OxFutures

Energy Saving Recommendations Report

for

Hill End Outdoor Education Centre

December 2017

European Union

European Regional Development Fund

OXFORD BROOKES UNIVERSITY

low carbon hub

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Cherwell DISTRICT COUNCIL NORTH OXFORDSHIRE

ORGANISATION OVERVIEW

Report overview

EiE carried out a site visit and interviewed key staff. All recommendations in this report are based on information and observations obtained during the site visit and information provided by David Millin. The report is set out in order of recommended priority based on factors discussed on site, ease of implementation, carbon impact and cost.

Client details

Organisation name	Hill End Outdoor Education Centre	Eynsham Road Farmoor, Oxfordshire OX2 9NJ
Contact name	David Millin	david.millin@hill-end.org 01865 863 510
Date of site visit	5th December 2017	Carried out by Moira Dorey

Energy savings recommendations - summary

Below is a summary of the opportunities recommended. Costs & savings have been estimated using available information; an explanation is provided in detail for each opportunity. Estimations have been based on energy data provided by Oxfordshire County Council. Where savings estimations are not given further details/surveys would be required or strategic discussions on the future of the Hill End buildings.

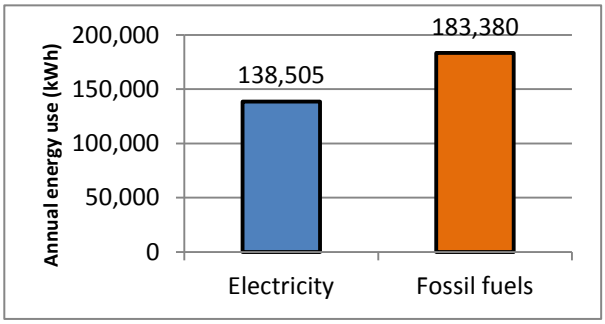
Opportunity	Savings (kWh / yr)	Savings (£ / yr)	Cost (£)	Initial payback	Carbon Impact (tCO_2e / yr)
Replace fan convector heaters	12,000	181	-	-	2.21
Consider under floor heating	6,000	91	5,200	57.40	1.10
Match heating times to building occupancy	7,000	106	0	0.00	1.29
Improve hot water heating times	2,737	41	0	0.00	0.50
Add double or secondary glazing	-	-	-	-	Not known
Add lining to curtains	0	0	500	0.00	0.00
Install floor Insulation	3,576	54	800	14.82	0.66
Add internal wall insulation	-	-	-	-	Not known
Upgrade lighting to LEDs	-	-	-	-	Not known
Install absence detectors	2,770	316	1000	3.17	1.14
Take, submit and analyse meter readings	0	0	0	0.00	0.00
Document energy management procedures	0	0	0	0.00	0.00
Consider adding solar PV panels	-	-	-	-	Not known
TOTAL	**34,083**	**£788/yr**	**£7,500**		**6.90 tCO_2e / yr**

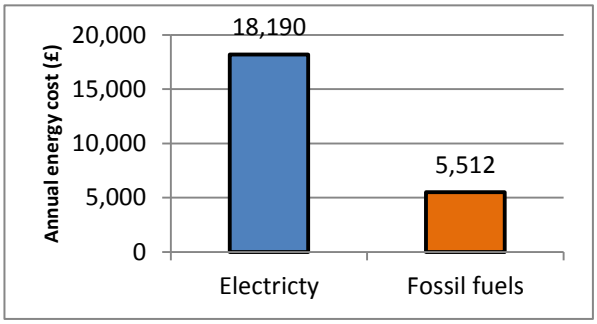
Site details

Hill End Outdoor Education Centre consists of 24 buildings ranging from offices to training and event rooms, residential dormitories for overnight stays and shower blocks for the campsite. The site was originally opened as an outdoor education facility in the 1930s. The Centre became a charitable trust in 2017 having been run by Oxfordshire County Council since the 1970s. This change offers the opportunity to strategically review building use for the short and long term. Mains gas is available to part of the site therefore buildings are heated with gas where possible while some have electric heaters or no heating.

Energy consumption annual profile				
Fuel type	**Annual Energy use (kWh)**	**Cost per kWh (p)**	**Standing charge (p/day)**	**Approx. annual cost (£)**
Electricity	138,505	11.395	31	18,190
Gas	183,380	1.51	171	5,512

Energy profile breakdown for Hill End consumption (left) and costs (right)





Consumption is based on OCC estimated figures for 1/10/2017 to 30/9/2018.

Replace fan convector heaters		
Energy saving (kWh)	**Cost saving (£)**	**Cost of action (£)**
12,000	181	-

This recommendation relates to the following buildings:
GREEN DRAGON
BLUE DRAGON
THE BARN
THE COOK HOUSE

The current fan convector heaters are Kestrel Temcana 26 and Kestrel Temcana 55 gas powered flued fanned convector heaters and were probably installed over the last 20 years with a recent replacement in the Cook House.

The fan convectors are still in working order, and regularly serviced by a heating engineer however in some areas, particulalry Green Dragon and Blue Dragon, which are used for training events. The noise of these heaters is disruptive to the point of requiring them to be turned off during some sessions.

Fan convector heaters will provide an instant heat and are widely used for heating up large rooms quickly and efficiently. However, consider replacing older fan heaters in these buildings with more modern fan convector heaters with reduced fan level or replace with a different form of heating (see next recommendation).

Your current fan heaters could be replaced by similar, quieter heaters from the same manufacturer. It may also be that the current heaters simply need servicing. An offer of a free on-site assessment of the units has been made by Martin Emmerson, Managing Director, of Vulcana Gas Appliances Ltd Email: mail@vulcanagas.co.uk. (I will supply further details by e-mail).

Alternatively, particularly in Blue Dragon where you have a gas boiler for the kitchen, you could consider running hot water pipes to a heating system in the hall for a fan convector. Examples are here:
http://www.copperad.co.uk/fanconvectors.php
https://www.biddle-air.co.uk/en/products/heating-and-ventilation

When considering the noise levels of heaters the following table may be useful for reference:
Recommended Noise Rating (NR) are as follows:
http://www.engineeringtoolbox.com/nr-noise-rating-d_60.html

Noise rating curve	Application
NR 25	Concert halls, broadcasting and recording studios, churches
NR 30	Private dwellings, hospitals, theatres, cinemas, conference rooms
NR 35	Libraries, museums, court rooms, schools, hospitals operating theaters and wards, flats, hotels, executive offices
NR 40	Halls, corridors, cloakrooms, restaurants, night clubs, offices, shops

NR 45	Department stores, supermarkets, canteens, general offices
NR 50	Typing pools, offices with business machines
NR 60	Light engineering works
NR 70	Foundries, heavy engineering works

When installing the new heater ensure the following:
1) The heater is fully guaranteed with a service agreement in place (preferably included in the cost) for a number of years.
2) A training session is also included on how to operate the system for optimal energy efficiency.
3) Simple operating instructions are provided by the installer and are attached to the heater for reference.
4) Heating controls are upgraded as required. If user-managed controls are selected do not over complicate them or give the users too many choices unnecessarily.

Actions

- Contact Vulcana for a free-of-charge assessment of heaters.
- If noise levels are not resolved contact Biddle or Copperad to request a site visit to discuss options for their potentially quieter heaters.
- We recommend obtaining quotes from at least three qualified heating suppliers to help ensure the best value.
- Before selecting a heating system discuss with heating companies the options for remote programming of heaters from the office.

Cost and savings calculations

Cost savings are estimated at 20% reduction in gas in Blue Dragon that is the most likely site for heater replacement for similar style heaters. New fan convector heaters cost between £1000 and £1500 per heater depending on size, plus installation however the number of heaters to be replaced will depend on the recommended research and which systems are selected.

Consider under floor heating

Energy saving (kWh)	Cost saving (£)	Cost of action (£)
6,000	91	5,200

This recommendation relates to the following buildings:
GREEN DRAGON

Flooring is to be replaced providing an opportunity to install under floor heating in this building. An under floor heating system is particularly suitable for well-insulated buildings as it provides low temperature heat that slowly warms up the building. Green Dragon has thick stone walls that will take several hours to heat up, therefore underfloor heating that is on regularly for several hours each day will warm these cold walls.
As under-floor heating operates at lower temperatures than standard radiators, it is most suited to buildings that are in regular use for several hours a day. Green Dragon is currently used daily for teacher training, so this would be an appropriate system.
An under floor heating system means that no interior wall space will be lost to radiators and it will provide whole room warmth at lower cost. It will also aleviate the noise problem from the current fan heaters.

For further information and prices see:
http://www.theunderfloorheatingstore.com
http://www.warmup.co.uk
https://www.uswitch.com/gas-electricity/guides/underfloor-heating/
http://centralunderfloorheating.com/water-underfloor-heating/underfloor-heating-cost.html

It may be necessary to supplement under floor heating with a mobile radiator or heaters during very cold weather, particularly if heat is lost rapidly from your building through an open door.

Actions

- We recommend making use of the gas supply to install a water-based under floor heating system that uses a boiler to heat water that circulates in pipes under the floor.
- Under floor heating works best with tile, stone or wooden floors.
- Obtain quotes from at least three specialised and qualified contractors. Also, ensure there are satisfactory guarantees on the performance and maintenance of the system.

Cost and savings calculations

Cost based on a floor space of 100 sq metres at £100 per square metre for the first 20 square metres and £40 per square metre for every additional square metre. Savings are based on a 10% saving on an assumed 60,000kWh annual use for Green Dragon. The main advantage to changing heating system is increased comfort and reduced noise.

Match heating times to building occupancy		
Energy saving (kWh)	**Cost saving (£)**	**Cost of action (£)**
7,000	106	0

This recommendation relates to the following buildings:
NORTH DORM

The heating across the site is controlled by a member of staff turning the heating on and off to match usage, or users turning on heating when they arrive on site. During the visit heating was found to be switched on in North Dorm when the building was not in use. If heating times do not match building occupancy, energy is wasted.

Re-programming the heating in North Dorm to match the heating times to occupancy will reduce energy usage and costs.

If controls systems are tampered with by volunteers when working in this building consider explaining the 'Extra Hour' boost button to volunteers that will overide the boiler settings in North Dorm to allow heating for one hour only. This will avoid the problem of heating being left on. A short video can be viewed here: https://www.youtube.com/watch?v=K179oneX1DY

Actions

- Programme your heating to reflect building use.
- Programme the heating to switch on a maximum of one hour before the users arrive and to switch off 15 to 30 minutes before they leave. This will allow the area to be heated sufficiently for the duration of the use.
- If tampering with controls is a problem, encourage use of the 'Extra Hour' button.

Cost and savings calculations

There is no cost to this action. Heating for North Dorm is thought to be approximately 14,000kWh /year. Savings are based on heating being off 50% of the time due to more accurate heating times.

Improve hot water heating times

Energy saving (kWh)	Cost saving (£)	Cost of action (£)
2,737	41	0

This recommendation relates to the following buildings:
NORTH DORM
MIDDLE DORM

The hot water tanks appears to be switched on at all times in these two buildings. Particularly in winter, users are only occupying these buildings occasionally.

Hot water tanks constantly lose heat and require energy to remain at temperature. If hot water heating times better match building occupancy, energy can be saved. Matching times to occupancy will reduce wasted energy usage and costs.

In order to reduce the risk from Legionella bacteria, where a hot water tank is turned off for a period of time, it will need to be turned on in advance of use to bring the whole tank up to 60°C for 5 minutes. As you already employ a maintenance company to visit regularly to run the pipes and showers to prevent legionella they should be able to accommodate this recommendation. If necessary the tanks can be programmed to heat to 60°C once a week out of season to address the risk of Legionella.

Actions

- Re-programme your hot water heating times to reflect building use.
- Programme the hot water to switch on a maximum of one hour before the users arrive and to switch off 15 to 30 minutes before they leave. This will allow for hot water to be available for the duration of the use of the buildings.

Savings calculations

There is no cost to this action. Savings are based on turning off these hot water heaters 50% of the time.

Add double or secondary glazing		
Energy saving (kWh)	**Cost saving (£)**	**Cost of action (£)**
-	-	-

This recommendation relates to the following buildings:
MIDDLE DORM
HIGH DORM
THE BARN
ROBINSON
NORTH DORM
THE BUNGALOW
THE FARMHOUSE

The windows in these buildings are single glazed. Double glazing will improve the insulation in the building and reduce energy used for heating as well as helping maintain the indoor temperature longer. Secondary glazing also reduces heat loss and draughts and is about half the cost of double glazing.

Middle Dorm is likely to be the first building to be used throughout winter for residential purposes. Double or secondary glazing should be considered as a package of insulation measures for this building.

High Dorm is currently not heated and Robinson is barely heated with the other buildings named having limited use in winter at the moment. However development plans for Hill End include encouraging further residential use during the colder seasons when heating is likely to be switched on. Installation of double glazing or even secondary glazing will be disruptive and costly for buildings that are rarely used in winter therefore this recommendation should only be pursued for buildings that will be well heated and used in colder months.

Additionally, Robinson and North Dorm are wooden buildings with a limited life span. Ensure that any double glazed units installed in these buildings will pay back before the end of the life of the building or can be re-used in replacement buildings.

Plans include using The Barn for more functions in winter months. Its windows are large, however secondary glazing could make a significant difference to heat loss and comfort. This measure should only be considered as an element of refurbishment plans for The Barn which may include increasing heating and re-flooring.

The bungalow and the farmhouse are on-site residential properties occupied throughout the year. They both have single glazing which is in need of repair. Double or secondary glazing will reduce heat loss and improve comfort.

Actions

- Obtain at least three quotes from qualified double glazing contractors before proceeding.
- If double glazing is not permitted or too costly, obtain quotes for secondary glazing.

Cost and savings calculations

Cost and savings are not included in this recommendation due to the uncertainly of use and longevity of the buildings under consideration. Costs for window replacement will vary considerably depending on the type of unit you choose. Costs for PVC double glazing begin at an estimated at £250/m2 (x 16 m2 = £3200). Costs for PVC secondary glazing range from approximately £80 to £120/m2.

Add lining to curtains

Energy saving (kWh)	Cost saving (£)	Cost of action (£)
-	-	500

This recommendation relates to the following buildings:
MIDDLE DORM
HIGH DORM
THE BARN
ROBINSON
NORTH DORM

The curtains for most windows are not lined. Adding insulated lining to your curtains is an excellent way of keeping the heat inside the room on cold nights and can also improve the acoustic properties of the room.

As discussed in the previous recommendation, this measure is relevant for buildings that are going to be used extensively during the months when the heating is likely to be switched on. It is a helpful interim measure before a decision is made on whether to install double/secondary glazing.

Actions

- Curtain lining can be ordered to measure and installed by staff.
- You may have volunteers who would be happy to line curtains if materials are funded.
- Encourage building users to close curtains overnight or when they feel cold. This could be promoted with signage, emails, or verbal reminders.

Cost and savings calculations

The cost for curtain lining material would start at about £20 per window. Costs are estimated at £500 as indicative of the cost of lining curtains for a number of buildings. Savings are dependant on the buildings to have curtains and how they are used.

Install floor Insulation

Energy saving (kWh)	Cost saving (£)	Cost of action (£)
3,576	54	800

This recommendation relates to the following buildings:
GREEN DRAGON
MIDDLE DORM

The floor in Green Dragon is due to be replaced shortly. Insulation should be added below the floor during refurbishment. If more than 50% of the floor is being replaced this will be a requirement of Building Regultaions.


Middle Dorm floor

The floor in Middle Dorm is a hung floor over joists with a void below through which heat is lost. There is a constant draught through this floor. If this building is going to be used more during colder months in the future adding insulation will reduce heat loss in winter months, reduce uncomfortable draughts and improve comfort conditions. There are no plans to replace the flooring, however it may be possible to insulate from below as there is a 50-100cm void beneth the building.

The following guidance, provided in the Building Regulations for refurbishment of an existing building, is worth noting:
Reasonable provision would be to upgrade a floor whose u-value is worse than the threshold value of 0.70w/m2K to achieve an improved u-value of 0.25w/m2K provided that this is technically, functionally and economically feasible. A reasonable test of economic feasibility is to achieve a simple payback of 15 years or less. Where the recommended standard is not technically, functionally or economically feasible, e.g. where meeting such a standard would create significant problems in relation to adjoining floor levels, we recommend the floor be upgraded to the best possible standard that would generally not be less than 0.7w/m2K. (paraphrased from P18-20 of the Guidance).
http://www.planningportal.gov.uk/uploads/br/BR_PDF_AD_L1B_2015.pdf.

Actions

- Obtain 3 quotes from qualified contrators for insulating beneath the floor in Green Dragon and also in Middle Dorm if use is expected to increase in colder months.
- Insulation is rated in u-values that is a measure of heat loss through a structural element of a building; the lower the u-value the better the insulation. In England or Wales we recommend the floor achieves a U-value of 0.22 W/m2K or less, if possible. To achieve this standard, you will normally need at least 70mm of high-performance foam insulation, or 150mm of mineral wool, but this will vary depending on floor type, shape and size. Ask flooring contractors to quote the u-values that will be achieved.

Cost and savings calculations

Costs are based on mineral wool slab insulation for Green Dragon at approximately £8/m2 with labour included as part of the refurbishment of the floor. Savings are based on Energy Saving Trust estimates. Cost and savings calculations have not been included for Middle Dorm as the time of insulation to be used is not known.

Add internal wall insulation		
Energy saving (kWh)	**Cost saving (£)**	**Cost of action (£)**
-	-	-

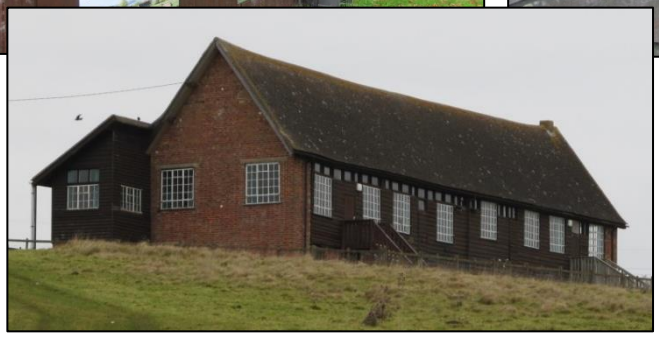
This recommendation relates to the following buildings:
MIDDLE DORM
HIGH DORM
NORTH DORM
ROBINSON

35% of heat may be lost through poorly insulated walls. Increasing insulation will minimize heat losses in winter, reduce heat gains in summer, improve comfort levels for users, and reduce annual energy bills by reducing heating requirements.

You have at least 4 residential buildings that have walls built of a wooden frame with interior timber walls and timber weatherboarding on the outside. Middle and High Dorms has weatherboarding with traditional waney edges. There is no insulation between the interior and exterior walls therefore heat from these buildings is rapidly lost through these walls.

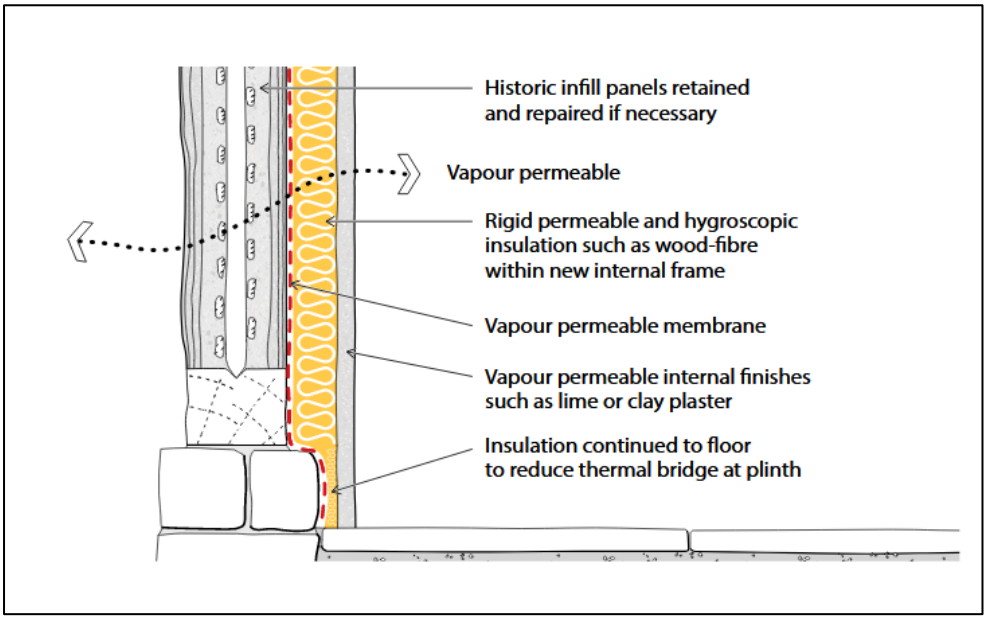
Insulating the walls of these buildings may be carried out internally or externally however reinstatement of the external boards if they were removed may prove very difficult. Internal Wall Insulation is suitable when rooms are spacious enough to afford some loss of area, or when owners do not wish to alter the outside of the building.

Prior to taking action on internal wall insulation for Middle Dorm and High Dorm a strategic decision is required on promotion of these buildings for use in cooler months. If the buildings are going to be regularly used when heating is required then internal insulation should be considered. Similarly a strategic decision needs to be made on the longevity and future of North Dorm and Robinson that were originally built as temporary buildings. Internal wall insulation will not pay back for several years therefore if there is a plan to replace these buildings internal wall insulated is not recommended.



English Heritage provides valuable advice on insulating between timber walls in their publication at the following link:
https://content.historicengland.org.uk/images-books/publications/eehb-insulating-timber-framed-walls/heag071-insultating-timber-framed-walls.pdf/

Below is an illustration of how insulation may be added internally.



When insulating wooden buildings consider permeability of the insulation materials. Timber-framed walls have very different characteristics to modern walls and are capable of absorbing and releasing moisture freely, both internally and externally. Consult a contractor with expertise in timber framed buildings, particularly for Middle Dorm that is an older building. The most damaging decay to a timber-framed building is usually found where inappropriate materials have been used to repair/upgrade the building.

Building Regulations: The u-value that will be achieved by adding traditional stud walls would be approximately 0.30 Wm2K. (The u-value is a measurement of heat loss through a structural element of a building). Any alternative wall insulation is recommended to at least match this level. Building Regulations 2010 require that, provided the wall area to be renovated is greater than 50% of the total surface area of that wall, the performance of the whole of the thermal element is best to be improved to achieve or better a u-value of 0.3 W/m2k. (where the u-value is a measure of the insulation properties of the material). If achievement of the relevant u-value is not technically or functionally feasible or would not achieve a simple payback of 15 years or less, the element is best to be upgraded to the highest standard that is technically and functionally feasible and that can be achieved within a simple payback of no greater than 15 years.

Actions

- Hold strategic discussions on the future of these buildings.
- Obtain quotes from at least three suitably qualified contractors to install internal wall insulation. Ensure that quotes include insulation which complies with building and fire regulations.

Cost and savings calculations

Cost and savings depend on the number of buildings insulated. Heating costs are likely to be reduced by 20-30% from insulating the buildings.

ENERGY SAVINGS RECOMMENDATIONS

Upgrade lighting to LEDs

Energy saving (kWh)	Cost saving (£)	Cost of action (£)
-	-	-

This recommendation relates to the following buildings:
ALL BUILDINGS

Lights currently installed in the buildings are mainly T8 fluorescent strip lighting. LED lights are more energy efficient and exist for nearly every fitting. They can reduce electricity use by up to 90% compared to other lighting. Additionally LEDs last up to 35,000 hours before they need to be replaced (fluorescent lights last 15,000 hours) resulting in reduced maintenance costs.

As you have other more pressing energy efficiency priorities we recommend that, once current lighting stocks are used, LED lights are always used to replace any future failed bulbs or tubes. The exception to this is Green Dragon where is is advisable to replace current lighting with LEDs as part of the refurbishment.

Example LEDs can be found here: https://www.tlc-direct.co.uk
http://www.lightingsupermarket.com
www.ledhut.co.uk

When selecting replacement lights there is also an opportunity to provide better lighting rather than using equivalent lights. For example, if The Barn is to be promoted for weddings and functions more elegant lighting could replace the current utilitarian lighting (see image). Consider the fixtures, light quality preferred (known as colour temperature) that ranges from warm white, cool white or daylight and the level of brightness needed (measured in lumens).

Ensure that, whichever supplier you use, they offer a minimum 5 year failure replacement guarantee and are prepared to let you test a number of LEDs to ensure the light quality is correct before making a final purchase.

Actions

- Carry out an inventory of current lighting on site noting number and type of each light.
- Once current lighting stocks are used, ensure failed bulbs or tubes are always replaced with LEDs.
- Consider replacing all lights at once as lighting suppliers will offer a discount for buying LEDs in bulk.

Cost and savings calculations

Costs and savings depend on fittings selected and rate of replacement.

Install absence detectors

Energy saving (kWh)	Cost saving (£)	Cost of action (£)
2,770	316	1000

This recommendation relates to the following buildings:
ALL BUILDINGS

The lights in several buildings are often left on as users leave the room/building. Motion sensors are particularly useful for switching off lights in communal areas such as shower and toilet blocks and dining areas where lights are often left on.

Lights controlled with an absence detector uses a manual on / off switch, however, if lights are left on for a period of time, the sensor automatically switches off lighting. Absence sensors therefore encourage user responsibility for turning off lights whilst managing energy use if lights are left on.

Example sensors are here:
http://tinyurl.com/danlerspir
https://www.yourelectrics.com/product-category/controller-timers/pir-sensors/

Actions

- Contact a qualified electrician to install absence sensors starting with the most used areas where lights are left on.
- Discuss with your electrician the appropriate time for lights to remain on with no movement detected. In offices this may be set at 15 minutes whilst in toilets it is more likely to be 5 -10 minutes.
- Ensure that contractors locate sensors appropriately so that they pick up movement in all parts of the room. As a rough guide, for best coverage a sensor will ideally be spaced every 5m in either direction.

Savings calculations

Cost based on adding 20 sensors costing £40 each and approximately a day of installation. Saving assumes lighting is 20% of current electricity use on site and would be turned off an additional 10% of the time.

Take, submit and analyse meter readings

Energy saving (kWh)	Cost saving (£)	Cost of action (£)
0	0	0

Some of your gas and electricity bills are based on estimated readings.

By recording and submitting energy meter readings to your suppliers regularly and accurately, energy management, as well as monitoring bills, will be easier. This will be particularly useful to monitor the success of changes you make to your buildings to improve their energy efficiency.

As you appear to have 19 electricity meters and 4 gas meters across the site reading these meters regularly is a time consuming task that could be allocated to a volunteer. By recording and analysing energy meter readings regularly and accurately, energy management, as well as monitoring bills, will be easier.

In order to reduce the burden of reading these meters monthly we recommend that you have a discussion with your supplier on smart meters or rationalisation of these meters to a single meter reading point for billing purposes. If electricity and gas can be supplied to the site through just one meter for each utility considerable savings could be made on standing charges which are currently applied to each meter. It is worth remembering however that individual building meters should be retained for monitoring purposes as a helpful way to measure energy use per building.

Actions

- Arrange to record actual meter readings / usage on the same day once per month. Enter these into a spread-sheet and calculate usage.
- Submit meter readings to your energy suppliers prior to invoicing (the timing of this will differ based on your bills). Depending on your supplier, readings can be submitted via website, email, or by telephone.
- Use this information to form a baseline for your consumption so that the effect of energy improvement measures can be assessed.
- When you have a year of readings, review information to ensure action is taken on noticeable increases in energy use.

Cost and savings calculations

There is no cost to this action. There are some potential savings from more accurate billing and reducing the number of fiscal meters on site.

Document energy management procedures		
Energy saving (kWh)	**Cost saving (£)**	**Cost of action (£)**
0	0	0

There are no written energy management procedures for your organisation. Energy management is the process of monitoring, controlling, and conserving energy in a building or organisation. Having structured, co-ordinated and documented energy management procedures maximises the benefits for energy saving and helps identify cost-effective opportunities.

The documents can also be used to capture knowledge that may be lost when employees leave or retire. Formal procedures will make employees aware of the importance of saving energy, both for the business and for their own working conditions.

A useful link is here:
https://www.carbontrust.com/media/7385/ctv045_an_introduction_to_energy_management.pdf

Actions

- Make an inventory of the energy using technology in the buildings. Record how each item is managed, including settings, maintenance and scheduled replacement.
- Establish how improvements are decided and implemented and how staff can be involved in this process, e.g. suggesting improvements to shut-down procedures or solving an over-heating problem.
- Establish a list of competent, recommended contractors who are available to help support repairs or further implementation.
- Consider whether an Energy Management Policy and Plan is required for your business (see link to Carbon Trust publication).

Cost and savings calculations

There is no cost to this action. This action will ultimately save staff time and energy costs through efficient operations.

Consider adding solar PV panels

Energy saving (kWh)	Cost saving (£)	Cost of action (£)
-	-	-

There are a number of south and west facing roofs on site that could potentially be used to site solar PV panels to provide electricity for your organisation.

By using the sun's energy to provide electricity you will reduce the amount of power you draw from the grid and therefore save money on your energy bills. Additionally, although at lower levels than in previous years, there is still a Government subsidy for solar PV that pays both for every kW of power generated and for the electricity exported back to the grid when it cannot be used on site. Solar power benefits the environment as it reduces the country's dependence on fossil fuels and, once fitted, the panels emit no pollution.

Useful information is at these links:
http://lowcarbonhub.org/ - Low Carbon Hub.
http://www.r-eco.coop/ - Oxfordshire solar installer and worker cooperative.

There may be an opportunity for the Low Carbon Hub to install solar panels on your roofs at no charge. In this case part of the savings in electricity, along with the Government subsidy, is used to re-pay investors and invest in the local community.

Solar panels will need to be installed by a specialist company who will both price up a system and assess the practicality of PV panels on your roofs e.g. will your roof bear the weight? Will summer tree cover block out the sun on the panels? Do you use enough electricity in your building to make installation economically viable?

Actions

- Consider a solar PV project and discuss the financial options of ownership or partnership.
- Approach qualified and experienced suppliers to carry out a detailed feasibility study of available roof space.
- If the project is funded by partners, agree on benefits to your organisation, such as discounted electricity.

Savings calculations

Costs and savings can be calculated by suppliers carrying out a feasibility study. Typically over 20 years solar PV panels payback in 10 to 12 years through reduced electricity costs and subsidies for export of surplus energy.

FURTHER RESOURCES

FUNDING

Possible sources of funding for the recommendation in this report:

OxFutures – 25% funding towards the cost of energy reduction and generation measures. Contact Alison Grunewald E-mail: alison.grunewald@lowcarbonhub.org.

TOE2 – Grants of up to £5000 for energy efficiency actions. http://www.trustforoxfordshire.org.uk/ Contact Lynn Parker admin@trustforoxfordshire.org.uk

Carbon Trust Green Business Fund - https://www.carbontrust.com/client-services/programmes/green-business-fund