OxFutures

Energy Saving Recommendations Report

for

Ewelme Watercress Beds and Local Nature Reserve (Chiltern Society)

November 2021

Survey of The Watercress Beds Centre

European Union

European Regional Development Fund

OXFORD BROOKES UNIVERSITY

low carbon hub

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Bioregional

Cherwell DISTRICT COUNCIL NORTH OXFORDSHIRE

ORGANISATION OVERVIEW

Report overview
EiE carried out a site visit and met with Peter Harden. All recommendations in this report are based on information and observations obtained prior to and during the site visit and information subsequently provided. The report is set out in order of recommended priority based on ease of implementation, carbon impact, cost and factors discussed on site.

Client details		
Organisation name	Ewelme Watercress Beds and Local Nature Reserve (Chiltern Society)	The Watercress Beds Centre The Street, Ewelme OX10 6HJ
Contact name	David Cooper	cooperfamy@btinternet.com 07885 611 894
Date of site visit	21/10/2021	Carried out by Moira Dorey

Energy savings recommendations - summary

Below is a summary of the opportunities recommended in this report. Costs and savings have been estimated using available information; an explanation is provided in detail for each opportunity. Estimations have been made based on energy data provided.

Opportunity	Savings (kWh / yr)	Savings (£ / yr)	Cost (£)	Initial Payback (yrs)	Carbon Impact (tCO_2e / yr)
Maximise heating system efficiency	302	53	200	3.78	0.06
Upgrade lighting to LEDs	67	12	450	38.38	0.01
Add solar PV panels	1,402	301	8,173	27.15	0.30
TOTAL	**1,771 kWh/yr**	**£366/yr**	**£8,823**		**0.37 tCO_2e / yr**

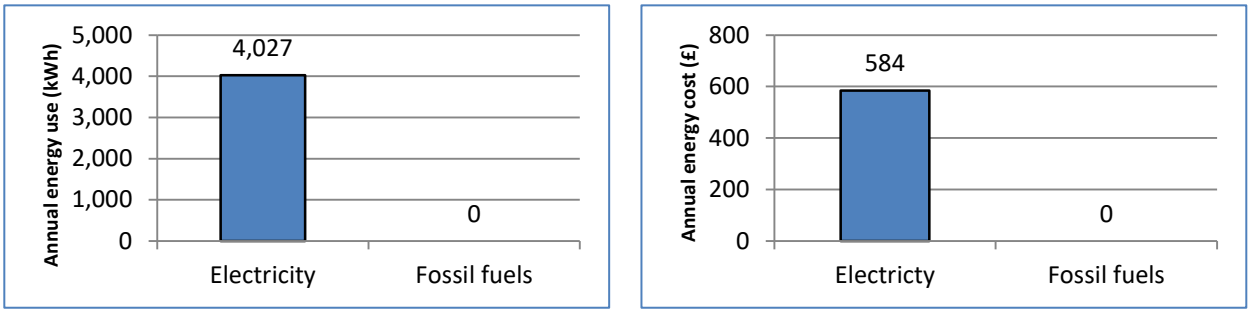
Site details

The Watercress Beds Centre is the visitor centre and volunteers hub for the Ewelme Watercress Beds Nature Reserve. The centre is a single story building constructed in 2004 and includes a meeting / interpretation room, toilet and stores. The building is used for an estimated average of 10 hours a week. This includes visits, meetings, volunteer days and occasional private hire. The building is heated by a water source heat pump that lies under the watercress bed, immediately outside the centre. Heating is supplemented by an infrared heater and oil-filled radiators in particularly cold weather. There is no gas at the site.

ENERGY PROFILE

Energy consumption annual profile				
Fuel type	**Annual Energy use (kWh)**	**Cost per kWh (p)**	**Standing charge (p/day)**	**Approx. annual cost (£)**
Electricity	4,027	17.5	25	584

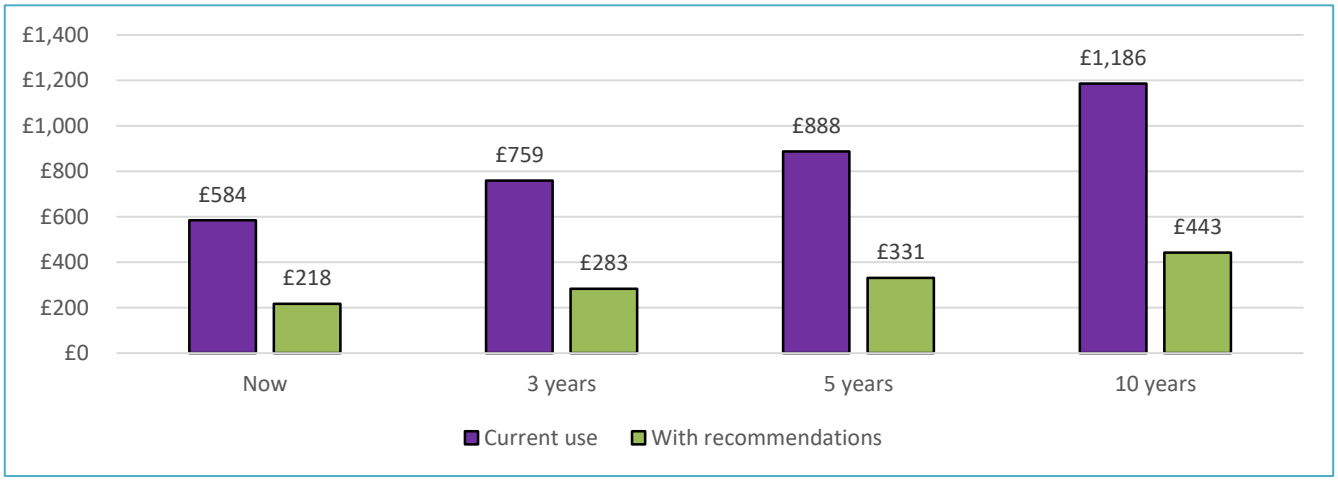
Energy profile breakdown for The Watercress Beds Centre consumption (left) and costs (right)
0.86 tonnes CO_2e from annual energy consumption



Consumption is based on figures provided.

£5,208 avoided energy costs over 10 years from implementing recommendations in this report

The Watercress Beds Centre energy spend in the next 10 years



From Laser mid-range predicted UK electricity price rises

Manage the heating system for maximum efficiency		
Energy saving (kWh)	**Cost saving (£)**	**Cost of action (£)**
302	53	200

The heating is thermostatically controlled and set from the control panel on the Ground Source Heat Pump (GSHP) internal unit. The heating is set for 10°C as a background temperature all year round, with the building temperature monitored from three room thermostats. If the external temperature goes above 16°C the heating is programmed to switch off. The image shows that the heat pump is set for the correct day but the time is incorrect.

The heat pump was installed when the building was constructed, in 2004. There are a number of ways that your heat pump could potentially be more efficient:

- Whilst heat pumps produce heat at a lower temperature, and therefore are most effective when left maintaining a minimum background temperature, your heat pump is providing heat throughout the summer when it is not needed, which wastes energy. If the indoor temperature drops below the set temperature overnight, even in summer, the heating will come on unnecessarily. We recommend turning off the heat pump in summer. The settings for your heating system appear to have a 'summer disconnection function' which provides hot water only but not heating (see link to manual below).
- An annual servicing of the heat pump will ensure it remains in good working order and is running as efficiently as possible.
- Finally, a service company can provide training on how to set the system for maximum efficiency and leave you with detailed, user friendly instructions. You can find complete operating instructions here: https://www.manualslib.com/manual/1318927/Ivt-Greenline-Ht-Plusc.html?page=27#manual on pages 12-27 however a simplification of this material from an expert would be helpful.

There are a number of local heat pump specialist that should be able to help you. For example:
Steve Cross - https://www.stevecross.co.uk/
Alto Energy - https://www.altoenergy.co.uk/
OPC Energy Ltd - https://www.opc-ltd.uk/

Actions

- Contact local heat pump specialists who can both service your heat pump and provide training on optimal settings.
- We recommend contacting at least three contractors to obtain a quote for this work.
- Re-programme the system to be off in summer and at reduced temperatures when the building is not in use.
- If appropriate, discuss with the service company the option of installing the technology that would allow you to programme the heating remotely.

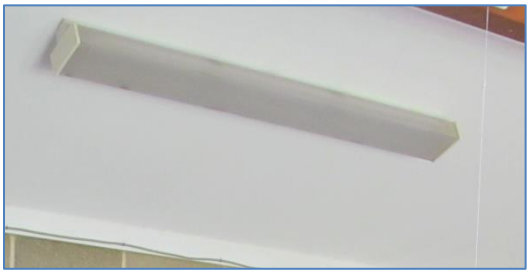
Costs and savings

Costs are based on £200 for the heating system to be serviced and advice provided. Savings are based on the heating using 75% of the electricity on site and this action reducing energy use by 10%.

Upgrade lighting to LEDs

Energy saving (kWh)	Cost saving (£)	Cost of action (£)
67	12	450

The following non-LED lights were noted in your building:
2 x double tube fluorescent fittings in the main room
1 x single tube fluorescent fitting in the kitchen
3 x D-lights in the bathroom and stores.



These can be replaced with LEDs to reduce energy use and maintenance as well as providing improved lighting quality.

LED lights are more energy efficient and exist for nearly every lighting type. They can reduce electricity use by up to 90% compared to other lighting. Additionally LEDs last at least 50,000 hours before they need to be replaced (fluorescent lights last 15,000 hours) resulting in reduced maintenance costs. We recommend replacing lights with new LED light fixtures to reduce the cost of lighting. This can either be carried out in a single re-fit or as the lights fail.

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

When selecting replacement lights there is also an opportunity to provide better lighting rather than using equivalent lights. Consider both the 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 contractor you use, they offer a minimum 5-year failure replacement guarantee. They may also agree to let you test a number of LEDs to ensure the light quality is correct before making a final purchase.

Consider additional lighting controls, such as absence detectors, that will switch off lights when no movement is detected for a period of time. This is particularly useful for toilets and store rooms where users spend short periods of time.

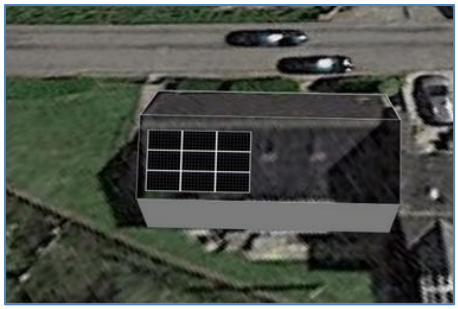
Actions

- Ensure LED lights are always used to replace any future failed bulbs or tubes. Consider replacing all lights at once as lighting contractors will offer a discount for buying LEDs in bulk.
- Discuss additional lighting controls, such as sensors, with contractors.
- We recommend contacting at least two lighting contractors for quotes.
- Choose a preferred contractor and arrange for the lights and controls to be installed.

Costs and savings

Costs are estimated at £200 for the lights with new fixtures and £250 for installation if all lights are changed at once. You may have a volunteer electrician who can carry out this work to reduce the cost. Actual quotes from lighting contractors may differ. Savings are based on lights being on 500 hours per year at 17.5p per kWh.

Add solar PV panels		
Energy saving (kWh)	**Cost saving (£)**	**Cost of action (£)**
1,402	301	8,173



There is sufficient space to install south facing solar PV panels on your roof to generate electricity from sunlight, which will reduce the amount drawn from the National Grid saving you energy costs and carbon. Recent surveys suggest that you could get up to 3.75 kWp solar array of 10 panels generating an estimated 2,804 kWh of electricity per year.

For ever kWh generated from solar panels that you use on site you will save 17.5p (your electricity rate). Surplus solar electricity is exported back to the National Grid and you will receive approximately 3p to 5p per kWh from the Smart Export Guarantee, paid through your electricity supplier. Although your daytime electricity use is low, solar energy can be used to power your heat pump therefore we anticipate up to 50% of electricity generated will be used on site. As less electricity is generated during the colder winter months, you will still need to import electricity from the grid to power your heat pump on cloudy days and when it is dark.

Useful information is at these links:
http://www.simssolar.co.uk/ - Wallingford based solar installer
https://www.exeoenergy.co.uk/ - Oxford based installer
http://www.r-eco.coop/ - Oxfordshire solar installer and worker cooperative
https://www.jojusolar.co.uk/location-oxford/ - Oxfordshire based
http://lowcarbonhub.org/ - Low Carbon Hub
http://www.solartech.org.uk/ - Oxfordshire based

In addition to installing an array of solar PV panels on the roof, an inverter is installed indoors to make the electricity compatible with your building's electricity demand.

While the sun shines every day, the amount generated is affected by temperature and cloud cover; weather data is used to estimate performance.

Actions

- Solar PV panels need to be installed by a specialist company who both assess the project well as providing a detailed quote for installation.
- Contact at least three solar panel contractors to obtain quotes – see links above.
- Select a contractor and arrange for the work to be carried out.

Costs and savings

Costs are based on recent quotes obtained from local companies. Savings assume that a 3.75kWp solar panel array will generate 2,804 kWh of electricity per year and that 50% of this will be used on site saving 17.5p/kWh. Exported electricity will provide an income of £56 per year through the Smart export Guarantee if paid at 4p/kWh.

FURTHER RESOURCES

Funding

Possible sources of funding for the recommendations in this report:

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

https://fcccommunitiesfoundation.org.uk/funds/fcc-community-action-fund
£2,000 to £100,000 for community assets within 10 miles of landfill site (Ewelme is).

https://www.dpd.co.uk/green-ts-and-cs.jsp
£2,000 for a school, charity, community or micro-business.

Your action progress update

Through the energy assessment process we will agree on what recommended actions your organisation would like to progress. After a number of months, we will ask for an update on your progress. Some actions will be completed, some in progress, and others not yet started. Below is an example of how you can indicate your progress (tick one box per row). There is no expected completion date for any action, however your information is extremely important for helping us track project improvements.

Opportunity	Action completed	Partially completed	Not begun but intending to	Not begun, not intending to	Not applicable
Manage the heating system for maximum efficiency	○	○	○	○	○
Upgrade lighting to LEDs	○	○	○	○	○
Add solar PV panels	○	○	○	○	○