Assessment Of Energy Saving Opportunities For

Wollaston Methodist Church

CONTENTS

EXECUTIVE SUMMARY 3

ACTION PLAN 4

1. INTRODUCTION 5

2. ENERGY USAGE PROFILE 6

3. CARBON REDUCTION OPPORTUNITIES 7

EXECUTIVE SUMMARY

The Carbon Trust is grant funded by the Department for Environment, Food and Rural Affairs, the Department for Business, Enterprise and Regulatory Reform, the Scottish Government, the Welsh Assembly Government and Invest Northern Ireland.

This report presents the results of a CMEE (Carbon Management Energy Efficiency) site survey of the Methodist Church in Wollaston carried out by Natalie Isaac of AECOM. The agreed objectives of the wider CMEE project is to undertake audits of 12 churches to identify energy saving opportunities and to produce a short, site specific report. The 12 reports are to be used to prepare a 'How To Guide' which will be distributed to all Methodist Churches to help them prioritise energy saving actions at their sites using real case examples.

Site visits were to concentrate on lighting, space heating, hot water as well as opportunities for changing people's behaviour. If a site is entitled to apply for the Carbon Trust Loans to assist in paying for installation of the measures recommended within the report then this will be indicated within the Action Plan (overleaf). For more information on the Carbon Trust Loan scheme, see http://www.carbontrust.co.uk/cut-carbon-reduce-costs/products-services/business-loans/pages/loans.aspx

If all the prioritised measures at this site are implemented, the aggregated savings from the measures identified represent a 19% reduction in energy consumption and a 29% reduction in cost or £569 which translates into direct cost savings.

ACTION PLAN

The recommendations listed below are prioritised, according to estimated annual savings and payback, with energy management the first priority.

Priority	Recommendations	Estimated annual savings			Estimated cost (£)	Payback period (years)	Timescale for implementation and by whom	May be eligible for loan*
		(£)	CO_2 (tonnes)	(kWh)				
1	Replace Tungsten 100W bulbs with CFLs	£65	0.27	501	£26	0.4	Immediately D Warnock	NO
2	De-stratification fans in the Chapel	£193	0.81	1,492	£1,072	5.6	3 – 6 months D Warnock	YES
3	De-stratification fans in the Church hall	£100	0.42	771	£583	5.9	3 – 6 months D Warnock	YES
4	Insulate Chapel boiler pipes	£16	0.06	323	£100	6.3	0-3 months D Warnock	NO
5	Draft proof main Chapel external doors	£30	0.11	619	£250	8.3	3 – 6 months D Warnock	YES
6	Insulate Chapel roof	£99	0.37	2,030	£1,080	10.9	0 – 3 months D Warnock	YES
7	Replace eight wire bound T12s in Hall with high freq T5s	£67	0.28	515	£900	13.5	6 - 12months D Warnock	YES
TOTAL		£569	2.33	6251	£4,011			

* Please refer to the Site Survey Publication for eligibility details or visit www.carbontrust.co.uk/loans

1. INTRODUCTION

1.1. Site details

The Wollaston Methodist Church is part of the Nene Valley Circuit, Northampton District. The 1840 Chapel is of solid stone construction with a pitched roof and has powder coated double glazed aluminium windows and timber external doors. The hall is of solid brickwork construction with a pitched roof and has uPVC double glazed units and timber external doors.

The windows at Wollaston are double glazed – the hall windows in 2008 /2009 and the Chapel windows 15+ years ago. A development programme 5+ years ago saw changes to the site where the stairs linking the Chapel to the hall were enclosed by a cavity brick construction with a flat roof covered with felt, pews were removed from the Chapel and a kitchen was added.

The heating system at Wollaston is turned on from October to April. It is a wet system provided by two gas boilers on separate circuits providing heat to radiators. Individual heating thermostats were installed just before Easter 2010 and radiators have TRVs. There is no caretaker in charge of building maintenance at Wollaston. Heating and lighting are managed by building users with support from Church members.

Good practice onsite includes:

- Notices reminding people to turn lights off when not in use and to keep radiators clear
- Internal glass secondary entrance chamber to the Chapel
- Double glazing
- Insulation on the Chapel boiler pipes
- Occupancy and daylight controls on external lighting
- Chapel lighting on separate circuits

2. ENERGY USAGE PROFILE

2.1. Site Energy Consumption and Spend

The site consumes approximately 38,910 kWh of energy per annum (based on 2007 – 2008 figures*), costing a total of £2,196. All energy values are in terms of delivered energy.

*A new gas fired boiler has been installed since 2007 – 2008 and as such any energy savings calculation related to heating within this report have been based on estimated current energy use at Wollaston. The estimated current energy use for gas has been calculated at 85% of that used in 2007 – 2008 (i.e. 29,962 kWh / year; £1,465; 5.5 tonnes CO_2).

This comprises

Utility	**Energy Consumption**		**Cost**		**CO_2 Emissions**
	kWh/year	**%**	**£/year**	**%**	**tCO_2**
Electricity (if used)	3,660	9%	£473	22%	1.99
Gas (if used)	35,250	92%	£1,723	78%	6.47
Total Energy	38,910	100	£2,196	100	8.46

The unit costs for electricity used in day, night and weekend calculating savings are 16.11, 11.33 and 11.33 p/kWh respectively (excluding VAT and standing charges where the data provided allows for this). For the purposes of energy saving calculations within this report an average electricity cost of 12.92p/kWh has been used. The unit cost for gas used for Rate 1 and Rate 2 are 6.08 and 3.70 p/kWh respectively. For the purposes of energy saving calculations within this report an average gas cost of 4.89p/kWh has been used.

The electricity and gas costs above include the Climate Change Levy. Carbon conversion factors used – grid electricity (0.544) kgCO_2/kWh; gas (0.1836) kgCO_2/kWh.

3. CARBON REDUCTION OPPORTUNITIES

<table>
<tr><td>Priority no. 1</td><td colspan="4">Replace Tungsten 100W bulbs with CFLs</td></tr>
<tr><td>Cost Saving
£/yr</td><td>CO_2 Savings
tonnes/yr</td><td>Energy Savings
kWh/year</td><td>Cost
£</td><td>Payback
Years</td></tr>
<tr><td>£65</td><td>0.27</td><td>501</td><td>£26</td><td>0.4</td></tr>
<tr><td>Detail</td><td colspan="4">During the site visit it was observed that 100W tungsten bulbs were in use within the Chapel. Although the site has a policy of replacing tungsten bulbs with CFLs it is recommended that these are replaced with CFL equivalents immediately as the savings that can be achieved mean that it is unnecessary to wait until the existing bulbs fail.

Although the cost savings are low it is a good example of how purchasing and installing energy efficient products where possible can assist the Church to reduce energy use.</td></tr>
<tr><td>Risks</td><td colspan="4">No risk. The cost to purchase these lamps is based upon the church buying them at £2 per lamp. However, it is recommended that a request is put out to the congregation that if they have any ‘spare’ CFL bulbs at home they should be donated. The Energy Saving Trust has estimated that the average household has six unused bulbs lying in drawers that were sent out by the electricity supply companies to meet their Government Energy Efficiency scheme. If the congregation are not using theirs then maybe the church could.</td></tr>
</table>

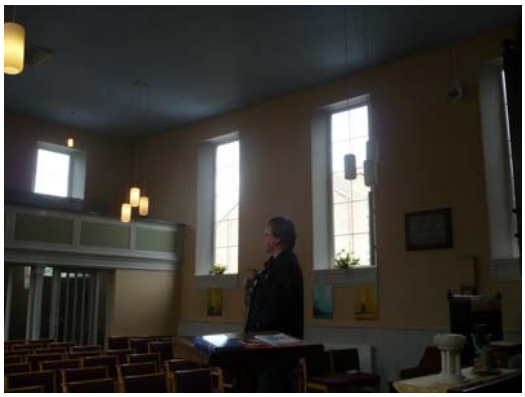
Priority no. 2	De-stratification fans in the Chapel			
Cost Saving £/yr	**CO_2 Savings tonnes/yr**	**Energy Savings kWh/year**	**Cost £**	**Payback Years**
£193	0.81	1492	£1,072	5.6
Detail	In heated rooms with high ceilings (+5m) de-stratification fans can help to blow the heat trapped under the ceiling back to ground level, thus sending the heat where it is needed and also reducing heat loss through the roof. De-stratification fans in the Chapel would help to reduce energy use to the area by sending the heat back to ground level and thereby reducing the time that the heating needs to be on in this area.  Ensure that the fans are thermostatically controlled so that the fans will switch on when the temperature in the roof area reaches the temperature required at floor level. Speed control can also be added to vary the air velocity. Calculation for this opportunity has been made for the heating period only and is based upon the installation of four de-stratification fans to this area.			
Risks	The system should be commissioned during the heating season in order to ensure that: • Noise level is acceptable at floor level • Air speed is acceptable at floor level • That proximity to lighting and other fixtures is suitable • Controls for the fan thermostat reduce the temperature at the ceiling to that at floor level throughout the hall Further inspection would be required to ascertain the ceiling construction and suitability to the installation of this system. There is also a risk that these fans will be used in the summer to provide cooling to this area. In order to provide energy and CO2 savings it is advised that Wollaston switch the fan system off when the heating season is over and request that natural ventilation is used to provide cooling to the area if required.			

Priority no. 3	**De-stratification fans in the Church Hall**			
Cost Saving £/yr	**CO_2 Savings tonnes/yr**	**Energy Savings kWh/year**	**Cost £**	**Payback Years**
£100	0.42	771	£583	5.9
Detail	In heated rooms with high ceilings (+5m) de-stratification fans can help to blow the heat trapped under the ceiling back to ground level, thus sending the heat where it is needed and also reducing heat loss through the roof. De-stratification fans in the Church Hall would help to reduce energy use to the area by sending the heat back to ground level and thereby reducing the time that the heating needs to be on in this area.  Ensure that the fans are thermostatically controlled so that the fans will switch on when the temperature in the roof area reaches the temperature required at floor level. Speed control can also be added to vary the air velocity. Calculation for this opportunity has been made for the heating period only and is based upon the installation of two de-stratification fans to this area.			
Risks	The system should be commissioned during the heating season in order to ensure that: • Noise level is acceptable at floor level • Air speed is acceptable at floor level • That proximity to lighting and other fixtures is suitable • Controls for the fan thermostat reduce the temperature at the ceiling to that at floor level throughout the hall There is also a risk that these fans will be used in the summer to provide cooling to this area. In order to provide energy and CO2 savings it is advised that Wollaston switch the fan system off when the heating season is over and request that natural ventilation is used to provide cooling to the area if required.			

Priority no. 4	**Insulate Hall boiler pipes**			
Cost Saving £/yr	**CO_2 Savings tonnes/yr**	**Energy Savings kWh/year**	**Cost £**	**Payback Years**
£16	0.06	323	£100	6.3
Detail	This opportunity relates to the hot water distribution pipes that feed the Hall. Insulation on any exposed pipes, flanges and valves will reduce the amount of waste heat being provided to this area.  Pipe insulation is relatively easy to install, low in price and will reduce heat wastage. It is assumed that this work could be undertaken without the use of an external contractor.			
Risks	None			

Priority no. 5	**Draft proof main Chapel doors**			
Cost Saving £/yr	**CO_2 Savings tonnes/yr**	**Energy Savings kWh/year**	**Cost £**	**Payback Years**
£30	0.11	619	£250	8.3
Detail	At Wollaston Chapel an internal glass secondary chamber has been installed to separate the congregation from the external doors and walls. Unfortunately congregation members are still encountering drafts from this area and the related energy savings are being undermined by small gaps surrounding the external doors.			

	  Installing draught proofing is one of the cheapest and most efficient ways to save energy in any type of building. Energy savings could be made if the small gaps around the external doors at Wollaston Chapel had the following installed: Door edges – Wiper or brush strips; or fit foam Door bottom - A hinged flap draught excluder or brush Reduction of drafts is likely to increase the general comfort of the members of the congregation.
Risks	None

Priority no. 6	**Insulate Chapel roof**			
Cost Saving £/yr	**CO_2 Savings tonnes/yr**	**Energy Savings kWh/year**	**Cost £***	**Payback Years**
£99	0.37	2030	£1,080	10.9
Detail	The Chapel roof at Wollaston is not insulated. Up to 25% of heat loss from a building's fabric is lost through the roof and the application of insulation to a roof without insulation can reduce this heat loss by up to 90%. If there is no insulation to this area then Wollaston should reduce energy loss from the Chapel by installing insulation.   Calculations for this opportunity are based on the installation of 250mm glass or rock wool blanket insulation between wooden frame members or laterally across the frame members.			

	Ensure that the work is carried out by an experienced and professionally registered contractor
Risks	No risks – however here are some things to consider: • Existing roof condition • Access to roof • Possible disruption to Chapel use

Priority no. 7	**Replace eight wire bound T12s in Hall with high freq T5s**			
Cost Saving £/yr	**CO_2 Savings tonnes/yr**	**Energy Savings kWh/year**	**Cost £***	**Payback Years**
£67	0.28	515	£900	13.5
Detail	The lighting to the hall at Wollaston is currently provided by five wire bound low frequency T12 fluorescent luminaires. This type of lamp is inefficient and has been is now no longer legally available in Europe.  Any future lighting refurbishment plans should include an upgrade to the lighting in the hall to high frequency T5 fluorescent as this lamp type uses less energy than the current T12s. T5 fluorescents give better quality light, for less energy consumption and have a longer life (approx 20,000 hours).			
Risks	None			

Further Considerations:

In addition the following measures are recommended for further investigation by the site, but are not graded as a priority for action at the present time:

Item No	Description of Recommendation
1	Solar PV: The building could benefit from the installation of a small PV array. The high capital cost of such a system makes this highly unlikely to be suitable at Wollaston in the near future. Should funding be available the following should be taken into consideration: panels need to have south facing orientation (±30o) or be mounted horizontally and should not be shaded. Space will be required for an inverter inside the roof space or plant room.
2	Curtains: Wollaston may wish to put up curtains on the back windows of the Chapel within the reveal, as these could be closed when appropriate and would then reduce heat loss to this area.   The curtains would need to be compliant with fire regulations and consideration given to the fact that they would reduce the provision of natural daylight to the back of the Chapel even when the curtains are open.