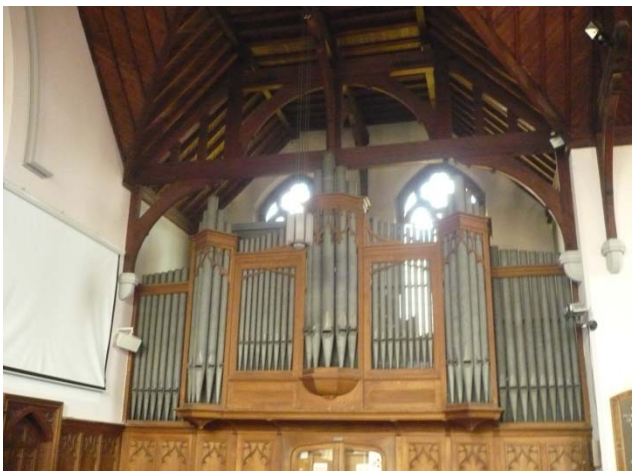
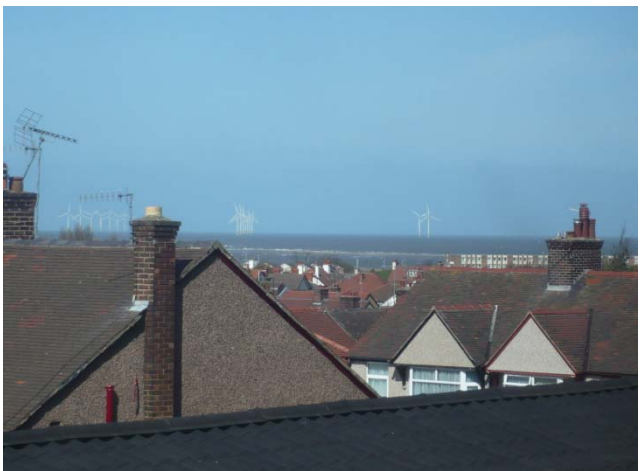
Assessment Of Energy Saving Opportunities For

Claremount Methodist Church





CONTENTS

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 Claremount Road, Wallasey 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 an annual 22.56% reduction in energy consumption and a 23.28% reduction in cost or £1,906 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 implementation 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	£409	2.1	9,544	0	immediate		no
2	Replace old inefficient fluorescent lighting (6 ft T12 units) with more energy efficient T8 lamps	£18	0.1	183	0	Immediate		no
3	Replace old inefficient remaining tungsten lamps with compact fluorescent units	£307	1.71	3,149	£160	0.5		yes
4	Switch off external lights at midnight rather than leaving them switched on all night	£141	0.78	1,441	£100	0.7		yes
5	Install optimiser control on New Hall boiler	£186	0.95	5,183	£370	2		yes
6	Insulate pipes and valves in boiler room	£25	0.13	700	£100	4		yes
7	Install a separate heating zone for the New Hall	£820	4.2	22,880	£3,500	4.3		yes
TOTAL		**£1,906**	**9.97**	**43,080**	**4,230**	**2.2**		

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

1. INTRODUCTION

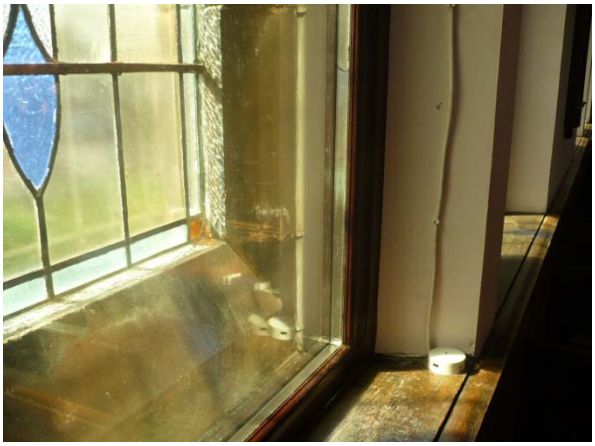
1.1. Site details

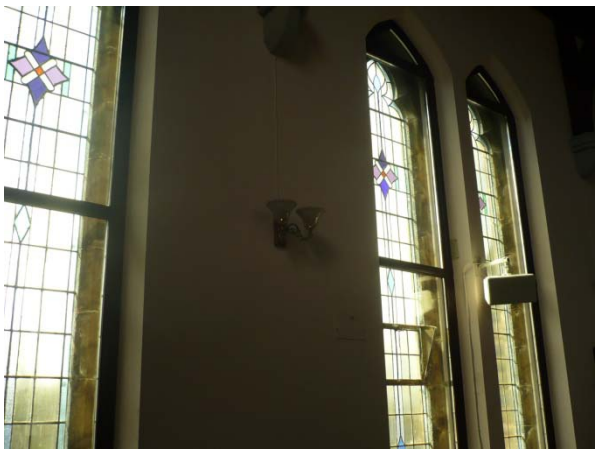
Buildings and site

Claremont Methodist Church was constructed in 1910, with the New Hall added in 1961, followed by the Rendezvous extension earlier. The buildings have an internal floor area of 1,294m2. The buildings comprise of the following elements;

- Church
- Old Church Hall
- Rendezvous Area
- Kitchen
- New Church Hall
- Lounge
- Art Room
- Office
- Ministers vestry
- WCs

There are no building refurbishments planned in the near future. There is the possibility of the Old Hall being redeveloped at some stage. A number of energy efficiency measures have been taken including the installation of a new boiler to provide the Church Space heating during the summer of 2009. Regular gas meter readings are now being taken in order to assess the impact of the new plant. Secondary glazing has recently been installed onto the church stained glass windows.





The original building is of solid stone with the New Hall and associated added buildings of brickwork.

Space Heating

Space heating for the Church is provided by a new Potterton Derwent Compact plus unit (116 kW) this includes a Heatmiser "Boilerman" control panel, which provides single zone optimisation. The New Church Hall and associated areas are heated by a Broag Quinta 65 kW unit, with a standard seven day timer control.

Space heating is distributed around the buildings by a low pressure hot water system, delivered to spaces by radiator units.

A review of the operating schedules against occupancy profile of the building indicated a reasonably close match e.g. heating in the church switched off 5 minutes before the end of the service and Church Hall heating switches on around 1 hour before first occupancy of the day and thirty minutes before occupancy finishes.

Domestic Hot Water
DHWS are provided by local direct acting electric units. In the kitchen there is also a hot water dispenser (zip heater) for hot drinks.

Lighting – Internal
The majority of internal lighting is fluorescent, with a small number of tungsten lamps. All internal lights are manually switched.

Lighting – External
External lighting is provided by sodium lamps (100W) which are controlled by a photocell. The lights remain switched on all night due to certain security concerns.

There is one electricity meter feeding all buildings on the site and two gas meters, one for the church and one for the hall areas.

Energy and Environmental Management
Energy is purchased by the Treasurer, who also pays the bills. The energy bills are received and reviewed by the Treasurer. There is monitoring of gas use on an almost daily basis at present in order to assess gas use of the new church boiler.

Responsibility for energy related matters on site falls to Peter Guyan and Ken Sturn the Property Steward. There are other key holders who are expected to switch off lights and equipment on the basis of last person out of the building. The site is very busy with activities in many areas on each day of the week; so many people also have an influence on energy use.

An annual report on heating and lighting is provided as part of annual budgeting and accounting. Property Council also report twice per year to the Church Council, identifying what has been done and what needs doing. People are not specifically trained on site in terms of procedures, however signs are used and there was interest in the idea of producing e.g. a small leaflet informing adults and children about energy, water and also possibly waste. There are recycling bins on site but people seem to struggle / understand what is required (e.g. better bin labelling) – pictures of the type of waste / colour coding etc.

The property HQ in Manchester was also mentioned as a source of support if needed, along with Barry Natton (Circuit Property Leader)

Maintenance
There is an in-house maintenance team. People report problems to Peter and Ken.
Maintenance arrangements are made locally, use there own contractors who know the premises.

Procurement
Procurement is generally dealt with locally at church level. When procuring the new boiler – 1) Obtained 3 quotations 2) Consulted the Council 3) Used chosen contractors to carry out the work.
Replacement of smaller items tends to be like for like, hence guidance would be useful.

2. ENERGY USAGE PROFILE

2.1. Site Energy Consumption and Spend

The site consumes approximately 190,876 kWh of energy per annum (based on 2009 figures), costing a total of £8,185. 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)	21,805	11	2,126	26	11.9
Gas (if used)	169,071*	89	6,059	74	31.1
Total Energy	190,876		8,185		43

*Following the installation of a new gas boiler for the church heating in summer 2009 it looks likely that annual gas consumption will significantly reduce.

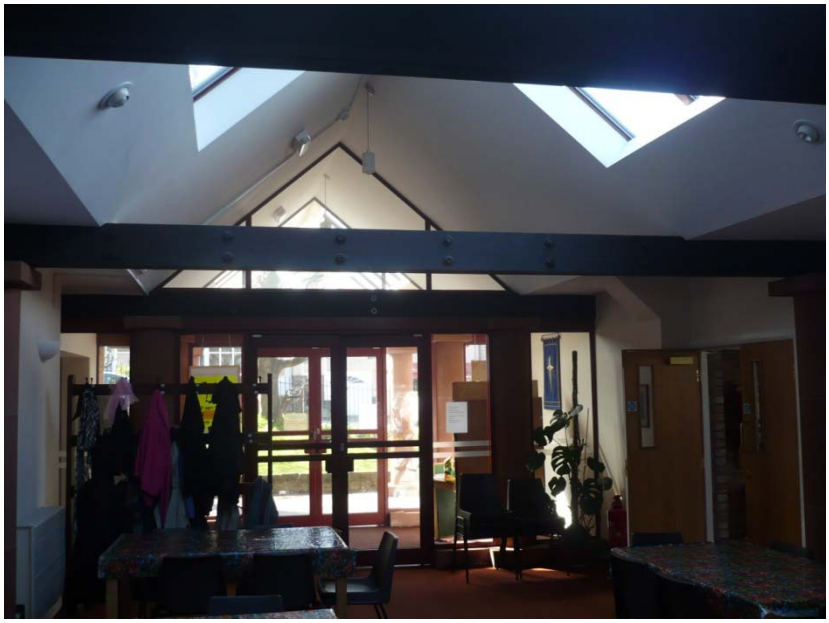
The unit costs for electricity and gas used in calculating savings are 9.75 and 3.584 p/kWh respectively (excluding VAT and standing charges where the data provided allows for this). These values are average costs (or state other source). The gas and electricity costs above include the Climate Change 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**
£409	2.1	9,544	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 (6 ft 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**
£18	0.1	183	0	Immediate
Detail	In a number of areas of the building old inefficient T12 fluorescent lights were found. • Church Welcome area – 5 x 6ft T12 • Church – 6 x 6ft 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.
Risks to business continuity	No risks

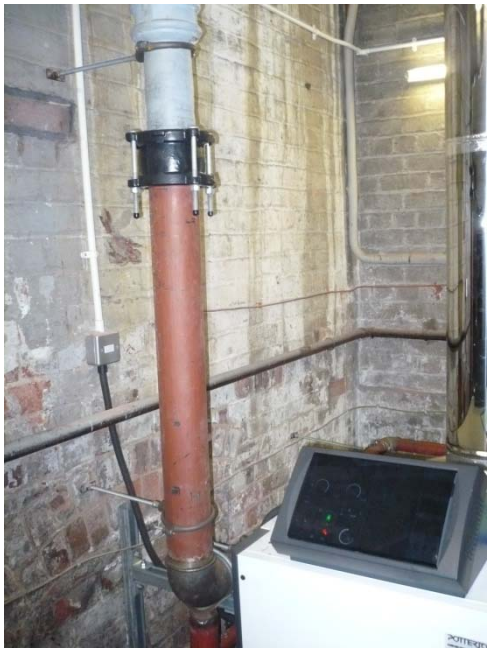
Priority no. 3	**Replace old inefficient remaining tungsten lamps with compact fluorescent units**			
Cost Saving £/yr or £k/yr	**CO_2 Savings tonnes/yr**	**Energy Savings kWh/year**	**Cost £ or £k**	**Payback Years**
£307	1.71	3,149	£160	0.5
Detail	During the survey a range of old and relatively inefficient type tungsten lamps were found around the building. • Vestry – 3 tungsten lights – replace with CFL • Arts Room – 6 tungsten lamps – replace with CFL • New Hall area 16 tungsten lamps – replace with cfl • Tungsten lamps in reception (13) replace with CFL • Wall lights – 14 tungsten – 100W uplights – replace with CFL It is recommended that these are all replaced with compact fluorescent lamps. These lamps will typically reduce the energy used by 75% and should last between 6 and 15 times longer than the existing lamps. The majority of these lamps can be directly replaced with a CFL equivalent, without the need to replace the fitting. 			

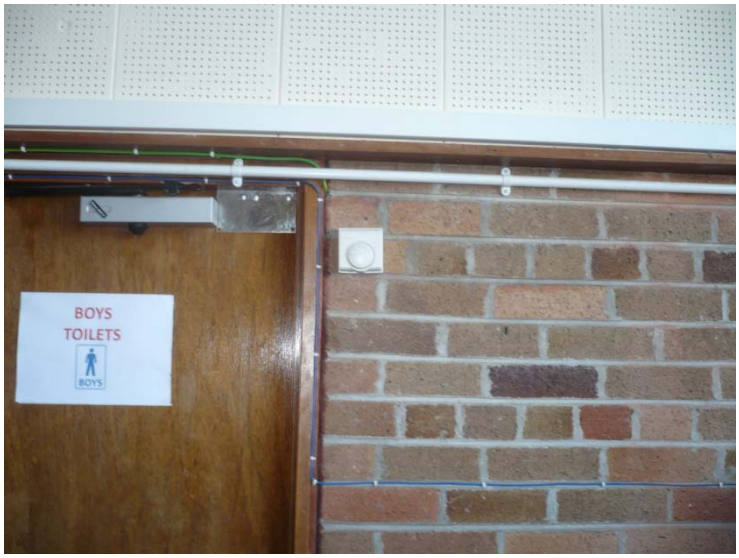
	For accent lighting in areas with long hours of operation e.g. reception, an alternative could be the use of LED type spot lights. The above calculation is based upon an average capital cost difference between the existing lamp and a CFL of £3/lamp. For LED lamps, currently costing between £10 - £20 each, the differential would mean longer paybacks. However in areas with long illumination periods the case for LED could be made, particularly when we take into account the LED lamp life benefit (over 20,000 hours) compared with around 8,000 for the CFL.
Risks to business continuity	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 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.

Priority no. 4	**Switch off external lights at midnight rather than leaving them switched on all night**			
Cost Saving £/yr or £k/yr	**CO_2 Savings tonnes/yr**	**Energy Savings kWh/year**	**Cost £ or £k**	**Payback Years**
£141	0.78	1,441	£100	0.7
Detail	The external lights (6no 100W sodium lamps) are controlled by a photocell, but remain switched on all night due to previous security issues. It is proposed that they should be switched off at midnight each night in order to save energy. This will require the installation of a time switch.			
Risks to business continuity	Security issues to be reviewed and to determine if this step is appropriate.			

Priority no. 5	**Install optimiser control on New Hall boiler**			
Cost Saving £/yr	**CO_2 Savings tonnes/yr**	**Energy Savings kWh/year**	**Cost £**	**Payback Years**
£186	0.95	5,183	£370	2
Detail	A seven day time controller is used to switch the main boiler plant, in order to supply space heating for the new hall and associated areas. Once a time schedule is established the timer brings the boiler plant on at the same time every day during the heating season, irrespective of the external temperatures. This can result in excessive boiler operation i.e. achieves building set point temperature before occupancy period begins. An optimiser takes the outside temperature into account when determining when to switch on the boiler, in order to achieve building set point temperature at the start of building occupancy. It is proposed that an optimiser control should be installed to control the boilers. This would help ensure that boiler plant was switching on when required, in order to reach target temperatures at			

	the right time, in line with ambient temperature fluctuations. Optimiser controls can typically achieve efficiency improvements of 5-10%. For the purposes of this calculation we have assumed a 7% saving applied to the gas use of the boiler feeding the New Hall etc area.
Risks to business continuity	There may be some limitations in terms of the types of optimisers controls available to fit these boilers. The above capital cost assumes that an off the shelf unit (e.g. Heatmiser "Boilerman" as this is currently installed on the Church boiler) (£170 plus a days labour) will be available to fit the system on site. If this is not the case, a bespoke control unit will be required which may incur additional costs.

Priority no. 6	**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**
£25	0.13	700	£100	4
Detail	It was found during the visit that there is a significant amount of pipework and valves currently uninsulated in the church heating boiler room area. 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.  It was estimated that there were approximately 3m of 3in pipe, 3m of 4in pipe and 4m of 2in pipe uninsulated.			
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. 7	**Install a separate heating zone for the New Hall**			
Cost Saving £/yr	**CO_2 Savings tonnes/yr**	**Energy Savings kWh/year**	**Cost £**	**Payback Years**
£820	4.2	22,880	£3,500	4.3
Detail	It appears that there are two issues on site associated with the heating of the new hall area. Firstly, the hall tends to be used in the evenings, when the majority of the rest of the building is not occupied. This means that the whole of the new hall area has to be heated in order to provide heat for the hall. Secondly the space heating thermostat for the new hall area has had to be located in the new hall due to the fact that in the past when it was elsewhere the heating was switching off before the hall got up to temperature. The result of it's location in the hall means that areas such as the lounge now suffer from overheating, and energy waste as a result.  A possible solution to both of these problems would be the installation of a separate heating zone for the hall itself. This would enable the hall to have a separate time schedule from the rest of the building, enabling main plant to be switched off a number of times each week. It would also provide for a separate thermostat for the hall and for the rest of the area, to improve comfort of both and to reduce energy waste due to overheating. To achieve this would require additional automated valves to be fitted to the heating circuit. It would also require additional sensors and controls. It will probably also require some additional pipework to be installed and possibly an additional pump set. An estimated capital cost is provided here, but this is very much an estimate and would require more detailed investigation to confirm costs and practicalities. For this calculation the assumption has been made that with the separate zone it will be possible to generally switch off heating to the rest of the building at 4 pm, with only the hall remaining on from 4pm - 9:30			
Risks to business continuity	Capital cost and practical difficulties to install.			

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	Replace all older lighting with high efficiency, high frequency T5 fluorescent fittings including occupancy and daylight (lux) detectors. This should be considered if any major refurbishments are planned as the capital cost is prohibitive as a retrofit measure.