



ENERGY SAVING IN CHURCH BUILDINGS

Summary Opportunities Guide

Supported by the



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Save Energy, Save Carbon and Cut Costs

Methodist Church – Carbon Reduction Mission

The Methodist Church wishes to take forward its Carbon Reduction Mission through the development and implementation of a Carbon Management Programme. The Church considers that there are theological, climate justice, financial and practical drivers for carbon management.

This summary opportunity guide explains how to identify opportunities to save energy and costs in Methodist church buildings. It details the measures which can deliver easy wins with little or no cost, as well as the opportunities which might require investment. Included is simple advice on how your church can develop and roll-out a carbon management plan at a local level.

About this guide

The guide is designed to help you to understand energy and carbon saving opportunities in your church buildings and the practical steps needed to take them. The detail contained in the guide has been gathered during a programme of energy surveys commissioned by the Methodist Church. It sets out information that is aimed to help each church reduce its carbon dioxide emissions by offering assistance with:

- [Where is energy used](#)
- [Where emissions come from](#)
- [Details of energy saving opportunities](#)
- [Steps to help manage and reduce energy waste](#)

- And where you could find further information

Included within the appendices of this guide is detail of the 'next steps' you may want to take – including detail on a conducting energy walk around, available funding options and even how to read your energy meters.

Methodist Church - Energy and Carbon

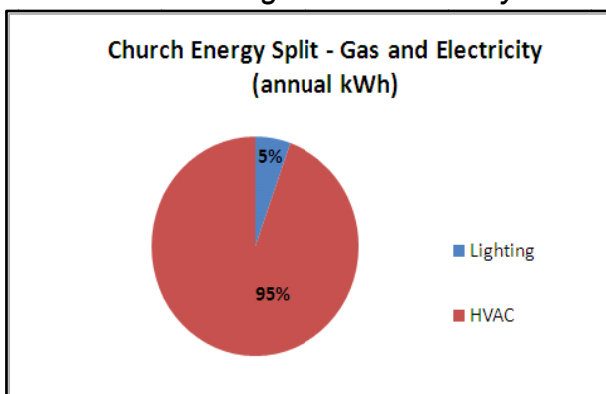
The estimated total annual energy use for the Methodist Church in the UK is approximately 369,932,410 kWh. Of this 310,675,100 kWh is gas use (heating) and electricity use of 59,257,310 kWh (lighting, kitchen appliances, localised heating) per annum. This equates to around 547,275 tonnes of CO₂ per annum and a total annual spend of approximately £14,262,630.

Church energy use

The graphs below provide an example of how the energy use within Methodist Churches is split between gas and electricity use.

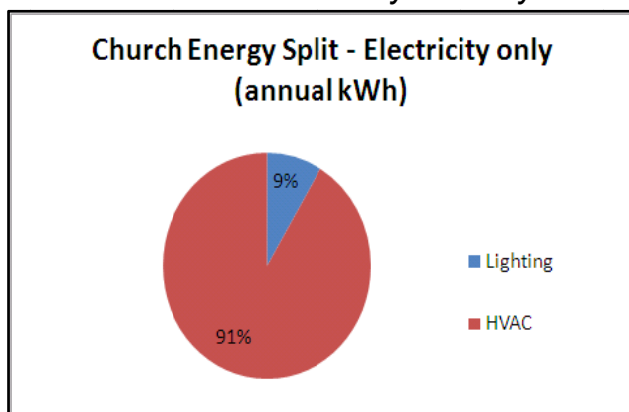
Example:

Methodist church - gas and electricity use



Example:

Methodist church - electricity use only



The above Methodist Church example energy split graphs show that for both sites with only electricity use and for those that have gas and electricity use that the majority of energy is used to provide heating to Church Buildings.

By reducing the energy use of your buildings you will not only save money but you will also save CO₂ had help to reduce your Church's Carbon Footprint.

Church Carbon Emissions

The energy consumption of a church varies with size, age, heating type, weekly occupancy and the community use of the buildings. Whether it is electrical energy or fossil fuels like gas, oil or coal, being used in church buildings this will result in the release of carbon dioxide emissions into the atmosphere.

Carbon dioxide emissions from churches arise from a limited number of activities. Mainly emissions come from energy used when heating and lighting a church but at larger sites other activities like hot water generation, kitchen and catering activities and office energy use will also contribute.

During energy survey visits to Methodist Chapels across the country it has been found that there are good opportunities to cut energy costs and reduce energy waste.

To help the membership move towards a low energy future the Methodist Church has partnered with the Carbon Trust to produce this guidance and to offer further support and help.

Church Building Categories

Information provided within this guidance document was collected from a representative sample of 12 Methodist Churches within the UK. It is anticipated that details collected from the sample churches will provide helpful energy and carbon saving insights to the remainder of the 5,913 Methodist Churches within the UK.

Church Energy Saving Surveys

The Churches that were surveyed included:

- Bromborough
- Claremount
- Greasby
- Haygreen
- Kingsway
- Knutsford
- Little Neston
- Norley
- Old Weston
- Raunds
- Wesley Chapel
- Wollaston

The surveys included such things as:

- Identification of the building occupancy profile and use
- Review of energy management procedures on site, including any data gathering, management procedures and responsibilities, monitoring and targeting, procurement and maintenance
- Review of building fabric, services and controls
- Identify and estimate a range of opportunities and recommendations to save energy including costs from the no and low cost opportunities to those that require capital investment.

In order to help you identify energy and carbon saving opportunities that may be relevant to your church the surveyed churches have been categorised based on their annual energy use (kWh). These groupings are provided to help you gain an idea of which energy saving

opportunities may be most suitable for your church. Please note, however, that any savings opportunities associated with a particular category may not necessarily be exclusive to that group and may very well be worth exploring at your church.

Church Categories

SMALL

Small energy using churches have been defined as those using a total of less than 20,000 kWh of energy (gas and electricity) per annum. Annual energy spend ranges from £60 to £1,288 for electricity use. None of the three small churches visited used gas.

Churches within this sample size group include:

- Haygreen
- Old Weston
- Raunds

Haygreen Church



The Church building is a 1930's brick solid wall construction. The roof is a wooden trusses with a vaulted ceiling (~40o pitch) and no insulation. The windows in the main church and linked vestries are double glazed. The Church was estimated to have a floor area of 77m² and a 3 metre plus height ceiling.

The Church hall was constructed in 1961 and is a brick cavity wall construction. It is assumed this is

unfilled as there are no recent drill marks in the mortar joints. It has a shallow pitched roof (~15o) with an open ceiling void. There is no insulation and the windows are double glazed. The Church Hall was estimated to have a floor area of 77m² and a 4 metre plus height ceiling.

Besides the Church and Church Hall, there is another vestry linking the Church. There is a kitchen plus five recently renovated toilets.

Old Weston

The Old Weston Chapel was built in 1839 and is of brickwork construction with hipped roof covered with clay tiles. Access to the site is limited and the building is not listed. The windows at Old Western are timber frame single glazed windows with top hung opening fanlights and there is no roof insulation.

Raunds

The late 18th century Church at Raunds was built of solid stone construction with a pitched roof and is set into the hillside. The building is not listed. In early 1911 a new organ was installed, necessitating an extension to the rear of the building (where there is a graveyard).

Windows are timber framed and single glazed and there is minimal insulation above the false ceiling above the main worship hall. The 1980s saw many changes to the inside of the Church including: the removal of the pulpit; the pews being stripped out; changes to the back, main and side entrances. In 2009 a new kitchen was installed.

MEDIUM

Medium energy using churches have been defined as those using a total of between 20,000 and 75,000 kWh of energy (gas and electricity) per annum. Annual energy spend ranges from £678 to £1,723 for gas use and £346 to £893 for electricity use. Medium sized church types typically hire out hall and other areas to community use sometime during the week.

Churches within this sample size group include:

- Bromborough
- Kingsway
- Little Neston
- Norley
- Wollaston

Bromborough

Bromborough Methodist Church was constructed in 1927, with the Church Hall added around 1930. The buildings have an internal floor area of 335m². The building is of brick construction, most of the windows are single glazed and attic area is not insulated.

Kingsway

Kingsway was built in 1957, is the newest Church in the Nene Valley Circuit and seats 60 – 70 people. It is of brick cavity wall construction with a flat roof covered with felt for the Chapel and a low pitch roof covered with profile corrugated sheeting for the Hall areas. The building is not listed.

Little Neston

The Norely Methodist Church was built in 1882 and consists of a single storey building with a pitched roof. The building is in an excellent state of repair and is well maintained. Recent improvements have included redecoration of the main worship hall and the installation of a disabled access ramp to the front entrance with improved car parking spaces.

Norley Church



Wollaston

The 1840 Chapel at Wollaston 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.

LARGE

Large energy using churches have been defined as those using a total of more than 75,000 kWh of energy (gas and electricity) per annum. Annual energy spend ranges from £2,188 to £6,059 for gas use and £1,276 to £2,126 for electricity use. Large sized church types typically hire out hall and other areas to community use during most days of the week.

Churches within this sample size group include:

- Claremount
- Greasby
- Knutsford

Claremount

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. 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.

Greasby

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 building is of brick construction.

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.

Knutsford Church



The Methodist Church in Knutsford 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.

Church Building Energy and Carbon Reduction Opportunities

Detail of the identified energy and carbon saving opportunities found during the energy saving sites surveys can be found in the report within the Key “No and Low Cost” Energy and Carbon Reduction Opportunities; Key Medium Cost Energy and Carbon Reduction Opportunities and the Opportunity Details sections of this report.

Methodist Church Buildings - Good Practice

During the energy site surveys of Methodist Churches many examples of good practice were observed across the country. The details below provide a chance to share some of this good practice and help make these happen within your Church buildings.

Good Practice found in UK Methodist Churches

Examples of good practice found during the energy site surveys at Methodist sites:

- Notices reminding people to turn lights off when not in use and to keep radiators clear
- Internal glass secondary entrance chamber to the Chapel
- Separate heating circuits for Chapel and Hall
- Double glazing and secondary glazing
- Insulation on the Chapel boiler pipes
- Occupancy and daylight controls on external lighting
- Zoning of lighting
- An exit notice for the people who are “last to leave” reminding them to switch equipment off and that the building is secure
- Paper recycling bins
- Heating demand override switches
- A note asking people not to adjust the heating time clock
- Secondary glazing
- Lighting and heating to match occupancy needs



Energy waste

How energy waste occurs

The term “Energy Waste” describes energy that is used unnecessarily. By understanding the causes of energy waste costs and CO₂ emissions can be reduced.

Energy waste occurs when three simple factors are not properly and regularly considered. Tackling energy waste requires us to consider:

- Efficient Operation
- Inefficient Equipment
- Building Energy Efficiency

Energy waste is a simple concept, with a pragmatic and questioning approach savings can be realised.

Efficient Operation

Is equipment in operation longer than required?

All equipment including lights, heaters and office equipment should only be switched on when needed. If equipment is left switched on when it is not in use then it is wasting energy.

Are controls set correctly?

Timers and thermostats should be set to switch equipment off when it is not needed. Examples of this include heating left on after an area is closed or when thermostats are set to the wrong level.

Inefficient Equipment

Is equipment or plant rated as energy efficient?

Generally with each new model comes an improvement in energy efficiency. Energy efficiency should be considered when the Church purchases any new equipment. Often the savings made by replacing older, but still working,

equipment with newer models will pay for the purchase and installation costs. This can be especially relevant if tax incentives or Carbon Trust interest free loans are used.

Is equipment maintained to ensure energy efficiency?

All Church equipment will eventually require repairing or replacement. In some cases when equipment becomes dirty, damaged or develops a fault it can result in energy waste. For example a dripping hot tap, a broken window or a faulty thermostat or switch.

Building Energy Efficiency

Is heated or cooled air lost from the building?

Heated or cooled air can be lost from an un-insulated building or through gaps in the building fabric. Leaving these issues unattended results in excess treated air to be lost unnecessarily and so wastes energy.

How you can prevent energy waste?

In general there are two ways that we can all help to prevent energy waste on site.

- Stop the energy waste yourself
- Report the energy waste

Details of preventing energy use and managing energy consumption in Church Buildings can be found in the following sections.

Key “No and Low Cost” Energy and Carbon Reduction Opportunities

Below is a summary table outlining the key “no and low” capital cost actions to reduce energy waste and carbon dioxide emissions in your Church buildings. These opportunities were observed during a series of energy audits of Methodist Church buildings throughout the country.

The “no and low cost” table includes details of identified carbon reduction opportunities available within Methodist Churches that can be implemented at a relatively low cost to the church. It includes an estimation of the likely percentage savings available should you wish to implement the opportunity at your church. Payback has been defined by the estimated number of years it would take for the opportunity for “pay for itself”. Payback categories are: Short (1 - 2 years); Medium (2 – 7 years); Medium to Long (7 – 20 years); Long (20+ years).

Further details of each of the “no and low cost” opportunities can be found in the corresponding Opportunities Details section of this document. Not all of the opportunities for saving energy and carbon were found at each of the church types that were visited during the energy saving surveys. However, it is important to note that this does not mean that they won’t be applicable to your church. Church type information has been provided as guidance only.

The percentage savings are included here as estimated. The actual figures will depend upon individual situations.

Key “No and Low Cost” Energy and Carbon Reduction Opportunities

Key “no and low cost” carbon reduction opportunities	Estimated percentage of savings available	Typical Payback	Opportunity Details	Church types where found
Improve energy management	Up to 15% of total building energy use ¹	Immediate	Improve energy management and good housekeeping	Medium Large
Reduce the time that heating operates	Up to 5% of heating use ²	Immediate	Space heating	Medium
Switch off external lights	15-30% of total external building	Immediate	Lighting controls	Medium Large

¹ From energy site surveys and the following resource: Carbon Trust, Focus on Energy, A practical introduction to reducing energy bills

² From energy site surveys and the following resource: Carbon Trust Guide, CTG002, Technology Guide, Heating control, maximising comfort, minimising energy consumption

	lighting use ^{1,3}			
Replace tungsten lamps with compact fluorescent lamps	75% of the lamp's energy use ¹	Short	Lighting controls	Small Medium Large
Push timers for heaters	Up to 5% of total building heating use ²	Medium	Space heating	Medium
Lighting occupancy controls	Up to 30% of target illuminated area lighting use ⁴	Medium	Lighting controls	Large
Insulate valves, joints & pipes	Reduce heat loss from valves, joints and pipes by up to 70% ¹	Short	Space heating	Medium Large
Replace lighting with more efficient systems	Up to 40% of target illuminated area lighting use ¹	Medium	Lighting use	Small Medium Large
Remove lighting	100% of energy use by removed lamps	Immediate	Lighting use	Medium Large
Separate lighting circuit	Up to 5% target illuminated area lighting use ⁴	Long	Lighting use	Small
Draught proof external doors	Up to 10% of building heat loss can be reduced ⁵	Short	Building envelope	Small Medium Large
Thermostat controls on heating	8 to 10% of total building heating use ^{6,7}	Medium	Space heating	Medium

³ From energy site surveys and the following resource: Carbon Trust Guide CTL033, How to implement automatic lighting controls

⁴ From energy site surveys and the following resource: Carbon Trust Guide CTV021, Technology Overview, Lighting , bright ideas for more efficient illumination

⁵ From energy site surveys and the following resource: Draught proofing in refurbishment programmes by the Draught Proofing Advisory Association (DPAA)

Wireless heating controls	5 to 10% of total building heating use ²	Medium	Space heating	Medium
Boiler optimiser control	5 to 10% of total building heating use ²	Short to Medium	Space heating	Large
Daylight lighting controls	Up to 30% target illuminated lighting use ⁴	Medium	Lighting controls	Large
Replace existing electric heating with radiant heaters	Around 7% of total space heating energy use	Long	Space heating	Small

⁶ From energy site surveys and the following resource: Carbon Trust GIL124, Energy saving fact sheet, heating

⁷ From energy site surveys and the following resource: Carbon Trust GIL122, Energy saving fact sheet, building fabric

Key Capital Investment Cost Energy and Carbon Reduction Opportunities

Below is a summary table outlining the key high cost reduction actions available to assist the Church to reduce energy consumption and carbon dioxide emissions in your Church buildings. These opportunities were observed during a series of energy audits of Methodist Church buildings throughout the country.

The table below includes details of identified carbon reduction opportunities available within Methodist Churches that can be implemented at some cost to the church. It includes an estimation of the likely percentage savings available should you wish to implement the opportunity at your church. Payback has been defined by the estimated number of years it would take for the opportunity for “pay for itself”. Payback categories are: Short (1 - 2 years); Medium (2 – 7 years); Medium to Long (7 – 20 years); Long (20+ years).

Further details of each of these” opportunities can be found in the corresponding Opportunities Details section of this document. Not all of the opportunities for saving energy and carbon were found at each of the church types that were visited during the energy saving surveys. However, it is important to note that this does not necessarily mean that they won’t be applicable to your church. Church type information has been provided as guidance only.

The percentage savings are included here as estimated. The actual figures will depend upon individual situations.

Key Medium Energy and Carbon Reduction Opportunities

Key “no and low cost” carbon reduction actions	Estimated percentage of savings available	Payback	Opportunity Details	Church types where found
De-stratification fans	Up to 20% of total building heating ⁸	Medium	Space heating	Medium
Insulate roof	Up to 90% saved of the 25% building heat loss made through the roof ⁹	Medium	Building envelope	Small Medium

⁸ From energy site surveys and the following resource: Carbon Trust Guide CTL023, How to implement de-stratification fans GIL124, Energy saving fact sheet, heating. Carbon Trust GIL122, Energy saving fact sheet, building fabric

⁹ From energy site surveys and the following resource: Carbon Trust Guide CTL064, How to implement roof insulation GIL124, Energy saving fact sheet, heating; Carbon Trust GIL122, Energy saving fact sheet, building fabric

Secondary glazing	Up to 50% saved of the 25% building heat loss made through the windows ¹	Long	Building envelope	Medium
Replace very old fluorescent T12 &/or T8 lighting with T5 lighting	T12-T8s; T12s-T5s will may provide 8-40% (respectively) of total onsite lighting use ¹		Lighting use	Small Medium Large
Zone heating	30% of total onsite heating ¹⁰	Medium	Space heating	Large
Replace boiler	30% of total onsite heating ¹¹	Short to Medium	Space heating	Medium Large

¹⁰ From energy site surveys and the following resource: Carbon Trust CTL043, How to implement GIL124, Energy saving fact sheet, heating zone controls; Carbon Trust GIL122, Energy saving fact sheet, building fabric

¹¹ From energy site surveys and the following resource: Carbon Trust CTL021, How to implement condensing boilers GIL124, Energy saving fact sheet, heating; Carbon Trust GIL122, Energy saving fact sheet, building fabric

Opportunity Details

Improve Energy Management and Good Housekeeping

DO YOU HAVE?

- Church building occupancy that varies throughout the week, month, year?
- Heating controls?
- Lighting controls?
- Vestry or office I.T. equipment that is left on or in standby mode unnecessarily?

The Opportunities

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.

General good housekeeping approaches to managing energy incorporate shared good practice and can deliver energy savings of up to 15%.

Making it Happen –

- Share good practice where possible
- Instigate a good housekeeping programme to include turning off all energy using equipment where possible.

Good Practice

Regularly check timers on heating system

Labelling light switches
Regularly reminding users to switch heating and lighting off when not in use and/or exiting the building (verbal or written prompts)

Switching off of any IT equipment at night and when not in use

Sustainable procurement policy – i.e. purchase low carbon options, recycled and environmentally friendly products

Barriers

Lack of knowledge about what can and cannot be turned off

Lack of dedicated person to ensure systems are regularly checked

Improve lighting and lighting use

DO YOU HAVE?

- Unnecessary lighting?
- Inefficient old lamps and fittings?
- Tungsten halogen lamps in use?
- Old fluorescent lights in Church buildings?
- Light switches without labels?

Good Practice

Label light switches so that people know which switches that control each lighting circuit

Advise membership that they need to turn lights off when an area is unoccupied

The Opportunities

The energy site surveys show that a number of Church buildings have areas that have inefficient, unnecessary and/or poorly utilised lighting.

Easy energy savings can be made by removing unnecessary lighting and replacing old inefficient lamps with energy efficient equivalents.

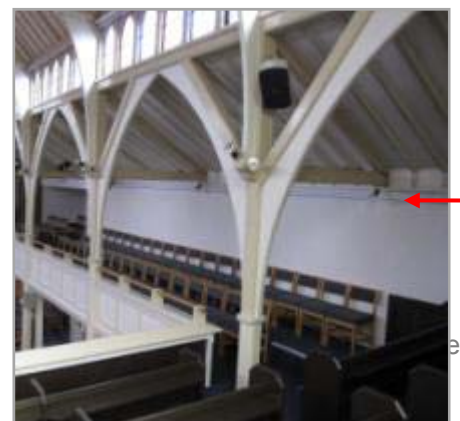
Making it Happen – Remove lighting

- Undertake a lighting survey to assess those lamps which are providing light to areas that don't require it. A good example is lamps which provide lighting to walls and ceilings (uplighters) but do not provide useful lighting to the surrounding area.
- Where on-site electrical knowledge exists set up a programme to remove any such unnecessary lighting. Otherwise request quotations from a qualified electrician to remove the lighting identified as being unnecessary.



Making it Happen – Replace lighting

- Undertake a lighting survey to assess those lamps which are old and inefficient (i.e. tungsten halogen, T12 fluorescent lamps and fittings)
- Where necessary request quotations from a qualified electrician to replace inefficient old lamps and fittings with energy efficient equivalents



Barriers

A lack of knowledge by building users and energy managers about what can and cannot be turned off.

A lack of understanding from building users and energy managers about the cost implications of leaving lighting switched on unnecessarily.

It may be very capital intensive to replace old wire bound fittings with high frequency fittings.



Install lighting controls

DO YOU HAVE?

- Lights that operate irrespective of occupancy?
- Discrete areas that are lit but not always occupied?
- External lighting on all night?
- Lights on when daylight is sufficient?

The Opportunities

The site surveys show that a number of Church building areas are lit by inefficient lighting that operates irrespective of occupancy or level of natural lighting.

These lights should be zoned and controlled - the best practise way of controlling this type of lighting is via occupancy (lighting turns off when people are not present in the area), lux (lighting turns off when daylight levels are high enough) and time controls (lighting is switched on and off depending upon set time points).

Good Practice

If areas are unoccupied then all opportunities should be taken to switch off as many lights as possible.

All lamps should be controlled by occupancy, daylight and/or time controls where there is potential for lighting to remain on when an area is unoccupied or suitably lit from natural lighting.

Making it Happen – Lighting controls

- Assess number of lamps in the Church buildings that are on unnecessarily which would benefit from occupancy, lux and/or time controls.
- Obtain quotes to install controls.
- Apply for Carbon Trust 0% loan.
- Install suitable controls (replace luminaires and fittings if suitable and financially viable).



Barriers

Ensure occupancy controls are set to cover all of the identified area so that lighting does not switch off when an area is still occupied

Energy management in the building must include regular checks of the lighting controls to ensure that they are set and running correctly

Building occupiers may be tempted to override the lighting control



Space heating systems

DO YOU HAVE?

- Heating that is on longer than necessary?
- Heating that is controlled by time clocks?
- Un-insulated heating pipe work?
- Heating controls that are difficult to access and/or understand?
- High ceilings which trap hot air?
- Heating provided by inefficient boilers?
- Areas of the building with different occupancy needs but the same heating circuit?
- Inefficient electric heating?

Good Practice

Match heating to occupancy and use with automatic controls.

Building maintenance programme should include regular review of heating controls

Regular inspection of current insulation to ensure it is fit for purpose and replace when necessary.

Old inefficient boilers should be replaced with modern energy efficient units (when financially possible – NB: high capital cost).

The Opportunities

The site surveys show a number of heating opportunities that include:

- The need for heating to match occupancy and use.
- The control of space heating on site can be improved - space heating could be controlled utilising optimisers, push timers, thermostat and wireless controls.
- Waste heat can be reduced in rooms where Church and Hall boilers are located by insulating any exposed valves, flanges and pipes.

If your church building is being refurbished investigate opportunities to update heating systems and controls as part of the refurbishment programme.

Making it Happen – Boiler optimiser

- An optimiser takes the outside temperature into account when determining when to switch on a boiler. This helps the boiler to switch on when required in order to reach target temperatures at the right time, in line with temperature fluctuations.
- Assess whether or not your boiler system could benefit from an optimiser.
- Obtain quotes to install boiler optimiser.

Making it Happen – Thermostat controls

- Review Church building heating systems to check whether space heating is controlled by the boiler return temperature or thermostatic control sensors located in the heating space.
- Obtain quotes for installation of thermostat controls.

- Ensure thermostat is located properly and will not be influenced by draughts or heat sources such as sunlight, radiators or electric heaters.

Making it Happen – Push timers

- Assess whether or not there is the potential for electric heaters in Church buildings to be accidentally left on – if so, push button timers may be suitable controls against this occurring.
- The can help reduce the need to heat areas which might not be occupied, by providing users with the ability to switch on heating for defined periods only as needed.
- Obtain quotes to install push button timer between the fused spur and the heater.



Making it Happen – Wireless heating controls

- Where access to heating controls is difficult consider installing a wireless thermostat and controller to heated areas / zones to allow easy access control of heating system.
- Obtain quotes to install wireless heating controls.

Making it Happen – Insulate valves, flanges & pipes

- Count the number, length and size of accessible un-insulated valves, flanges and pipes.
- Purchase and install insulation.



Making it Happen – De-stratification fans

- In heated rooms with ceilings higher than 5 meters de-stratification fans can help to blow down to ground level hot air which is trapped in the ceiling.
- If the ceiling is strong enough to hold de-stratification fans and there is space for them (amongst light fittings, beams etc), then obtain quotes to install de-stratification fans in your Chapel and/or Hall.
- Schedule installation to occur during heating season
- Care is required in the specification of de-stratification fans with due regard to the creation of noise and draft.

Making it Happen – Replace boiler

- If your boiler is old and inefficient then investigate the possibility of replacing it with a more energy efficient control system. In general a high efficiency condensing boiler should be installed.
- Consider linking the boiler to a time control, including an optimiser, which will vary the time of switch on according to outside temperature. Temperature control of the system is also required to ensure that overheating and energy waste is avoided.



- Obtain quotes to install new energy efficient boiler system
- Schedule the installation for a time that limits interference with church building operations.

Making it Happen – Zone heating

- If there are areas of your building which have different occupancy needs but the same heating circuit then you should consider separating these areas into different heating zones.
- To achieve this would require additional automated valves to be fitted to the heating circuit. It would also require additional sensors and controls. It may also require some additional pipework to be installed and possibly an additional pump set.
- Obtain quotes to install new heating zone/s within your building that is designed to effectively meet heating needs.
- If there is inefficient electric heating in your Church or Hall then replace current units with radiant heaters
- Obtain quotes to install radiant heaters

Improve building envelope

DO YOU HAVE?

- Un-insulated roof space?
- Un-insulated wall space?
- Drafts from external doors?
- Single glazed windows?

The Opportunities

The site surveys show a number of opportunities to improve the energy efficiency of the fabric of Church buildings by installing such things as:

- Wall insulation
- Draft proofing external doors
- Roof insulation
- Secondary glazing

Investigate opportunities to improve your church building envelope as part of any building refurbishment programme.

Good Practice

Reduce heat being wasted from the building's fabric by installing insulation where possible.

Building maintenance programme should include inspection of current insulation materials to ensure they are fit for purpose and replace when necessary.

Making it Happen – Wall insulation

- If cavity walls in Church buildings are un-insulated then these areas should be insulated with insulating beads or granules blown into the wall cavity where possible.
- Careful external and internal inspection of the existing structure and its current condition is required to determine the suitability of wall insulation. Remedial work such as re-pointing the brickwork may have to be incorporated.
- Obtain a quote from an experienced and registered installer.

Making it Happen – Draft proofing

- Reduction of drafts is likely to increase the general comfort of the members of the congregation.
- 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 gaps around the external doors had the following installed: Door edges – Wiper or brush strips; or fit foam. Door bottom - A hinged flap draught excluder or brush



Making it Happen – Roof insulation

- 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%.
- Identify roof areas where insulation is suitable or needs replacing.
- Obtain a quote from an experienced and registered installer.



Making it Happen – Secondary or Double Glazing

- Where possible windows should be double glazed and/or have secondary glazing installed to reduce heat loss.
- Obtain a quote from an experienced and registered installer.



Barriers

Access to wall or roof areas

Ensure that the work is carried out by an experienced and professionally registered contractor

The introduction of secondary glazing to the existing church windows could potentially cause some condensation problems between the two components and the allowance for trickle ventilators within the secondary units are to be considered to overcome this problem.

Next Steps:

This section of the guide summarises the recommended steps to help ensure that your projects for cutting energy costs get the best chance of implementation. Financial support methods are also summarised.

1. Steps to Manage Cost, Energy and Emissions

Each church should attempt to reduce energy consumption and CO₂ emissions. This section lays out the simple steps required to manage and monitor the progress being made. This process is a useful reminder even if the site has procedures in place.

Step 1 – Appoint a Champion

1.1 Each Church should agree a champion to lead the work to manage energy and emissions.

The aim of the Champion should be to manage the energy consumption of local Church buildings; depending on the sites this may only require an hour or two a month.

Step 2 – Read meters and collect information

2.1 Read meters. Information recorded should cover

- Electricity (KWh)
- Gas (m³ or kWh)
- Water (m³)

2.2 Begin a spreadsheet or a paper file and keep the information on site. Take readings monthly. See Appendix 5 for details on how to read your meters.

Step 3 – Review your performance

After collecting the above information it is important to review it and look for changes in consumption.

3.1 Compare collected information to the previous month and to the same month for the previous year. Look for changes and then monitor these changes over the coming months.

3.2 If consumption is higher compared to previous months and previous years then the Champion should try to find out why.

3.3 If the impact is reducing compared to previous months and previous years then the Champion should discuss the causes for this and publicise any good progress made.

Care should be taken when comparing data because there may be several reasons for the changes. For more information see the Key Publications section.

Step 4 – Regular energy walk around

4.1 Undertake energy walk around regularly and look for where progress is being made or where work needs to undertaken.

As the Church develops its approach to tackling its environmental impact it may wish to broaden this walk around work to include the other area of impact such as travel and recycling. See below 'Next Steps – 2' for advice on how to complete an Energy Walk Around.

Step 5 – Create an action plan and implement

5.1 Create an action plan to continue progress on reducing energy consumption.

5.2 It is suggested that this action plan is created and reviewed annually to monitor the actions taken and the successes achieved.

5.3 The energy walk around undertaken on the site should inform the creation of the Action Plan.

5.2 An action plan should;

- state clear energy saving actions, objectives and targets Church buildings
- assign energy saving actions to individuals with clear deadlines for completion
- state dates to review progress on the energy saving actions
- describe the resources that are required,
- link into annual budgets decisions

More information on how to develop an action plan can be found in the Energy Management Tools section of the Appendices. An action plan template is provided in Appendix 2.

2. Energy Walk Around

Background

An energy walk around is undertaken to reduce wasteful practices and to establish which appliances, equipment or plant, will need replacing.

An energy walk around is a simple tour or inspection of a building or site. Armed with a checklist, you simply walk around the Church Buildings in your Church and undertake a systematic visual inspection of each area. The inspection should note:

- Efficient Operation – is plant being left switched on or controlled incorrectly?
- Inefficient Equipment – does equipment need maintenance/repair? Can it be replaced with more efficient alternative?
- Building Energy Efficiency – is being lost through the building fabric? Can natural light be increased?

The information gathered should help construct an action plan to reduce energy consumption on the site. More information on how to develop an

action plan can be found in the Energy Management Tools section of the Appendices.

How to undertake a survey

Step 1 Initially refer to the checklists and tools in this document and complete/update where appropriate.

- a) **Occupancy Profile** – update this document before starting
- b) Refer to **Key Carbon Reduction Check List** of simple energy saving measures
- c) Refer to **Survey Check List**
- d) Refer to **Low Carbon Check List**
- e) Complete **Controls Sheet**

Step 2 Agree a date with a colleague to undertake the survey

Step 3 Decide on where you will start the survey, what you will inspect and where the survey will end (refer to checklist and energy consumption charts)

Step 4 Familiarise yourselves with the energy consuming plant and equipment that you will be inspecting. Make sure you understand which areas they heat, cool, light etc and how they are controlled.

Step 5 Undertake the survey using the checklists **c** and **d**, compare the outcomes of the survey to the remaining checklists **a**, **b** & **e** and note areas where energy could be used more efficiently.

When to undertake a survey

- When equipment is in use
- Or when energy equipment stop being used
- At specific times relevant to the operation of the plant and equipment to be inspected

Appendices

Appendix 1 – Energy Management tools

a) Occupancy Profile

How to complete the building occupancy schedule:

- First list the main areas of the site, these should be separated into areas where lighting or heating is controlled
- Then, for each day of the week, record the times when it is occupied

Estimate if the area is fully or partially occupied

- List the unoccupied periods

Use the occupancy schedule to;

- Check that any timer schedules match this unoccupied period
- Control heating, cooling and lighting

Occupancy Schedule of Building Areas														Is the area fully occupied? Give a % estimate	
Building area	Mon		Tue		Wed		Thu		Fri		Sat		Sun		
	Start	Finish	Start	Finish	Start	Finish	Start	Finish	Start	Finish	Start	Finish	Start		Finish

b) Key Cost Reduction Check List:

Name of checker.....Date of Energy Check.....

Key Cost Reduction Check List		Where/What to check	When to check	tick yes or no		Action	Notes (record any Action Points needed and % compliance)
1				Yes	<input type="checkbox"/>		
				No	<input type="checkbox"/>		
2				Yes	<input type="checkbox"/>		
				No	<input type="checkbox"/>		
3				Yes	<input type="checkbox"/>		
				No	<input type="checkbox"/>		
4				Yes	<input type="checkbox"/>		
				No	<input type="checkbox"/>		
5				Yes	<input type="checkbox"/>		
				No	<input type="checkbox"/>		
6				Yes	<input type="checkbox"/>		
				No	<input type="checkbox"/>		
7				Yes	<input type="checkbox"/>		
				No	<input type="checkbox"/>		
8				Yes	<input type="checkbox"/>		
				No	<input type="checkbox"/>		
9				Yes	<input type="checkbox"/>		
				No	<input type="checkbox"/>		

c) Survey Check List

Date or Survey:		Undertaken by:	
Begin by taking meter readings. Then move through the building noting where energy saving actions are/are not being undertaken. The goal is to note areas where energy could be saved by making changes to day to day operation.			
meter readings (include units, kWh, litres, m ³ etc)		Gas/Oil units	Electricity units
Good housekeeping actions	Yes/No	Chapel	Hall
Lighting			
Are windows and lights clean?			
Is lighting switched off in areas when not required?			
Are lighting time clocks set to match the occupancy of the building?			
Are time clocks for external lighting correct?			
Is lighting switched off when there is sufficient daylight?			
Heat and Hot Water			
Have the boilers or electric heaters been maintained/serviced regularly?			
Are draughts being addressed using draught curtains, blinds and draught stripping?			
Are radiators (or other heat emitters) free from obstruction?			
Are the time clock(s) on the heating controller set correctly?			
Are electric hot water heaters switched off at the end of the day?			
Is the hot water thermostat is set 60°C			
Are thermostats in offices set to 19°C?			
Is the heating turned off whilst not in use?			
Are radiator TRVs set correctly?			
Air Conditioning			
Are remote and wall controls on a/c set to cool to 24°C			
Are air filters clean?			
Are a/c units in use when offices are unoccupied?			
Common Area actions			
Is electrical equipment switched off at the end of the day?			
General actions			
Is all electrical equipment switched off at the end of the day?			
Are doors and windows closed whilst the heating or cooling is on?			

Now use these general notes to update your Energy Check List.

d) Low Cost Replacement Check List

Date or Survey:		Undertaken by:	
<p>Whilst looking at the Good Housekeeping actions that could save energy you should consider the appliances and plant and their replacement or maintenance. Are they operating efficiently? When they were last maintained? When will they need replacing? Are they low energy appliances? Could they be replaced with lower energy consuming versions?</p>			
Replacement/Maintenance	Estimated replacement date	Chapel	Hall
Lighting, check - <ul style="list-style-type: none"> • Lighting levels, is it dull or bright, are you using daylight? • Types of fittings and lamps, are there any efficient versions available? • Is the lighting sufficiently controlled to switch off in areas that are unoccupied? 			
Heating, Ventilation and A/C check - <ul style="list-style-type: none"> • Is the boiler reliable – has it been given a predicted lifespan? • Do the boiler controls enable you to control the heating and hot water? • Do air conditioning units need to be replaced? • How regularly do air filters need replacing? • Are heat emitters clean and unobstructed? 			
Other Electrical, when are the following due for replacement - <ul style="list-style-type: none"> • Computers, Printers etc • Fridges, Freezers etc • Hot water urns • TVs and entertainment devices Consider energy consumption as part of purchasing decisions, see			
General building: <ul style="list-style-type: none"> • Are door closing mechanisms operating freely? • Does draught proofing need replacing? • Is there insulation in appropriate roof spaces? Check thickness • Are conveyors being operated efficiently? • Are external doors left open? 			
Notes			

Once completed use observations on appliances and plant that need replacing and maintaining to help to create an Action Plan for energy consuming options.

e) Controls, Timers and Switches Record Sheet

The following sheets are for you to use to record the details of timers and switches and operations that will help achieve the energy savings measures outlined in the “Simple Ways to Save” section – these may change over time.

Action	Detail
Location of thermostats/time clocks and Church building heating controls	
<i>Describe how to operate control – include switching off/on, and any temperature set points</i>	
Location of light switches	
<i>Describe how and when to switch off if sufficient daylight</i>	
<i>Describe how to switch off at the end of shifts</i>	
Location of automatic lighting controls (if any)	
<i>Describe how to adjust these controls and suggested set points</i>	

<p>Location of external automatic lighting controls</p>	
<p><i>Describe how to adjust these controls and suggested set points</i></p>	
<p>Location of air conditioning and air handling unit controls</p>	
<p><i>Describe which set points, a/c times, AHU times</i></p>	
<p>Location of hot water controls</p>	
<p><i>Describe how to check hot water temperature and control the time of operation</i></p>	

Appendix 2 – Energy Saving Action Plan

Name Date of Energy Created

Refer to the outcomes of the most recent energy walk around. Use the main points to complete the following action plan template.

Areas of energy waste	Action	Cost	Potential savings	Payback	Priority level	Date of action	Person responsible
<i>Example</i> Chapel lighting	<i>Example</i> Upgrade Chapel lighting	<i>Example</i> £10,000	<i>Example</i> 17% from energy survey	<i>Example</i> 3.5 years	<i>Example</i> Priority for 2010	<i>Example</i> August to September	<i>Example</i> Mrs J Doe

Appendix 3 – Support for investment: The Carbon Trust 0% SME loan

In order to strengthen the base for investing in energy saving initiatives 0% loans of £3,000 - £500,000 are available from the Carbon Trust to help organisations finance and invest in energy saving projects.

In order to qualify for these loans your company must be able to fulfil these criteria:

1. Private sector
2. Trading for at least 12 months
3. For projects based in England, Scotland & Wales: all Small or Medium sized Enterprises (SME) OR any business that do not qualify for participation in the CRC
4. For projects sites based in Northern Ireland: any sized enterprise can qualify

For clarity the EU definition of an SME is an organisation with:

1. Less than 250 full time employees
2. Less than €50m Turnover (approx. £43m) and/or less than €43m assets (approx. £37m)
3. No controlling interest of more than 25% by a non SME

In order to qualify projects must:

- Deliver cost-effective carbon savings
- Carbon Trust can loan £1,000 for every 1.5tCO₂ saved per annum from a project
- Borrow £3,000 to £500,000 at 0% interest unsecured loan, interest free, with no arrangement fees.
- Loans can be repaid over a period of up to 4 years
- Part loan are available
- Loan offers remain valid for 3 months from point of signing the Loan Agreement

Appendix 4 – Funding Options

Energy Efficiency								
No.	Name	Funding Body	Website	Brief Description	Applicable to	What is funded	Grant available	Other Info and contact
1.	The Community Sustainable Energy Programme (CSEP)	Run by BRE as an award partner of the Big Lottery Fund (BIG)	www.communitysustainable.org.uk	CSEP will provide funding to community based organisations for the installation of microgeneration technologies, such as solar panels or biomass boilers and energy efficiency measures including loft and cavity wall installation. It will also provide funding for project development grants.	Grants are open to not-for-profit community based organisations in England. Registered charities and trusts. Parish councils Church based and other faith organisations.	<p>Project Development Grants are available for studies investigating the feasibility of installing the technologies mentioned below.</p> <p>Capital Grants:</p> <ul style="list-style-type: none"> • cavity wall insulation, • loft insulation, • Solar Photovoltaics • Solar Thermal Hot Water • Wind Turbines • Ground Source Heat Pumps • Air Source Heat Pumps • Automated Wood Pellet Stoves • Wood Fuelled Boiler Systems • Micro-hydro Turbines 	<p>There are 2 grants available:</p> <p>Project development grants: maximum grant available is £5,000 or 75 per cent of the study cost – whichever is lower.</p> <p>Capital grants: up to £50,000 or 50 per cent of the project cost.</p>	<p>Project development grants will be awarded on a first-come first-served basis until all funds are spent. Capital grants will be awarded on a competitive basis at quarterly Selection Panel meetings.</p> <p>Capital grant funding will continue throughout 2010, with the last deadline on 29th October 2010.</p> <p>Any queries call the Changing Spaces helpline on 0845 3671671 or e-mail at info@communitysustainable.org.uk</p>

B. Renewable Energy and Community Projects

No.	Name	Funding Body	Website	Brief Description	Applicable to	What is funded	Grant available	Other Info and contact
1.	Low Carbon Building Programme (Phase 2) extended (LCBP2E)	LCBP Phase 2 is part of the UK Environmental Transformation Fund (ETF), a joint DECC/Defra fund	www.lowcarbonbuildingsphase2.org.uk	Grants for the installation of heat microgeneration technologies are available to public sector buildings and charitable bodies.	Provide grants to charitable organisations, community groups and the public sector.	The upper limit for heat technologies has been raised to 300kW. The programme is open to all products and installer companies registered on the Microgeneration Certification Scheme (MCS). In terms of the additional products this also includes Solar Keymark for solar thermal collectors, and the Environmental Technology List (ETA part of the Enhanced Capital Allowance Scheme) for biomass boilers and heat pumps rated above 45kW and up to 300kW thermal. Photovoltaic and solar thermal projects. Bio-energy	Organisations may apply for up to 50% of the cost of installing approved technologies up to a maximum of £200,000 per site. A site may include more than one building and multiple application from one organisation for different sites will be considered. A maximum of three eligible technologies may be grant-assisted at each property. The grant levels for the not-for-profit sector are applied to total installation costs and levels are as follows: <ul style="list-style-type: none"> • Ground source or air source heat pumps: 50% • Solar thermal: 50% • Wood fuelled boilers: 50% • Automated wood 	Heating only applications can be made throughout 2010 or until funds last. New applicants will have to claim their grant by the end of February 2011 . This scheme ends on 1 st April 2011 when the Renewable Heat Incentive will be introduced. Applications are allocated on a first come first served basis. Phase 2 has closed to all new applications for grants for electrical microgeneration as 3 rd February 2010. For further information on products, contact: http://www.microgenerationcertification.org/ www.eca.gov.uk

							pellet stoves: 50%	/etl/find www.estif.org/so larkeymark/productsand certificates.php or call 08704 232313 or email info@cbpphase2.org.uk
2.	Bio-Energy Capital Grants Scheme	<p>The scheme is now funded and the responsibility of the Department of Energy and Climate Change (DECC)</p> <p>The scheme is part of the UK Environmental Transformation Fund (ETF). Further information about the ETF is available from : www.defra.gov.uk/environment/climatechange/uk/energy/fund/</p>	<p>Details are available at: www.bioenergycapitalgrants.org.uk</p>	<p>Supports the installation of biomass-fuelled heat and combined heat and power (CHP).</p>	<p>Industrial, commercial and community sectors.</p>	<p>Biomass and CHP</p>	<p>The scheme sixth round is now closed for applications.</p>	<p>The sixth round is now closed for applications.</p> <p>Details are available at: www.bioenergycapitalgrants.org.uk</p>
3.	Green Energy Trust (Scottish Power)	<p>Scottish Power</p>	<p>http://www.scottishpower.co.uk/Home_Energy/Product_Information/Green_Energy/Green_Energy_Fund/</p>	<p>Supports the development of new renewable energy sources in the UK by funding projects that advance renewable energy ie. result in the production of renewable electricity or heat, and support communities through education and public</p>	<p>Projects from local community groups and not for profit organisations and charities.</p>	<p>Projects needs to be advance renewable energy and support your local community through education and public engagement. The trust considers all kinds of renewable technologies, including :</p> <ul style="list-style-type: none"> • small scale hydro, 	<p>Will grant up to 50% of the renewable technology project cost up to a maximum of £25,000.</p> <p>The grant requests</p>	<p>The trust meets twice a year to consider applications – usually during the first week of April and October.</p>

				engagement. Awarding funds to help community based renewable energy projects.		<ul style="list-style-type: none"> • wind power, • biomass, • landfill gas, • solar energy • Ground source heat pumps Other technologies may also qualify for support.	must be to support the capital and installation costs of a renewable energy project.	Applications must be received 7 weeks prior to the trustees meetings. If you have been successful, your offer is valid for 2 years from the date of the letter of offer. The trust does not fund feasibility studies. Contact by e-mail: greenenergytrust@scottishpower.com or calling 0141 568 3492
4.	E.ON Source Fund	E.ON	http://www.eon-uk.com/about/2654.aspx	The E.ON Source Fund has been developed to support community energy projects. Funding must be used for the purchase and implementation of capital equipment, physical measures and associated costs only. For community groups and not for profit organisations who wish to consider and implement sustainable energy projects in their buildings – from energy efficiency through to micro-generation	Community groups and not for profit organisations, including religious if the technology or measures are to be installed in a community building that is available for the whole .community to use, regardless of religious or political beliefs. Community groups and not for profit	Projects which either result in the production of energy from a sustainable source or which reduce the amount of energy used by a community organisation.	Up to £20,000 Funding must be used for the purchase and implementation of capital equipment, physical measures and associated direct costs only. The maximum grant awarded is 90% of the total cost of the measures applied for.	Applications will be assessed at least twice a year by the E.ON Sustainable Energy Fund committee. E.ON must be the only corporate sponsor of the project.

					<p>organisations. Your organisation must benefit specific groups namely:</p> <ul style="list-style-type: none"> • Education • Vulnerable people • People in fuel poverty 			
5.	The Co-operative Fund	The Co-operative Group	http://www.co-operative.co.uk/en/fund/	<p>Supports co-operative projects that:</p> <ul style="list-style-type: none"> • Promote, support and develop co-operative solutions and co-operative enterprises • Expand The Co-operative Movement • Promote the co-operative advantage and demonstrate its relevance in the UK today. 	<p>Funding will be considered for incorporated bodies whose project will be used in a co-operative nature, this includes community interest groups.</p>	<p>Funding for Renewable / sustainable construction. Funding can be used under the following streams:</p> <ul style="list-style-type: none"> • Start-Up • Co-operative Solutions • Promotion of Co-operation • Co-operative Support Structures 	<p>From £5,000 and no upper limit stated.</p>	<p>co-operative.fund@co-op.co.uk</p> <p>There are no deadlines for applications.</p> <p>It may take up to two months to consider applications for £49,999 or under, and up to four months for applications over £50,000.</p> <p>If your application is for £49,999 or less the management group of the Co-operative Fund takes the decision, and if it is over this amount then The Co-</p>

								operative Fund Board will decide.
6.	WREN grant scheme - Landfill Communities Fund	Waste Recycling Environmental Limited (WREN)	www.wren.org.uk	Funding is available for church maintenance, repair or restoration from the Landfill Tax Credit Scheme for churches within 10 miles of a landfill site.	Public parks or other public amenities, places of worship or of historic or architectural interest within 10 miles of a landfill site.	The provision, maintenance or improvement of a public park or other public amenity within 10 miles of a landfill site. The delivery of biodiversity conservation for UK species or habitats. The maintenance, repair or restoration of a building or other structure, which is a place of worship or of historic or architectural interest.	Funding of between £2,000 and £50,000	www.wren.org.uk

Appendix 5 – Types of Energy Meters



Types of Energy Meters

It is important to be able to identify the different types of energy meters to ensure that accurate readings are taken.

The type of meters used will vary from premise to premise and this will also mean that the process of reading a meter will also differ. The following will explain the different types of Energy meters that maybe in use and will later explain how to read them/ The Electricity Guide.org (2008) identify three common electricity meters in use in buildings:

- **Standard meters**
- **Variable rate meters**


The differences between these meters is outlined below:

Meter Type	Rate	Example
<p>Standard meters</p>	<p>Measures in terms of Kilowatt-hours</p> <p>All electricity units are charged at the same rate 24 hours a day</p>	
<p>Variable rate meters (Economy 7 meters)</p>	<p>Measures in terms of Kilowatt hours.</p> <p>Two readings taken,</p> <ul style="list-style-type: none"> • Daytime and • Nighttime <p>Electricity is usually charged at two different rates.</p> <p>Night charges are usually charged at cheaper rates.</p>	

N.B. Definition, Killowatt-hour (kWh): The amount of energy used by a load of one kilowatt over the period of one hour

Data sourced from: energywatch.org (2008)

Gas Meter Types

Meter Type	Rate	Example
<p>Credit meters</p>	<p>Gas consumption measured in units.</p> <p>Units can be multiplied by 31.1 to convert approximately to kilowatt hours. (breakdown will appear on a gas bill)</p> <p>Quarterly bills are sent to customers. Gas readings usually occur every six months, and an estimated bill will be sent when meters are failed to be read.</p>	

Data sourced from: energywatch.org (2008)

N.B. all meters will have a **Meter Point Reference Number (MPRN)** which is individual to each meter. This is usually a ten digit number located on the meter. This number is important for taking meter readings and for locating individual meters.

Reading an Energy Meter

Electricity Digital

- To read a single rate digital meter, simply write down the numbers shown from left to right.
- Make sure to write down any zeros, including any at the start of the reading. Ignore any red figures.
- To find out how many units you have used since your last reading, subtract the previous reading from the new one.



Electricity Digital (2 Rate)

You may have two rows of figures if your electricity is supplied on a Variable Rate Meter Tariff.

Always check both rows of figures when you read this meter:

- One row is for the lower priced night-rate electricity - it is marked LOW.
- The other is for the day rate - it is marked NORMAL.



Electricity Digital (Dial)

Dial Meters can vary in appearance. The dials next to each other go round in opposite directions.

- Always write down the number which the pointer has just passed – this is not necessarily the nearest number to the pointer.
- If the pointer is anywhere between, say, 4 and 5, write down 4. If the pointer is directly over the number, say 5, write that number down.

Reading your Gas Meter

Gas Digital

To read a digital type meter, use only the white figures. Ignore any numbers after a decimal point or any numbers in red. To get the amount of gas you have used, take away the previous reading from the new one.

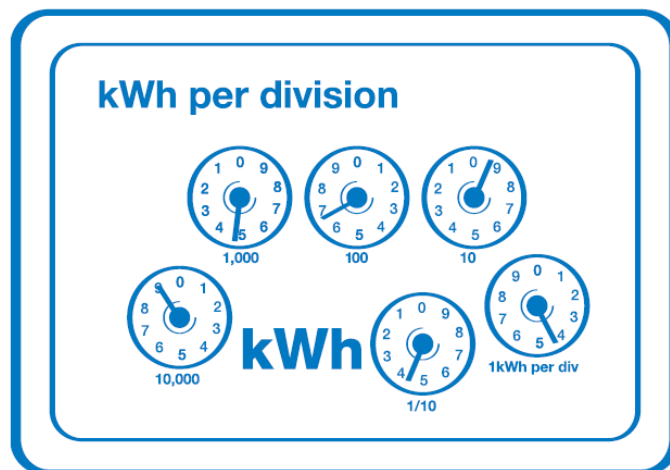


Gas Dial (Clock)

Different dial meters can sometimes vary in appearance. By carefully using the tips below and practicing, reading your meter becomes very easy.

Ignore the dials marked 100 per rev, the large dial and the red dials. Read the other dials from left to right and write down the number that the hand has passed.

When reading your dial meter, always remember that dials next to each other go round in opposite directions.



Data sourced from: Scottish Power.co.uk (2008)

For further information on reading a meter please contact your local energy supplier.

Appendix 6 – Key Publications

The Carbon Trust has produced several documents that can be obtained free of charge from their website www.carbontrust.co.uk/publications

Telephone: 0800 085 2005

Opening hours: 8.30am-5.30pm, Monday to Friday

Key Publications

- *Energy Management Fact Sheet* (GIL136)
- *Assessing the energy use in your building fact sheet* (CTL003)
- *Heating Your Church* (1996). Council for the Care of Churches
- *How to implement de-stratification fans* (CTL023)
- *How to implement roof insulation* (CTL064)
- *Heritage and culture Energy saving in historic sites and modern buildings* (CTV026)

Appendix 7 – Glossary of Terms

Kilowatt hours

A unit of energy equal to the work done by a power of 1000 watts operating for one hour. Kilowatt hours are used by the Utility companies to measure the amount of gas or electric billed.

Carbon dioxide (CO₂)

CO₂ emissions result from the combustion of fuel, from land use changes (agricultural processes, deforestation etc) and from some industrial processes. CO₂ emissions are limited by the Kyoto protocol.

Greenhouse gases

Greenhouse gases are those which contribute to the greenhouse effect when present in the atmosphere. Six greenhouse gases are regulated by the Kyoto Protocol, as they are emitted in significant quantities by human activities and contribute to climate change. The six regulated gases are

- carbon dioxide (CO₂),
- methane (CH₄),
- nitrous oxide (N₂O),
- hydrofluorocarbons (HFCs),
- perfluorocarbons (PFCs)
- and sulphur hexafluoride (SF₆).

Emissions of greenhouse gases are commonly converted into carbon dioxide equivalent (CO₂e) based on their 100 year global warming potential. This allows a single figure for the total impact of all emissions sources to be produced in one standard unit. Conversion factors of greenhouse gas to CO₂e are calculated by the IPCC and Defra publish guidance on which set of conversion factors to use.

Carbon dioxide equivalent (CO₂e)

There are six main greenhouse gases which cause climate change and are limited by the Kyoto protocol. Each gas has a different global warming potential. For simplicity of reporting, the mass of each gas emitted is commonly translated into a carbon dioxide equivalent (CO₂e) amount so that the total impact from all sources can be summed to one figure.

Carbon footprint

The total set of greenhouse gas emissions caused by an individual or organisation, event or product. It should be expressed in carbon dioxide equivalent (CO₂e).

What is green electricity?

Green electricity is generated by renewable energy; sun, wind, water, the heat of the earth and well managed forests. Usually “green” electricity is supplied to our homes and other buildings using the national grid by a utility company that charge for a “green” tariff.

Care should be taken when considering “green” tariffs as they will be supplied on the basis of part of the electricity being generated by renewable sources. Some tariffs may also have other environmental benefits and some “green” tariffs will supply electricity that has been generated from 100% renewable sources.

The Department for Environment, Food and Rural Affairs (DEFRA) has announced that the calculating of greenhouse gas emissions from “Green” tariffs should now use the same conversion factor as the normal grid supplied electricity. For more information see the DEFRA website.

Emissions conversion factor

When calculating emissions from energy use it is common to know what quantity of energy was used, either in kWh or by volume or mass of input material. Emissions factors enable a conversion to be made from the input measure of energy to the amount of carbon dioxide emissions that will result. UK conversion factors for energy to CO₂ are published by DEFRA.

Carbon Offset

An emissions reduction, commonly resulting from a project undertaken in the developing world, which has been sold to compensate for emissions elsewhere. Offsets are commonly used to net off corporate emissions so that an organisation can claim to be **carbon neutral**. See The Carbon Trust

three stage approach to developing a robust offsetting strategy.

Carbon neutral

Commonly accepted terminology for something having net zero emissions (for example, an organisation or product). As the organisation or product will typically have caused some greenhouse gas emissions, it is usually necessary to use carbon offsets to achieve neutrality. Carbon offsets are emissions reductions that have been made elsewhere and which are then sold to the entity that seeks to reduce its impact. In order to become carbon neutral it is important to have a very accurate calculation of the amount of emissions which need to be offset – requiring calculation of a carbon footprint.

Good practice

A term used in this document to indicate a building that has a low annual energy consumption per square metre of floor area (kWh/m²). This benchmark (kWh/m²) is commonly used to compare buildings energy consumption performance. Good practice is defined as the top 10% of a given category of buildings that were surveyed to produce the benchmark figure.

TRVs

Thermostatic radiator valves are fitted to radiators or heat emitters to limit the flow of heat into a room. They are set manually to a desired temperature and will automatically sense when that temperature is reached and limit the flow of heat.

Lamps

Lamps are light bulbs and they are used in luminaires (light fittings) to produce light from electrical energy.

Efficacy

This is the measure of the amount of light emitted per watt (lumens per watt or lm/W) of electrical power consumed by a lamp. Together with the life expectancy of the lamp figures for efficacy can provide an indication of the efficiency of the lamp.

CFLs

Compact fluorescent Lamps are commonly used as an energy efficient replacement for traditional Tungsten lamps. CFLs are now produced with a range of efficacies, power ratings and are suitable for a range of fittings and uses.

The U-value

Thermal transmittance (i.e. the U-value) is a measure of how much heat will pass through one square metre of a structure when the air temperatures on either side differ by one degree. U-values are expressed in units of Watts per square metre per degree of temperature difference (W/m² deg C).

Whole life cost

When considering the purchase of a new energy consuming appliance, piece of equipment or plant the purchaser should consider the other factors rather than just the initial cost. The whole life cost considers the initial cost, the cost in use (energy consumption costs) for its lifespan, maybe maintenance costs and then perhaps the disposal costs. This enables a fuller picture of cost of the appliance, piece of equipment or plant across its lifespan.