

Appendix 2

Energy saving guidance and cost comparisons on heating, lighting and appliances

April 2013



Camborne, Roskear, Tuckingmill Townscape Heritage Initiatives

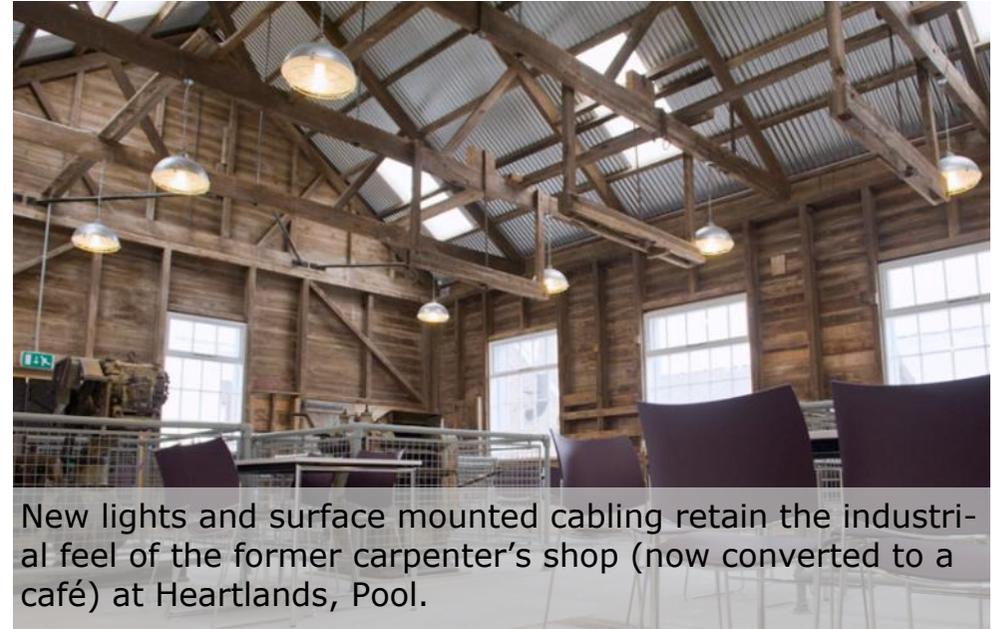


Introduction

Technological advances give more scope to reduce energy consumption. This section provides guidance and options to improve energy efficiency in:

- **Heating**
- **Lighting**
- **Appliances**

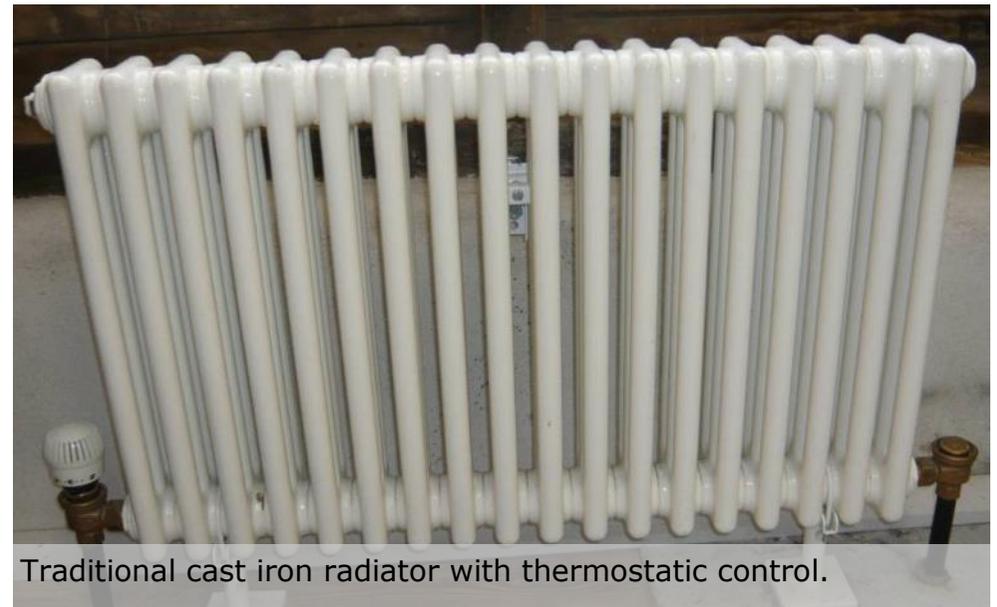
Costs and payback periods included in this section are indicative and should be examined in further detail with specialist local contractors and suppliers.



New lights and surface mounted cabling retain the industrial feel of the former carpenter's shop (now converted to a café) at Heartlands, Pool.



Modern fuel-efficient stove.



Traditional cast iron radiator with thermostatic control.

1. Heating

1.1 Heating options

Being a gas poor county, many parts of Cornwall heat their houses electrically or by oil-fired heating. This section considers ways of improving the efficiency of different types of heating systems. For additional guidance on understanding and improving your heating system visit:

[Energy Saving Trust - Saving money on heating](#)

[YouGen - energy efficiency information for homeowners and businesses](#)

1.2 Electric heating

An electrical heating system will be at least twice as expensive to run as mains gas. If the electricity is consumed at the peak period e.g. using fan or convector heaters or oil-filled/panel radiators then that cost rises to around 4 times that of mains gas. Electricity is also responsible for the emission of around 3-4 times more carbon dioxide than mains gas and therefore significantly increases the users' contribution to climate change. If mains gas is available, it is highly recommended that it be used in preference to electricity for heating. Where gas is not available, modern electric storage heaters used in conjunction with a green tariff can provide a relatively efficient means of space heating. As with other heating systems, efficiency and effectiveness is increased through use of temperature and timer controls.

1.3 Space heating

Modern slim-line fan assisted storage heaters are better insulated and store heat longer than conventional wall mounted storage heaters. They heat up rooms quicker which leads to cost savings through reduced running times.

1.4 Underfloor heating

Underfloor systems may be suitable when a concrete slab floor is being replaced and on extensions to historic buildings and larger refurbishments. It may be possible to add an underfloor system to an existing boiler.

1.5 Heating controls

Older central heating systems have only simple controls and updating these can improve efficiency and reduce heating costs by up to 20%. Installing a modern electronic programmer, room thermostats, thermostatic radiator control valves and cylinder thermostats will produce more responsive heating that will use less fuel .

Approximate cost: £80 - £400

Approximate saving: £25 - £120 per year

For more information see the following links:

[Energy Saving Trust - Thermostats and controls](#)

[Community Energy Plus - Demand reduction](#)

1.6 Oil / Gas

If you are using oil you are likely have a wet heating system in place (radiators etc). Performance can be increased by:

- Insulating pipes / tank: this will reduce heat loss and directly reduce the fuel consumed.
- Ensuring boiler is correctly sized: oversized boilers run inefficiently.
- Ensuring boiler is regularly maintained (once a year)
- Buying a new boiler: the newest have net seasonal efficiencies of 90 – 95%.

1.7 What's the cost?

Boilers more than 15 years old are likely to be operating at efficiencies of 60-65%. This means that for every £1 spent on fuel only 60-65p is being used to heat your home and 35-40p is wasted on hot air and partly burnt fuel going out of the flue. Boilers over 25 years old may be as low as 50% efficient.

Boiler efficiency affects running costs for typical domestic properties in UK with central heating and gas boiler. Costs will vary on individual cases based on occupancy, insulation, heating controls and other factors.

Table showing comparisons of boilers

	Seasonal Efficiency	Flat	Bungalow	Terraced	Semi-detached	Detached
Old Boiler (Heavy Weight)	55%	£267	£341	£354	£397	£550
Old Boiler (Light Weight)	65%	£231	£293	£304	£340	£470
New Boiler (non-condensing)	78%	£197	£249	£258	£289	£396
New Boiler (condensing)	88%	£178	£224	£232	£259	£355

When installing a new boiler, or replacing an old one in a historic building, be careful not to damage any original features and sensitively position any flue. If in doubt consult your local authority:

[Cornwall Council - Planning](#)

[Cornwall Council - Building Control](#)

1.8 Solid fuel

Many historic buildings traditionally relied on burning coal and wood on an open fire for space heating. This is not efficient with only 20% of the heat directly warming the room. Although a further 20% does provide some heating by warming the chimney bricks this still means that 60% of the heat is lost directly to the atmosphere. More efficient wood burners are available at 70 – 80% efficient heat distribution. These can be fitted in place of a fire place and the chimney adapted to take the flue. On a larger scale it is possible to purchase solid fuel boilers to heat water, although this is likely to be much less practical than using gas, electricity or oil. As with all improvements, expert advice should be sought, especially regarding fuel storage and appropriate ventilation. Great care should be taken when using open fires and stoves especially in thatched buildings. Poorly installed wood burners are a common cause of fire. Consult your local fire prevention officer for more advice:

[Cornwall Fire and Rescue Service Homepage](#)

Burning coal should usually be avoided. This is a 'dirty' fuel which is cheaper than natural gas but releases nearly pure carbon dioxide when burned. Wood is considered a 'carbon neutral' fuel as it releases as much carbon dioxide when burned as it absorbs during its growth.

Chimney safety: If unused, air flow in chimneys can be controlled by using vented caps/balloons or internal/external venting. Disused must also be maintained to avoid build up of debris which could lead to damp. A chimney should always be inspected before use, especially after a period of disuse. Chimneys should be swept regularly (usually every year). This is to ensure the chimney will allow the safe removal of harmful gases. Further advice is available at:

[English Heritage - Open fires, chimneys and flues](#)

1.9 Radiators

Conventional radiators installed with central heating systems work at high temperatures. Larger, low temperature radiators can be used although they can take up a lot of space. Some older conventional radiator systems may have been over-sized when installed which may make them suitable for use with a heat pump system (see Appendix 3).

1.10 Water heating

Water can be heated and stored in a cylinder or provide instantaneous water heating at the point of use. Immersion heaters are increasingly rare as a stand alone water heating method in dwellings and are more often used as a back-up system. A timer and well insulated cylinder are required to maximize energy efficiency. Even if the cylinder is well insulated an alternative method of water heating should be considered, given the expense of electricity and levels of CO² generated.

Combination boilers combine central heating with instantaneous multi-point water heating. Single-point water heating provides hot water on demand to individual points of use, such as in staff toilets or an electric shower. Single-point heating can utilize gas or electricity. Using electricity for devices with a high power demand, such as an electric shower, will be inefficient and expensive.

As with space heating, if mains gas is available it should be used to heat water in preference to electricity. If hot water is stored in a tank, it is important that whatever heating method is used that a timer and programmer is installed so that users cannot easily leave the water heating on. All tanks and hot pipe-work should be as well insulated as possible.

2. Lighting

Incandescent bulbs are being phased out and energy efficient light bulbs are now available for use on domestic and commercial properties.

Only around 5% of energy used by a traditional incandescent light bulb actually generates light; the other 95% is emitted as heat.

Low energy bulbs have received negative publicity regarding their mercury content. Mercury amounts are very low and only pose a very small risk if bulbs are broken and not disposed of sensibly. Should a bulb break, ventilate the room for 15 minutes before sweeping up, while wearing rubber gloves. Bulbs should be disposed of as hazardous waste at a local council waste recycling centre.

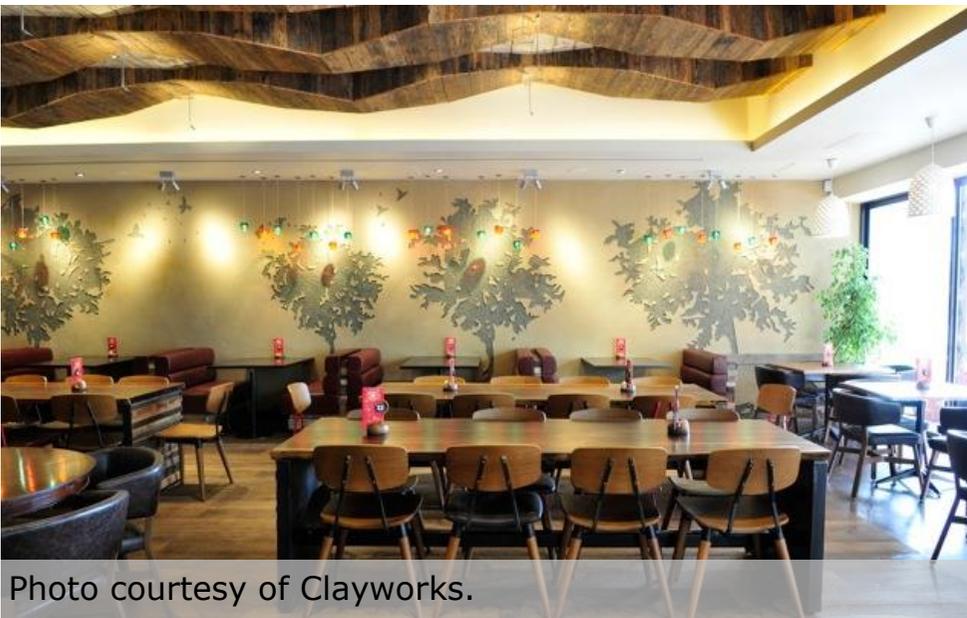


Photo courtesy of Clayworks.

2.1 Types of light

Traditional light bulbs: Tungsten filament or General Lighting Service (GLS) bulbs.

Halogen lamps: More efficient than GLS lamps as they run at a higher temperature. They are mostly used in spotlight downlights.

Compact fluorescents (CFLs): These are commonly used lights that use around a quarter of the electricity that an equivalent GLS lamp uses.

LEDs: LEDs are an efficient light source that lasts longer than most other options.

Strip lights: These are fluorescent tubes and are not often used in the home.

Light fittings or luminaires: Energy can be saved by using more transparent shades or fittings. The most efficient fitting will usually be the one where you can see the light bulb.

For more information see:

[Energy Saving Trust - Lighting products](#)

[Energy Saving Trust - Energy-saving light bulbs](#)

[Community Energy Plus - Low Energy Lighting guide](#)

2.1 Domestic lighting

Lighting typically accounts for anywhere between 15 and 50% of electricity use. Conventional filament bulbs use 5 times more electricity, are 5 times more expensive to run and can be 5 times more environmentally damaging than low energy versions. Buy products with an average life expectancy clearly stated and energy efficiency logo. Low energy bulbs should pay for themselves within the first year, with savings averaging at least £3 a year. Low energy bulbs are also available for use with dimmer switches, although at present these are still more expensive. Bulbs offering different light qualities are also available, such as 'warm' and 'cool' white.

Energy use can be reduced through efficient lighting systems. Fitting LUX sensors in rooms well served by daylight will help maintain consistent light levels and minimise energy use. Occupancy sensors can be fitted in rooms that are used briefly such as bathrooms or utility rooms, and timers can control lighting patterns.

Ensure that all electrical work is carried out by an approved electrician or electrical installation contractor.

For more information see:

[Energy Saving Trust - Lighting guidance](#)

[Community Energy Plus - Low energy lighting](#)

There are some practical measures that can be taken to reduce use of electric lighting. Old houses were often originally built with large windows to use natural daylight as no electric or gas lights were available. Keeping curtains open during daylight hours will maximise this source of light. In addition, if the internal surfaces are suitable for painting, paint them white or a light colour. It will naturally reflect light around the room creating a brighter living area.

2.2 Costs

LED lamps can save 80-95% of the energy used in conventional lighting systems and operate at significantly lower temperatures. LEDs are also directional and therefore highly efficient as no light is wasted. LEDs use no poisonous elements in their manufacture. For every 10kW of useable energy generated, 7kg of carbon dioxide is saved from being released into the atmosphere.

CFLs use 80% less electricity than standard bulbs and depending on usage can last up to 10 times longer and save around £7 and 26kg CO² a year. When purchasing CFLs, the "Energy Saving Recommended" logo should be looked for to avoid poor performance and poor quality products.

2.3 Products to avoid

All filament lighting uses around 5 times more electricity for the same light output as fluorescent lighting. This is a particular problem when halogen mini spotlights are employed (MR16s or GU10s). The narrow beam of these lamps results in many more lamps being needed to provide adequate overall light levels. Halogen spotlights and incandescent bulbs also have the added disadvantage of generating additional heat, which may be problematic with historic buildings and with air conditioning/space cooling.

2.4 Commercial lighting

For offices install high frequency fluorescent lighting with tri-phosphor tubes wherever possible. This is currently the most efficient form of lighting that is readily available. Modern energy efficient fluorescent lighting systems use up to 20% less electrical energy. High frequency fluorescent lighting systems offer improved lighting quality – including the elimination of lamp flicker and stroboscopic effects, instant start and efficient and simple methods of dimming. Under Building Regulations it is anticipated that lighting in a building should average not less than 45 luminaire-lumens/circuit-watt. Where display lighting is required it is expected that individual display lighting should have an average efficiency not less than 15 lamp-lumen/ circuit-watt. Wherever possible display lighting should include dedicated circuits to enable switching off of lighting outside of opening hours.

LED lamps are more expensive but have a much longer life, usually between 50,000 to 100,000 hours. They are available in a variety of colours including colour changing lamps which could help in commercial buildings. This can provide options for advertising/promotions in a commercial setting.

Links

www.plmgroup.co.uk

LED & fibre optic lighting systems

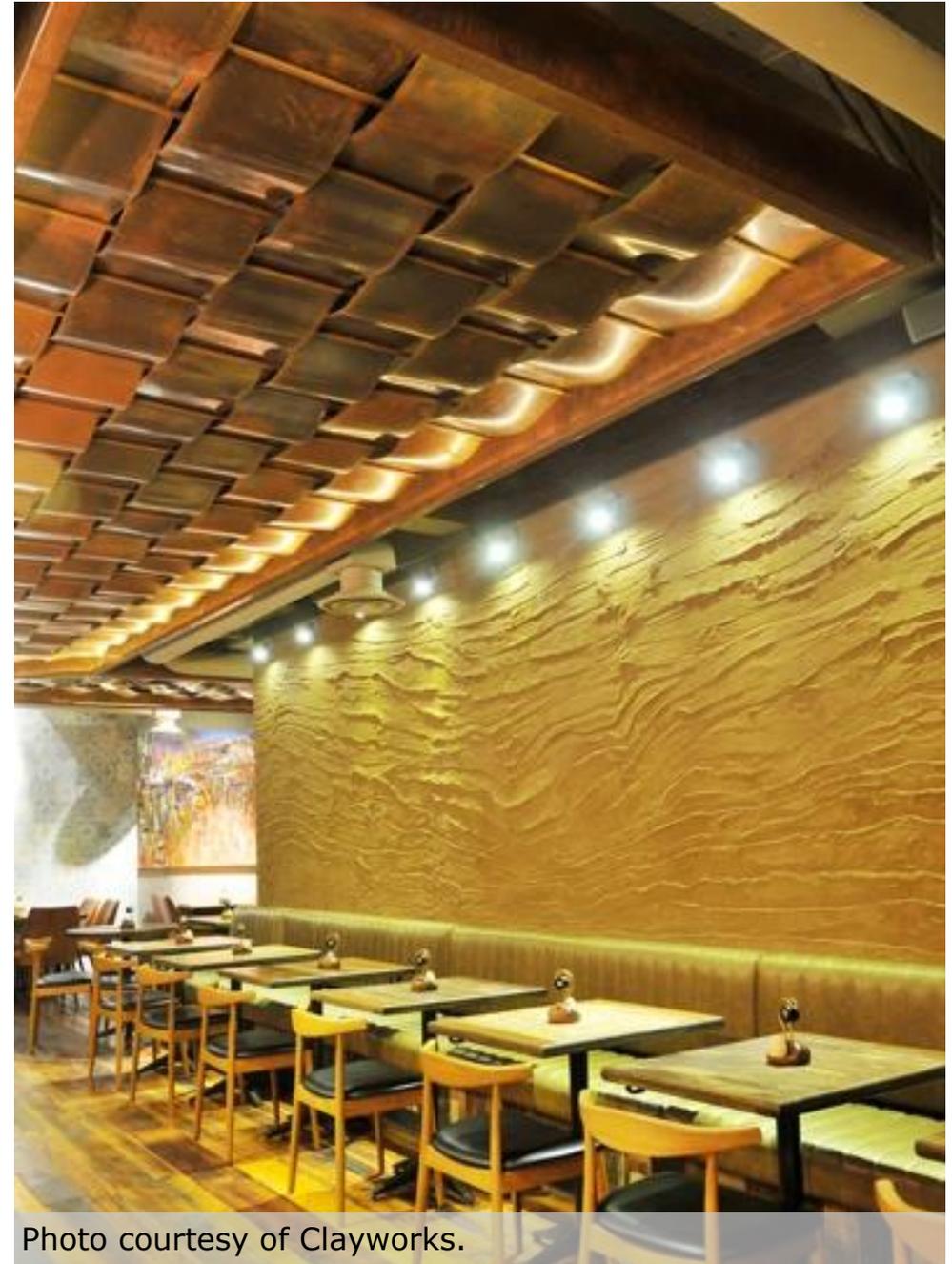


Photo courtesy of Clayworks.

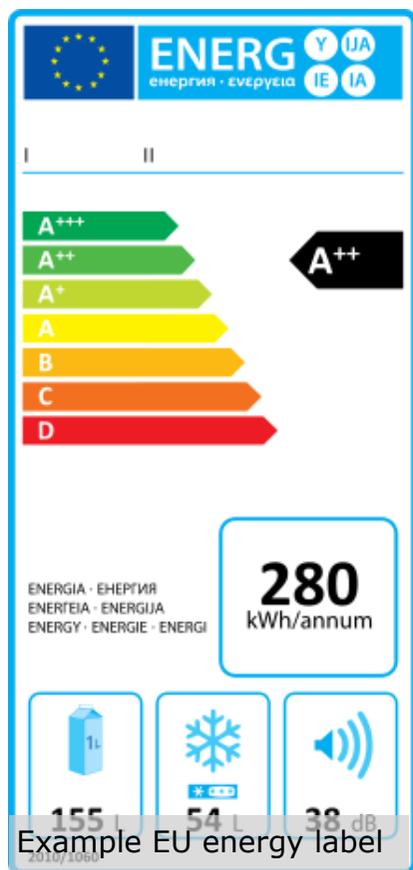
3. Appliances

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When buying new appliances look for equipment with an energy efficiency rating of A or better and a low annual energy consumption (KWh/annum). This will give an indication of the amount of electricity used and possible savings between models.

Savings can also be made by reviewing how the equipment is normally used and by switching off equipment rather than using standby modes. For more information see:

[Energy Saving Trust - Products and appliances](#)



3.1 Running costs for typical household appliances

Appliance	Usage	Average running power per use	Cost per Year	Annual CO2 emissions (kg)
Microwave	96 times a year	0.945 kWh	£9.07	39
Washing Machine (washing at 40°)	187 times a year	0.63 kWh	£11.78	51
Tumble Dryer	148 times a year	2.50kWh	£37	159
Kettle	1542 times a year	0.11kWh	£16.90	73
Gas Hob	424 times a year	0.9kWh	£14.12	71
Electric Hob	424 times a year	0.71kWh	£30.10	129
Dishwasher (washing at 55°)	110 times a year	1.07kWh	£11.77	51
Fridge Freezer A++	24 hours a day	206kWh	£20.60	89
Fridge Freezer A	24 hours a day	408kWh	£40.80	175
Standard Lightbulb	4 hours a day	100w	£14.60	63
Low Energy Bulb	4 hours a day	18w	£2.63	11

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Replacing an old fridge freezer (bought new in 1998) with a new A+ or A++ rated product would save £39 a year and 142kg of CO₂ EST figures. If the product had a lifespan of 20 years, that would add up to savings of nearly £800 and 2.8 tons CO₂

3. Appliances

3.2 Commercial costs

Running costs of typical commercial appliances

Typical office appliance	Average Running Power	Average Standby Power	Annual running cost if left on standby	Annual cost if switched off when not in use	Annual CO ² emissions (kg) when switched off when not in use	Annual CO ² emissions (kg) if left on standby over-night and weekends	Annual CO ² savings if switched off when not in use (kg)
Computer - Hard Drive	40W	25W	£37	£12	36	108	72
Monitors:							
Conventional CRT screen	95W	15W	£45	£31	85	128	43
Flat screen	40W	5W	£17	£12	36	50	14
Laser printer	110W	25W	£36	£5	12	104	91
Photocopier	1000W	50W	£103	£39	112	295	182
Fax Machine	25W	8W	£11	£1	3	32	29
Total			£249	£100	284	717	431

NOTE: all costs are based on 15p/kWh. Calculated on typical office use (Computers and monitors in use 8 hrs a day, Standby over night for 16 hrs Mon – Fri and 24 hrs at the weekends and bank holidays. All other office equipment used for 1 hour a day, 23hrs for the remainder and 24 hrs at the weekend on standby).

Purchasing 'A' or better rated products and using products as efficiently as possible will increase savings. In commercial properties staff should be encouraged to turn off lights and equipment (such as computers) rather than leaving them on standby.

