Energy Audit Report for
St John the Baptist Church

May 2019

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2 INFORMATION

ESOS Energy conducted an Energy Audit at St Johns the Baptist Church in Dorking on 5th May 2019. The audit consisted of a site visit and data analysis during which all church areas were investigated.

This report summarises the audit findings and energy saving opportunities identified during the site visit and subsequent energy data analysis.

The headline messages from the audit are:

- £1,300 investment in energy reduction measures would achieve an estimated annual saving of 9,022 kWh (gas)
- Based on today's tariffs, this would result in an annual financial saving of £325
- The simple payback period on this investment is 4 years
- Lighting saving as per CES lighting report and not included in the above figures

3 CHURCH INFORMATION

A site survey was undertaken by Harjit Thind on Monday 5th May 2019. The survey was non-invasive (visual only) and entailed a general walk throughout the church areas including back of house and plant rooms.

Address: **St John the Baptist**

The Street

Dorking

RH5 5JY

GENERAL	
Listed Status	Grade 2
Building Age	13C with Victoria renovation and additions
Area	Approx. 350sqm
Usage	Typically 9 hours per week

4 ENERGY DATA ANALYSIS

4.1 ENERGY CONSUMPTION:

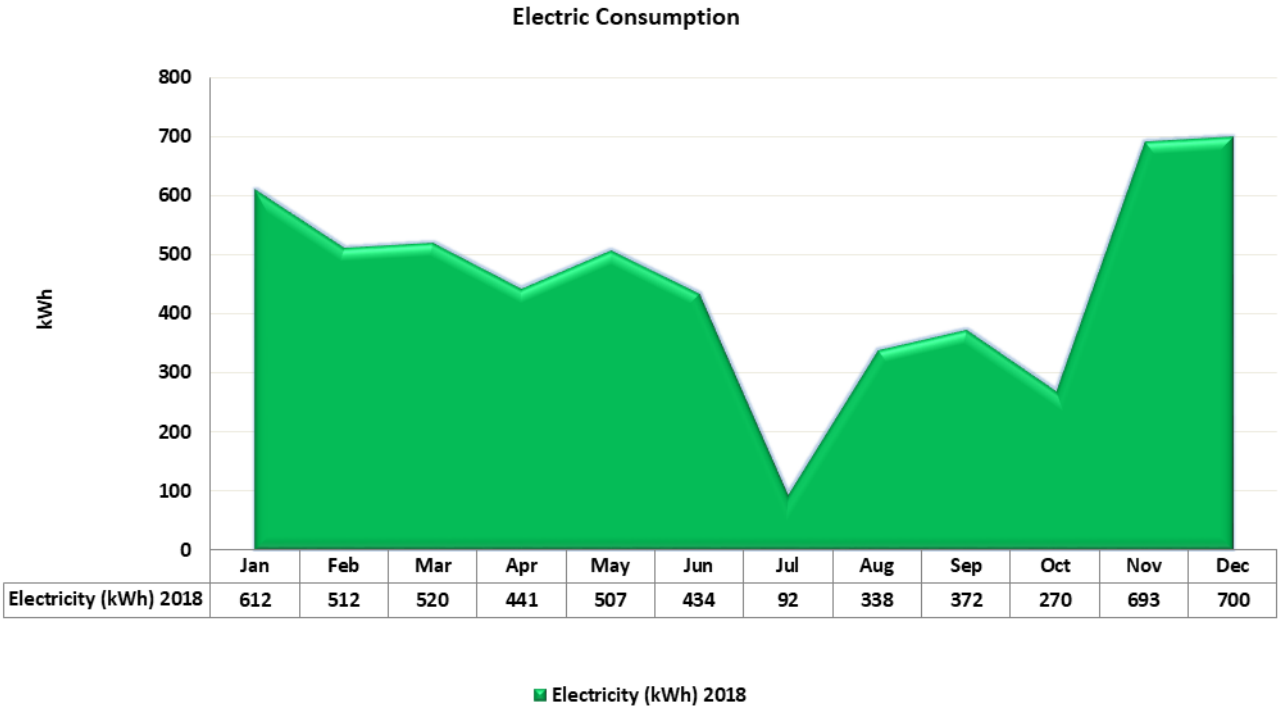
The energy consumption for the church during January to December 2018 is detailed below:

Utility	Energy Consumption		Energy Cost		CO_2 Emissions
	kWh/year	%	£/year	%	tCO_2
Electricity	5,490	10.9%	646	35%	3
Gas	45,110	89.2%	1,195	65%	8
Total Energy	**50,600**	**100%**	**1,841**	**100%**	**11**

Note: the costs exclude standing charge and VAT.

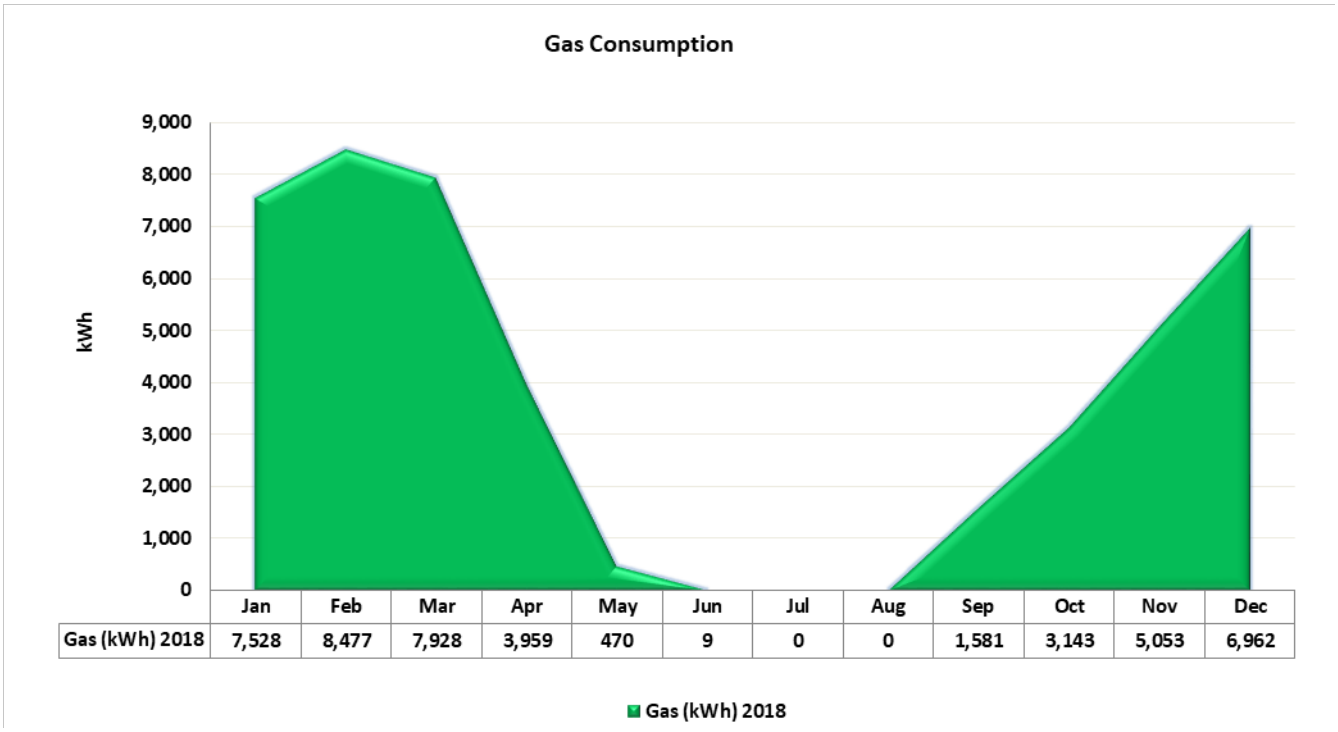
4.2 MONTHLY DEMAND PROFILE - ELECTRICITY

The electric consumption profile below shows the annual trend for the period of January 2018 to December 2018. The annual profiles show reasonable consistency throughout the year in-line with typical building usage. Noticeable increase in consumption during the Christmas and Easter period. Electric consumptions is largely from lighting and small power.



4.3 MONTHLY DEMAND PROFILE - GAS

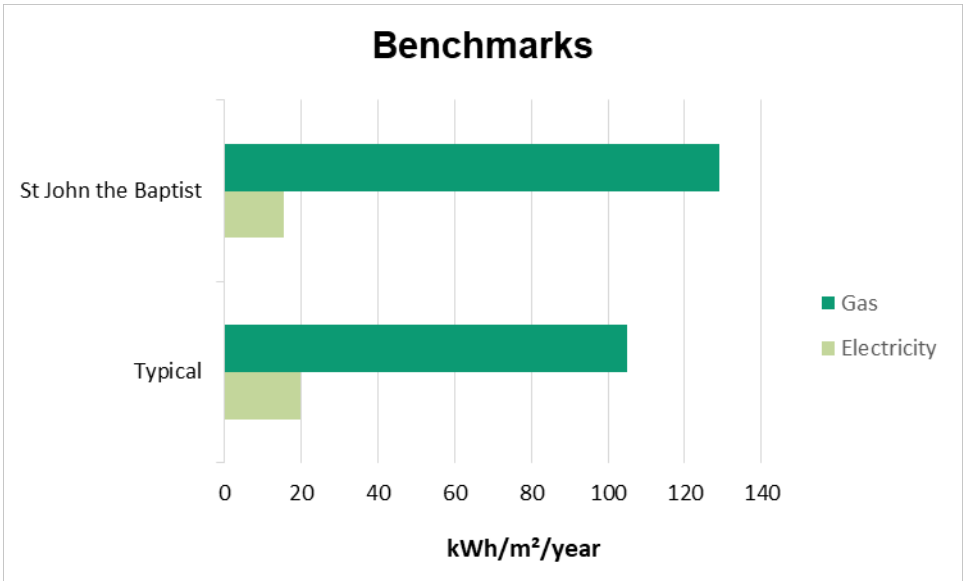
The gas consumption profile below shows the trend during January to December 2018. No consumption during late May to end of August when the heating system is switched off and hot water is from local point of use units.



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Gas (kWh) 2018	7,528	8,477	7,928	3,959	470	9	0	0	1,581	3,143	5,053	6,962

4.4 BENCHMARK PERFORMANCE

The use of benchmarks is designed to show how a building is performing in relation to similar buildings with comparable operation. The benchmarking information is broken down on a meter square basis which can be applied to any building size. The graph below depict building energy consumption per square meter compared against CIBSE TM46 Guide 2008 Energy Benchmark guide lines.



The electric consumption is performing better than the typical benchmark by approximately 22% lower and the gas consumption is performing worse than the typical benchmark by approximately 23% higher.

It should however be noted these are standard industry benchmarks that only provide an objective point of reference. Benchmarks can be higher due higher building use, age and typical heating systems from the typical building stock.

5 BUILDING PERFORMACE & OPPORTUNTIES

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 however highlight where further improvements could potentially be made.

5.1 BUILDING ENVELOPE

The building envelope is in good repair and no recommendations in this area.

5.2 HEATING SYSTEM - BOILERS

Heating is provided by two wall mounted gas fired boilers (Worcester 30CDi) located in restroom cupboard. The boilers appear to be relatively new complete with thermostat control in church area set to operate from 17deg. There is a remote digital programmer installed with 7 day program function. At present no significant heating complaints other than some users turn the thermostat up and then forget to reset when they leave. Current onsite team looking at installing HIVE wireless controls to provide better control functions.

The heating system is switched off during late May to end of August which is evident from the gas consumption profiles in section 4.3.

As the boilers appear to be relatively new, in good serviceable condition and well maintained. The flue gas analysis shows this is running at approximately 94% efficiency as such no current recommendation to replace boilers.

5.3 Heating System – Pipework & Distribution

The pipework is well lagged from the boilers as such no recommendations in this area.

5.4 Heating System – Heat Emitters

Heating to the church area largely from double radiators with the odd cast iron radiators of varying sizes across the church floor which are supplied from heating pipes running in floor trenches covered with grilles. Currently none of the radiators have Thermostatic radiator valves (TRVs) which if installed can help reduce energy and provide better thermal comfort. It is recommended to install TRVs on all conventional radiators and to combine this with a flush and clean of the heating system to ensure optimum efficiency.

5.5 Hot Water System

Hot water to toilets and kitchen is from point of use electric system.

5.6 Lighting

The current lighting system is out of dated and with high energy usage lamps with little to no control. A detailed lighting study has already been carried out by CES Lighting & Electrical Specialist which has been reviewed and it is recommended to replace with full LED replacements and dimming controls. Cost details as per report dated May 2018.

5.7 Renewables

There is currently no renewables on site. Further investigation rules out any potential renewables taking into account usage and grade 2 listed status.

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 savings			Investment (£)	Simple payback (yrs.)
			Elec/Gas KWh/yr.	Cost £/yr.	tCO2/yr.		
Lighting	1	Full lighting replacement with LEDs and dimming controls as per CES detailed lighting report	Detailed costs as per CES lighting report				
Billing	2	Review electric tariff as cost per kWh has increased by 15% and standing charge increased by 298% from October 2018	Dependant on new tariff rates				
Billing	3	Review gas tariff as cost per kWh has increased by 66% from October 2018	Dependant on new tariff rates				
Heating	4	Install TRVs to all conventional radiators & full flush and clean of heating system	5,413	£195	1.0	£800	4.1
Heating	5	Install HIVE wireless heating controls	3,609	£130	0.7	£500	3.8
		TOTAL ELECTRICITY SAVINGS	**-**	**-**	**-**	**-**	**-**
		TOTAL GAS SAVINGS	**9,022**	**£325**	**1.7**	**£1,300**	**4.0**
		GRAND TOTAL	**9,022**	**£325**	**2**	**£1,300**	**4.0**

7 ASSUMPTIONS

7.1 ASSUMPTIONS

- Average cost of electricity at 13 p/kWh
- Average cost of gas at 3.6 p/kWh
- Electricity carbon emission rate of 0.541 kgCO2/kWh
- Natural Gas carbon emission rate of 0.1836 kgCO2/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 & 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 are generating 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.