers are set to enter into a hibernate mode after a short period of time of not being used.

This can be set on the computers by going into the Power Options settings on the computers control panel and adjusting the times on the ‘change when computer sleeps’ option. It is recommended that computers should turn off their display after 2 minutes and put the computer to sleep after 5minutes. Putting the computer to sleep will not loose any unsaved work

but will require the user to power up the computer again when returning to their desk. Having shorter hibernate modes not along helps to save energy but also improves security by reducing the time that computers are left on but unsupervised.

8.5 Reflective Radiator Panels

The church is heated by radiators served from the boiler. These radiators are located on the external, uninsulated walls and have no reflective or insulated surfaces directly behind them at present. They therefore lose much of their heat into the masonry of the wall behind the radiator rather than give out the heat into the body of the church.

In order to improve the insulation directly behind the radiators a reflective panel can be installed, this helps to make sure more of the heat from the radiator goes into the space and requires less overall heating from the boiler to achieve the set point. There are a wide variety of reflective panels for installing behind radiators on the market such as www.heatkeeper.co.uk. It is recommended that these panels are installed behind all radiators within the building

The installation of radiator panels can be carried out by anybody competent in basic DIY and does not require the radiators to be removed.

8.6 Draught Proof External Doors

There are four glass doors at the west end of the nave. Two give direct access, whilst the others open into the church office and children's office.

8.7 Secondary Glazing

The hall is fitted with a mix of large metal framed Crittall windows on the south and east elevations and a mixture of single glazed wooden and metal framed windows on the non visible elevation facing the church. The non visible units, such as the nursery store room on the first floor and the north facing flat window are recommended to be replaced by double glazed units.

The smaller first floor south facing windows could benefit from internal secondary glazing.

The large windows on the hall ground floor would be very expensive to refit (below).

8.8 Insulation to Roof

The church hall, which is in regular use, is believed to have an uninsulated roof.

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.

An area of around 150m^2 can be fitted with loft insulation for £1,450.

9. Saving Recommendations (Water)

9.1 Tap Flow Regulators

It is recommended that taps in toilets which are frequented by children are fitted with flow regulators. 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.

These regulators can be self-installed or by any good facilities staff.

9.2 Detergents for Cold Water Hand washing

Use of cold water for hand washing can be just as effective as using hot.

https://www.nhs.uk/news/lifestyle-and-exercise/cold-water-just-as-good-as-hot-for-handwashing/

10. 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 – visible roof in conservation area
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
Biomass	No – air quality issues
Air Source Heat Pump	Yes, suitable for regularly used parts of building Air to air and air to water to be compared
Ground Source Heat Pump	No, Lack of land

The installation of ASHP in the church, hall and flat has been discussed previously in the report, in section 6.2.

11. Funding Sources

There are a variety of charitable grants for churches undertaking works and a comprehensive list of available grants is available at www.parishresources.org.uk/resources-for-treasurers/funding/

This includes a 77 page guide to funders and their criteria:

https://www.parishresources.org.uk/wp-content/uploads/Charitable-Grants-for-Churches-Jul-2020.pdf

12. 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.