OxFutures

Energy Saving Recommendations Report

for

Pietersen Fine Furniture Limited

October 2018

Survey of Pietersen Fine Furniture Workshop

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 met with Jeremy Pietersen. All recommendations in this report are based on information and observations obtained prior to and during the site visit. The report is set out in order of recommended priority based on ease of implementation, carbon impact, cost & factors discussed on site.

Client details		
Organisation name	Pietersen Fine Furniture Limited	6a Lupton Road Thame OX9 3SE
Contact name	Jeremy Pietersen	Jeremy@pietersenfinefurniture.com 01844 260 770
Date of site visit	23/10/2018	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)
Record and analyse meter readings	0	0	0	n/a	0
Consider a bio-mass heating system	46,800	0	10,000 (inc VAT)	Not known	8.61
Add door closers	260	34	45	1.33	0.11
Install secondary glazing	0	0	600	n/a	0
Replace loading bay doors	0	0	8,000	Not known	0
Add cavity wall insulation	0	0	750	Not known	0
Power down or switch off appliances when not in use	600	78	12	0.15	0.25
Consider adding solar PV panels	18,786	2,447	34,000	13.89	7.74
TOTAL	**66,446 kWh/yr**	**£2,559/yr**	**£53,407**		**16.71 tCO_2e / yr**

Site details

Pietersen Fine Furniture moved into the 1960s industrial unit in July 2018. The floor space extends over 340 m^2 and is made up of mainly workshop space with an office, toilets and a kitchenette. There are a number of large woodworking machines that are turned on as needed and an air extraction system to remove atmospheric sawdust. There is a gas heating system for the offices; either expanding this system into the workshop or adding a biomass wood burner to make use of their waste wood to heat the workshop is being considered.

ENERGY PROFILE

Energy consumption annual profile				
Fuel type	**Annual Energy use (kWh)**	**Cost per kWh (p)**	**Standing charge (p/day)**	**Approx. annual cost (£)**
Electricity	21,888	13.028	33	2,852
Gas	Not known	4.710	27.000	0

Consumption is based on part-year figures provided from 30/7/18 to 23/10/18.

ENERGY SAVINGS RECOMMENDATIONS

Record and analyse meter readings		
Energy saving (kWh)	**Cost saving (£)**	**Cost of action (£)**
0	0	0

As the business is settling down into new premises, having accurate energy billing improves budgeting and energy management. By recording meter readings regularly and accurately, sending them to your supplier and analysing energy use several timers per year, energy management, as well as monitoring bills, will be easier. This will be particularly useful to monitor the success of changes you make in your operation.

Actions

- Contact your electricity and gas suppliers to confirm what day you should supply meter readings to ensure accurate billing. Depending on your supplier, readings can be submitted via website, email, or by telephone.
- Submit meter readings and enter them into a spread-sheet and calculate usage by subtracting the previous meter reading from the current reading.
- Use monthly consumption data to form a baseline of your typical annual energy use.
- When you have a year of monthly readings, review information to ensure action is taken on noticeable increases in energy use.

Costs and savings

There is no cost to this action. There may be savings through further actions identified.

Consider a bio-mass heating system

Energy saving (kWh)	Cost saving (£)	Cost of action (£)
46,800	n/a	10,000

The current heating system is based on a gas boiler with radiators. You are considering alternative options for heating the workshop, either expanding this system into the workshop or installing a wood burning heater to make use of your wood off-cuts from your processes.

A biomass heater would provide the opportunity to make use of waste wood on site to heat your building, using a renewable resource whilst reducing your energy bills. Correctly managed, biomass is a sustainable fuel than can offer a significant reduction in net carbon emissions compared with fossil fuels. Income from the Renewable Heat Incentive will help reduce the payback period of investment (if applicable). We recommend investigating a biomass heating system to heat your warehouse.
Points that should be considered when choosing and installing a waste wood heater:

- Can the sawdust shavings (from the ducted air and shavings on the ground) be used as a fuel?
- Can the sawdust extracted from the filtered air also be used as a fuel supply in addition to larger slabs of wood?
- Would a chipper need to be purchased to cut the waste slabs of wood for combustion or can you make use of the current machinery to do this?
- How will the exhaust smoke from the burning wood be handled? For reference, there is 25 grams of carbon dioxide for every kilowatt-hour (kWh) (Wood Fuel South West Advice Service, 2009; p4).
- Have fuel requirements take into account the energy density of different types of wood? The heating capacity will be dependent on the wood at your disposal even though they will have a steady supply from your processes.

For background information go to:
Wood Fuel South West Advice Service. 2009. A guide to small-scale wood fuel (biomass) heating systems. South West Woodland Renaissance and Forestry Commission England. Website: https://www.cse.org.uk/pdf/guide%20to%20small-scale%20wood-fuelled%20heating.pdf

The Carbon Trust has a helpful guide to biomass project specification etc. https://www.carbontrust.com/resources/guides/renewable-energy-technologies/biomass-heating-tools-and-guidance/

Biomass systems are usually eligible for the non-domestic Renewable Heat Incentive (RHI) that provides financial assistance to generators of renewable heat. The renewable heat generated for biomass is based on an estimated figure of heat demand from an Energy Performance Certificate (EPC) and is currently paid at a rate of 2-2.7p/kWh depending on the size of the system. Check whether this system qualifies for RHI.

Actions

- Obtain quotes from at least 2 additional suppliers for a biomass specification for your building.
- Take up references from the selected company for other similar businesses they have worked with.
- Ensure that the supplier can support your application for the RHI (if applicable).
- Ensure that the supplier builds into the cost a regular service of the boiler and a free and timely call out service while the boiler is newly installed.

Costs and savings

Costs are estimated at £10,000 based on a recent quote from Talbotts. Savings assume the comparative gas system would be 60kW and would be in operation for 30 hours a week for 26 weeks a year = 46,800 kWh. Financial savings are dependant or the cost of extending/adding the gas system into the warehouse.

Add door closers between the workshop and offices

Energy saving (kWh)	Cost saving (£)	Cost of action (£)
260	34	45

Example of mechanical door closer

As the workshop area will not be heated to the same temperature as the office, heat will be lost when the door is left open, quickly cooling down the office. This may also occur between the kitchenette and the workshop. Additionally, if the external front door is left open, heat from the hall will be lost. Heat loss wastes energy as it requires the boiler to work harder to provide the same amount of heat.

We recommend adding mechanical door closers to minimise this heat loss between the spaces that are heated to office temperature and other areas of the building.

Actions

- Identify doors where heat will be lost in winter when they are left open.
- Purchase door closers and arrange for a member of staff to install them.

Costs and savings

The cost is based on purchasing 3 door closers at £15 each. Savings estimate that this action will reduce heating costs from the office heating system by 5%.

Install secondary glazing

Energy saving (kWh)	Cost saving (£)	Cost of action (£)
0	0	600

The 3 windows in workshop are single glazed and the window frames are metal and have poor insulation properties. Replacing these windows with double glazed units would be costly. Secondary glazing installed inside of single glazing will reduce heat loss and draughts to help keep the building comfortable in cold weather. We recommend installing secondary glazing to improve insulation and comfort.

Local suppliers who supply secondary glazing include:
Bicester Glass: http://www.bicester-glass.co.uk/secondary-glazing
C N Glass: http://www.cnglass.co.uk/double-glazing/secondary-double-glazing/
A and C Glazing: http://www.aandcglazing.co.uk/oxford-secondary-glazing

The cost will be reduced if you purchase the materials yourself and arrange for a member of staff to build and install the secondary glazing. Before agreeing on a design you will have to consider whether these glazing panels will need to be removed in the summer to increase ventilation or whether they can be attached permanently to the window frame.

Actions

- Discuss with other staff the type of secondary glazing (temporary or permanent) that is required.
- Obtain prices for purchasing the supplies to produce secondary glazing panels OR arrange for quotes from secondary glazing companies.
- Arrange for the panels to be made and installed.

Costs and savings

The cost is based on adding secondary double glazed units to 3 windows 2m x 1.5 m at £200 per window for supplies. Savings are minimal however there will be some reduced heat loss from the workshop and reduced draughts for staff working nearby.

Replace loading bay doors		
Energy saving (kWh)	**Cost saving (£)**	**Cost of action (£)**
0	0	8,000

Your two loading bay doors are made of steel with no insulation. Heat will be lost through these doors in winter. There is no effective method of adding insulation to the existing doors, therefore replacing them with more modern insulated doors would be required to reduce heat loss.

Examples of well insulated loading bay doors can be found here:
https://www.assaabloyentrance.co.uk/en/aaes/assaabloyentrancecouk/products/industrial-doors/overhead-sectional-doors/insulated-overhead-sectional-doors/

https://www.kingspan.com/gb/en-gb/products/insulated-sectional-doors/insulated-sectional-door-systems/services-innovations/thermalsafe

As your loading bay doors fail, or when you are upgrading the building, we recommend replacing your existing doors with well-insulated equivalent doors.

Actions

- When considering replacement door ensure that they having excellent insulation qualities to reduce wasted energy.
- Obtain quotes from several contractors for an insulated replacement door.
- Choose a supplier and arrange for the work to be carried out.

Costs and savings

Costs are based on research and are estimated at £4,000 per door, though actual specifications may differ. Savings are dependant on the fabric of the building and the heating system at the time when the doors are changed.

Add cavity wall insulation

Energy saving (kWh)	Cost saving (£)	Cost of action (£)
0	0	750

You are aware that the building has an unfilled cavity between two layers of breeze block on your outside walls. 10% to 30% of heating may be lost through unfilled wall cavities. 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. We recommend adding cavity wall insulation to reduce heat loss and improve comfort in conjunction with other insulation measures, in particular improving the insulation in the loading bay doors (see recommendation above), which form a significant proportion of your external wall space. Adding cavity wall insulation before the loading bay doors are replaced will reduce the effectiveness of this measure as heat will continue to be lost through the large doors.

Examples of internal wall insulation companies can be found here: https://ciga.co.uk/registered-installers/
https://www.carbontrust.com/media/19461/ctl176-how-to-implement-cavity-wall-insulation.pdf

Most cavity wall insulation companies will provide a free initial consultation and many will offer a borescope survey to ascertain accurately the levels of insulation present. If an initial consultation confirms that cavities can be filled we recommend asking for quotes from at least three competent contractors for the work to be carried out. See link above for installers registered with the Cavity Insulation Guarantee Agency.

Actions

- Plan to add cavity wall insulation in conjunction with other insulation measures.
- Obtain at least three quotes from qualified suppliers for insulating the wall cavities.
- Choose a preferred supplier and arrange for the work to be carried out.

Costs and savings

The cost of cavity wall insulation is estimated at £750 based on and area of 150m² and a cost of £5 per m². Savings are dependant on the fabric of the building and the heating system at the time when the insulation is added.

ENERGY SAVINGS RECOMMENDATIONS

Power down or switch off appliances when not in use		
Energy saving (kWh)	**Cost saving (£)**	**Cost of action (£)**
600	78	12

Your large Hewlett Packard printer was identified as being switched on ready for immediate use at all times. There is no 'sleep' mode or automatic power down on this type of machine.

Powering office equipment when not needed wastes energy. The energy use of this printer can be estimated from the published information as 150W per hour however the literature does not state its energy use while idle. In order to accurately measure the energy use we recommend adding a plug monitor between the plug and the wall socket and measuring a day and a week's energy use.

For examples of plug monitors see:
https://tinyurl.com/ybj74y7a £14.72
https://tinyurl.com/yd5swo9c £11.99

Actions

- Purchase a plug monitor and install it between the printer plug and plug socket.
- Measure energy use over 24 hours and over a 7 day week.
- Share this information with other office staff members.
- Turn off the printer at night and weekends if the energy use is established as being significant.
- Carry out checks to ensure that equipment is turned off as expected.

Costs and savings

7 day plug socket timers cost £12 - £15. Savings are assume this printer uses 75W per hour when not in use and is switched on 24/7 throughout the year.

Consider adding solar PV panels		
Energy saving (kWh)	**Cost saving (£)**	**Cost of action (£)**
18,786	2,447	34,000

You have a large south facing roof which could potentially be used to site solar PV panels to provide electricity for your business.

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. We recommend exploring the installation of solar PV panels either with direct investment or via a 3rd party to reduce energy use from the national grid.

Useful information is at these links:
http://lowcarbonhub.org/ - Low Carbon Hub (community owned panels through third party investment)
http://www.r-eco.coop/ - Oxfordshire solar installer and worker cooperative.
Spirit Energy https://www.spiritenergy.co.uk/ - used by an OxFutures partner organisation
Darke and Taylor https://darkeandtaylor.co.uk/services/services-energy-solutions/ - - used by an OxFutures partner organisation

Actions

- Solar PV panels will need to be installed by a specialist company who will both assess the project (Will the roof would bear the weight? Will nearby buildings block out the sun on the panels?) as well as providing a detailed quote for installation.
- Contact at least three solar panel contractors to obtain quotes – see above links.
- If considering third party investment, ensure there is a clear agreement and benefits to your organisation (e.g. a reduction in electricity prices).
- Choose a preferred contractor and arrange for the work to be carried out.

Costs and savings

Costs are estimated as £34,000 for a 23kWp system however this is a mid-point of online estimates ranging from £19,000 to £44,000 therefore accurate quotes are needed. Savings are based on online calculators for this size of solar array and include current Government subsidies for solar PV.

There may be an opportunity for the Low Carbon Hub or other community group to install solar panels on your roof 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.

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

Electric vehicles

The electric vehicle market is developing quickly and there are an increasing number of electric vans on the market with distance ranges that may suit your transportation needs.

There are a number of ways to explore the options for changing some of your fleet to electric vehicles (EV) and how to benefit from grants for a charging point at your workplace.

Contact Lewis Knight on lewis.knight@bioregional.com who runs the EV business networking group in Oxfordshire and ask him to send you details of up and coming events locally.
For example **Oxford Electric Vehicle Business Breakfast on Thursday 15th November at Lady Margaret Hall** which is free to attend.

Contact Hello EV www.helloev.city are also offering free support for businesses considering changing to fleet EVs and have extensive knowledge of the latest EV vans on the market.