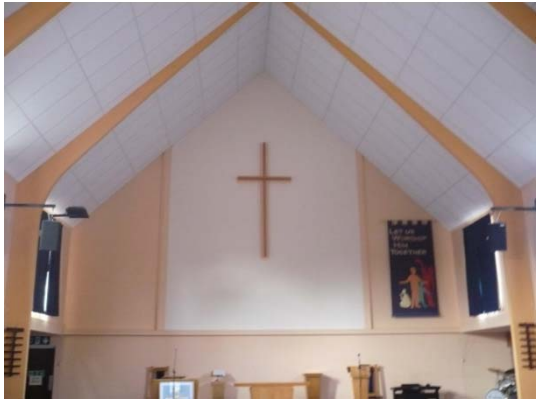
Assessment Of Energy Saving Opportunities For

Greasby Methodist Church



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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 Greasby carried out by Malcolm Hanna 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 could 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 31% reduction in energy consumption and a 31% reduction in cost or £1,395 which translates into direct cost savings.

ACTION PLAN

The recommendations listed below are prioritised, according to payback, with energy management the first priority

Priority	Recommendations	Estimated annual savings			Estimated cost (£)	Payback period (years)	Timescale for implement ation and by whom (to be completed by client)	May be eligible for loan*
		(£)	CO_2 (tonnes)	(kWh)				
1	Improving management, monitoring and targeting of energy use – link to meter reading and bill checking	£228	1.9	8,636	0	Immediate		no
2	Replace old inefficient fluorescent lighting (T12 units) with more energy efficient T8 lamps	£6	0.04	76	0	Immediate		Yes
3	Insulate pipes and valves in boiler room	£52	0.46	2,509	£150	2.8		Yes
4	Install cavity wall insulation	£405	3.58	19,507	£1,512	3.7		Yes
5	Replace old boiler with new high efficiency unit.	£704	4.2	23,040	£20,000	28		Yes
TOTAL		£1395.00	10.18	53,768	£21,662.00	15.5		

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

1. INTRODUCTION

1.1. Site details

Buildings and site

The Main Hall of Greasby Methodist Church was constructed in 1937, with the current church built in 1957 and new hall added in 1960s. A major building project took place in 2002 when a new Welcome atrium area was added which links the church and the halls and provides a new meeting area with a kitchen / café.

The buildings have an internal floor area of approximately 1,430m^2**.** The buildings comprise of the following elements;

- Church
- Vestry
- Original Church Hall
- Atrium Area
- Kitchen
- Scout Hut
- Youth Hall
- Meeting rooms
- Office
- WCs

There are no building refurbishments planned in the near future, following the major work in 2002. Quite a number of energy efficiency measures have been put in place on site. These include; new boiler controls installed two years ago providing zoned optimised and compensated (one zone) space heating, installation of energy efficient high frequency lighting in office area (including occupancy and daylight controls), the installation of space heating boost override, to enable building users to bring on heating for short periods as needed, rather than have it programmed on and risk the heating of unoccupied spaces. Occupancy controls have also been installed in a number of store areas and compact fluorescent lamps have been installed as a replacement for PAR spot lamps. Roof insulation has also been installed.
The building is of brick construction.

Space Heating
Space heating for the Church, Atrium and Scout Hut is provided by an 8 year old Ideal Concord gas boiler (108 kW unit). The remainder of the site is served by two 35 year old Heatrae Aggressor gas boilers (60kW each). Space heating is distributed by a low pressure hot water system which delivers heating to the spaces through a combination of warm air fan convectors (church) and radiator units. The Youth Hall has an optimised start control and is weather compensated.

Lighting – Internal
The majority of internal lighting is fluorescent, with a small number of metal halide units. The fluorescent lighting covers T12, T8, T5 and compact fluorescent types. Most lights are manually switched.

Lighting – External
External lighting is provided by a combination of 5ft fluorescent lights and PL units. They are controlled by a photocell and a timer which switches them off at midnight.

There are three electricity meters on site and two gas meters.

Energy and Environmental Management
Energy is purchased by Alan Chamberlain along with the Treasurer. Alan focuses on gas, with the Treasurer the electricity. The contracts are tendered each year and this has enabled the church to secure competitive prices. The energy bills are received and reviewed there is no explicit monitoring and targeting of energy use.

Responsibility for energy related matters on site falls primarily to the two Property Stewards. However the site is relatively active and a range of building users also have an impact and responsibility in terms of controlling energy use on a day to day basis.

The property HQ in Manchester was highlighted and in particular the Property Points circular. This provides very useful information e.g. regarding new property related legislation or legal aspects.

Maintenance
Maintenance arrangements are made locally. Use own in-house expertise if possible and external contractors e.g. for boiler maintenance.

Procurement
Procurement is generally dealt with locally at church level. Would welcome central guidance also would like specifications for key elements.

Site Occupancy profile

	Church occupancy	Hall etc occupancy
Mon		8:30 - 20:30
Tue		8:30 - 20:30
Wed	11:00 - 12:00 pm (lounge)	8:30 - 20:30
Thu		8:30 - 20:30
Fri		8:30 - 20:30
Sat		occasional
Sun	10:00 - 13:00 pm plus 18:00 - 19:30	

2. ENERGY USAGE PROFILE

2.1. Site Energy Consumption and Spend

The site consumes approximately 172,725 kWh of energy per annum (based on 2009 figures), costing a total of £4,557. All energy values are in terms of delivered energy.

This comprises

Utility	**Energy Consumption**		**Cost**		**CO_2 Emissions**
	kWh/year	**%**	**£/year**	**%**	**tCO_2**
Electricity (if used)	14,976	9	1,276	28	8.1
Gas (if used)	157,749	91	3,281	72	28.2
Total Energy	172,725		4,557		37.2

The unit costs for electricity and gas used in calculating savings are 8.52 and 2.08 p/kWh respectively (excluding VAT and standing charges where the data provided allows for this). These values are average costs (or state other source). The gas and electricity costs above include the Climate Change Levy. Carbon conversion factors used – Grid electricity (0.544 $kgCO_2$/kWh), Natural gas (0.184 $kgCO_2$/kWh)

3. CARBON REDUCTION OPPORTUNITIES

Priority no. 1	**Improving management, monitoring and targeting of energy use – link to meter reading and bill checking**			
Cost Saving £/yr or £k/yr	**CO_2 Savings tonnes/yr**	**Energy Savings kWh/year**	**Cost £ or £k**	**Payback Years**
£228	1.9	8,636	0	Immediate
Detail	General good housekeeping approaches to managing energy can deliver energy savings of up to 15%. These should be underpinned by monitoring of energy use by a monthly review of actual (not estimated) use based on meter readings. Comparison with previous monthly use and eventually with historic data (same month last year) can provide insights into any exceptional use or progress made. An annual energy report could be provided to the Finance Committee to highlight progress made and future actions needed. The programme of good housekeeping could include; • Lights to be switched off when areas unoccupied or when daylighting permits • Regularly checking timers on boilers and heaters, checking of any lighting controls • Switching off of any other equipment such as catering equipment when not being used • Tighter control of heating systems – switching off of radiant heaters when not needed It is appreciated that the buildings are already quite tightly controlled by a relatively small group of people and therefore potential further savings are limited. However in general there should still be scope to improve, particularly as at present energy use is not monitored at all. A conservative view has been taken that savings of 5% should be achievable.			
Risks to business continuity	There are no significant risks but care should be taken when asking other building users to participate in a Good Housekeeping energy saving actions. Make sure that any sensitive equipment is carefully marked so that others do not tamper with settings. Also information should be circulated to ensure that people understand controls.			

Priority no. 2	**Replace old inefficient fluorescent lighting (T12 units) with more energy efficient T8 lamps**			
Cost Saving £/yr or £k/yr	**CO_2 Savings tonnes/yr**	**Energy Savings kWh/year**	**Cost £ or £k**	**Payback Years**
£6	0.04	76	0	Immediate
Detail	In a number of areas of the building old inefficient T12 fluorescent lights were found. • Toilets – 6 x 2ft T12 • Utility room - 1 x 5ft T12 • Office – 1 x 5ft T12			

	These units should be replaced by T8 lamps, which in most cases can be fitted directly into the existing lamp holders. The T8 units offer an 8% energy reduction compared with the T12 units, whilst providing at least the same lighting performance. If this is carried out on lamp failure there is effectively no additional capital cost. An alternative to this no cost approach would be to replace the entire light fitting with a more energy efficient unit. The most efficient approach would be to install high frequency T5 fittings. However this approach would incur significant capital investment and would best be considered as part of a wider refurbishment project. This opportunity assumes lighting operational hours of approximately 50 hours per week.
Risks to business continuity	No risks

Priority no. 3	**Insulate pipes and valves in boiler room**			
Cost Saving £/yr or £k/yr	**CO_2 Savings tonnes/yr**	**Energy Savings kWh/year**	**Cost £ or £k**	**Payback Years**
£52	0.46	2,509	£150	2.8
Detail	It was found during the visit that there is a significant amount of pipework and valves currently uninsulated in the boiler room (Hall areas). It is recommended that these hot pipes are insulated. Capital costs have been included above, in order to give a comparative view of this opportunity compared with others. It has been assumed that half a day of labour would be required for this task. This opportunity assumes a seasonal boiler efficiency (Heatrae units) of 70% and weekly heating period of 50 hours during the heating season. Assume that a minimum of 19mm of insulation is installed around pipework (preformed rigid fibrous sections)			
Risks to business continuity	No significant risks. Health and safety considerations need to be understood by those carrying out this work. In particular if there are any concerns about the presence of asbestos in any areas, specialist advice should be sought.			

Priority no. 4	**Insulate the external walls**			
Cost Saving £/yr or £k/yr	**CO_2 Savings tonnes/yr**	**Energy Savings kWh/year**	**Cost £ or £k**	**Payback Years**
£405	3.58	19,507	£1,512	3.7
Detail	The majority of the external walls of the building are uninsulated cavity walls with the exception of the new building of 2002. It is recommended that these wall areas are insulated with insulating beads or granules blown into the wall cavity in order to reduce heat loss from this heated area.			

	 The Carbon Trust guide CTL062, How to implement cavity wall insulation indicates that Typically 10-30% of the heat lost from a building shell is lost through its wall and that the application of insulation to un-insulated walls can reduce this loss by this loss by around two-third. Please note that these calculations are estimates. There were no detailed drawings available and the wall area has been calculated based upon a rough schematic sketch and average wall height estimates. It is recommended that these estimates and costs are confirmed by more detailed investigations before implementation.
Risks to business continuity	The filling of cavity walls can potentially cause damp and water penetration problems to the external walls inner leaf and could aggravate existing thermal bridging problems. Therefore careful external and internal inspection of the existing structure and it's current condition is required to determine the suitability of this opportunity. Remedial work such as re-pointing the brickwork may have to be incorporated into the scope of this opportunity.

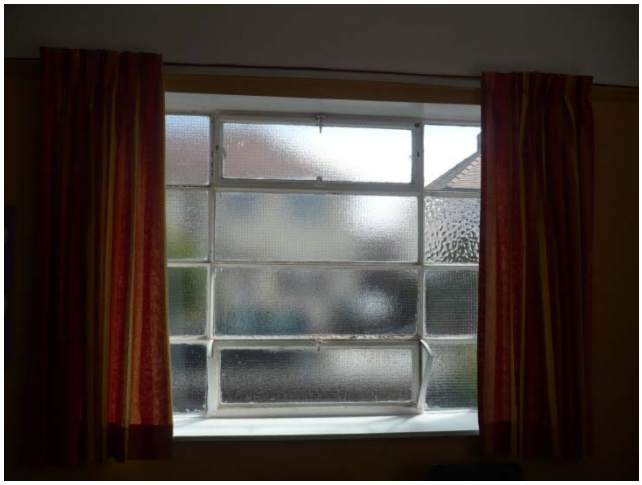
Priority no. 5	**Replace old boiler with new high efficiency unit.**			
Cost Saving £/yr or £k/yr	**CO_2 Savings tonnes/yr**	**Energy Savings kWh/year**	**Cost £ or £k**	**Payback Years**
£704	4.2	23,040	£20,000	28
Detail	The existing 35 year old Heatrae gas boilers are due for replacement with high efficiency modern units. The above calculation has been provided in order to indicate the potential savings associated with this boiler change. Typically we could expect seasonal efficiency improvements for modern boilers compared with 35 year old units of at least 20%. As the replacement unit will hopefully be in operation for the next ten to thirty years, this represents one of the biggest opportunities to improve site energy efficiency and reduce carbon emissions. It is understood that the Church will use local contractors to help with the selection of the boiler equipment. It is also recommended that the central property group (Manchester) should be consulted to see if there is further support available. The Energy Technology List contains details of the boilers which qualify for Enhanced Capital Allowances (see note below). In order to be included on this list the units have to meet key performance criteria e.g. net thermal efficiency must be >=95% at 100% of it's rated power. This can be used to help compare energy performance of equipment. In general high efficiency condensing boilers are recommended. It is appreciated that in some situations there may be limited scope for condensing			

	mode to be achieved. The relative efficiencies of different units should be compared before selection. Ideally the lifetime or at least the energy costs over the next 10 years should be factored into the decision making process. The size rating of the new boiler should also be considered on replacement. Over 35 years the building requirements have changed and as a result boiler requirements will be different. A calculation of the sizing should be carried out based upon updated operations and building details. 
Risks to business continuity	No significant risks

Additional Opportunities

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	Glazing – A small number of areas have old metal framed 'Crittal' type window frames, single glazed. These units present maintenance issues and can over time represent problem areas in terms of air infiltration due to an inability to tightly close the units. From an energy efficiency perspective there is a case for replacement with modern double glazed units, however it does represent a long term payback and would probably best be considered when a refurbishment is planned. Energy efficiency impact can be included in the case along with the maintenance benefits.

	 If the condition of the units deteriorates to the point at which significant air infiltration is occurring then the case for replacement becomes more pressing and the payback in terms of energy efficiency will shorten.