

# Assessment Of Energy Saving Opportunities For

## Knutsford 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 Knutsford Methodist Church carried out by Adam Fjaerem 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 for a 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 2% reduction in energy consumption and a 3.6% reduction in cost of £146.5 which translates into direct cost savings.

## ACTION PLAN

The recommendations listed below are prioritised 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 the church)	May be eligible for loan*
		(£)	CO2 (tonnes)	(kWh)						
1	Install daylight controls in community hall rooms	£60	0.45	826	£476	7.95			✓	
2	Replace lighting on upper balcony	£33	0.25	450	£97	3				
3	Replace spot lighting	£36	0.3	493	£147	4			✓	
4	Daylight controls in corridors	£3	0.02	45	£192	59				
5	Replace tungsten in foyer and staircase	£12	0.09	164	£10	<1				
6	Install PIR in toilets	£2.5	0.02	35	£96	38				
	Total	<b>£146.50</b>	<b>1.13</b>	<b>2013</b>	<b>£1018.00</b>	<b>7</b>				

\* Please refer to the Site Survey Publication for eligibility details or visit [www.carbontrust.co.uk/loans](http://www.carbontrust.co.uk/loans)

# INTRODUCTION

**IMPORTANT NOTICE:** Whilst reasonable steps have been taken to ensure that the information contained within this Report is correct, you should be aware that the information contained within it may be incomplete, inaccurate or may have become out of date. Accordingly, AECOM, the Carbon Trust, its agents, contractors and sub-contractors and the Government make no warranties or representations of any kind as to the content of this Report or its accuracy and, to the maximum extent permitted by law, accept no liability whatsoever for the same including without limit, for direct, indirect or consequential loss, business interruption, loss of profits, production, contracts, goodwill or anticipated savings. Any person making use of this Report does so at their own risk. © Queen's Printer and Controller of HMSO. Any trademarks, service marks or logos used in this publication are the property of the Carbon Trust, and copyright is licensed to the Carbon Trust. Nothing in this publication shall be construed as granting any licence or right to use or reproduce any of the trademarks, service marks, logos, copyright or any proprietary information in any way without the Carbon Trust prior written permission. The Carbon Trust enforces infringements of its intellectual property rights to the full extent permitted by law.

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## 1.1. Site details

The Methodist Church in Knutsford, Cheshire was built in 1864 with a newer community hall built onto the back of the property in 1970.

The church consists of a double storey building with a pitched open aspect roof (containing 4" of insulation). The second storey comprises of a balcony which was extended along the side wall in 2006 to cope with increased congregations.

The community centre comprises of two stories with a flat roof, the upstairs area is split into 6 different sized rooms which are used for a variety of clubs, education facilities and meetings with associated store rooms. Downstairs comprises of a main hall, an office area, a vestry and a kitchen that is used weekly to provide meals for the elderly residents of the town.

The church building is lit by 120W tungsten lamps positioned at a high level with additional lighting supplied by 28W 2D lighting located beneath and above the new balcony and five 60W GLS bulbs used to light the foyer and staircase area.

The community centre is predominately lit by 35W T8 HF quad fittings in the rooms, with twin 14W CFL in corridors and 28W 2D fittings in the store rooms. The majority of the store room lighting is controlled by PIR controls however; there have been a few incidents of the light fittings burning out after the PIR's haven't turned them off so these PIR have been removed and replaced with manual switches.

Heating is provided by radiators in the church and the community centre with each area being supplied by a separate zone. The gas boiler is six years old with excellent controls. The radiators in the church are all fitted with TRV's as are the majority, but not all, of the radiators in the community centre.

The building is regularly used with services each Sunday at 09:15 to 10:15, 10:45 to 12:00 and 18:30 to 19:45. The Church is used on Wednesday between 10:00 to 12:00 and Thursday from 19:00 to 21:00 and is opened and lit but not heated each morning for free worship every weekday morning. The office in the community centre is opened four days a week for three hours and the rest of the community centre is operational with varying occupancy between 09:00 to 22:00 Monday to Friday.

For the purpose of the calculations in this report it will be assumed that the church is open and lit for 10 hours per week throughout the year and heated (during the heating season) for 10 hours per week every week (averaged over the year). The community centre is heated and lit for 13 hours per day, five days per week every week (averaged over the year).

## 2. ENERGY USAGE PROFILE

### 2.1. Site Energy Consumption and Spend

The site consumes approximately kWh of energy per annum (based on 2009 figures), costing a total of £4,072. All energy values are in terms of delivered energy.

#### This comprises

Utility	Energy Consumption		Cost		CO <sub>2</sub> Emissions
	kWh/year	%	£/year	%	tCO <sub>2</sub>
Electricity (if used)	25,980	23	1,884	46	2.0
Gas (if used)	87,920	77	2,188	54	2.2
Total Energy	113,900	-	4,072	-	4.2

The unit costs for electricity and gas used in calculating savings are 10.42 and 3.284 p/kWh respectively (excluding VAT and standing charges where the data provided allows for this). These values are average costs. The gas and electricity costs above include the Climate Change Levy. Carbon conversion factors used are Grid electricity (0.544 kgCO<sub>2</sub>/kWh) and Natural gas (0.184 kgCO<sub>2</sub>/kWh).

### 3. CARBON REDUCTION OPPORTUNITIES

<b>Priority no. 1</b>	<b>Install daylight controls in community hall rooms</b>			
<b>Cost Saving £/yr</b>	<b>CO<sub>2</sub> Savings tonnes/yr</b>	<b>Energy Savings kWh/year</b>	<b>Cost £</b>	<b>Payback Years</b>
60	0.45	826	476	7.95
<b>Detail</b>	<p>On the day of the audit most of the community hall rooms were in use with their lights on despite the large amounts of natural light entering the rooms, which meant that they could have been left off.</p> <p>It is recommended that daylight controls are installed on the lighting circuits in each room to hold the lights off when natural lighting levels are sufficient. To retrofit these controls will be more expensive than they would have been if fitted when new but will save energy.</p>			
<b>Risks</b>	<p>No risk, however, the sensors will need to be installed and calibrated correctly to ensure lights come on when the natural lighting levels drop to ensure that people are not working in dark conditions.</p>			

<b>Priority no. 2</b>	<b>Replace lighting on upper balcony</b>			
<b>Cost Saving £/yr</b>	<b>CO<sub>2</sub> Savings tonnes/yr</b>	<b>Energy Savings kWh/year</b>	<b>Cost £</b>	<b>Payback Years</b>
33	0.25	450	97	3
<b>Detail</b>	<p>The church is lit by 30 x 120W tungsten bulbs in spotlight luminaires. Above the new balcony nine of these fittings are installed as single lamps which are inappropriate for this location as they provide a great deal of heat onto the congregation's heads.</p>  <p>It is suggested that these nine lamps are replaced with a 20W CFL equivalent. These would not have sufficient throw of light to replace the remaining spot lights but would provide sufficient light to light the upper balcony efficiently</p>			

	and in the process provide a more comfortable environment for people sitting upstairs.
<b>Risks</b>	No risk, but the site should not use these lamps to replace the 'true' spotlights as the 'throw' of light would be insufficient.

<b>Priority no. 3</b>	<b>Replace spot lighting</b>			
<b>Cost Saving £/yr</b>	<b>CO<sub>2</sub> Savings tonnes/yr</b>	<b>Energy Savings kWh/year</b>	<b>Cost £</b>	<b>Payback Years</b>
36	0.3	493	147	4
<b>Detail</b>	It is recommended to replace the remaining twenty one 120W tungsten lamps with 75W halogen lamps that are direct replacement fittings. These will have sufficient light 'throw' to provide the relevant lighting levels at the front of the church whilst saving energy.			
<b>Risks</b>	No risk, these replacement lamps will have a light life of 2,000 hours which at current usage rates should last about 4 years. At this point LED technology may have improved sufficiently to allow a complete luminaire replacement with an LED equivalent.			

<b>Priority no. 4</b>	<b>Daylight controls in corridors</b>			
<b>Cost Saving £/yr</b>	<b>CO<sub>2</sub> Savings tonnes/yr</b>	<b>Energy Savings kWh/year</b>	<b>Cost £</b>	<b>Payback Years</b>
3	0	45	192	59
<b>Detail</b>	<p>On the day of the audit the upstairs corridor lighting in the community hall was on despite the amount of natural light coming through the roof lights.</p> <p>It is recommended that daylight controls are added to these circuits to turn these lights off when natural lighting levels are sufficient.</p>			
<b>Risks</b>	No risk, however, a 10 minute override should be set up on the controls to hold the lights on or off should the day light be temporarily reduced i.e. a cloud passing over the sun.			

<b>Priority no. 5</b>	<b>Replace tungsten in foyer and staircase</b>			
<b>Cost Saving £/yr</b>	<b>CO<sub>2</sub> Savings tonnes/yr</b>	<b>Energy Savings kWh/year</b>	<b>Cost £</b>	<b>Payback Years</b>
11.92	0.09	164	10	<1
<b>Detail</b>	It is recommended that the five 60W lamps in the foyer and staircase area 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.			
<b>Risks</b>	No risk. The cost to purchase these lamps is based upon the church buying them. 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 is not using theirs, the church could.			

<b>Priority no. 6</b>	<b>Install PIR in toilets</b>			
<b>Cost Saving £/yr</b>	<b>CO<sub>2</sub> Savings tonnes/yr</b>	<b>Energy Savings kWh/year</b>	<b>Cost £</b>	<b>Payback Years</b>
2.50	0.02	35	96	38
<b>Detail</b>	It is recommended that occupancy lighting controls are installed in the gents and disabled toilets and that the existing occupancy control in the ladies toilets is moved to allow it to detect when people are in the cubicles.			
<b>Risks</b>	No risk, however, the small amount of lighting in these toilets results in the long pay back periods. However, implementation of this type of opportunity to save energy is further evidence that the church is doing its bit to reduce its carbon production.			

### 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	On the day of the site audit it wasn't possible to determine whether the cavity walls on the community hall had been filled with insulation but it was thought that they probably had. This should be checked and if this is not the case then these should be filled as soon as possible.
2	When the recent building works were undertaken the architect involved wanted to install secondary glazing to the church windows but this was not included in the final completed project. It is recommended that secondary glazing is installed in the main church building as this will reduce gas consumption required in heating this zone.
3	The church and community centre is very forward thinking in that store rooms were fitted with movement controls. However, as mentioned earlier some of these have been removed after they were blamed for the light fittings burning out. It is recommended that a thorough investigation as to why these fittings burnt out is undertaken and assuming that no risk of further burnout is discovered that these are reinstated as soon as possible.