OxFutures

Energy Saving Recommendations Report

for

3Keel

October 2018

Survey of offices at 7 Fenlock Court

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 Will Schreiber. 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	3Keel	7 Fenlock Court Blenheim Business Park, Long Hanborough OX29 8LN
Contact name	Will Schreiber	will.schreiber@3keel.com 01865 236 500
Date of site visit	30/10/2018	Carried out by M Esvelt

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)
Add heating controls	850	128	2,000	15.63	0.35
Control extractor fan	466	70	10	0.14	0.16
Add timer to hot water	183	27	10	0.37	0.18
Investigate installing EV charge points	0	0	0		0
Add draught proofing to external doors	0	0	10		0
Add insulation above the suspended ceiling	500	75	410	5.47	0.21
TOTAL	**1,999 kWh/yr**	**£300/yr**	**£2,440**		**0.9 tCO_2e / yr**

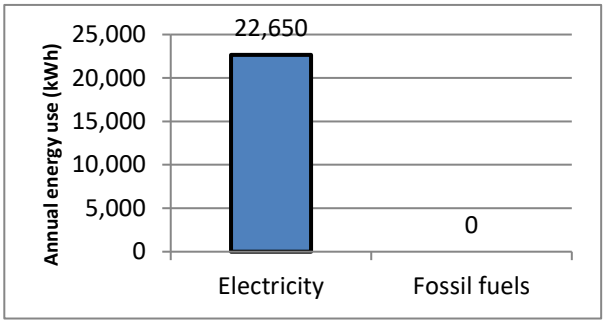
Site details

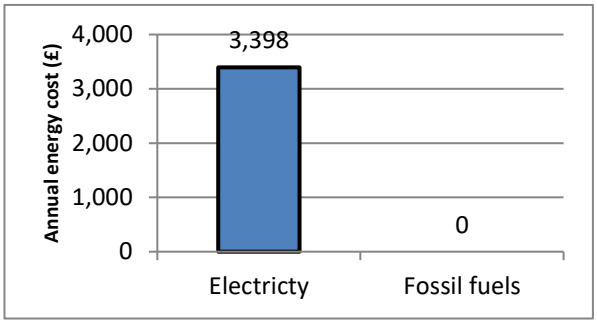
The 3Keel offices moved in October 2018 to a two storey, naturally ventilated, circa. 1990s building. Approximately 13kW of electric heating is provided by original wall mounted units controlled manually. A 9.7kW solar PV array for the roof is awaiting planning permission before being installed. The ground floor offices are intended to be sublet to another business shortly.

ENERGY PROFILE

Energy consumption annual profile				
Fuel type	**Annual Energy use (kWh)**	**Cost per kWh (p)**	**Standing charge (p/day)**	**Approx. annual cost (£)**
Electricity	22,650	Day rate 15.00 Night rate unknown	Day rate 25.00 Night rate unknown	3,398

Energy profile estimate for Office at 7 Fenlock Court consumption (left) and costs (right)





Estimated annual consumption is based on 50 hours of operation per week using 119kWh per m^2 from 100% National Grid electricity.

Add heating controls		
Energy saving (kWh)	**Cost saving (£)**	**Cost of action (£)**
850	128	2,000

The electric wall mounted heating is controlled manually at each unit by staff; there is no thermostat nor timers controls. The heating units are original 1990s, thus at higher risk of failure than newer heaters would be. Generally the office will be occupied Monday to Friday from 8am to 6pm, though the ground floor may be rented by an organisation with a different schedule. Since meeting rooms will be used less often, and internal walls will have insulation added for sound proofing, there is an opportunity to have room thermostats, ideally controlled centrally or wirelessly.

We recommend engaging a heating contractor to see if the current electric heaters can be retrofit with thermostatic and time controls to help prevent overheating of the office. If this is not possible, consider replacing the current heating with new wall mounted heaters the local / room thermostats and local timer controls.

For either options, discuss possible controls with the contractor that will allow setting temperature of the meeting rooms and other rooms; there are a range of wireless controls, not all of which may be compatible with all electric heaters. Choose robust controls and consider how all members of staff could access them, if appropriate.

For wireless control examples see (there are also other heating controls listed in the resources section):
https://www.plumbnation.co.uk/site/wireless-programmable-thermostats/

http://www.prefectcontrols.com/

https://www.plumbnation.co.uk/site/horstmann-thermoplus-as2-rf-wireless-programmable-room-thermostat/

One Oxford based heating control company has carried out extensive work on reducing heating in seldom used rooms. Their product may be compatible with electric heating: Eco Sync:
https://www.ecosync.energy/

New electric radiators will have individual heater controls. There are many suppliers; they all have similar efficiency. For examples see:
https://www.dimplex.co.uk/panel-heaters

http://www.heatersuk.com/domestic-heaters.html

Energy savings will only heating the offices when occupied, and reducing thermostats for less frequently used areas. Programme the heating to turn on a maximum of one hour before building users arrive and to turn off 15 to 30 minutes before they leave. This will allow the area to be heated sufficiently for the duration of the use.

Actions

- Speak to your contractor about adding thermostatic controls to the current heaters.
- If not possible or suitable, obtain quotes from local, qualified electricians to replace your wall-mounted electric heaters. We recommend obtaining at least 3 quotes. Replace like for like (about 11 - 13kW of heaters).
- For the controls, ask about individual controls so that each unused meeting room is at a reduced temperature when the heating is on. Also, ask about the most convenient controls.
- Ensure simple operating instructions are provided by the installer and are available to guide users; review settings with staff to minimise unnecessary heating.

Costs and savings

Costs for retro-fitting thermostats on the current units are not known. Costs for replacement heaters are estimated at 11 x 1kW heaters (about £90 each) and thermostat (£50) plus three days of staff time at £300 (per day) for a total of approximately £2,000. We have calculated some savings compared to current heating management assuming heat sometimes exceeds comfortable room temperature before it is manually switched off.

Control extractor fan

Energy saving (kWh)	Cost saving (£)	Cost of action (£)
466	70	10

The kitchen extractor fan is always on and no controls have been discovered for this. The power of the kitchen fan is not known but can be assumed to be between 25W and 75W using 219 to 675 kWh per year. Potentially, in the winter heated air will be extracted needlessly. If the fan is only on during normal office hours this can be switched off 71% of the time.

If an electrician will be on site during installation of the solar PV array they will access the roof space and can install improved controls. We recommend asking an electrician to add an isolator (perhaps connected to the kitchenette lights) or a 7 day timer set so that the extractor fan is only on when needed.

Regulations compel air exchanges for large public buildings and catering, however, we are not aware of a requirement to extract in these offices.

Actions

- Ask your electrician or PV contractor to have a look at the extractor fan controls; confirm the wattage of the fan.
- Arrange for an isolator or timer on the controls. If opting for a timer, ensure this is set to match occupancy of the building.

Costs and savings

Savings are based on 71% reduction in the time the extractor is on at 75W. The savings would be 155kWhs or £23 per year with a 25W fan. Costs are based on a £10 timer or isolator (assuming labour is included in solar PV costs).

Add timer to hot water		
Energy saving (kWh)	**Cost saving (£)**	**Cost of action (£)**
183	27	10

Your hot water tank is assumed to be above the suspended ceiling and is likely permanently switched on and heating water 24 hours a day 365 days a year. The tank size is not known but insulated units from 35 to 120L are usually 3 to 4kW and will use about 1 to 1.4 kW a day on average over the year to heat the water.

If an electrician will be on site during installation of the solar PV array they will access the roof space and can install improved controls. We recommend asking an electrician to add a 7 day timer (in an accessible place) set so that the tank is only on when needed. An example of timer is here: http://www.screwfix.com/p/lap-7-day-digital-immersion-timer/1804r

The risk of Legionella in the tank is very low if the hot water is on at 60°C regularly.

Actions

- Arrange for an electrician to fit a 7 day timer to the hot water tank (in an accessible place) and set it to turn the tank off when not needed (for example 7pm every night until 7am).

Costs and savings

Savings are based on saving 50% (12 hours per day) of 1kW per day over a year. As this work will coincide with PV panels, we assume the costs will be £10 for the timer and labour will be covered.

ENERGY SAVINGS RECOMMENDATIONS

Investigate installing EV charge points		
Energy saving (kWh)	**Cost saving (£)**	**Cost of action (£)**
0	0	0

The office building has access to parking and there is interest in adding at least one EV charge point. The government provides financial support to cover costs for this:
https://www.gov.uk/government/publications/workplace-charging-scheme-guidance-for-applicants-installers-and-manufacturers

The OxFutures project can potentially fund 25% of the costs of EV charge units, providing conditions are met (contact Alison at OxFutures for more information).

Some organisations offer EV charger information, including:
https://www.zap-map.com/charge-points/charging-work/

Also, Hello EV who advise on fleet vehicles are working with the OxFutures programme: https://helloev.city/our-services

These organisations offer workplace EV chargers:
https://evchargers.co.uk/commercial-charging-points/
https://www.chargedev.co.uk/at-work
https://chargemasterplc.com/workplace/

We recommend investigating workplace charging options and, if an appropriate options exists, arranging for installation of an EV charge unit (or several).

Actions

- Check that your organisation meets the funding requirements for workplace EV chargers. You may also need to check any restrictions at your location.
- Engage several organisations about an appropriate EV charger, and discuss needs, particularly how controls and recharging will work.
- Obtain quotes from several suppliers; choose the most appropriate and arrange for the work to be carried out.

Costs and savings

EV chargers range in cost in hundreds of pounds. Funding appears to cover 75% of costs. There are potential savings if recharging when there is surplus solar PV electricity at the office location.

Add draught proofing to external doors		
Energy saving (kWh)	**Cost saving (£)**	**Cost of action (£)**
0	0	10

There is a draught from a gap in your front door that appears to be due to the draught proofing degrading. Heat will escape in winter through any gaps around the door; draught proofing will greatly reduce this. We recommend adding draught proofing to reduce discomfort during colder months.

An examples of draught stripping can be found online here: https://www.screwfix.com/p/stormguard-self-adhesive-brush-pile-weatherstrip-white-5m-3-pack/30322 and https://www.screwfix.com/p/stormguard-epdm-rubber-p-strip-white-20m/33145

Actions

- Add draught stripping to the front door.

Costs and savings

The costs for a pack of 20m rubber draught proofing strip is £10 and could be attached by a member of staff. Savings are negligible but this action will help reduce discomfort in winter months.

Add insulation above the suspended ceiling		
Energy saving (kWh)	**Cost saving (£)**	**Cost of action (£)**
500	75	410

The first floor offices have a suspended ceiling of ceiling tiles. There is a 100m of mineral wool insulation above this ceiling. Adding an additional 200mm of insulation will potentially further reduce heat loss and save energy: a total of 300mm insulation is considered best practice in UK lofts.

As the existing insulation has been rolled over the tiles in strips, we recommend adding additional insulation to coincide with the installation of the solar PV panels as presumably access to the inside of the roof will be needed. You may wish to use staff members to roll out the additional insulation or hire contractors to do so.

Loft insulation is widely available in 200mm thickness. An alternative is here: http://www.judge-ceilings.co.uk/Ceiling-Insulation/Insulation-Pads/300mm-Thick-Ceiling-Insulation-Pads

Actions

- Chat to a contractor about adding additional weight to the suspended ceiling.
- If there is no risk, purchase the insulation after confirming the area to be covered.
- Arrange for 200mm of insulation to be added above the ceiling.
- As the insulation lies on a suspended ceiling, care will need to be taken not to condense the insulation as it reduces its effectiveness. It may be necessary to lay the additional insulation perpendicular to the existing insulation.

Costs and savings

200 mm of loft insulation will cost approximately £410 based on £4.45 per m^2 for 92m^2. Savings are based on several thermal models of the office assuming 50 hours occupancy per week.

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.

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

More heating controls

Below is a list of heating controls with remote / 'smart' functions, for interest. They are mainly useful for domestic buildings with unpredictable occupancy.

Heat Genius (http://www.heatgenius.co.uk/);
£249 excluding installation + £35 per room sensor + £50 per smart TRV
This smart system offers the greatest level of control, allowing remote control of timings and temperatures, as well as zoning of different areas and 'learns' how your building is used to further automate temperature control. Each room or zone requires a motion sensor and a TRV for each radiator.

Hive (https://www.hivehome.com/products/categories/heating)
£249 including installation
The Hive is provided by British Gas. It allows you to control heating remotely setting times and temperatures from elsewhere via computer or smart phone. However, the Hive is not 'intelligent' like some other systems and does not react to use. It does however include automatic anti-frost protection, switching on heating if the temperature falls below 7 Celsius.

Honeywell Evo Home (http://www.honeywelluk.com/products/Systems/Zoned/evohome-Main/)
£372 excluding installation + £70 per radiator valve
The EvoHome allows different heating zones to be created and involves adding controlled TRVs to radiators to allow automatic control. You can then control heating manually or remotely. Again this is not a smart system.

Nest (https://store.nest.com/uk/product/thermostat/T3028GBBI)
£279 including installation
This is an 'intelligent thermostat'. It operates like a normal thermostat - users can change the temperature themselves by touching the screen. However, it also 'learns' patterns of use for a building (after you manually set them to start with) meaning that after a while it is able to set times and temperatures automatically. It also automatically switches off heating if the building is empty. It can also be set remotely from your computer or smart phone.

Tado (https://www.tado.com/gb/heatingcontrol-savings)
This smart system is only really suitable for domestic use as it tracks the presence and absence of users via their mobile phones.

FURTHER RESOURCES

Radiator innovation

Regarding domestic radiators for wet heating systems, the current aluminium wall radiator designs are efficient. However, in many rooms the heat first circulates up the wall and across the ceiling, sometimes cooling noticeably. Fans can help move warm air throughout a room, though insulation and draught proofing is another solution. We recommend speaking to a heating contractor if there is a particular problem with your heating.

Below is some information on products compatible with wet domestic systems:

Potentially more efficient radiator design:
https://rointe.co.uk/radiators/

Self-powered fans atop radiators:
https://www.radfan.com/
https://radiatorbooster.com/

Also see the LAVA heating solution related to Project Phoenix on this page:
http://www.innovation-services.org.uk/projects

A new alternative to radiators:
http://www.discreteheat.com/thermaskirt/products-and-information/alternative-to-radiators.aspx