Energy audit report

Organisation: Piddington Village Hall Management Committee

Contact: Ken Howard

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Aim

This report provides energy efficiency and energy management recommendations for Piddington Village Hall.

Overview

This report consists of three sections. The first section includes energy efficiency recommendations for insulation, heating, ventilation, lighting and appliances. The second contains energy management recommendations while the third covers funding.

Summary of recommendations

- Install loft insulation
- Repair or replace double glazed windows
- Install draught proofing
- Install wall mounted electric heaters with a programmable control system
- Utilise existing ventilation measures
- Replace bulbs and tubes with low energy alternatives
- Turn off fridges when not in use
- Consider installing a plumbed in hot water boiler
- Learn to programme new heating system and record instructions
- Record and monitor meter readings

Background

EiE carried out a site visit and interviewed Ken Howard. All recommendations in this report are based on information and observations obtained during the site visit to the hall and any information subsequently provided by the organisation.

Piddington Village Hall

Piddington Village Hall was originally built in 1952/3 as a French Barn Construction with a steel roof. Since then a kitchen and a toilet block have been added and the walls have been rendered. There is no insulation present in the roof and there is unlikely to be any in the walls. Double glazing is installed throughout however many of the units have broken seals and condensation is present between the panes. Heating is supplied through electric radiant heaters.

Usage

The hall is used 3-4 days a week by regular users such as pilates and indoor bowls. It is also used regularly for parties

Future developments

A new committee has recently taken over and they are very keen to begin planning on future developments and encouraging new user groups to the hall.

Section 1: Recommendations - INSULATION

INSULATION

The table below illustrates the energy required to heat your main hall with current levels of insulation and how this will change if you improve insulation of different elements. From the table it can be seen that roof insulation is likely to have hthe greatest effect on reducing your heating requirement. All of the insulation options are discussed in the sections below.

		Comments
Current heating output required:	**25.94**	This figure (in kW) is based upon a temperature of 20 degrees being required in the hall whilst the outside temperature is -5 degrees

Improvement	New heating output required (kW)	Change (kW)	Change (%)	Comments
Install loft insulation	18.55	7.39	28.49	Based on a U-value of 0.16 being achieved
Repair double glazing	23.71	2.23	8.60	Assumes that by repairing double glazing draughts are also cut by 10%
Install draught proofing	24.75	1.19	4.59	Assumes draughts are cut by 20%
All Improvements	15.71	10.23	39.44	

These calculations are only rough estimations. However EiE is confident that these calculations do illustrate that loft insulation will result in the greatest energy savings and that conducting all improvements will result in substantial energy savings. The savings figures for 'All Improvements' is not equal to the total of the individual improvements due to the cumulative effect of adding on improvements.

Install Loft Insulation

As the photograph illustrates your current loft space has no insulation at all. As the loft space is large and not being used for storage installing 270mm of mineral wool would be the most cost effective way to achieve the current recommended insulation levels for new and retrofit buildings.. Mineral wool is readily available from DIY stores and can be installed by volunteers if you have the work force available and want to reduce costs.

Given the size of your existing loft space material costs will be in the region of £450.This cost is based upon the prices of rolls at thicknesses of 170mm and 100mm (Wickes price check 03/10/2013). Request a discount for a ordering a large quantity of insulation to reduce your costs even further. Loft insulation is readily available so you can shop around for the best prices.

INSULATION (cont.)

Repair Secondary Glazing

Condensation on the inner faces of the double-glazed unit is an indication that the air or gas cavity is no longer sealed. An unsealed unit will not be performing as expected and heat will be being lost. The performance of this window will likely be nearer to that of a single glazed window http://tinyurl.com/NRCanada.

An example of how double glazed units can be repaired http://tinyurl.com/IWSolution

As the windows were installed in 2000 the guarantee is likely to have run out however it may be possible to repair the windows rather than replacing them. There are a number of companies who will remove condensation from inside the double glazed units and then reseal the units. For examples see the following sites: http://tinyurl.com/IWSolution, http://tinyurl.com/DGServicing. When obtaining quotes from these companies ensure that the original U-value of the double glazed unit will be achieved (usually around 2.8). If repair is not possible, or a suitable U-value cannot be reached, replace the sealed glass units.

Install Draught Proofing

There are gaps around some of the exterior doors which can be draught-proofed. (see photographs below). Plastic draught stripping is the cheapest option but does not last very long, especially if doors are frequently opened. Metal and nylon bristle draught excluders are more hard-wearing. If these are not suitable to attach (e.g. if the gap is not uniform), ask a carpenter to draught-proof the doors as the most long-lasting solution. If this is not possible because the door is warped it may need to be replaced. Examples of draught stripping can be found online here: http://tinyurl.com/draught-proofing.

Actions:

- Install loft insulation
- Contact contractors to see if double glazing repair is possible.
- Obtain quotes for either double glazing repair or replacement
- Install draught proofing

Section 1: Recommendations - HEATING

HEATING

The existing heating system in the main hall consists of:
- 6 x 1.5kW electric radiant fan heaters
- 3 x 2kW electric radiant fan heaters

Electric radiant heaters offer instant heat direct to the users. This form of heating does not warm the air in the hall resulting in noticeable cold spots in parts of the hall which are not directly under the heaters. Additionally the heating system is felt to be and difficult to control as the current radiators are either on or off.

Install a new heating system

The current heating output required to heat the main hall and kitchen area is 2**5.94kW** however once both insulation options have been carried out (loft insulation and draught proofing) the heating output required will be reduced to **15.71kW**.

EiE advises that these insulation projects should be carried out first, therefore the heating system proposed here is based on a required heating output of **15.71kW**.

- 8 x 2kW electric panel heaters
Approx. cost of units = £1209 (VAT incl.)
http://tinyurl.com/panelheater (prices checked 04/10/2013)

An example of a Danfoss 7 day programmer. A programmer such as this should be used to programme your heating on a weekly basis. Guidance on programming a new heating system is provided in the Energy Management section of this report.

Heating control

The current heating control system uses a series of labelled switches by the front door which operate different sets of heaters around the hall. Given the reasonably low use of the hall and that sometimes only part of the hall is used (e.g. for small meetings) this system works effectively for electric radiant heaters as it allows you to control the number of heaters which are switched on. The risk of this system is if heaters are left on after someone has left the building.

With a new system of wall mounted radiators a new programmable control system should be installed for the following reasons.

- Heating can be programmed in advance to match usage for each week. This makes sure that heating is supplied only when required.

- In order to provide a warm hall for users from the start of their let the heating will have to be programmed to come on before users arrive.

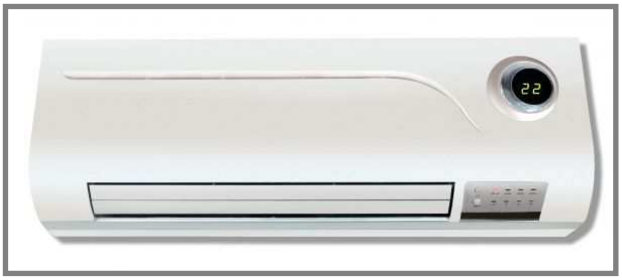
Section 1: Recommendations – HEATING and VENTILATION

HEATING (cont.)

Consider installing an Overdoor Heater

The existing electric fan heater positioned above the door is rarely used. This could be potentially replaced with an overdoor heater. Overdoor heaters are designed to create a barrier of air that helps maintain the indoor air temperature and resist the entrance of outside air when people are using the door. Therefore the overdoor heater could be turned on in cold weather when users are coming into the hall at the start of a booking and turned off once everybody is inside. Another way to maintain the indoor temperature when the front door is being used is to install a double door system using the front porch already constructed.

Existing 2kW Electric Radiant Heater



An example of a 2kW Overdoor Heater: http://tinyurl.com/overdoorheater

A door could be added to the front porch where users could open the front door, enter the porch, close the front door and then enter through the main hall door. This would help reduce draughts and maintain the indoor temperature.

Actions:

- Install wall mounted electric heaters
- Install a programmable control system
- Consider installing an Overdoor Heater
- Consider adding an extra door to the front of the building to create a porch

VENTILATION

Utilise existing ventilation measures

The hall sometimes experiences a stale air smell, which is likely to be caused by lack of ventilation in the main hall. Older buildings absorb moisture and release it when conditions become drier, so ventilation and use of breathable materials are important.

There is one extractor fan located at the back of the hall and a vent in the ceiling which vents into the roof space. Controls for both of these ventilation systems are located at the front of the hall. When turned on they generate large amounts of noise, making their use impractical during certain activities like meetings. To optimise the use of existing ventilation we recommend that:

1. When an action occurs that causes warm moist air (e.g. a number of people in the hall, cooking or boiling water in the kitchen) ensure that at least one of the ventilation methods is used, such as opening a window or using one of the fans.

2. Clean dust and dirt from the fan grilles to ensure they operate efficiently.

3. Ensure that ventilation is maintained in the cold roof space. As the central ventilation point in the hall vents warm moist air into the roof space it is important to maintain air circulation to prevent condensation. When insulation is laid on the ceiling ensure this does not block any air ventilation gaps under the eaves. There is a ventilation brick at one end of the roof space however if condensation becomes a problem, a ventilation slot built into the opposite end would encourage air flow across the roof space. It is important that the ventilation slots are not blocked.

Actions:

- Utilise existing ventilation measures by improving and using them appropriately

Section 1: Recommendations - LIGHTING

LIGHTING

Replace bulbs with low energy alternatives

There are currently:

8 x 60w bulbs in the hanging lights

3 x 15w (est.) low energy bulbs in the hanging lights

6 x 60w candle bulbs in the uplighters

2 x 40w T12 tubes, one in the kitchen and one in the store room

The tables and calculations are based on replacing the above configuration of bulbs with the following:

11 x 6w LED bulbs in the hanging lights - http://tinyurl.com/60wLEDequiv6w

6 x 11w low energy candle bulbs in the uplighters - http://tinyurl.com/lowenergy11wcandle

2 x 36w T8 tubes, one in the kitchen and one in the store room

6w LED bulb http://tinyurl.com/60wLEDequiv6w

11w low energy candle bulb http://tinyurl.com/lowenergy11wcandle

T12 and T8 tubes

All bulbs suggested here should supply an equivalent intensity and dispersal of light to those which they are replacing. We recommend though that in the case of the LED and low energy candle bulbs you may wish to purchase 1 or 2 bulbs to begin with and compare them with your existing bulbs before purchasing replacements for all. From the tables it can be seen that replacing bulbs with low energy alternatives will payback quickly (within 2yrs) and provide significant energy and cost savings.

	Bulb cost (£)	Annual energy use (kWh/yr)	Annual energy savings (kWh/yr)	Annual energy costs (£)	Costs in year 1
Current Setup	-	942	-	£129.34	£129.34
Proposed Setup	£171.28	245	697	£33.64	£204.92

Bulb and fittings costs from www.leds4less.co.uk, www.easy-lightbulbs.com and www.scldirect.co.uk. All costs include VAT. Calculations based on lights being on 1200hrs/yr (equivalent to just over 3 hrs/day) at the electricity rate of 11.83p.

	Cumulative costs			
	yr1	yr2	yr3	yr4
Current Setup	£129.34	£258.67	£388.01	£517.35
Proposed Setup	£204.92	£238.56	£272.20	£305.83

Actions:

• Replace bulbs and tubes with low energy alternatives

Sections 1 and 2: Recommendations – APPLIANCES and ENERGY MANAGEMENT

APPLIANCES

Turn of one of the fridges in the Kitchen

The kitchen area contains two fridges turned on at all times. Energy can be saved by turning one fridge off when not needed. On average for your size of appliance this could save you around £20/year. http://tinyurl.com/fridge-energycosts

Install a plumbed in hot water urn

Hot water for tea and coffee for larger events is currently heated using the freestanding 3kW 20l urn. An auto fill hot water boiler of a practical size, plumbed into the water mains, is a safe and energy efficient replacement. If a hot water boiler is purchased we recommend:

-The plug should be fitted with a timer that is set to turn the boiler off at, say, 10pm every night in case it is left on.
- Users should use the kettle if only a small quantity of water is needed.
- Information should be posted near the boiler to advise users of warm up times (e.g. This hot water boiler needs to be switched on 30 minutes before boiling water is required).

Example of a plumbed in hot water boiler
http://tinyurl.com/ecoboiler

Actions:

- Turn off fridges when not in use
- Remember to leave units open when switched off to avoid mould
- Consider installing a plumbed in hot water boiler

ENERGY MANAGEMENT

Learn how to programme new heating system

If a new heating system with a 7 day programmer is installed it is essential that you learn and document how to use it. You should:

1. Ask the installer to show you how to use the programmer.

2. Take note of programming instructions and produce a presentable copy which can be used by other hall users involved with programming the heating.

3. Program the heating on a weekly basis to match usage with heating coming on 1 hour before a group arrives and turning off 30 minutes before they leave.

4. Investigate how long the hall takes to warm up from when the heating comes on. For example start with 1 hour before then if the hall is warm when people arrive change it to 45 minutes before until you find the minimum amount of time you have to turn the heating on beforehand.

It is likely to be difficult to completely predict your usage and heating requirements at the beginning of the week and programme the heating for all users. For example an unexpected table tennis group may book or a meeting may considerably overrun. For these instances a heating programmer with a 'boost button' or an 'extra hour button' will allow you to override the pre-programmed heating schedule and turn the heating on for an hour before it re-sets back to its pre-programmed schedule.

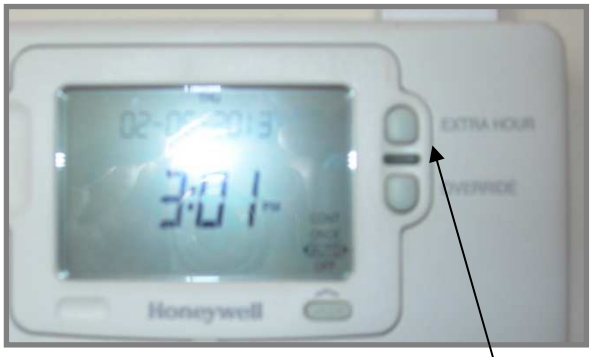


Photo of a heating programmer with an 'extra hour' button taken at Eynsham Baptist Church.

ENERGY MANAGEMENT (cont.)

Record and monitor meter readings

Many of the meter readings on recent bills are estimates by the energy company (denoted by an 'E'). By taking meter readings and providing them to your energy supplier (via website, email, or telephone) prior to bills being issued your bills will be accurate. Additionally, recording meter readings monthly in a simple graph format will allow the hall to gain knowledge such as, what 'normal' energy usage is, what effect energy efficiency measures have on overall usage and costs, and when there has been an unusual peak in energy usage.

Actions:

- Learn how to programme new heating system
- Record instructions for programming new heating system
- Record and monitor meter readings

FUNDING

WREN

WREN's Small Grant Scheme accepts funding applications between £2,000 and £15,000 (if the total project is under £50,000) http://www.wren.org.uk/schemes

Green Deal

Under the Green Deal there will be non-means tested funding to insulate solid-walled properties (internal and external wall insulation) and those with 'hard-to-treat' cavity walls. http://www.energysavingtrust.org.uk/Take-action/Find-a-grant/Green-Deal-and-Energy-Company-Obligation-ECO

TOE2

Up to £10,000 for energy efficiency measures following an energy audit. Contact Fiona Danks on 01865 883488 toe@oxonrcc.org.uk This grant application could be for a number of the lower-cost recommendations made in this report.

Biffa Award Funding

Biffa Award provides grants to a range of community projects, for example building improvements that increase the range of services on offer to the local community. Grants between £5,000 and £50,000 are available. For eligibility criteria, please see the website: http://www.biffa-award.org/community-buildings

OCVA Guide to Funding Opportunities 2012

Website has a number of links listing Oxfordshire funders, their area of interest and how to apply.http://www.oxnet.org.uk/funding/guides

The Low Carbon Hub

Contact the Low Carbon Hub to find out about Support for a community share offer for renewable energy http://www.lowcarbonhub.org/advice/how-to-set-up-a-community-enterprise

ORCC

Contact Lynne Newin at Oxfordshire Rural Community Council for assistance with your energy audit report Lynne.newin@oxonrcc.org.uk