

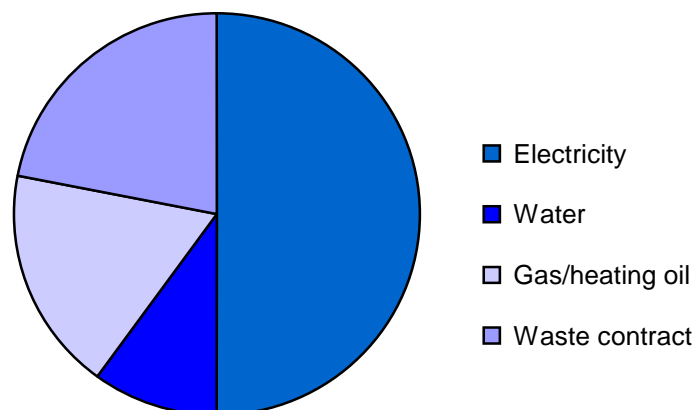


services limited

Waste minimisation tips for Students' Unions

Produced by the Ethical & Environmental Committee
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The average Students' Union spends £35,000 per year on utility costs. The typical cost breakdown is: 50% on electricity; 10% on water; 18% on gas / heating oil (or heating charges to the institution); 22% on waste disposal.



The Carbon Trust, the Government-funded programme offering advice to businesses on saving energy, estimates that most businesses waste 30% of their energy. If this is true for Students' Unions, wasted electricity is costing each Union around £5,250. If it applies to all utilities, Students' Unions may be wasting over £10,000 per year through inefficiency. In some instances, these will be conservative estimates. Couple this with the fact that energy prices have, on average, doubled since 2001, and it becomes apparent that there is now a real business advantage to waste minimisation.

This document identifies waste minimisation solutions to common problems identified in Students' Unions. The majority of the recommendations cost nothing to implement. Those that do require capital investment will generally pay for themselves within three-years. The less money your organisation has, the more justification there is for investing in waste minimisation.

1.0 Lighting

Lighting typically costs £3/m² annually. In very efficient offices, this can be **reduced** to £1/m²

1.1 Switch off

- It is a popular misconception that it is cheaper to leave fluorescent lights on than switch them off. A modern fluorescent tube uses over 500 times more energy if left on for 15 minutes than the energy needed to restart it. If a room is empty, the lights should be off.
- A common wasteful practice is having lights on next to windows. If possible, switch off lights, or rows of lights, parallel to windows.

1.2 Don't switch on in the first place!

- You should only have lights on if there is not enough natural light available. You can maximise natural daylight by cleaning windows regularly and keeping them unobstructed. Trim back plants outside and keep windowsills clear inside. Any plastic light shades covering fluorescent tubes should be cleaned periodically. All staff should open their blinds when they arrive. If glare is an issue, tilt blinds upwards to bounce sunlight onto the ceiling.
- If you have any windows that have been painted black (sometimes in Union dance venues), replace them and get blinds or curtains. This will **reduce** costs when the venue is used in the daytime.
- Instead of lighting the whole office, use more localised 'task lighting' by lighting only the working area (e.g. desk lamps).
- Label light switches so people know which ones to switch on, rather than switching them all on.
- Make staff aware that they are responsible for the lighting in their own areas. Assign responsibility for lighting in communal areas.
- Do any lights have to be on unnecessarily because of the switching arrangement? If so, consider having individual lights put on separate switches, or remove any unnecessary light fittings. One switch should not control too many lights or else there will be wastage. For open plan offices, consider separating control by putting pull-switches above each desk.

1.3 Take away control

- Most Unions have between 50 and 100 corridor lights on when the offices are open. Unions should install motion sensors in intermittently-used corridors and communal areas (staff toilets, kitchens, etc.). As people walk into an area, the lighting will come on. Motion sensors can be bought for under £10 each, plus installation. The sensors should collectively **save** the average Union around **£450** per year.
- Use light sensors for exterior lighting and lighting within naturally well-lit areas (such as glass covered areas). This will prevent lighting being left on unnecessarily on sunny days, potentially **saving £200** per Union per year. Light sensors typically cost between £6 and £10 each, plus installation.
- If you are considering installing sensors, invite a specialist company to provide a quotation on the installation of energy saving technology for lighting. Ex-Or (www.ex-or.com/) offers a free quotation service nationwide, and has worked with several academic institutions (see www.ex-or.com/casestudies/warwick.htm for a case study). Alternatively, try www.andovercontrols.com/; www.aes-control-systems.co.uk/, or search through the database of electrical companies on www.buildingdesign.co.uk/elec/eindex.htm.

1.4 Maintenance

Report all flickering or spent lamps as soon as possible - amazingly, even completely 'dead' fluorescent lamps left in fittings that are switched on use around **20%** of the energy they require to be lit.

1.5 Health and Safety

Don't get carried away and compromise health and safety - some areas need to be lit!

1.6 Awareness

Get free energy saving awareness stickers and posters about lighting from www.thecarbontrust.co.uk/.

1.7 Upgrade your lighting!

The main properties of any lamp are the amount of light emitted (Lumens) and the energy they consume (Watts). Combining these values gives what is termed the lamp efficacy (lumens/Watt). The higher the efficacy, the lower the running costs. So always calculate the efficacy of lighting before commissioning a refit.

- Any old large diameter (38mm, known as T12) fluorescent tubes should be replaced. These old tubes use 8% more energy than modern slimline (26mm, known as T8) tubes, and are more expensive to buy than the newer versions. Converting from a twin 5-foot fluorescent luminaire with switchstart gear and T12 lamps to a single lamp with reflectors, high frequency ballasts and T8 lamps should **save** about **£25** per year per unit in **reduced** energy costs and lower maintenance charges, and should pay for themselves in about 30 months. As a general rule, **the thinner the tube, the more efficient it is**.
- If you are installing new office lighting, the most efficient lighting available is T5 - make sure you ask for it when getting quotes. As a general rule, the lower the 'T' number, the more efficient. For example, T8 Fluorescent lamps typically provide up to 40% in energy savings with no loss of light over T12 lamps.
- You can upgrade your T8 fittings to T5 with adaptors made by www.chalmor.co.uk, or by www.8to5energysaver.com/.
- If you are getting a refit, lighting manufacturers will usually offer a free site visit. If you invite them, be sure to specify that you want an efficient solution. Manufacturers of efficient lighting include www.dextralighting.co.uk/, www.thornlighting.com/, www.flg.co.uk/. Typically these companies do not install, so you will need to ask your contractors to order it and fit it.
- Ballasts are used to start and operate fluorescent tubes correctly, and high-frequency ballasts are available to overcome the common problem of 'flickery light', as well as using less energy.
- Do you still use standard (tungsten) light bulbs? These bulbs have a low efficacy (8-12) are expensive to run for long periods and produce more heat than light! Replacing them with low-energy compact fluorescent bulbs should **save** 75% energy (**£30** over their lifetime), and they last 8-times longer than the standard bulbs. Note that low-energy bulbs are not suitable for dimmer switches.
- You can now replace tungsten halogen spotlights (typically 50W) with mini **compact-fluorescent** versions (typically just 11W). They are only available for mains voltage (240v), not low voltage (12v). They cost about £9 each, but have excellent life and use comparatively little energy. It is now also possible to buy dimmable versions of these bulbs. For an example, see http://www.ebulbshop.com/acatalog/GU10_Dimmable_11_Watt.html.
- Even more efficient are **LED Bulbs**. At present they are only available as 2.2W, but a 4W version is expected next year. LED bulbs usually last over 50,000 hours, so you will make big maintenance **savings**. Note that you might need to change your transformers as well.
- If you use mercury-vapour lights, replace them with high-pressure sodium vapour bulbs. A 250-watt or 400-watt high-pressure sodium vapour bulb produces more light at a lower cost than a typical 1000-watt mercury bulb, and is ideal for car parks, loading bays and other outdoor areas.
- If your internal fluorescent strip lights do not have reflectors (built in mirrors), it is time to upgrade your lighting.
- You can find out if you are over-lighting, or under-lighting, an area by using a light-meter (£60 from RS Components, <http://rswww.com/>). As a general guideline, areas should be light as following:

	Brightness (Lux)
Close, detailed work	1000 to 2000
Offices	400
Workshops	300
Stairs & corridors	200

Rest rooms	100
Street lighting	20
Security lighting	5

- If you are having a lighting refit, always install motion sensors in corridors and toilets and light sensors in areas with good natural light. It is much cheaper to do this at the time of installation rather than a few years later. The sensors should pay for themselves within 2 years. Given that most lighting refits have a life of over 10 years, the profits will soon add up.
- For information about lighting technology, visit www.thecarbontrust.co.uk/ and download the Lighting Fact sheet FSSB029 (you will need to register first) or www.lampotech.co.uk/.

Note that any new lighting schemes over 100m² now need to meet new building regulations. Contact your Local Authority planning department, or your electrical contractor for further details.

2.0 Heating and cooling

2.1 Air conditioning

- As a general rule, air conditioning should be avoided unless essential. Air-conditioned buildings use about twice as much energy as naturally ventilated buildings.
- The accepted limit for naturally-ventilated (i.e. no air conditioning) is 40W/m². This refers to the amount of energy-consuming equipment in a given space, such as an office. It's easy to work out, all you have to do is add up the wattage of all the lights, computers, photocopiers, fridges, etc. in a given area and then divide it by the size of the room in square meters (also see section 4). The calculation will help you to identify if you need air conditioning. Once you have calculated the figure, you can use it to justify investing in energy-efficient technology (such as Flat-Panel Liquid Crystal Display monitors) to reduce heat gains instead of investing in air conditioning.
- If you have got air conditioning, you don't have to use it! Leaving doors open in the summer is an excellent way of providing free ventilation. But if you do switch it on, all exterior doors and windows *must* be shut or else you will be paying to cool outside!
- In air-conditioned rooms, try to close blinds on sunny days. If not, the sun could double the energy consumption of your air conditioner. Air-conditioning costs a lot more to run than artificial lighting! All air-conditioned rooms should have blinds, and the blinds should be shut if the window is in direct sunlight on a sunny day.
- All ventilation systems should be switched off as staff leave and not left to be turned off by cleaners.
- Photocopiers and laser printers should not be sited in air-conditioned areas as they generate heat that will work against the air-conditioning.
- It is strongly recommended that you get your combination heater and air conditioning unit (HVAC) serviced annually by a qualified engineer. The engineer will clean filters and ensure that the machinery is topped up with coolant. You can **save** as much as **£6,000 per year** by keeping the HVAC system in good shape (based on a 100,000 square foot building). The Heating Ventilation Contractors Association (www.hvca.org.uk/) will be able to suggest qualified mechanics in your area.

2.2 Thermostats

- Are room thermostats in correct locations? They should be away from heaters and sunlight? Very often they are in crazy locations, such as behind curtains or near windows. If yours are, consider having them moved.
- If you have separate heating and cooling systems, ensure that both are not on at the same time! If they are, they will just work against each other and cost your Union a small fortune.
- Heating costs rise by 8-10% for every 1°C rise in set temperature. Cooling costs increase by 10-12% for every 1°C decrease in set temperature.
- According to The Carbon Trust, thermostats should be set to:
 - 21°C** daytime when heating (winter)

24°C daytime when cooling with air conditioning (summer)
 Server room thermostats should be set to **24°C**.

- It is a myth that rooms heat up faster if thermostats are set higher. The truth is that the area heats up at the same speed, but then becomes too hot.
- Managers should be the only staff allowed to alter thermostats. All thermostats should be checked regularly to ensure they are set to the correct temperature. Awareness-raising wall thermometers are available free from www.thecarbontrust.co.uk. If only a few staff are cold, encourage them to wear additional clothing, or move them to warmer parts of the office.
- Install Thermostatic Radiator Valves (TRVs) in any rooms that get too hot in winter. TRVs are situated on the radiator and turn down the hot water flow as the room heats up due to other heat gains, such as sunlight. TRV's cost between £5 and £12 each. As a general rule, if you have got windows open in the winter, you are overheating.
- Ideally your Union will have a building control system that adjusts the heating according to the outside temperature. Some Unions have been incorporated into their University's building control system.

2.3 Air ventilation plant

Air extraction equipment in clubs, bars and kitchens can consume enormous amounts of electricity, and in some examples up to 20% of the total energy consumption of the whole building. Many organisations make the mistake of installing bigger than required fans, and then dampening them down as required. This 'overspecing' can be very inefficient - see Figure 1.

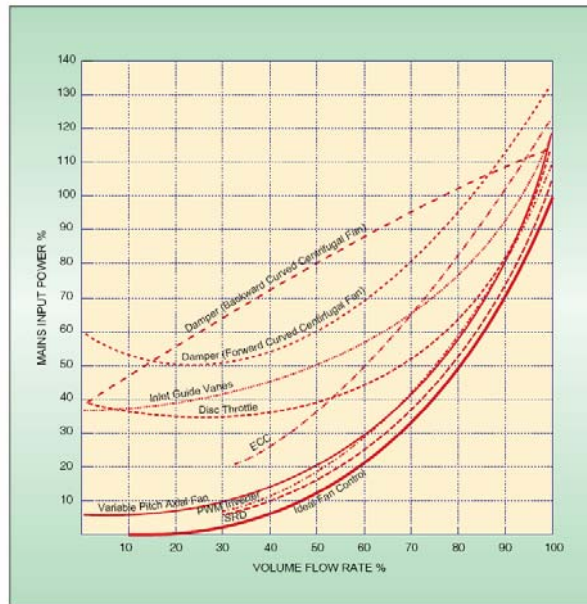


Figure 1: Power use against air flow for different types of fan drives. Note that dampened fans produce a less efficient flow of air - reproduced from The Carbon Trust's publication 'How to Select a Variable Speed Drive'.

It is best to install the right size fan to start with. Sometimes replacing fans with more suitably sized smaller versions can have a payback period of less than three years. Alternatively, you could install variable speed drives. A variable speed drive system (VSD) consists of two main components - the motor and a variable speed drive, sometimes integrated as a single unit. The VSD takes information from sensors and adjusts the speed of the drive accordingly. Because energy and motor speed are exponentially related, even a relatively small reduction in speed can result in a significant energy saving. Fitting a VSD to a motor can provide quick results and a relatively short payback period. For more information on how to save energy using variable speed drives, download the following free documents from The Carbon Trust (www.carbontrust.org.uk):

- 1 GPG002 - Energy savings with electric motors and drives;

2 General Information Report 41- Variable flow control.

2.4 Stop heat loss

- Internal roof areas should be well insulated. Newspaper-based insulation is making a comeback.
- Any draughts in windows, doors or vents should be plugged.
- Double-glazing helps keep rooms warm in winter and cool in summer, reducing energy costs. Fully upgrading glazing usually has a payback period of about 20-years. If you can't afford double glazing replacements, consider fitting polycarbonate glazing.
- Doors and windows should always be shut if heating (or cooling) systems are switched on. If external doors are regularly left open, self-closers should be installed. These could **save** up to **£700** per year in heating costs.
- Extractor fans in toilets should be controlled (e.g. switched on by motion sensors) or else they will suck all the heated or conditioned air out of the building. If the light switch switches them on, it is important to make sure that staff switch off the lights after use. If they are regularly left on, install a motion sensor.
- Similarly, if you put air extractors in your kitchen, make sure you pump air into the space as well as sucking air out or else you might suck all the warm air out of your restaurant or bar.

2.5 Winter

- Radiators should be kept clear and unobstructed. Furniture in front of radiators will lead to warm furniture and cold staff!
- Blinds can **reduce** heating bills in the winter, so make sure they are all shut over night.
- Portable electric heaters are inefficient and expensive to run. They also influence existing thermostats and heating systems, exacerbating any heating problems. If an area is cold, there is a heating problem that needs fixing. Try plugging draughts, fitting door closers or bleeding any radiators. You may need to install extra radiators. After you have solved the problem, make it policy that portable electric heaters they are not allowed. For every three you remove, you should **save £100** per year.
- Use the 1 pence test. If you can slide a 1p in a gap between windows or doors, it will be cost-effective to install draught-proofing.
- A building will hold its temperature, so switch heating off early. For example, if a shop is occupied until 20:00 hours, set the heating to go off at 19:00 hours.
- Boilers should be serviced every 12-months to maintain efficiency. Ask for a combustion efficiency report as part of the service. Most contractors will only maintain for safety and reliability, but not efficiency.
- Thinking of getting a new boiler? The most energy efficient method of space heating an office is a gas-fired condensing boiler / radiator system.
- Degree Days is a concept that can be used to find out if you are unnecessarily heating a building. The base temperature used to calculate degree days in the UK is **15.5°C**. At this temperature most UK buildings can heat themselves without the need for supplementary heating, due to the internal gains from occupants and equipment and the solar gains through the building fabric, i.e. the walls and windows. Several websites provide Degree-day figures, which quantify how hot or cold the weather has been as a single index number for the region and month (or week). You can then plot the degree day data against your gas or electricity consumption – the closer your consumption data is to the degree day plot, the more control you have over your heating. To find out more, visit www.thecarbontrust.co.uk/energy/pages/page_86.asp.

2.6 Hot taps

- Are water tanks heating your hot water to the correct temperature? When heating water, energy costs increase by 15% for every 10°C temperature increase. NB: Hot water tanks should be set at 60°C to avoid the risk of Legionnaires disease.
- A typical hot-water tank has two 6KW heaters in it. If they are on 24/7, you will be wasting a vast quantity of energy, so much so that you will be able to see them switching on and off on your energy

data (see section 8.5). Set the timers to come on at 5 am, so they will do most of their work on cheap-rate electricity (all tanks are designed to heat up in between 1 and 2 hours). This will also help avoid your maximum demand peaks (see section 8.5).

- Ensure all hot water tanks are covered by insulation jackets.
- Consider installing point-of-use water heaters where there are long pipe runs. As well as saving energy, this will **save** water and time because staff will not have to run the hot tap before the water turns hot.

2.7 Awareness

Get free energy saving awareness stickers and posters about heating and cooling from www.thecarbontrust.co.uk.

3 Refrigeration

Fact: Refrigeration and air conditioning costs are reported to amount to 11% of the total energy produced in the UK.

- Refrigerators work best if the heat rejected from them is easily dispersed. They therefore work most efficiently if grills are clean and not obstructed.
- If you are getting new dairy-decks, consider fitting heat exchangers to remove the waste heat from inside the building. This will allow the fridges to work in a cooler environment, saving energy. Alternatively, make sure that all shop shutters are vented, rather than the solid variety.
- Dairy deck fridges and open-top chest freezers should be covered at night. This can **save 20%** of the refrigeration cost.
- Heaters and air conditioning units should be situated well away from freezers and refrigerated displays. Fit blinds to any shop or bar windows to prevent the sun from heating up rooms containing fridges.
- Do you turn off chilled drinks cabinets in bars out of operating hours? It will **save** you money to switch them off, especially if they have internal lighting that cannot otherwise be switched off. Seven-day timer plugs can be used to switch them off when not needed. Timer plugs are a similar concept to an adaptor plug in that they fit between the socket and the appliance plug. A timer plug should **reduce** refrigeration costs by **15%**. Seven-day timer plugs cost between £5 and £25 each (Timeguard are the main manufacturer in the UK, and will be able to advise of local stockists. www.timeguard.com). Digital plugs (like the ETU17) have battery backup to avoid problems caused by power cuts. We recommend you check with manufacturers before you invest in the timer plugs for your fridges - some fridges can be damaged by the surges of power associated with power cuts.
- The same should apply to water coolers in offices...
- ...and to any cold (or hot) product vending machines. Some chilled drink vending machines costs £400 per year to run! Use seven-day timer plugs to **save** money.
- Is defrosting carried out as per the equipment instructions? Defrosting helps maintain efficiency.
- A saver plug works on the basis that when a fridge is running, its compressor is not fully loaded all the time. The plug senses this and cuts out power to the motor in rapid short bursts without changing the operation of the fridge. This can reduce the energy consumed by the fridge by over 20%, giving you a typical return of £140 over 10 years. The plugs are only suitable for fridges up to 350w, and the manufacturer recommends that they are not used in commercial environments. It is especially worth considering for older fridges. For more information, visit www.savawatt.com.
- Try to choose the most efficient models. It is estimated that a typical fridge costs more than six times to run than it will to purchase.

4 Electrical equipment

You can calculate how much energy any appliance uses by locating the wattage or voltage / amps sticker on it.

Example 1: Standard tungsten filament light bulb.

A 60W bulb is on for 12 hours per day during term time, seven days per week. From electricity bills, the daytime tariff (7am to 12 midnight) is £0.04 per KWh. Additionally, there is a Climate Change Levy of 0.0043p per KWh.

12 hours x 7 days = 84 hours per week.

84 hours per week x 33 weeks = 2772 hours.

60 W/hour x 2,772 hours = 166.32 KWh used per year.

166.32 KWh x £0.04 (cost per KWh) = £6.66 per year.

166.32 KWh x £0.0043 (CCL per KWh) = £0.72 per year.

£6.66 + £0.72 = £7.38 per year

Example 2: Electric heater

A 3000W electric fan heater is used between 9am and 5pm every weekday during October through to the middle of April. The tariffs are the same as in the example above.

8 hours per day x 5 days = 40 hours per week

40 hours per week x 26 weeks = 1040 hours

3000W/hour x 1040 hours = 3120 KWh used per year

3120 KWh x £0.04 (cost per KWh) = £124.80 per year.

3120 KWh x £0.0043 (CCL per KWh) = £13.42 per year.

£124.80 + £13.42 = £138.21 per year (assuming it is not on a thermostat - i.e. running at full capacity all the time).

NB: If you do not know the Wattage of a piece of equipment, you can calculate it using the simple calculation $W = \text{Volts} \times \text{Amps}$. This data is usually available somewhere on the outside of an appliance.

NB: To account for the energy used by starters, when calculating the energy consumption of fluorescent tube lighting, you need to add 25% for old wide tubes (have old-style starters, causing them to flicker when switched on), and 10% for all other tubes (including those with quick electric start, so they do not flicker when switched on), including compact fluorescents. This can be reduced by using high frequency ballasts.

4.1 Personal Computers

- The running cost of a PC and monitor can be **reduced** from the average £63 per year to just £6 through good practice, a **saving** of **£57** per PC per year...
- Standard PC monitors (Cathode Ray Tube) typically consume two-thirds of the energy used by the PC, much of which is expelled as heat. Staff should be encouraged to switch monitors off when a PC's will not be used for more than 5 minutes. Laptops typically use as little as 1% of the energy used by a desktop PC, so switching off PC screens should be the priority. Turning off just 10 monitors when they are not being used could **save** your Union **£200** a year in energy costs.
- Make sure that all new monitors are Flat-Panel Liquid Crystal Display (LCD) monitors as they use only use around 10% of the energy used by equivalent standard Cathode Ray Tube (CRT) monitors.
- If your attempts to encourage best practice fail, why not fit monitor misers to your CRT monitors? They state they can save an average of **£27** per monitor per year. For more info, visit www.llumarlite.co.uk/.
- Don't be fooled by thinking screensavers **save** energy; they only prevent the screen image from burning in.
- The best-known energy saving label for PCs is the Energy Star rating, whereby the equipment automatically enters a low power mode after a set time. However, this equipment has to be enabled before it will work. Typically, only 15% of PC's have their power-saving modes activated. All monitors should be set to go onto standby after 10 minutes, and staff should be instructed not to change the settings. Windows XP has the facility to set universal standby settings.
- Staff should be encouraged to shut down PCs that will not be used for more than one hour. If you have air conditioning, this will also **reduce** your cooling bills.

- Staff should be asked to switch off all stand-alone processors, monitors and printers at the end of each day. This is especially important for laser printers, which use 87% more energy than inkjet printers when on standby. If printers are regularly left on, use a seven-day timer plugs to ensure they are switched off.
- Before staff go on holiday, make it a procedure that they switch their computers off at the plug to prevent residual background electrical leakage.

4.2 Printers and printing

- All PC's should be set to draft print by default and, for duplex printers, two-sided print.
- Encourage staff to 'Print Preview' before printing.
- Where possible, it is preferable to **reduce** the number of printers by sharing via networks. Better still, invest in a new photocopier that can be networked to all PCs - that way all staff printing can be two-sided as default.
- Alternatively, invest in a Kyocera Ecosys laser printer, which allow you to replace the toner (like a photocopier) rather than the whole cartridge drum and roller. The University of Surrey Students' Union bought a single Kyocera FS-3800N (which has now been replaced by the 3830) that does all the printing for all 27 Union staff. Because the printer has a duplex unit, all printing is double sided. The Kyocera web page has a calculator that lets you work out how much you will save if you replace your current printer with theirs. Student Unions can buy Kyocera products from XMA who supply these products at educational prices.
- Consider investing in Print Manager Plus. It is a great bit of software for networks that allows you to monitor how many copies each employee is making, and allows you to set limits for those that print everything!
- When rebranding, chose a relatively compact font and adjust the page margins all template documents to maximise the content of new page. For a Union that makes 60,000 copies per year, putting 5% more text on a page could **save** between 1,500 and 3,000 copies per year.

4.3 You turned me on, now turn me off!

- Do not leave equipment (printers, scanners, stereos, TV's, videos, photocopiers) on standby overnight or on at weekends. Switching off a photocopier over night and at weekends can **save** more than **£100** per copier per year. To avoid residual background leakage, switch off equipment at the plug. Seven-day timer plugs can be used to ensure that this equipment is switched off, and can be set to switch off at weekends as well. Out-of-hours checks are a good way of spotting wastes.

	Average power consumption while in use (watts)	Standby energy consumption (watts)
PC (processor only)	40	20-30
PC monitors	80	10-15
Inkjet printer	40-80	20-30
Laser printer	90-130	20-30
Fax machine	30-40	10
Photocopier	120-1000	30-250
Copy printers	160-200	35-50

- Check that tea boilers are switched off overnight. A seven-day timer plug can be used to ensure that the water is hot for staff in the morning. As with all seven-day timer plugs, it is important have procedures in place to ensure that they are all adjusted when the clocks go forward or back. Digital timer plugs have built-in battery backup to prevent problems caused by power cuts.
- Use seven-day timer plugs for gaming machines and digital photo booths as well. Check with manufacturers first to make sure that switching the machines off will not interrupt any processing or

computer-controlled (Midas) downloading functions. For gaming machines, this shouldn't affect payout frequencies.

- Check that all kettles automatically switch off upon boiling. Faulty kettles should be replaced.
- Use timer plugs to ensure that illuminated notice boards are switched off when the building is closed.
- Introduce a switch-off policy and agree who is responsible for compliance in each work area. This is especially important in communal areas with photocopiers.
- Produce a brief for your cleaners that details which lighting, heating and ventilation and other equipment should be switched off when they have finished. Staff should switch equipment off; cleaners should merely check that equipment has been switched off. Alternatively, consider employing Duty Officers, as is successfully done at the University of London Union, to ensure that all equipment is shut down correctly each evening.

4.4 Kettles and urns

- The average tea urn uses around £300 of electricity per year. Use a timer plug to switch off urns over night and at weekends. If you use timers, a top tip is to make sure you set them to come on when you are paying night-time rates on electricity (12 midnight to 7am), as this is much cheaper than daytime rates. At NUS Services, our urns come on at 6am to take advantage of this.
- Better still, replace tea-urns and kettles with Zip Hydroboils. Zip Hydroboils are over three times more energy efficient than urns and uses less energy than kettles. Payback period is typically just 18 months. Find out more at www.zipheaters.co.uk.

4.5 Awareness

- Put laminated easy-to-understand posters on how to photo-reduce and double-side copy above all photocopiers.
- Get free energy saving awareness stickers and posters from www.thecarbontrust.co.uk.

5 Water

5.1 Cisterns

Cistern volume adjusters (CVA's) should be fitted to all pre-2000 cisterns to **reduce** cistern capacity. The recommended flush for toilets is 7 litres; cisterns made before the year 2000 are typically larger than required. CVA's typically **save 16%** of water used by toilets and urinals. CVA's available include self-swelling water hogs, hippos or pigs, special bottles, plastic bricks or cistern dams (which work by retaining a proportion of the water in the cistern behind a dam made of a flexible compound fitted between the front and back wall). It should be remembered that wastewater charges are usually calculated at 95% of water in, so reducing water consumption has a cumulative effect on cost savings. It is usually possible to **save 25%** of your total water charges by installing CVA's. CVA's are usually available free of charge from your water provider, as are water saving awareness-raising stickers.

5.2 Is your urinal taking the...?

- The average urinal flushes 3.5 litres of water every 20 minutes, 365 days a year. That's a total of 26,280 flushes and 92,000 litres of water per urinal year! Given that water costs about £1 per 1,000 litres, plus taking into account wastewater charges, the average cost of each urinal will be around £200 per year.
- In addition to the use of CVA's, measures to **reduce** unnecessary flushing include:
 - Reducing the frequency of the flush;
 - Fitting motion sensors that trigger a flush after the urinal has been used (can also be linked to the lighting and extractor fans to make energy **savings**);
 - Fitting flow restrictors that only allow the cistern to top-up when the taps in washbasins are used (A number of companies manufacture these devices - www.environment-

agency.gov.uk/commondata/105385/cwb7_suppliers_876698.pdf. At NUS Services, we have a device manufactured by *Cistermiser* www.cistermiser.co.uk).

Together, these solutions can produce **water savings** of up to 90%. This should bring water charges down to less than £40 per urinal year. That is a potential **saving** of **£360** per urinal per year. As with lighting sensors, get a professional company to provide a free quotation. As well as offering lighting efficiency solutions, Ex-Or (www.ex-or.com/) also offers washroom efficiency solutions.

- If you are planning a washroom refit, consider installing waterless urinals. A special fluid is held in the trap of the urinal that allows urine to pass through but continuously seals the drainage from the atmosphere, preventing any odours from emerging. The absence of water flushing saves substantial volumes of water. Edinburgh University Students' Union has successfully installed waterless urinals.
- Can't afford any of this? Make sure you turn the water off to urinals before each vacation period. Ideally the Union will develop a formal closedown procedure that also covers switching off emersion heaters and heating.

5.3 Problems with pressure

For Unions that suffer from high pressure, tap regulators should be installed. These can cut water flow by **70%**, and will have associated heat **savings** for hot water. Alternatively, consider fitting spray heads. If you are in a hard water area, trial a few first to make sure there are no problems with lime scale deposits. The CP961 water saving valve is produced by Cottam and Preedy (0121 552 5281).

5.4 Leaks

- There should be regular formal maintenance checks to identify dripping taps, faulty ball valves in cisterns (leading to water seeping from the overflow pipe) and leaky toilets.
- Identify leaky toilets by putting a few drops of food colouring into a cistern. Wait 20 minutes (make sure no-one uses the toilet during this period). If coloured water escapes into the bowl, you have a leak that needs fixing.

6 Refuse

Landfill Tax is currently £18 per tonne, and will rise by £3 per tonne until the target of £35 is reached. Once you have taken in to account contractor charges, it is likely you will eventually be paying towards £100 per tonne to dispose of your waste. Setting up procedures now to **reduce** and divert waste streams will help your Union **save** money when tendering for your next waste contract. If Unions with low recycling rates can consistently divert all the materials detailed in this section, they should be able to **reduce** the cost of their waste disposal contract by up to 65% (a **saving** of **£5,000** per year). Its not all about money though - providing recycling bins can symbolise a lot, helping to motivate your staff and visitors to do their bit.

Remember the three R's waste hierarchy: it is always better to Reduce, then Re-use, than Recycle.

6.1 Reducing

- If Unions are required to use plastic glasses, re-usable is always better for the environment than one-use.
- If disposable cups are used in offices, consider issuing each employee their own ceramic mug.
- All polystyrene packaging should be avoided. Re-usable crockery should be the first preference. If disposable packaging is necessary, paper or cardboard is less damaging to the environment than polystyrene.
- Hand-driers are preferable to paper towels, and will cost less money over time.
- If a Union has a crèche, it should try to use re-useable cotton nappies in preference to disposable. If disposable nappies have to be used, ensure they are biodegradable.
- Whiteboards on office doors **reduce** the use of post-it notes.

- Don't over-order publications (flyers, SU newspapers) simply because it is cheaper to order bigger quantities. Take into consideration the environmental cost and only order the amount you know you will require. Alternatively, consider employing students to deliver the publications around the residencies.

6.2 Re-using

- **Paper:** There should be a collection tray for paper printed on one side only in every office (this paper should not be recycled, but re-used in photocopiers or printers). John W. Hannay & Co. Ltd. (www.treecycler.com) makes the 'Treecycler' boxes used in NUS Services' offices. The large boxes cost £8.75, and the desk trays cost £1.75 each. You can obtain a free sample desk tray from www.treecycler.com/request.phtml.
- **Envelopes:** All staff should re-use used large envelopes and padded 'Jiffy' bags that arrive as mail. Standard re-use labels can be bought from stationers or, as NUS Services has done, have your own re-use labels printed. Either way, reusing envelopes will **reduce** the amount sent to landfill and **reduce** stationary costs, **saving** around **£20** per year.
- **Stamps:** All used postage stamps should be collected and sent to charity. Most large charities, such as Guide Dogs For The Blind or the RSPB, collect used postage stamps. Their volunteers then soak the stamps from the backing paper and prepare them for sale to stamp dealers. In 2003, used postage stamps raised nearly £4,000 for the RSPB. They are now collecting postage stamps as part of their albatross campaign (www.rspb.org.uk/international/albatross_appeal/stamps.asp)
- **Printer and toner cartridges:** Your empty cartridges are worth money to charities. The charities sell them to companies that refill them. The following charities offer free collection schemes: www.actionaidrecycling.org.uk; www.tonerdonor.co.uk/; www.cartridges4charity.co.uk; www.recyclingappeal.com; www.nru.org.uk/; www.tommys.org/1/lx3x1olx156x1olx175x1olx-5001x1olx200x1/0/0/261005/0/0//Recycling.htm; www.inkagain.co.uk/. Why not order a collection box for your Union foyer and promote the scheme to students as well as staff?
- **Mobile phones:** Over 674 million new mobile phones were sold worldwide in 2004. Each phone is typically designed to last 7 to 8 years, although the majority tend to be replaced after just one year. The following organisations offer collection schemes for old mobiles. The majority of donated phones will be serviced and sent to Africa, where they are used in community projects as the main form of telecommunication, contributing to developing world development.
www.childadvocacyinternational.co.uk/fundraising/recycle.htm
www.helptheaged.org.uk/SupportUs/Donate/Recycling/_mobile_phone_recycling.htm
www.greenersolutions.com/
www.mobile-phones-recycling.co.uk
www.oxfam.org.uk/what_you_can_do/recycle/phones.htm;
<http://recyclingappeal.com/rspb/rspb/index.asp>
www.recycledmobiles.co.uk/info/info4.htm

Alternatively, most local volunteer bureaux have their own charitable collection scheme run by volunteers. To contact your local bureau, visit www.yell.co.uk and type in 'volunteer bureau' in the 'company name' box.

- **Office furniture in any condition:** Most parts of the country have charities that specialise in repairing and renewing old and unwanted furniture. Visit www.frn.org.uk/ to find your local restoration charity.
- **Computers:** From June 2006, IT equipment will be included into the category of Hazardous Waste in The Special Waste Regulations through the Waste Electrical & Electronic Equipment Directive. The new Directive will require all businesses to dispose of IT equipment and televisions through licensed contractors. Eventually, the responsibility of disposing of this waste will fall upon the IT suppliers, who will take back old equipment as they sell new, on a like-for-like basis. If your Union produces more than 200kg of hazardous waste per year on any of your sites then the Union will have to be registered

as a hazardous waste producer with the Environment Agency (or SEPA in Scotland, or other equivalents). Regardless of the amount, it is recommended that Unions divert IT equipment away from landfill through the following methods:

- By selling, or donating, equipment to staff;
 - By donating equipment to a local charity;
 - By donating the equipment to a national charity such as www.computer-aid.org/ or www.computersforcharity.org.uk/;
 - By giving the equipment to an organisation to recycled - www.ukitrecycling.com is the main company that does for free this in the UK.
- **Useable scrap:** The network of Children's Resource Centres collects any waste materials suitable for creative play from businesses. Customers of the CRC's include arts groups, special needs schools, scouts groups, etc., and the groups use the materials for collages, art projects, games, etc. The centres usually collect materials free of charge. Any bubble wrap, books, card, crates, fabric off-cuts, flyers, plastic trays, posters and banners, paper, plastic containers, stationary, etc. should be collected for your local Centre. At NUS Services, we are collecting all our **bottle tops** for them, and we also give them printer paper that has been used on only one side. To find your local restoration charity, or view the list of most-needed scrap, visit www.childrensscrapstore.co.uk. N.B. All materials must be clean and suitable for use by children.
 - **Clothing, shoes and books:** Deposit unwanted clothes in preference to disposal (also see www.recycle.mcmail.com/clothes.htm). Most supermarkets have clothes banks. Alternatively, contact either Oxfam (www.oxfam.org.uk/what_you_can_do/shop/how_to_donate/donationbanks.htm) or the Salvation Army for a bank (www.satradringco.org).
 - **Pallets:** Any wooden or plastic pallets should be given to pallet companies in preference to being sent to landfill (also see www.recycle.mcmail.com/pallets.htm, www.recyclewood.org.uk/).

6.3 Recycling

The following materials should be recycled:

- **Glass:** Depending on end use, contractors do not always specify colour separation (www.recycle.mcmail.com/glass.htm; www.wrap.org.uk/dundee%5Fglass/links.htm). Berryman's is the UK's only national collector of glass and services over one-third of the Students' Unions in the UK (www.berryman-uk.co.uk/). The WRAP pub glass toolkit is a useful way of considering all the practicalities of setting up a glass recycling scheme (www.wrap.org.uk/pubglasstoolkit).
- **Cardboard:** Depending on the contractor, you might need a cardboard baler - as is used at Loughborough Student's Union. For more information of collectors, visit www.recycle.mcmail.com/card.htm).
- **Glossy paper and newsprint:** Do not contaminate with card, envelopes with plastic windows or shrink-wrap. Severnside is a national collector www.severnside.com, as is Abitibi www.abitibiconsolidated.com
- **Office paper:** This is worth more to recyclers than newsprint and glossy, so should be collected separately (see also www.recycle.mcmail.com/paper.htm).
- **Plastic bottles (PET):** It is important to remove lids to allow compacting. www.recoup.org.
- **Steel and aluminium cans:** Visit www.scrib.org/, www.alupro.org.uk and www.thinkcans.com/.
- **Plastic vending cups:** Save-a-cup collect and recycle plastic vending cups free of charge. www.save-a-cup.co.uk.
- **Christmas cards:** After each Christmas, Christmas cards should be collected for charity. Christmas cards can be given directly to charities, or taken to Tesco and Boots, who collect them on behalf of charities. For more information, visit www.woodland-trust.org.uk/recycling/.

If you want to find your local recycler for any of the above waste streams, use the directories of recyclers at either www.recycle.mcmail.com/ or www.recycle-more.co.uk/. For Unions in London, visit www.londonremade.com/ or www.greenwichgateway.com/envirecycle/.

In 2006, Reverse Vending Systems launches their recycling vending machine (www.reverse-vending-england.co.uk/).

Note that new waste contracts provide an excellent opportunity to recycle more. Make sure you put recycling as a priority in your tender specifications. Many waste collectors will only quote for inclusion and service of cardboard balers, glass skips, plastic and paper recycling if you ask for it. Consolidating your waste and recycling contracts through a single contractor has been shown to **save** a potential **£2,500** per Union per year.

For non-recyclable refuse, it is important to keep your waste skip covered. Open lids may result in Unions paying to dispose of significant amounts of rainwater. As a general rule, keep all bins and skips covered.

Finally, be careful not to breach environmental legislation! Don't dispose of **waste catering oils** down drains - it is illegal and could result in prosecution under the Environmental Protection Act 1990. All oils should be securely stored in suitable containers a covered bunded area prior to collection by an authorised collector (www.recycle.mcmail.com/fats.htm). And never put **fluorescent tubes** or compact fluorescent bulbs into your waste for landfill. Most tubes contain mercury, a metal that poisons ecosystems. Spent fluorescents need to be disposed of through lighting companies or specialist contractors. As of January 2007, under the WEEE Directive, you are also not allowed to send **IT equipment** to landfill (www.eauc.org.uk/weee_regulations_insight_guide).

For more information on reducing, re-using or recycling waste:

- 1 The Government's recycling database, the *Wastebok* at www.recycle.mcmail.com/. It is a database of waste reducers, re-users, repairers and recyclers. Although it is aimed at companies in London and South East England, it lists many national companies.
- 2 Your Local Authority: All County Councils and most District Councils have a Recycling Officer or the equivalent. To find your local contact, visit www.direct.gov.uk/QuickFind/LocalCouncils/fs/en.

7 Transport

Remember the transport hierarchy: In order of *least* environmental impact, it is Walk, Cycle, Train, Bus, Car-share, Car, Plane.

7.1 Avoid journeys

- The Union should make commitments to encouraging home working where practicably possible. It should also develop a comprehensive flexible working policy that includes flexi-time (so that staff can avoid rush hours) and annualised hours (to **reduce** the number of trips to work).
- When possible, use the phone for meetings rather than travelling. BT offers a teleconferencing facility that allows multiple callers to join the same line.

7.2 Get out of the car

- About 5% of the UK workforce currently cycle to work. Good ways of encouraging staff to cycle include: providing shower and locker facilities; providing safe parking for cycles; providing financial incentives, such as interest-free loans or allowances; charging for car parking.
- Why not cycle for business travel? In Europe, it is not unusual for cyclists to be awarded higher expenses mileage rate for bike travel than car travel. The Inland Revenue recommends that cyclists be reimbursed at 20p per mile (www.hmrc.gov.uk/rates/mileage.htm).

- Unions should establish car-sharing schemes for staff. The easiest method is to place a large map on a wall and ask employees to pin their names where they live. Offer free priority parking spaces for staff that are car sharing.
- There should be financial incentives for clubs and societies to use the Union minibuses in preference to using private vehicles.

7.3 Minimise emissions

- All fleet vehicles should be replaced before they reach 5-years old. This will ensure that the Union has relatively efficient vehicles.
- When purchasing new vehicles, always take CO2 emissions into account. The lower the emissions figure, the more fuel-efficient the vehicle, and the less it will cost you in fuel each year.
- The Energy Saving Trust manages the PowerShift, CleanUp and Best Practice schemes, all of which are funded by the Government and aim to reduce emissions from road transport. The TransportAction scheme provides grants for investment in fuel-efficient vehicles (www.est.org.uk/fleet/). The Transportenergy CleanUp scheme offers grants of up to 75% for particulate traps, oxidation catalysts, selective catalytic reduction and exhaust gas recirculation for diesel vehicles.
- In conjunction with the Department for Transport, the Energy Saving Trust offers free visits from independent fleet consultant to help organisations save money. Visit www.est.org.uk/fleet/ob for more information.
- As part of minibus training, drivers should be trained on energy efficient driving techniques. www.dft.gov.uk/ActOnCO2/
- It is recommended that checking tyre pressures is added to the pre-journey checklist for minibus drivers. A 2-psi drop in tyre pressure can increase fuel consumption by 3%.

8 Other areas for review

8.1 Tariffs

It is always worth checking that your organisation is on the correct tariff for all utilities. Since deregulation, most electricity suppliers will negotiate on price. Shopping around should be an annual procedure. But be careful not to get your bills increased!

8.2 Training

All new staff should be formally inducted on environmental policy and good practice. The induction should include recycling policy and procedures, responsibility for opening blinds and turning off lighting and equipment, operation of heating and ventilation controls, and how to use the photocopier to two-side printing and photo reducing. General good environmental practice should be included in all staff job descriptions, work procedures and new staff induction programmes. This is really important as it motivates staff to do their bit right from the start, potentially saving thousands of pounds through reduced wastage over a career.

Employees that drive vehicles as part of their job should be trained in fuel-efficient driving techniques. The way you drive a vehicle can have a big impact on fuel efficiency. With the correct driver training, fuel use can be **reduced** by between **10 and 30%**. Improved training can also help to **reduce** accident and maintenance costs. There are several specialist courses listed on www.fleetdirectory.co.uk/training_services/.

8.3 Whole lifecycle costings

Over the whole lifecycle of a typical appliance, overall costs will be:

- 15% procurement cost
- 75% energy costs
- 10% maintenance costs

...so it really is a false economy to cut costs by buying the cheapest equipment to start with if it is less efficient.

The Union should have a policy of calculating whole lifecycle costs for any new purchases over the value of £50. The cheapest equipment is often the least efficient and will usually cost more in the long-term through running and replacement costs.

A policy of calculating whole lifecycle costs will justify efficient technology including: the purchase of computers with Flat-Panel LCD monitors; photocopiers with duplex (two-sided printing) that use low melting-point inks and that can act as the printers for all networked PCs; high-efficiency hydrocarbon fridges; gas-fired condensing boilers; LPG vehicles; hybrid petrol / electric vehicles; percussion taps with spray heads; dual-flushing toilets; waterless urinals, hand dryers (in preference to paper or ream towels); LED lighting; high frequency fluorescent ballasts; motion or light sensors for lighting in communal areas; intelligent self-dimming glass; low maintenance (cleaning) flooring, buildings with natural cooling systems, and wind towers to collect wind; rainwater harvesting; solar collectors; small-scale wind turbines, solar hot water heaters.

Note that Students Unions are eligible to apply for grants for renewable technology under the EST's Low carbon buildings programme (www.lowcarbonbuildings.org.uk/home/).

Before committing to any refits or investment, it is always a good idea to check whether your institution has a recommended list of efficient technology. Many Universities employ environmental professionals that happily provide guidance on the most efficient technology. Regardless of this, it is good practice to always state high efficiency as a standard for all refits or alterations.

If planning a new building, it is worth considering that Royal Academy of Engineering has shown that the running costs of an average building are 200 times more than the initial design and build costs!! It is therefore sensible to invest in the most efficient technology that you can afford to save money later. For new builds, contact BREEAM (www.breeam.org/) for best practice advice.

Also note that Part L of the new Building Regulations requires reasonable provisions for the conservation of fuel and power through: a) Limiting heat loss; b) Providing space heating and hot water systems that are energy efficient; c) Providing lighting systems with appropriate lamps and sufficient controls so that energy can be used efficiently; d) Provide sufficient information with the heating and hot water services so that building occupiers can operate and maintain the services in such a manner as to use no more energy than is reasonable in the circumstances.

The Government runs the Enhanced Capital Allowances scheme to encourage commercial investment in efficient technology. Although Unions might not be eligible for the tax rebates, it is recommended that, where possible, Unions invest in the technology detailed in the Water Technology List (www.eca.gov.uk/) and the list of efficient electrical equipment (www.eca.gov.uk/etl/). All the products detailed in these lists are guaranteed to be highly efficient. For more information on Enhanced Capital Allowances, visit www.eca.gov.uk/.

8.4 Baselines

A member of staff should be responsible for obtaining and recording consumption baselines (for electricity, water and gas / heating oil) at least once a month through a formal monitoring procedure. The data should be logged into a spreadsheet.

If this is not possible due to a lack of meters (many institutions get their utilities from their institutions), the long-term plan should be to install meters for all Union premises. Electricity meters cost from around £400 each. Meters are the most important tool in identifying waste minimisation savings. If you can't measure it, you can't manage it! Also, if you are trying to change behaviour, you need to be able to show people that they are making a difference.

If you don't have an electrical meter, all is not lost! A portable analyser can be attached to the outside of your main input wire and data extracted. These devices cost around £200 and can provide you with graphs like the one below (figure 2) that can highlight wastes such as tea urns left on over the weekend,

heating plant coming on unnecessarily, and delays in heat pumps coming on in central heating systems. RCC offer a range of these devices, www.rccgroup.com/product.html. Or try www.sinergy-meters.com.

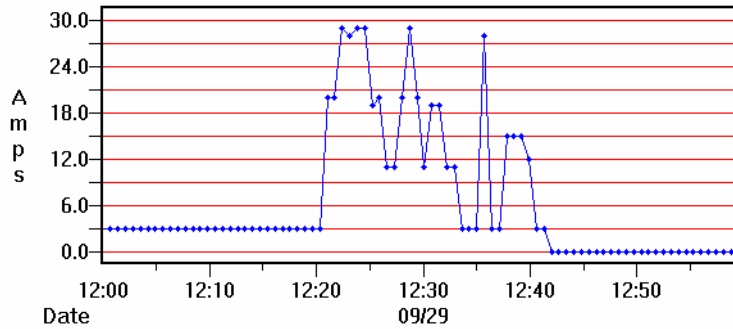


Figure 2: Data obtained from a portable analyser. The data can be used to ensure that equipment has not been left on unnecessarily.

Comparing monthly values from utility bills in a chart should show a **reduced** consumption out of term time, and **reduced** values for electricity and gas in the summer (for an example of this, see figure 3). If there is not a significant decrease, the Union has appliances left on somewhere. Comparing through a chart will also help identify any unusually high values, allowing faults to be identified and fixed before costs build up. If you are going to install meters, consider getting **smart meters** that automatically take readings as regularly as every 30 minutes. You can then examine consumption differences between daytime and nighttime and find yet more wastes. You might be able to benefit from free smart meters and - see about the benefits of being on tariff 00, in section 8.5.

Following this principle, the Union should also record all purchases of consumables (papers, refill pads, printer cartridges, toner, toilet rolls, cleaning materials, paper towels, etc.), the monthly number of photocopies made, and all maintenance records (to help identify any equipment that is unsuitable or consistently unreliable; see section 8.5).

Expenses forms should be amended to record the approximate number of miles travelled on business by car, taxi, train, and plane. As a minimum, the mileage of every company vehicle should be logged every month, as should the volume or value of fuel put into that vehicle. This will enable the average fuel consumption of the fleet to be calculated. In addition, all utility bill payments should be recorded in a spreadsheet to help with the calculation of annual costs.

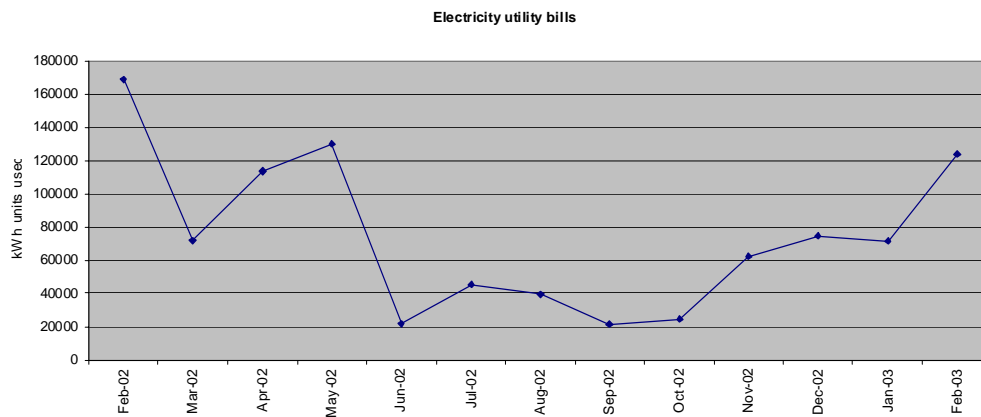


Figure 3 The plotting of monthly electricity meter readings: All utility data should be logged in a spreadsheet every month and compared through a chart. Look for any unusual peaks, evidence of faulty appliances, appliances that have been left on, or leaks.

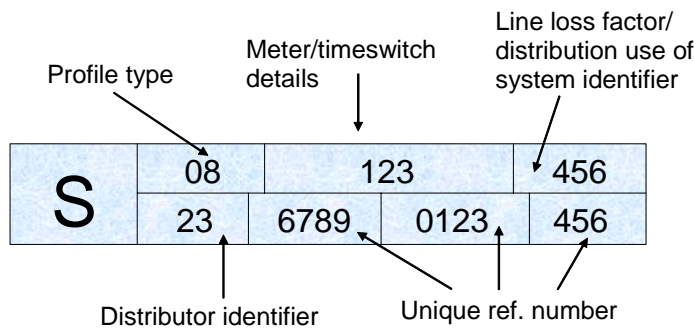
Similarly, the tonnage of waste sent to landfill should be obtained from the weighbridge notes held by your waste contractor. If possible, record how much of each material you collect for recycling. This information will be useful when renegotiating contracts.

The easiest way of extracting and logging all this data is to include finance staff in your waste minimisation team (see section 9.1). Finance staff should be trained to look for anomalies in the data as it is recorded in an attempt to identify faults or leaks. All the data should be fed into an annual waste review (see section 9.3 below).

Over your first year, if you save money, it's a good idea to ring fence it so that it can be used to invest in further improvements. However, given the current increase in energy bills, it might be more sensible to commit to investing 1% or 2% of your energy bill instead.

8.5 Free utility data

If you have your own electricity contract (i.e. not via your institution), get one of your electricity bills and look to see if you have any easy savings. Every electricity bill will have a box like the one below:



The profile types are interpreted as:

Domestic

- 01 - Domestic day
- 02 - Domestic day/night

Less than £6k per year

- 03 - Non domestic day
- 04 - Non domestic day/night

£6k to £20k per year

- 05 - MMD Load Factor < 20% (more expensive per unit)
- 06 - MMD LF 20% to 30%
- 07 - MMD LF 30% to 40%
- 08 - MMD LF > 40% (less expensive per unit)

Free 30-minute readings

- 00 - Half hour metered supplies

Basically there are lots of benefits of being on tariff 00, including far cheaper energy and free meter readings taken electronically every 30-minutes. However, you can only be on this tariff if you have used 100KW or more *at any one time* during three months in the last 12 months (i.e. it is not on total consumption, but linked to your maximum demand). If you have more than one building, you can aggregate your Maximum Demand values for energy tenders, allowing you to be put on profile type 00. If you are on tariff 00, contact your supplier and ask them to make the data available to you - they usually give you a website link where you can view your data. See figures 4 and 5 for an example of what 30 minute data looks like.

The graphs paint a picture of how your organisation manages its energy. For example, big peaks in January and February show that your organisation uses electrical heaters. If your consumption does not

significantly decrease during vacations, your organisation is not in control of its energy use. On a daily graph, the steeper the incline at the end of a day, the better the organisation is at switching equipment off.

If you do get 30-minute data, it is recommended that you continue to read your meters regularly and log the data. This is because the 30-minute data is consumption, rather than meter readings.

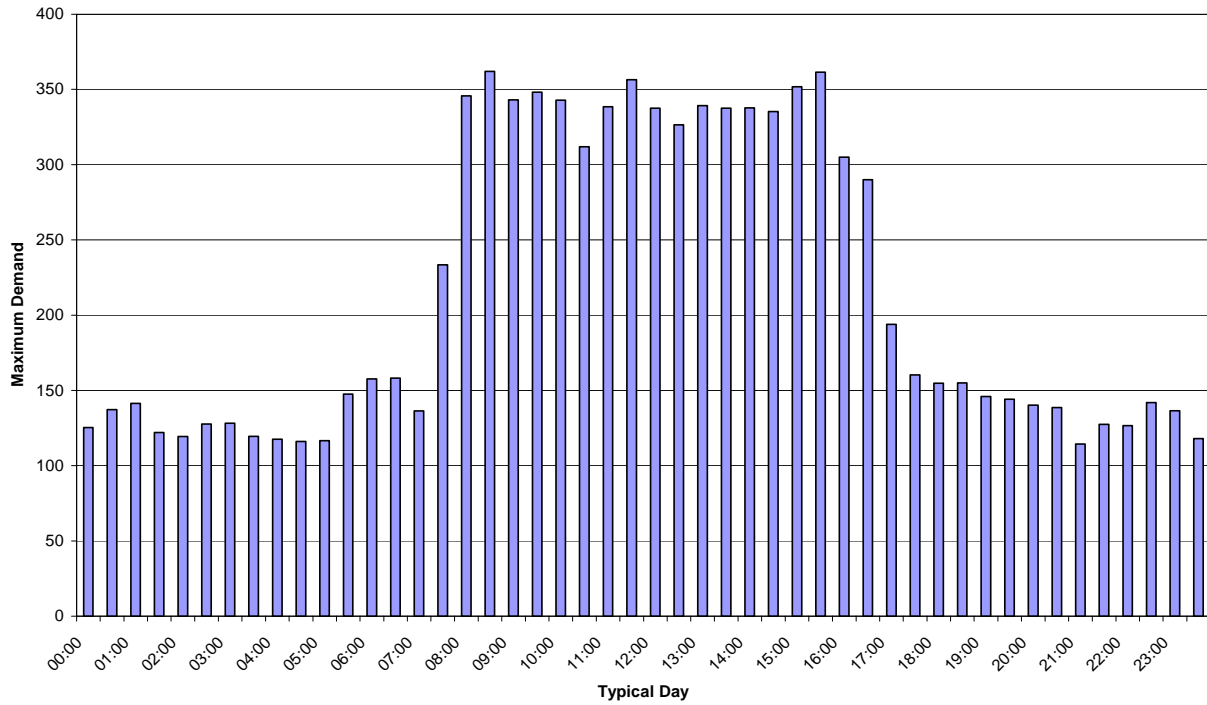


Figure 4 Daily maximum demand data for a large industrial site - as provided through 30m meter readings

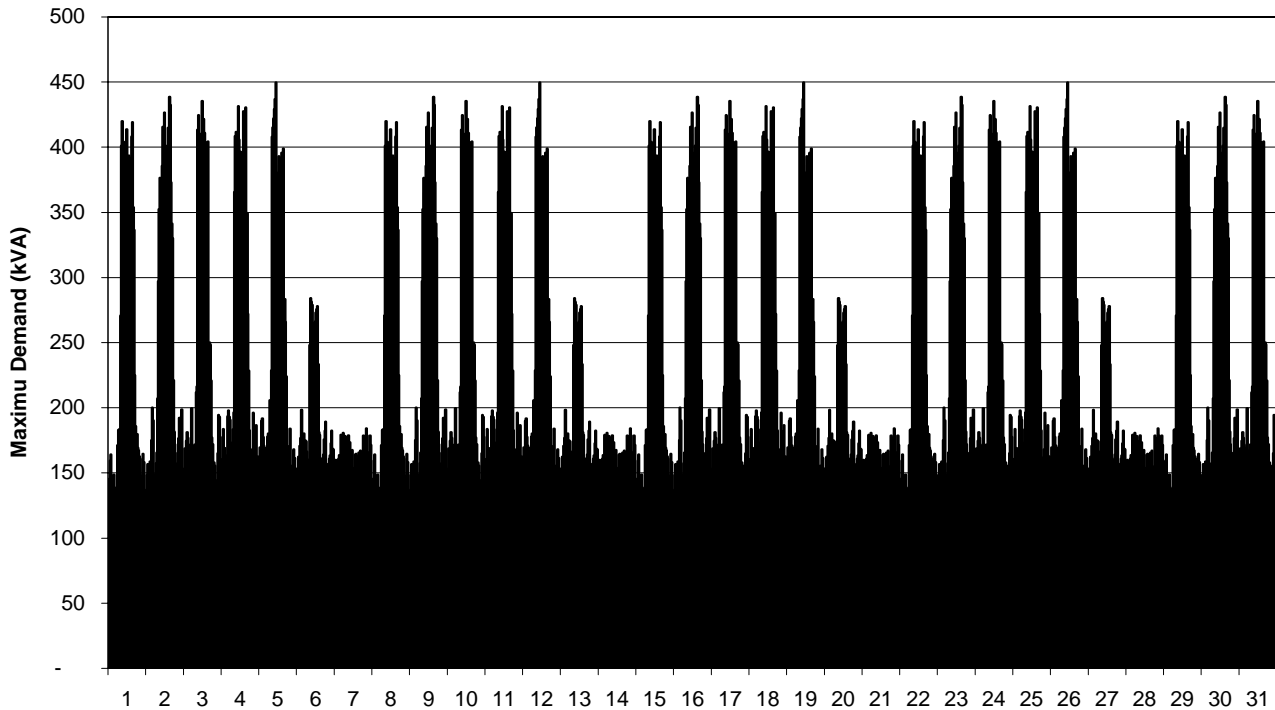


Figure 5 Maximum demand data for a large industrial site - as provided through 30m meter readings. Notice that the data indicates that the building is in use on a Saturday, but not on a Sunday.

A related top-tip is, if you do have your own high-demand meter, make sure that the time is set correctly on it. Very often, the internal digital clock is wrong, which can mean that you can be missing your cheap overnight energy.

8.6 Available supply capacity

This is the amount of electricity you reserve, so that your energy supplier always has enough on tap for you. You will be paying around £1 per KW reserved. If you are on tariff 00, you will be reserving over 100KW per month. The amount you reserve is usually more than you need, and in some instances a lot more - meaning you are wasting cash. Have a look at your maximum demand readings on your bills for the last year and then compare with the ASC that you are paying for. If there is a big discrepancy, contact your supplier to ask to reduce it.

Note that, if you are on tariff 00, the 30-minute data can be really useful in helping you to reduce your ASC. For example, if 10 of your staff switch on 3KW electric heaters at the same time, it will put up your ASC by 30 units, costing you an extra £360 per year ON TOP of the energy they actually use!

8.7 Voltage reduction – the quickest way to save energy

Not one suitable for all Unions, but definitely worth looking into if you can. Electricity is supplied at the standard 240 volts. However, modern electrical equipment is designed to run at 220 volts. Some Universities have brought their supply voltage down to 220 volts and achieved an instant savings of between 4.0 and 7.5 percent without any problems at all. Indeed, because motors tend to work slightly slower / lights are slightly dimmer, it can reduce maintenance and cooling costs as an added bonus! Contact your institution's energy manager to find out if your campus has reduced its voltage. Or if you are a large Union that has its own supply, contact your energy supplier or provider to investigate further. Powerperfector is the brand name of a commonly used voltage reducer.

8.8 Gas bills

Avoid take or pay clauses, whereby you pay for a set volume of gas whether you use it or not.

8.9 Who is accountable for energy use?

It's always a good idea to make a member of staff accountable for energy use - if no one has responsibility, energy use will go unchecked.

8.10 Reviewing maintenance records

All Unions should establish systems that enable them to identify equipment that are unsuitable or are repeatedly unreliable (e.g. types of bulbs that repeatedly blow, ceramic sinks that keep getting broken, etc.). If you can identify these, it is possible to reduce replacement costs, make time savings and reduce solid waste. The best ways of doing this are to establish a maintenance log book, and review it regularly, or set maintenance budgets for the manager of each venue or facility.

8.11 Home working policy

About 10% of the UK workforce work from home. On average, UK companies pay £8,000 per person per year in building and consumable costs (rent, heating, lighting, etc.). Having staff working from home helps **reduce** this cost. A good start is to actively encourage any staff in suitable positions to work from home for one day a week.

8.12 Maintenance schedules

Servicing is essential to maintain expected efficiency. For example, a 2-psi drop in tyre pressure can increase fuel consumption by 3%. This figure doubles with a 1% wheel misalignment. Re-tuning an engine can increase efficiency by 10%. Computerised maintenance schedules should be developed for the servicing of company vehicles, the servicing of heating and ventilation system (including boilers), the defrosting of any refrigerators or freezers, the bleeding of radiators, the de-fragmenting of computers and the cleaning printer cartridges - all as stated in the official maintenance instructions.

Additionally, all taps, toilets and urinals should be checked monthly for leaks, and all lighting should be checked weekly for faults. There should be procedures in place for staff to report any faults.

8.13 Building log book

It's a good idea to create a building log book, containing equipment instructions, maintenance schedules and meter data, so that knowledge can be easily passed on when staff move on.

9 How to get the ball rolling

9.1 Waste team

When trying to save energy, remember that your colleagues are part of the solution, rather than just the problem! Why not invite all staff to suggest ways to save energy through a brainstorming session. A waste minimisation team should be established, with champions or energy wardens. Ideally, the champion will be the non-sabbatical Environment Officer. The best champions are those that can enthuse staff and make them want to do their bit, so offer the role to someone with tact and diplomacy.

There is a charity called Global Action Plan that specialises in helping organisations to motivate their staff to do their bit. For a modest fee, the charity will develop a tailored package for your Union, whether you are interested in tackling waste, energy, water, transport or all of the above. For more information, visit www.globalactionplan.org.uk.

9.2 Waste or energy survey

Any Union employee is capable of carrying out an internal waste audit regardless of their background. Waste minimisation is basically common sense, and there are tools available to help those new to the concept. The waste minimisation team should carry out an initial detailed waste survey to identify any wastes. A survey checklist is available from www.envirowise.org.uk. Alternatively, NUS Services offers both the Sound Impact Awards and Environmental Audits. Visit www.nussl.co.uk for more information

If it specifically energy you are targeting...

- The Carbon Trust offer free Energy surveys for Small to Medium Enterprises. See Section 10 for links.
- A little known fact, but if your Union has its own contract with a commercial energy supplier, suppliers are obligated to help any customers wanting to reduce their bills – so make contact and get one of their consultants to come and visit your Union.

9.3 Waste report and plan

The findings of the waste survey should be detailed and a SMART (Specific Measurable Achievable Resourced Timed) plan developed to minimise waste. The findings should be fed back to staff, and staff should be invited to comment on the findings. The baseline data detailed in section 8.4 should be reviewed annually thereafter.

9.4 Waste policy

The waste minimisation team should develop policies that will reduce waste. For example, for a Union that makes 5,000 photocopies a month, a policy of two-sided photocopying could **save** 30,000 sheets per year, **saving** £150 in paper and £400 in toner and energy savings each year.

9.5 Promotion

The marketing department should be utilised to promote waste minimisation messages to students, staff and visitors. Student Unions have an important role in influencing the decision-makers of the future. They should be communicating what the Union is doing for the environment, and why it is doing it. If the Union is seen to be doing its bit, others will follow the example. Making the communications catchy and interesting to students will help improve uptake.

9.6 Continuous improvement

The best way of maintaining momentum is to employ a member of staff to work on environmental issues, either by extending the responsibility to an existing staff member or by recruiting a specialist. At Lancaster, the Union appointed a part-time paid Environmental Coordinator. The Coordinator has helped the Union develop a SMART environmental policy and environmental management system (see below), and paid for himself in his first year through the savings he made.

9.7 Going for Gold - ISO 14001 or EMAS

ISO 14001 is the most popular environmental management system accreditation. The other well-known accreditation is EMAS. Both are very similar in that the process of gaining accreditation will ensure that the Union is compliant with legislation, has targets to reduce environmental impacts, and has processes in place to meet those targets. The main requirement from the organisation seeking accreditation is a long-term commitment to reducing waste and environmental impacts, usually in the form of an employee with an environmental remit.

The accreditation requires continual input, and is more of a cyclical process than a destination. For more information, www.iso.org/iso/en/ISOOnline.frontpage or www.emas.org.uk/.

10 Links

10.1 Additional support

- www.envirowise.gov.uk. Envirowise is the Government-funded programme that aims to help businesses reduce wastage. On average, businesses using free resources from Envirowise **save £1,000 per employee per year**. Envirowise offer a free CD called 'Getting started: preparing for profits', which contains a wealth of highly useful information. Envirowise also offer Fast Track consultancy visits where professional environmental audits are offered **free-of-charge** to any small-to-medium enterprise (SME).
- www.thecarbontrust.co.uk. The Carbon Trust is the Government-funded programme offering free, impartial help and advice to businesses and the public sector on saving energy. The programme offers the following free services:
 - Tailored support (energy surveys, building design visits, phone advice);
 - Financial incentives (interest free loans to fund energy-efficient equipment);
 - Website with lots of very useful information;
 - Publications (including free wall thermometers, posters, stickers and fact sheets) - visit www.carbontrust.org.uk/energyCMS/CarbonTrust/items/Documents/Publications/Current%20publications%20winter%202005_69.pdf;
 - Training events.
- www.wastewatch.org.uk. Wastewatch the leading waste minimisation charity. Wastewatch is currently running an environmental audit scheme for University institutions.
- www.nusonline.co.uk. NUS runs *Planet Pledge* - a sign-up scheme for Unions that helps develop an environmental policy and team.
- www.peopleandplanet.org. People & Planet run Going Green - a student-facing campaign that helps students encourage their University institution to address environmental issues and recruit staff to work on environmental issues.

- www.nussl.co.uk. In the 2004/05 academic year, NUS Services' Ethical and Environmental Committee will publish a guide called 'A greener Union: A guide to environmental policy and practice'. The guide will cover many of the issues noted in this report. The guide will be available on the NUS Services website, and will be promoted to Unions through Trading News.
- www.greenbusinessnetwork.org.uk or www.businesslink.gov.uk/bdotg/action/home. There is a UK network of waste minimisation clubs.
- www.globalactionplan.org.uk. Global Action Plan is the practical environmental charity that helps people to make positive changes at home, at work, at school and in the wider community. By working together, we make the small changes that have a big impact on the things that matter. We achieve measurable results in the UK by taking action on energy, waste, water and transport.

10.2 Energy efficiency

- www.thecarbontrust.co.uk
- www.energysavingtrust.co.uk
- www.breeam.org/
- <http://esta.kiwi.co.uk/>
- Ex-Or www.ex-or.com/ - energy efficiency consultants
- AES Control www.aes-control-systems.co.uk/ - energy efficiency consultants
- www.danlers.co.uk - manufacturers of lighting and HVAC controls
- Ecofys www.ecofys.co.uk/ - energy efficiency consultants for new builds
- The Building Design database of electrical companies www.buildingdesign.co.uk/elec/eindex.htm.
- www.urbanturbines.com/
- www.thermomax-group.com/index.htm

10.3 Manufacturers of waste-saving devices

Cistermiser www.cistermiser.co.uk

Sava Watt www.savawatt.com

Water saving devices: www.environment-agency.gov.uk/commondata/105385/cwb7_suppliers_876698.pdf

Timeguard www.timeguard.com

10.4 Re-use schemes

- Children's Resource Centres www.childrensscrapstore.co.uk
- Community Recycling Network www.crn.org.uk
- Computers and office equipment: www.computersforcharity.org.uk/; www.computer-aid.org/; www.green-works.co.uk/
- Furniture www.frn.org.uk/
- Mobile phones; toner and printer cartridges:
 - www.cartridges4charity.co.uk
 - www.childadvocacyinternational.co.uk/fundraising/recycle.htm
 - www.helptheaged.org.uk/SupportUs/Donate/Recycling/_mobile_phone_recycling.htm
 - www.lasertech.co.uk/lrp/index.html?PHPSESSID=c2e39e79aae8ec04b009636d0487e6d9
 - www.mobile-phones-recycling.co.uk
 - www.nru.org.uk/
 - www.oxfam.org.uk/what_you_can_do/recycle/phones.htm
 - <http://recyclingappeal.com/rspb/rspb/index.asp>
 - www.recycledmobiles.co.uk/info/info4.htm
 - www.recyclingappeal.com
 - www.tonerdonor.co.uk/

10.5 Recyclers

- www.crn.org.uk/
- www.environ.org.uk/
- www.recycle.net
- www.recycle.mcmail.com/
- www.recycle-more.co.uk/
- www.recyclenow.com/
- www.reducetheuse.co.uk/
- www.rethinkrubbish.com
- www.slimyourbin.org.uk
- www.wasteguide.org.uk/
- www.wrap.org.uk/
- Aluminium drinks cans www.alupro.org.uk/; www.thinkcans.com/
- Batteries www.bbma.co.uk
- Fluorescent tubes www.recycle.mcmail.com/content.htm; www.recyclite.co.uk/;
www.envirogreen.co.uk/services_lamp.html; <http://wastecare.co.uk/tube-care.htm>
- Glass www.berryman-uk.co.uk/; www.wrap.org.uk/dundee%5Fglass/links.htm
- Oil www.recycle.mcmail.com/fats.htm; www.cdoil.co.uk/acorn_map.htm;
www.cdoil.co.uk/waste_oil.htm;
- Paint www.communityrepaint.org.uk/
- Paper www.severnside.com; www.abitibiconsolidated.com; www.storaenso.com
- Plastic www.recoup.org/business/default.asp; www.biffa.co.uk; www.recoveredplastics.com
- Local Authorities www.direct.gov.uk/QuickFind/LocalCouncils/fs/en
- London: www.greenwichgateway.com/envirecycle/; www.londonremade.com/
- Steel drinks cans www.scrib.org/
- Vending cups www.save-a-cup.co.uk
- Wood www.recyclewood.org.uk/

10.6 Recycling bins

- www.treecycler.com
- www.ers-silverbox.com
- www.greenermedia.co.uk
- www.glasdon.com

10.7 Recycled products

- www.greenchoices.org/recycling.html
- www.recycledproducts.org.uk
- Cutouts www.cutouts.net
- www.inkcycle.co.uk
- Paperback recycled office papers www.paperback.coop/
- Recoup www.recoup.org/
- Remarkable www.re-markable.com

10.8 Suppliers of 'green' cleaning products

- www.bio-productions.co.uk
- www.ecolab.com/
- www.simplegreen.co.uk/
- www.earthfriendlyproducts.co.uk

10.9 Positive / ethical products

- NUS Services' ethical purchasing scheme www.forthetheplanet.co.uk

- Epona (currently listed as a NUS Services screen-printer) www.eponasport.com
- Fairtrade Foundation www.fairtrade.org.uk
- Gresham Office Furniture (suppliers of FSC approved timber furniture) www.gof.co.uk
- Student Fairtrade Coalition www.fairtradestudents.org.uk/
- www.zipheaters.co.uk
- www.triodos.co.uk/
- www.co-operativebank.co.uk

10.10 Legal compliance

- www.environment-agency.gov.uk/netregs/?version=1&lang=e
- www.envirowise.gov.uk/envirowisev3.nsf/key/DSUR5YHJEQ

10.11 Environmental management system accreditation

- www.iso.org/iso/en/ISOOnline.frontpage; www.emas.org.uk/

10.12 University projects and contacts

- Environmental Association for Universities and Colleges www.eauc.org.uk
- Higher Education Environmental Performance Improvement www.heepi.org.uk
- Higher Education Partnerships for Sustainability www.forumforthefuture.org.uk
- International Journal of Sustainability in Higher Education
<http://taddeo.emeraldinsight.com/vl=9694041/cl=15/nw=1/rpsv/ijshe.htm>
- University Leaders for a Sustainable Future www.ulsf.org

10.13 Grants

- Business Link www.businesslink.gov.uk/bdotg/action/home
- Energy Saving Trust www.est.org.uk/
- Energy Saving Trust's TransportAction Scheme www.est-powershift.org.uk
- Enhanced Capital Allowances www.eca.gov.uk/
- J4b grants website www.j4b.co.uk
- Energy Saving Trust's low carbon buildings programme www.lowcarbonbuildings.org.uk/home/

10.14 Other

- www.futureforests.com/