CARBON TRUST
Making business sense of climate change

Hospitals

Healthy budgets through energy efficiency

enter

Preface

Reducing energy use makes perfect business sense; it saves money, enhances reputation and helps everyone in the fight against climate change.

The Carbon Trust provides simple, effective advice to help organisations take action to reduce carbon emissions. One of the simplest ways to do this is to use energy more efficiently.

This overview for hospitals introduces the main energy saving opportunities for the sector and demonstrates how simple actions save energy, cut costs and increase comfort for patients and staff.

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Introduction

Improving energy efficiency in healthcare is about making the most of the energy that is used – without compromising the comfort of patients and staff.

The UK's healthcare sector spends more than £400 million per year on energy. Unfortunately, a significant proportion of this is wasted, meaning that money is being wasted too. Implementing a few simple techniques can help to reduce the amount of energy consumed in a hospital, which releases important funds for use elsewhere. Furthermore:

- Energy efficient buildings provide better indoor conditions for patients and staff
- Taking control of energy usage will enable a hospital to achieve mandatory Government targets
- Energy efficiency campaigns can go beyond departmental boundaries, improving general morale
- Hospitals can publicise their energy efficiency achievements, generating a positive image to stakeholders and the local community
- The environment will benefit from reductions in carbon emissions and energy use, which helps to preserve fossil fuels and minimise climate change.

A significant number of healthcare units are already feeling the value of these benefits.

Energy management within hospitals

Achieving energy and carbon savings in hospitals requires strong leadership from the front – ideally by the chief executive and an 'energy champion' at board level. Demonstrate commitment through:

- Publicly endorsing the organisation's energy policy
- Empowering staff to take action
- Encouraging a willingness to explore energy saving opportunities.

Strong commitment from the top underpins all energy saving initiatives undertaken throughout the hospital.

Who is this publication for?

Focusing on low and no-cost measures with quick paybacks, this overview will help facilities and energy managers to:

- Assess the potential for energy savings and indicate key areas for improvement
- Raise awareness and motivate action across the whole site
- Prioritise activities to maximise savings.

Carbon Reduction Commitment

The Carbon Reduction Commitment (CRC) Energy Efficiency Scheme is an emissions trading scheme aimed at reducing carbon emissions in large non-energy intensive organisations by 1.2 million tonnes of carbon per year by 2020.

It is a mandatory scheme, targeting emissions currently not included in the EU Emissions Trading Scheme or Climate Change Agreements, and will apply to organisations that used more than 6,000MWh of electricity through half-hourly meters during 2008.

See our website for more about CRC

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Energy consumption

Energy consumption in hospitals is growing steadily. Electricity already accounts for over 50% of a hospital's energy costs and with the increased use of specialist medical equipment that generally relies on electricity, consumption is set to increase.

There are still many opportunities to achieve energy and cost savings just by implementing a few basic measures. The chart on page 5 details where the biggest savings can be made: in heating, hot water, lighting, ventilation and the effective use of electrical equipment.

In each of the key consumption areas identified in the chart above, there are three main opportunities to save energy.

Switching off – all energy-consuming equipment should be switched off when not required. This can be done manually by staff or automatically with special devices.

Maintenance – a number of energy efficiency measures can be carried out as part of routine maintenance procedures at no extra cost.

Refurbishment – energy saving measures taken when planning major refurbishment can be extremely cost-effective.

Specialist help

Enco$_2$de 2006 and its accompanying CD-ROM is the primary guidance on energy efficiency in NHS healthcare facilities. It provides a one-stop shop for all issues relating to the procurement and management of energy in the NHS. Enco$_2$de is not prescriptive and draws together best practice guidance so that healthcare organisations can determine a way forward that best suits their situation.

Enco$_2$de is funded by the Carbon Trust and written by the Building Research Establishment (BRE) as a collaborative project between the Department of Health, NHS Scotland Property and Environment Forum, Welsh Health Estates and Northern Ireland Health Estates.

This publication and its accompanying CD-ROM is available from TSO (The Stationery Office). Visit www.tsoshop.co.uk for ordering information.

NHS trusts in England and all UK Government departments can download core guidance (HBNs, HTMs etc) from the Estates Knowledge and Information Portal (KIP).

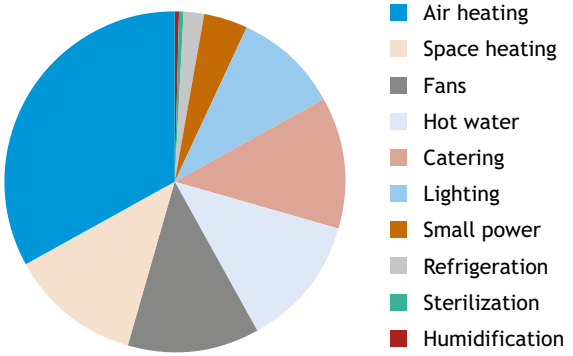
A free synopsis is available to download from the Carbon Trust website: Health Technical Memorandum: Enco$_2$de (CTC605).

There are various other Government-funded schemes that offer specialist support to healthcare organisations seeking energy saving opportunities and guidance on appropriate actions. Contact the Carbon Trust for more information.

The European Energy Performance of Buildings Directive (EPBD)

This Directive promotes improvement in the energy performance of buildings, taking into account outdoor climatic and local conditions as well as the internal environment and cost-effectiveness. The Directive requires hospitals with floor areas over 1000m^2 to produce and display energy performance certificates in a prominent and public location.

Figure 1 Energy consumption in a typical hospital, by end use



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Opportunities for energy saving

There are many energy saving measures that hospitals can implement without affecting patient comfort or well being.

Heating and hot water

Eliminating energy waste does not have to compromise patients' comfort.

Most managers recognise the importance of having an effective heating system to keep patients and staff comfortable. A good heating system is an efficient one and it is often possible to reduce energy wastage whilst improving internal comfort conditions at the same time.

Costs can be reduced by setting appropriate temperatures and ensuring that heating equipment and controls are operated and managed correctly. In fact, it is possible to save up to 30% on heating costs through the implementation of some simple energy saving measures.

Biomass heating

The guidance on the Carbon Trust website can help you evaluate the effectiveness of implementing biomass at your site.

Tell me more about biomass.

Heating

Obtain feedback

Encourage staff to report any areas that are too hot, cold or draughty. Investigating problem areas can help to identify maintenance issues. If these issues are addressed, staff and patients are less likely to adjust the temperatures by opening windows whilst heating or cooling is on, or bringing in portable electric heaters or fans.

Maintain appropriate internal temperatures

Temperature settings should reflect the activity taking place in the area. A good starting point is to know the recommended temperatures for specific areas in hospitals and these are outlined in the table below.

Room type	Temperature °C
Bedheads/wards	22–24
Circulation spaces/wards	19–24
Consulting/treatment rooms	22–24
Nurses' stations	19–22
Operating theatres	17–19

Source: CIBSE, Heating Guide B1.

Remember

Patient welfare comes first, so seek further guidance before turning the heating down.

Check controls

Some signs of poor control in hospitals include:

- Heating being on in unoccupied areas, because timers are not set correctly
- Heating being on too high or not high enough, because the thermostat is located where sunlight, draughts, radiators or equipment affect the reading
- Thermostats being set to maximum, because staff believe this will make the space heat up faster. It does not; it simply results in overheated space.

Check controls thoroughly and regularly. Ensure system operating hours match the times when heating, ventilation and cooling are required, as needs vary throughout the day. Fit simple time switches in smaller spaces, such as treatment and consulting rooms, to automate this process.

It is important to ensure time settings are reviewed every month or so to check that they are correct. Many systems function inefficiently because someone made a short-term adjustment and then forgot about it – for example, in waiting areas of specialist wards with occasional extended hours. Although heating or cooling may be required during these extra hours, building services (such as heating, ventilation and lighting) should be set so they revert back to normal operating times outside these periods to minimise energy wastage.

Zoning

Hospital buildings frequently have areas with different time and temperature requirements such as in waiting areas or individual private rooms. This can be problematic where only one overall heating or cooling control system exists. In this instance, consider dividing the area into zones with separate controls for heating (other systems such as lighting can also be zoned in a similar way). As well as saving money, the extra control often results in increased comfort for patients and staff. See the Carbon Trust's Heating control guide (CTG002) for more information.

Keep the heat in

Easy access to hospitals is imperative at any time of day or night. However, open doors allow warmed air to escape and cold air to enter. The thermostat then senses a temperature decrease and automatically switches on heating which may be unnecessary. The same happens with cooled air in warmer months. Try to keep external doors open only when absolutely necessary. Alternatively, install automatic doors or a draught lobby, particularly in frequently used building entrances. Lobbies should be large enough to provide unrestricted access and enable one set of doors to be closed before the other is opened. Where possible, the two sets of doors should have automatic control to increase ease of access and help keep heat in.

Investigate CHP

The Carbon Trust can help you find out if combined heat and power is suitable for your site with our range of tools, guides and advice.

Is CHP right for me?

Keep systems clear and unobstructed

Make sure any radiators and vents are not obstructed by furniture or equipment and keep any filters clean. This ensures better circulation of heat into the space and reduces the energy required to meet the heating demand.

Maintain boilers and pipework

Have boilers serviced regularly by a reputable firm or maintenance contractor. Gas-fired boilers should be serviced once a year; oil boilers twice a year. A regularly serviced boiler can save as much as 10% on annual heating costs.

Boilers, hot water tanks, pipes and valves should be insulated to prevent heat escaping. Payback can usually be expected within a few months of installation, with additional savings in subsequent years.

More information is available in the Carbon Trust's technology overview of Low temperature hot water boilers (CTV008).

Localise control

A thermostatic radiator valve (TRV) is a simple control valve with an air temperature sensor, used to control the heat output from a radiator by adjusting water flow. Correctly fitted and operated, TRVs can provide efficient temperature control in areas which have different usage patterns, such as treatment and consulting rooms.

Upgrade controls

Many existing systems have old, inefficient time controls. Upgrading them is worthwhile as they can pay for themselves very quickly through savings on energy bills.

Sophisticated heating systems can adjust themselves in line with the changeable UK weather. A compensator is a form of control for heating systems that automatically regulates the heating temperature based on the weather. An optimum start controller learns how quickly the building reaches the desired temperature and brings the heating on at the optimum time prior to building occupancy, again depending on the weather.

These types of controls can save thousands of pounds and will pay back their investment in just a couple of years. Consult a qualified heating technician to discuss the range of options available.

Consider combined heat and power (CHP)

In an appropriate application, CHP can reduce a hospital's energy bill by around 20–30%. Hospitals are good candidates for CHP due to their year-round demand for heat. Further information is provided in the CHP section on page 27.

An example of a draught lobby

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Hot water

Water costs within a hospital can be considerable and this is made worse when hot water is wasted, as the energy used to heat it has been wasted too. However, water is a metered and controllable resource and it is possible to save a significant amount of water simply by implementing some inexpensive efficiency measures. Conservation of water also reduces the pumping requirement, which saves energy and reduces carbon emissions.

For further tips on saving energy in hospital laundries, see page 24.

Consider water-saving devices

The largest area for potential savings is through the installation of water-conserving devices such as:

Tap restrictors – these provide equal flow at a number of taps in a washroom and can reduce water flow by 15%.

Push taps – these only operate when pressed, turn off after a brief time period and are ideal for areas where taps may be left running.

Shower regulators and water-efficient showerheads – these decrease the volume of water coming out of a tap or shower and can reduce water flow by 20%.

Infrared controllers – these provide water only when required, switch off automatically and can save between 5 and 15% of water per tap per year.

Supply efficiently

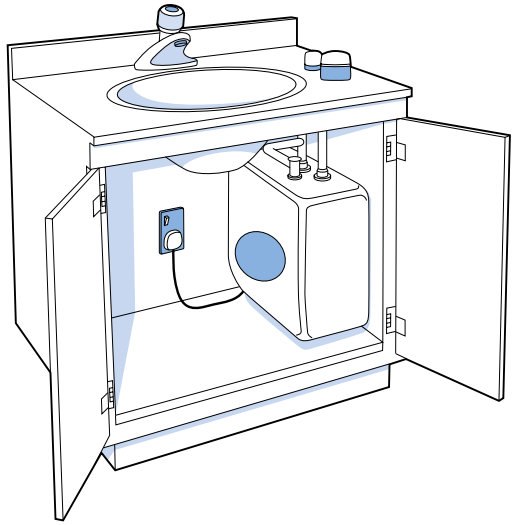
It is inefficient to supply isolated and infrequently used hot water taps from a central hot water storage tank because of heat loss from long pipe runs. Consider installing a point-of-use instantaneous water heater in such cases. These can be extremely economical where hot water demand is intermittent, yet essential such as for hand washing in administrative areas.

Regular maintenance for optimum performance

Maintain water services including taps, storage facilities and pipework on a regular basis and ensure all drips are fixed immediately. Check for water vapour, flooded ducts and corrosion around joints or fittings on pipework.

Run an awareness campaign

Encourage staff to report any issues such as dripping taps, overflowing cisterns and inefficient water-saving/flushing devices in toilets so they can be repaired before the problem escalates.



Point-of-use water heater

Top tip

Taps and toilet flush mechanisms fitted with infrared controllers are a particularly good idea because they also reduce the opportunity for the spread of infection.

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Ventilation and air conditioning

In modern hospitals, ventilation can account for more than 30% of total site energy consumption. Although an integral part of hospital design, it is possible to reduce the amount of energy that ventilation systems consume by focusing on some key energy saving opportunities.

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Ventilation is especially important in hospitals – it is required not just to combat heat gains from lighting, staff, patients and specialist equipment but, more importantly, to provide high air change rates in operating theatres and on the wards to help eliminate airborne bacteria.

Some of the actions below will assist in simply cooling the premises while others will provide air changes.[1] It is important to remember that a certain level of ventilation for infection control is vital in healthcare buildings. Always seek advice from an expert technician or microbiology department before implementing any major changes.

Take advantage of natural ventilation

As simple as it sounds, natural ventilation and cooling relies on natural airflow between openings on opposite sides of a room or building – or rising warm air being replaced with cooler air sucked in through windows or vents. It may be possible to use windows and doors to provide good levels of natural ventilation in some areas within a hospital, allowing mechanical ventilation to be switched off or turned down to save money. When opening vents, doors and windows, always consider security implications.

Safety first – ventilation systems

The use of ventilation for infection control is paramount so always seek professional advice before making alterations to systems.

Ventilation systems for clinical areas in hospitals differ from those in most commercial buildings in one critical respect: they must use full fresh air with no recirculation. This can create very high energy demands and is expensive to operate.

It is therefore important to distinguish between separate non-clinical areas such as administrative rooms which do not have this constraint, as some further energy efficiency measures may apply to these. In general, air should flow from clean to neutral to dirty areas within a hospital, and outlet grilles should be sited at locations that do not present a health and safety risk.

[1] The true definition of an 'air conditioning system' is one which has the ability to control temperature, humidity and air quality within precise limits, yet the term is often applied to systems which simply cool the space. These cool air systems are more correctly referred to as 'comfort cooling'.

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Set a 'dead band'

Do not let heating and cooling operate at the same time. This can be avoided by setting a temperature 'dead band' – a wide gap between the temperatures at which heating and cooling cut in. For example, in a hospital ward, the heating may be set to switch off when a temperature of 19°C has been reached and cooling would not come on until the temperature exceeds 24°C. See *Figure 2* below.

Maintain system components

Energy consumption can increase by up to 60% if regular maintenance is not undertaken. Dirty or faulty fans, air ducts and components directly affect system efficiency and will increase running costs and risk of breakdown. The performance of the whole system should be reviewed annually and replacement parts ordered as necessary. Always consult a maintenance technician.

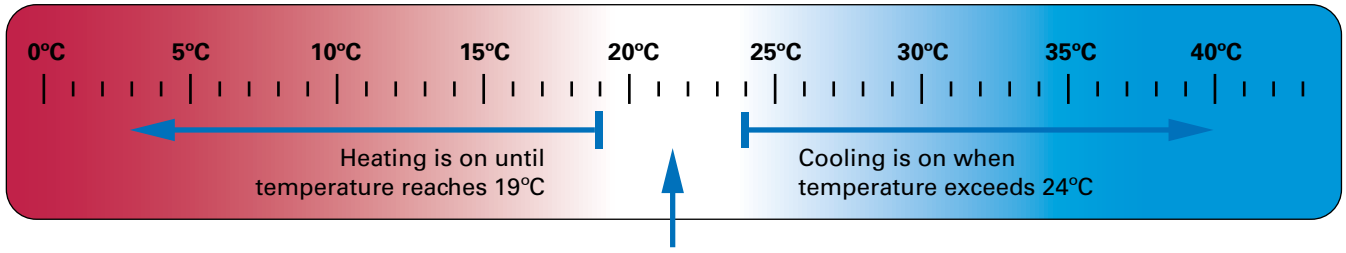
For more detailed technical advice, refer to Enco$_2$de 2006 (see page 4 for more details).

Mixed mode systems

Some hospitals use what is known as a 'mixed mode' system, which uses a combination of both natural and mechanical systems. The building uses natural ventilation, heating and cooling where possible, with mechanical systems being used only when needed. There are various advantages to such a system:

- The building becomes more adaptable to a wide range of requirements
- The occupants have more control over their environment
- Hospitals can cut down on energy spend and carbon emissions.

Figure 2 ***Diagram of 'dead band' control providing recommended temperatures***



Heating and cooling both off between 19°C and 24°C — a 'dead band' of 5 degrees

Case Study

What are other hospitals doing?
Freeman Hospital in Newcastle

Ventilation systems serving 11 operating theatres were being run at either full or standby rates for 24 hours a day. Proposals to reduce the plant run time were put forward. Unlike other, older hospitals in the district, the Freeman has modern, purpose-built theatre suites and this encouraged ventilation to be switched off when not required, rather than to a 'standby' level.

The ventilation plant was linked to the BMS and fitted with passive infrared (PIR) detectors. At night, the plant is now switched off and the BMS switches it back on if required (i.e. if people are present). The cost of the project was around £20,000 and benefits have included a reduction in electricity consumption and boiler fuel, leading to financial savings of over £17,000 per year.

Further information

Find more information in the Air conditioning technology guide (CTG005), available from the Carbon Trust.

Variable speed drives (VSDs)

Fans do not need to operate at full speed all of the time and variable speed drives (VSDs) can help to reduce costs by enabling the output speed of the fans to match requirements at different times of the day. This reduction in speed saves energy and there are corresponding heating and cooling cost savings too. For more information, see the Carbon Trust's technology guide on Variable speed drives (CTG006).

Building Energy Management Systems

A Building Energy Management System (BMS or BEMS) is based on a network of controllers and offers closer control and monitoring of building services performance, including heating, ventilation and air conditioning. This is shown on a computer screen in real time and allows settings to be changed quickly and easily. BEMS can reduce total energy costs by 10% or more so they are well worth considering.

Myth

Turning air conditioning thermostats as low as they can go cools the building more quickly.

Reality

The temperature drops at the same rate but then overshoots, using more energy than necessary and creating discomfort for staff and patients. If controls are not coordinated, the temperature could even go low enough for the heating system to be switched on. Both systems then operate at the same time.

Remedy

Set thermostats correctly and educate staff to dispel this myth. As a last resort, protect thermostats to prevent tampering, where possible.

Top tip

To save money and increase comfort, it is better to reduce the amount of heat produced in an area than to raise ventilation rates. If you are concerned that your system is not operating correctly, or if staff or patients complain about draughts from ventilation fans, talk to your maintenance technician.

Did you know?

Fan power requirements are high in buildings that are poorly insulated and draughty because of the need to distribute larger volumes of air. Improving insulation can help to reduce this need. See the Building fabric section on page 25 to find out more.

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Case Study

What are other hospitals doing?
Hammersmith Hospitals NHS Trust

With a current annual energy bill of over £6 million and annual emissions of more than 43,000 tonnes of carbon dioxide, the Hammersmith Hospital's NHS Trust is continuing to work with the Carbon Trust to cut its carbon emissions by 15% by 2010. Current initiatives aim to reduce energy costs by over £0.5 million and 3,540 tonnes of carbon dioxide within two years.

The energy saving initiatives being implemented include a programme of continuous commissioning, installing variable speed drives and high efficiency electric motors, along with automatic lighting controls. These schemes follow on from two years of successful work aided by the Carbon Trust which have seen the hospital's annual emissions of carbon dioxide reduced from 49,600 tonnes in 2003/04.

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Lighting

Effective lighting is essential for healthcare staff to carry out their work properly, yet it is possible to achieve significant savings in this area and improve the quality of the lit environment.

Lighting can account for over 20% of the total energy use or over 35% of the electricity used in a typical hospital. Good lighting design can reduce costs and have the added benefit of decreasing internal heat gains, thus reducing the need for air conditioning too.

The lighting of healthcare buildings requires specific knowledge of a wide range of light sources and lamp types. Normal standards and methods of lighting may not be appropriate. If in doubt, always seek professional advice before making drastic changes to a lighting system.

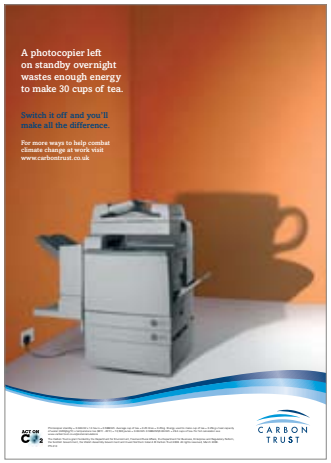
'Switch off' policy

Involve all staff in making energy and cost savings. As part of an awareness campaign, conduct regular meetings, place stickers above light switches and put posters up in the staff areas.

Make a member of staff responsible for going around at set times during the day to check lighting. For example, a morning check would include making sure that external lights are switched off, if there is sufficient daylight.

Examples of posters and stickers available from the Carbon Trust

PFL308



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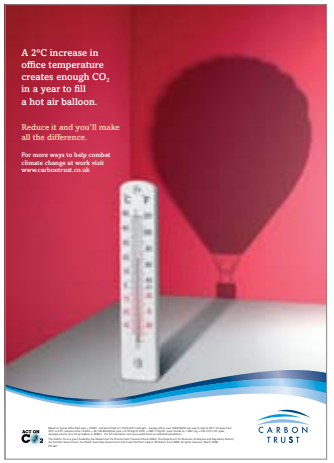

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PFL313

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PFL338

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Label light switches

Help staff to select only those lights they need by labelling light switches. As part of general policy, lights in unoccupied areas should be switched off but remember to consider health and safety implications, particularly in corridors and stairwells. Key areas for security lighting include pharmacy drug stores, laboratories and residential accommodation.

Maintenance

Without regular maintenance, light levels can fall by 30% in 2–3 years. Keep windows, skylights and light fittings clean. Replace old, dim or flickering lamps and keep controls in good working order by ensuring timers are set correctly and that any occupancy sensors are clean.

Encourage staff to report maintenance issues. This will help maintain the desired light output and, in turn, provide a safer, more attractive environment for both staff and patients.

Top tip

Lighting design is complex and many of the examples given here are general guidelines, appropriate for reception areas and other common rooms in healthcare units. Some tips will not be appropriate for specialist areas, so always seek advice before making any changes to the lighting in your hospital.

Install low-energy lighting

Upgrade lights to the most efficient suitable options. For example, any 'standard' tungsten light bulbs can be upgraded directly to energy saving compact fluorescent lamps (CFLs) which use 75% less energy, produce less unwanted heat and last 8–10 times longer.

Replace blackened, flickering, dim or failed fluorescent tubes with triphosphor coated ones. This is stated on the packaging. Triphosphor coating provides a more natural, brighter light for the whole life of the tube. If the tubes are 38mm (1.5 inch), replace them with slimmer 26mm (1 inch) tubes.

Specify high frequency fluorescent lighting systems and mirror reflectors whenever fluorescent lighting is to be replaced. This should be included in the hospital's purchasing policy. High frequency tubes reduce energy use and heat output, eliminate flicker and hum, extend lamp life (by up to 50%) and can allow dimming – all of which can make a ward more comfortable.

Always consult a qualified lighting technician before upgrading lighting systems and specify lighting that appears on the 'Energy Technology List' to ensure it is efficient. Visit www.eca.gov.uk/energy to find out more.

Sensors can achieve savings of up to 30% on lighting costs

Examples of modern, attractive low-energy bulbs – trial a few different types to see which best suit your premises

Did you know?

Good housekeeping can typically save 10% on energy bills.

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Switching in parallel

Hospitals tend to have a lot of windows, particularly on wards and in consulting areas. This provides a good opportunity to maximise daylight. Wire lights so that those closer to the windows can be switched off, while the rest remain on with separate controls. This is called 'switching in parallel' and enables staff and patients to make the most of natural daylight, which is usually preferred. As a result, less lighting is used, reducing energy consumption and additional heat generated by the lights which, in turn, means that less cooling is required.

Myth

It is better to leave fluorescent lighting on as starting it up wastes more energy than if it remains permanently switched on.

Reality
Fluorescent tubes use only a few seconds worth of power in start-up – therefore, energy is always saved by switching it off when leaving a room.

Occupancy sensors

Occupancy sensors ensure lights only operate when there is somebody there to require them. These are especially useful in, for example, the following spaces:

- Intermittently used office areas
- Toilets and washroom facilities
- Storerooms
- Areas where lighting is zoned.

Occupancy sensors can also be used to lower light levels in corridors at night time, which can be an effective cost-saving measure. However, it is imperative to maintain minimum light levels so as not to compromise health and safety standards.

Occupancy sensors may not be appropriate for wards and in patient rooms where people may not be moving frequently enough to be detected.

More information on lamps, lighting gear and controls can be found in the Lighting technology overview (CTV021), available from the Carbon Trust.

Top tip

Always make the most of natural daylight. Research indicates that increased daylighting in patient rooms may ease post-surgical pain, decrease the use of pain medication and reduce the length of stay.

Case study

What are other hospitals doing?

Maintenance staff at **Blackburn, Hyndburn and Ribble Valley Health Care NHS Trust** noticed that the lights in sluice rooms tended to be left on when nobody was around. To combat this, they replaced traditional switches with intelligent lighting that incorporates passive infrared and motion detection. Lights now come on when someone enters the room, but go off if no motion is detected after a preset period. This measure not only saves energy, but helps to prevent the spread of disease because staff no longer need to touch switches. Similar systems have been installed in some corridors too.

St Charles' Hospital in London, managed by the Parkside NHS Trust, knocked £1,200 a year off electricity bills by installing a microprocessor controlled lighting system in the main corridors. Each controller sets the light level depending on the amount of natural daylight available. At night, light switching is controlled by presence detectors. The system is also linked to the fire-alarm system so that lights respond to emergency situations. This measure was introduced during refurbishment and cost no more than a traditional lighting scheme.

Office and small power equipment

Office and small power electrical equipment can account for more than 10% of total electricity use within healthcare organisations.

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Office and IT equipment is widely used in hospitals, particularly in reception areas. Other common small power appliances include equipment in on-site staff residences such as kettles, electric cookers, toasters, microwaves and other electrical appliances including vending machines, televisions, stereos, vacuum cleaners and washing machines.

Turn off and power down

Where equipment is left on unnecessarily there are opportunities to make significant savings. Switch off all equipment when not in use and enable power-down modes. This reduces the energy consumption and heat produced by equipment, lowering cooling costs and improving staff and patient comfort. The lifespan of this equipment will also be extended, the risk of breakdown reduced.

Seven-day timers

These only cost a few pounds from most DIY stores but reduce the likelihood of machines being left on out of hours. They can be fitted to photocopiers, printers, drinks and vending machines. Check with your equipment supplier first about any service agreements particularly in vending machines (see the top tip below).

Maintain equipment

Check and clean all heat-emitting equipment regularly, including keeping filters free of dust. This is not just to improve cleanliness and appearance; dirt can reduce the effectiveness of apparatus and affect its cooling down process. Seek advice from the manufacturer on servicing schedules in order to maintain optimum efficiency.

Top tip

Switch off vending machines at night in areas of the hospital that are unoccupied. Leaving them on 24 hours a day costs around £120 a year per machine. Fit a simple time switch and save around 30% of this cost. NOTE: do not switch off vending machines containing perishable items and check service agreements before taking action.

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Reduce the risk of an area overheating

Place heat-emitting equipment such as printers and photocopiers in a separate, naturally-ventilated area with good airflow. This helps prevent overheating, removes potential emissions from the equipment and reduces noise.

Purchase for your requirements

With healthcare units under increasing pressure to spend budgets wisely, it makes sense to work out the whole life cycle cost of the item, that is the capital cost plus the running costs in energy over the lifetime of the equipment. Slightly higher costs of some energy efficient equipment can often pay back very quickly. This could be an important policy point for the hospital's procurement department, which may only consider the capital outlay in its decisions.

More information about simple actions and purchasing can be found in the Office equipment technology overview (CTV005), available from the Carbon Trust.

Remember

Ensure all staff are aware of switch-off policies and inform them of the cost and environmental benefits of doing so. It is important to get policies endorsed by senior management so that they are not purely seen as an 'Estates issue'.

Further information

The Carbon Trust has a broad range of publications on saving energy aimed at all levels of experience. Contact the Carbon Trust on 0800 085 2005 for further details or visit www.carbontrust.co.uk/publications.

Case study

What are other hospitals doing?

The typical annual running cost of a PC with a traditional screen is around £30, as opposed to just £9 for a PC with an LCD flat screen. One NHS trust energy manager persuaded its Board to adopt a new policy which states that when equipment is being replaced, it must incorporate a flat screen. This saves on electricity and cuts heat emissions, reducing the need for comfort cooling. The flat screens are also more popular with users because they allow flicker-free viewing.

Catering

Water and energy usage in hospital catering departments are areas that can offer major cost savings without compromising hygiene or resources.

Efficient catering facilities can reduce the energy requirement per meal by as much as 40%. Managing consumption can have additional benefits of improving the quality of the food produced as well as the working environment for kitchen staff.

Did you know?

Simple actions arising from raising awareness could reduce energy use by 25%.

Raise awareness amongst kitchen staff

- Do not switch on too soon — most modern catering equipment reaches optimum temperature quickly. Label equipment with its preheat time and educate staff to switch on only when required
- Avoid using catering equipment to warm the kitchen space on staff arrival — the hospital's heating system should do this effectively. If it does not, find out why
- Switch off grills, fryers and hobs immediately after use
- Avoid overfilling saucepans and kettles, and use lids where possible
- Keep fridge and freezer doors closed and defrost at manufacturers' recommended intervals to save energy and prolong equipment lifetime
- Switch off equipment, lights and extraction fans when they are not being used.

Purchase equipment with running costs in mind

Although gas-fired equipment is often more expensive to buy than electrical or steam equivalents, savings made on running costs make it an attractive option. Equipment that automatically switches off, such as pan sensors on hobs, can save 25% on energy costs. Select ovens with large, double glazed viewing windows to reduce the need to open doors to inspect contents.

When purchasing any domestic-sized catering equipment such as fridges, freezers or dishwashers, always look for the most efficient 'A' rated models using the European A-G efficiency label.

Consider heat recovery

Large volumes of warm air are expelled from kitchens. Many kitchen managers do not realise that over 50% of this heat can be recovered using heat recovery devices which can significantly reduce energy costs. An air-to-water recovery device is often the most effective method of recovering heat because it can then preheat hot water, providing a year-round use for the recovered heat.

Maintain kitchen extract ventilation

Ventilation units and extractor hood grease filters should be kept free from dust and grease and cleaned at regular intervals, as recommended by the manufacturer. Regular cleaning of ventilation systems can increase efficiency by as much as 50% compared with unmaintained systems. There is also a reduced risk of breakdown.

Monitor with submeters

Submetering kitchen areas can provide an extra incentive for staff to be efficient, by showing how energy is used in this facility and how subsequent efforts have paid off. Catering in hospitals is often outsourced so there is the additional benefit of allowing for budget allocation and charging to take place. Submeters are discussed further on page 31.

Case study

What are other hospitals doing?

One Trust in central England tested out insulated 'hot boxes' as replacements for traditional, electrically-heated food trolleys. After making a few minor adjustments to working routines, it was possible for food to reach patients at the correct temperature without the need for trolleys. The trust withdrew 33 traditional trolleys at a saving of almost 145,000 kW per year, and at 7p/kWh, that is over £10,000 per year.

Specialist equipment

The specialist nature of a hospital environment means that there is a significant amount of energy-intensive equipment, such as medical fridges, mortuary and pharmacy cold stores, laboratory equipment, and X-ray machines.

Each speciality area will have a wide range of apparatus. Because each item requires careful evaluation, and because of the potential risks to the welfare of the patients, this publication does not provide in-depth guidance on this topic. However, careful purchasing, along with maintaining good housekeeping practices can generally keep consumption to a minimum, as detailed in the action points below.

Top tip

Ensure X-ray machines, film processors and other significant, individual pieces of equipment are switched off when not required.

Portable medical equipment

While being both convenient and cost-effective, portable medical equipment can cost hospitals in terms of energy use. Fortunately, energy performance can be tackled in several ways:

Establish a purchasing policy
Choosing the most efficient equipment will reduce energy use and heat gains.

Raise awareness of energy management techniques
Encourage staff to switch off devices when they are not being used, or to make use of built-in standby or power-down modes.

Building design
Deal with heat gains generated by medical equipment in the context of the building's overall design strategy. For example, instead of installing air conditioning for an entire department, consider local comfort cooling that can be used as required.

Refrigeration equipment

The energy consumption of refrigeration equipment can be reduced by:

Defrosting
Follow the manufacturer's recommendations to save energy and prolong the lifetime of equipment.

Maintenance
Check door seals on cold rooms, fridges and frozen stores and replace if damaged. Keep condensers and evaporator coils clean and free of dust and check systems have the correct amount of refrigerant.

Temperature control
Maintain correct temperatures on cooling equipment and avoid over-cooling. Keeping refrigerated equipment at the correct temperature is better for the stored contents and for cost savings. Energy consumption by refrigeration equipment can be reduced by 2–4% if the set cooling temperature can be increased by 1°C. Set the temperature based on manufacturer's recommendations.

Medical gases

Where medical gases are supplied in bottles or other storage vessels and connected to manifold systems, they have a negligible impact on energy use. However, medical compressed air, medical vacuums and anaesthetic gas scavenging, all use pumps and compressors which consume a significant amount of energy. Consider the following actions:

- Selecting plant and equipment using whole-life costing techniques
- Monitoring (but not controlling) plant operation via a Building Management System to identify unexpected usage and highlight possible problems
- Providing localised systems for applications such as dentistry, medical physics, laundry and sterilisers to minimise distribution energy and potential leakage.

Sterilisation and disinfection departments

To operate effectively, sterilisation and disinfection departments require equipment that is particularly energy-intensive. As packing areas need to be kept particularly clean, the ventilation to this department is filtered by high-efficiency particulate air (HEPA) filters and usually air-conditioned. In order to minimise energy consumption, consider:

- Using cascade systems where conditioned air from the cleanest space (packing) flows to neutral then to dirty areas
- Using heat recovery in these areas as heat is often emitted 24 hours per day
- Choosing sterilising and disinfecting equipment on the basis of energy usage as well as performance – energy usage and whole-life cycle costs can differ widely between manufacturers
- Insulating sterilizer bodies and pipework connections, valves, flanges and so forth, to minimise standby losses
- Metering the department for each utility and specifying individual energy metering for each major washer and steriliser.

Case study

What are other hospitals doing?
East Cheshire NHS Trust

Compressors that served the medical gas system (to operate ventilators and air tools) dated back to 1984 and needed to be overhauled. This would have cost around £2,000–£3,000. The energy manager ran a test on the system to find out the typical usage and discovered that although the maximum requirement for compressed air was 8 L/s, the compressors were sized to deliver 45 L/s. Therefore, the compressors were constantly switching on and off and wasting energy.

Instead of overhauling them, the Trust decided to downsize to rotary screw compressors. They only cost £713 to run annually against £1,925 for the previous versions, providing an immediate saving of £1,212 per year. Installation of the new equipment gave a three-year payback.

Motors and drives

Motors are generally running out of sight, sometimes constantly, every day of the year. The value of the electricity consumed by an electric motor over its life is typically 100 times the purchase price of the motor itself. It is therefore important to ensure that motors (and their associated drives) are as efficient as possible. Motors typically account for 19% of primary energy consumption in acute hospitals.

Considerable energy savings can be achieved by good system design to minimise the motor load. A small increase in duct or pipe size can significantly reduce system losses and thus greatly reduce the fan or pump power required. Low-loss motors, variable-speed controls and effective control can realise savings of more than 50%.

Remember

Always check with an expert before switching off or altering controls on specialist equipment.

Laundries

Laundry facilities are extremely energy-intensive. Water usage is also an important issue. Make sure that laundries are targeted in the site-wide energy strategy. Some actions to consider are listed below:

- Most steam-heated laundries will generate excess low-grade heat that can be conveniently re-used elsewhere across the site
- Water recovery by recycling the rinse water from washer extractors is a proven means of reducing water usage
- Total water recovery (grey water recycling) is becoming more acceptable and should be investigated
- Heat recovery via heat exchangers from hot effluent is standard practice and can be used on all types of machine
- Consider combined heat and power (CHP) which might be viable for many sites that incorporate a laundry. See page 27 for more information on CHP
- Sub-meter the laundry to see how energy is used. This is discussed further on page 31.

For more information on these technologies, contact the Carbon Trust.

Case study

What are other hospitals doing?

North Staffordshire Hospitals Trust invested £10,000 in a project to fit six variable speed drives in the main plant room. The energy services engineer monitored electricity consumption before and after the installation and found that running costs were reduced by around 40%, giving a payback of just 1.8 years on the installation. Running costs were reduced to £27 per day from £50 per day.

Fife Acute Hospitals NHS Trust's laundry washes 8 million items per year (some under contract to other trusts). The laundry system was very old and inefficient and had to be replaced.

Steam from the gas-fired boiler powers the system, which now includes a two-line, ten-batch washing machine. The Trust spent approximately £100,000 on electronic controls for the system which help maximise water re-use, cutting down on both water and heating costs.

The enhanced efficiency of the machines means that the amount of moisture in cleaned laundry is cut, reducing the energy needed for drying. At the same time, old steam traps were replaced with new ones that reduce leakage and cut down on maintenance. A steam meter was also installed so that performance of the steam heating system can be monitored.

MENU
HELP

Building fabric

Considering the age and outdated design of many hospital buildings, it is not surprising that some are inefficient. Newly–built structures are prone to insulation and draught problems too.

Typically, two thirds of heat from a hospital is lost through the building fabric, with the remaining third being lost through air infiltration and ventilation. The rate at which heat is lost depends on:

- The temperature difference between inside and outside
- The insulation properties of the building fabric
- The amount of fresh air entering the building either by controlled ventilation or through poorly fitting windows, doors or joins in walls.

Improving building fabric in a hospital makes good sense for many reasons:

- Better temperature control – it can lower ventilation costs and prevent overheating
- Enhanced patient comfort – a more comfortable ward gives patients the best conditions for a faster recovery
- Improved productivity – staff morale and output can be enhanced by providing a more comfortable working environment through reducing draughts, solar glare, overheating and noise
- Lower capital expenditure – a more efficient, well-insulated hospital needs smaller heating and cooling plant
- A brighter, cleaner environment – this may help increase patients' confidence in the care the unit is providing.

Undertake regular maintenance

Identify potential building fabric problems as part of routine maintenance and deal with them promptly. In particular, repair gaps or holes in walls, windows, doors and skylights immediately. Preventing the loss of heated or cooled air provides instant savings and also improves the appearance of a hospital. It is more comfortable for staff and patients too.

Establish a housekeeping schedule

Compile a regular checklist to address areas where energy is lost via the building structure. If the hospital is large, it would be worth delegating this to several members of staff, all of whom can work from the same checklist. A comprehensive schedule includes checking walls, floors, roofs and skylights, doors and windows, including frames and panes.

Keep windows and external doors closed as much as possible when heating is on and consider sealing unused doors or windows to further reduce draughts.

MENU
HELP

Regularly check the building for damp

Damp causes significant damage to the building structure and reduces its insulating properties. It is also unsightly and even though it may not reflect the quality of the healthcare offered, patients could be concerned by what appears to be dirty and unkempt premises.

Repair split down-pipes, faulty gutters and leaky roof tiles as soon as an issue becomes apparent. Do not just opt for a quick fix – repair the cause and save time on expensive work later on. Regularly check for signs of damp and condensation at least once a year, preferably prior to winter months.

Check and maintain insulation

Ensure that hot water and heating pipes are insulated. Similarly, check accessible loft spaces to make sure that insulation is in good condition and replace if required. As well as saving energy by reducing heat loss from the pipe, insulation can also improve internal comfort by reducing the risk of overheating.

Identifying and repairing problems quickly can help avoid expensive problems later on

Make the most of curtains and blinds

As well as providing privacy for patients, curtains and blinds play an important role in protecting the building. If correctly chosen, they can reduce draughts and help rooms retain more of their residual heat overnight during winter months. Close curtains and blinds at the end of the day to keep the heat in. The same process can help in summer to reduce heat in rooms that receive direct sunlight. Blinds can also be an effective way of controlling direct daylight and glare.

Improve glazing

Double glazing is now a minimum requirement when replacing windows. Further protection is available from triple glazing and should be considered, particularly on north-facing or exposed sides of a building. Some window units even have integrated blinds and/or allow for secure night opening, which can provide additional ventilation and cooling benefits.

High performance glass has a coating that improves its insulation properties. Coatings that allow daylight through but block or reduce heat (infrared) can be particularly effective at reducing overheating from direct sunlight, therefore lowering mechanical cooling requirements.

In highly glazed spaces such as waiting rooms and atria, it may be more effective to replace some of the glazing with insulated blank panels. This will reduce the amount of light entering the space but provide better insulation and reduce heat and glare problems associated with a large area of windows.

Install more insulation during refurbishment

Around a quarter of a building's heat can escape via an uninsulated roof which adds hundreds of pounds per year to heating bills. Insulating any roof spaces and unfilled external cavity walls is an effective and inexpensive way of reducing heat losses.

Many hospital buildings have flat roofs and single external walls making insulation measures more difficult, disruptive and costly. Improvements to these are most cost effective during refurbishment projects and should always be considered when the opportunity arises.

Improve your building fabric

The Carbon Trust offers help and advice on how to make the most of the energy saving opportunities available from improving your building fabric.

Show me how.

Combined heat and power (CHP)

CHP can offer an economical method of providing heat and power which is less environmentally harmful than conventional methods.

CHP is the simultaneous generation of heat and power in a single process. CHP equipment usually burns fossil fuel such as natural gas or diesel oil to generate electricity on-site.

At a power station, the heat generated when electricity is produced has to be dissipated via cooling towers. With CHP, the heat is recovered on-site, and used for space heating and hot water. This means that overall, the process is more efficient, so less fuel is used.

To gain maximum benefit from CHP, the system needs to be in operation for as many hours of the year as possible.

With year-round requirements for electricity and significant amounts of hot water, hospitals are ideally suited to using CHP.

However, not all sites are suitable for CHP, nor will they have good payback. Make sure that the site is investigated properly, including a complete financial and technical appraisal from an expert.

Information for sites without CHP installed

When to consider CHP installation

The best time to consider CHP in existing buildings is when the heating plant is being replaced, so that the CHP unit can be integrated with the heating system. The commercial value of the electricity and heat produced by a CHP unit is greater than the combined cost of the fuel and maintenance required for the system to operate.

Understand existing heat and electricity loads

When considering CHP, it is important to carefully assess its application and feasibility. Space requirements should be considered, along with a detailed evaluation of the system's engineering, economics, reliability, operation and maintenance. To justify the cost of investment, the aim should be to maximise the use of all the heat and hot water that the system can produce. Every hospital is different and therefore a detailed cost calculation is essential. This assessment should be made only after other, simpler energy efficiency measures have been implemented.

CHP support

In an appropriate application, CHP can reduce energy bills by around 20–30%, provided the unit is designed to meet the building's seasonal demands for electricity and heating. Even better, Good Quality CHP qualifies for Enhanced Capital Allowances and the fuel input is exempt from the Climate Change Levy (CCL). Contact the Carbon Trust for more information.

Consultancy support is also available from the Carbon Trust to help evaluate the feasibility of CHP for hospitals and large healthcare facilities.

Consider exporting heat via a community heating system

Where there is insufficient heat demand in an area, CHP may still be feasible if there is a close off-site heat demand. For example, a nearby industrial company with a demand for heat could allow any excess heat to be sold on.

Investigate funding opportunities

If budgets cannot stretch to investing in CHP, explore options for third-party funding. Energy services and contract energy management options absorb the initial cost and risks associated with installation, maintenance and operation of a CHP unit. Charging arrangements vary but under certain contracts, a hospital may only pay for fuel used by the CHP unit and receive the heat for free, as well as paying a reduced price for electricity.

Information for sites with CHP installed

Maintenance issues

CHP systems require regular maintenance to ensure efficient operation and reduce risk of breakdown. Major maintenance should be carried out as part of a planned shutdown. When deciding on the timing and duration of a shutdown, always consider cost implications such as for labour and materials required to carry out the planned work as well as additional costs of meeting the site's heat and power requirements from other sources. For smaller installations, shutdowns are normally undertaken by the CHP supplier who also maintains the unit.

Monitor performance

A CHP system should be monitored to ensure it is operating correctly. Look out for factors that affect performance such as changes in output and fuel consumption, air temperature and pressure in gas turbine installations. It is also important to monitor the rate that system performance changes as this provides a basis for planning maintenance tasks and plant overhauls. Always explore why performance is failing to meet the specification as this could indicate maintenance requirements. It will also be reducing the cost effectiveness of the system.

Meet CHPQA requirements and avoid paying the Climate Change Levy (CCL)

Monitoring data collected can be used to demonstrate compliance with the necessary quality standards for exemption from the Climate Change Levy (CCL). Metering installed for CCL registration must be able to differentiate between heat used by the site and heat rejected to the atmosphere via a cooling system, so ensure meters are positioned correctly to achieve this.

Exemption from the CCL for Good Quality CHP is based on certificates issued by the Government CHPQA programme. Details of monitoring requirements for the CHPQA programme are available at www.chpqa.com.

Case study

What are other hospitals doing?

The two natural gas CHP units run by **Milton Keynes General NHS Trust** date back to the early 1990s and have shown ongoing savings in electricity. Both machines qualify for exemption from the CCL. Together, the units provided around 20% of the hospital's total electricity consumption during 2000/01.

The two gas-fired CHP plants installed in 1991 and 1994 at **Glenfield Hospital** have helped to reduce electricity consumption by 21.5% — a reduction of 1,256,272 kWh. A key benefit of the CHP system is the security of the energy supply to the hospital's operating theatres and critical care facilities. In addition, the hospital saves around £20,000 a year through exemptions from the CCL.

Did you know?

CHP can have financial, environmental and strategic benefits. A well-designed and operated CHP plant can reduce carbon dioxide emissions. However, CHP schemes represent a significant long-term investment so the economics need to be studied carefully before a decision is made.

Good housekeeping and energy management

Gaining everyone's involvement is crucial if energy savings are to be achieved and maintained.

Most savings are within the control of staff. It is important to ensure that all staff members are aware of the benefits that energy efficiency can bring to a hospital in order to get them involved and committed to an energy management programme. Benefits include:

- A better environment for patients which may help their recovery time
- Healthier and more productive working conditions for staff
- Cost savings which can be spent on improving healthcare facilities.

Whether starting an energy conservation programme from scratch or simply checking the effectiveness of an existing management system, there are a number of basics to consider.

Responsibility at all levels

Every staff member must be on board in order to make a hospital energy efficient. Establish a clear energy policy and have it endorsed by the Trust board. Communicate this throughout all levels of staff. Consider appointing 'energy champions' or an energy team as this can improve involvement and awareness on-site.

Involve staff

All employees should be aware of areas of waste and trained to operate equipment and controls correctly. It is important to emphasise the cost of wasting energy, and how it impacts on Trust resources. Motivate staff – ask their opinions and encourage them to review their own working practices to increase energy savings. Competitions, campaigns and team projects are great ways to get buy-in.

Reinforce the benefits of improving their work area and give them a sense of ownership of energy management.

Undertake regular walk rounds

Carry out regular good housekeeping walk rounds. Note down and act on any maintenance measures needed in order to avoid expensive problems later on. As patterns of energy use vary throughout the day, it is advisable to carry out a series of walk rounds at different times to get a better idea of where and when energy is being wasted.

A walk round helps to:

- Establish current operating practices
- Identify wasteful practices and ensure they do not recur
- Demonstrate commitment to improving energy performance
- Identify further opportunities for savings.

Further information

For information on staff involvement, see Creating an awareness campaign (CTG001) available from the Carbon Trust.

During a walk round, look at all parts of the building, including the heating, lighting and building fabric, as well as any electrical equipment.

Base an energy walk round on the information in this overview. Further tips and a sample checklist can be found in Assessing the energy use in your building (CTL003), available from the Carbon Trust.

Did you know?

It is possible to save 5-10% of a healthcare building's total energy costs by implementing some common sense, good housekeeping measures. Even better, energy savings made through good housekeeping yield immediate results and require no financial investment or specialist skills.

Monitor energy use

Understand the hospital's energy consumption by reviewing energy invoices over the last year. This should help build a picture of the site's monthly performance. Larger hospitals may have meters recording half-hourly electricity consumption and these data are likely to be available from the energy supplier. Inspecting half-hourly data is also a good way to see when (and sometimes where) energy is being used, and is an effective way to identify potential savings.

If the unit does not have a half-hourly electricity meter, at least check and record monthly gas and electricity meter readings. Compare this information with the hospital's invoices to check for accuracy.

The information gathered can provide a picture of current energy use which can be used to monitor ongoing performance, showing where savings have made a difference. As well as measuring progress, the figures can be used to compare the site with similar hospitals to see how it is performing.

Maintenance contractors

Ask maintenance contractors for advice on how to maintain optimum conditions whilst minimising energy costs and upkeep. Why not add a clause in their contracts which stipulates the importance of energy efficiency as part of their regular services? It could act as an incentive to reduce energy costs and everyone will benefit.

Did you know?

Sample environmental policies and energy efficient procurement policies are provided in Enco$_2$de 2006 – available on the Department of Health Knowledge and Information portal.

Set targets

Tell staff how much energy is currently being consumed. Then, when the energy saving programme gathers momentum, it will be possible to track progress and highlight energy savings. Set targets – most organisations in the UK could reduce their energy consumption by 10–40%. However, it is important to be realistic: many start by aiming for 5% savings each year.

Submetering

Submeters can be helpful in understanding how energy is used across the estate. The information they provide can highlight areas where cost savings can be made and justify investment. Target particularly energy-intensive areas, such as laundries and catering. Submetering, and any subsequent monitoring and targeting of energy use, can act as an incentive for managers to reduce energy costs by providing some financial reward for doing so.

Case Study

What are other hospitals doing?

There are approximately 25 properties in the **Wolverhampton City Primary Care Trust** portfolio. One energy manager was using annual consumption figures to compare the performance of similar buildings when he noticed that a particular community health centre was faring much better than its comparators. Upon further investigation, he found that one person's hard work to encourage everyone to switch off lights and electrical equipment had led to a significant reduction in the centre's electricity bills.

One Trust in Oxfordshire was spending £2.5 million on energy each year but had no dedicated energy manager. The Trust designated an energy manager on the basis that savings made through the energy manager's work would pay their salary. The energy manager subsequently achieved substantial savings and more than recovered their own costs through energy-efficiency measures and the introduction of combined heat and power (CHP) plant.

The energy management team at **Worcester Royal Infirmary** set up an incentive scheme with interdepartmental competitions. This helped to give everyone a sense of ownership of the corporate policy. After only ten months, the hospital had saved £35,000. As a result, the Health Authority awarded a £3,500 cash prize to the hospital which went towards the purchase of a foetal heart monitor.

Next steps

There are many easy low and no-cost options to help save money and improve the energy performance of your hospital.

MENU

Step 1. Understand your energy use

Look at your hospital and identify the major areas of energy consumption. Check the condition and operation of equipment and monitor the power consumption over one week to obtain a base figure against which energy improvements can be measured.

Step 2. Identify your opportunities

Compile an energy checklist. Walk round your building and complete the checklist at different times of day and night to identify where energy savings can be made. Build a checklist based on the one on page 33 or order an example from the Carbon Trust: Assessing the energy use in your building (CTL003).

Step 3. Prioritise your actions

Draw up an action plan detailing a schedule of improvements that need to be made and when, along with who will be responsible for them.

Step 4. Seek specialist help

It may be possible to implement some energy saving measures in-house but others may require specialist help. Discuss the more complex or expensive options with a qualified technician.

Step 5. Make the changes and measure the savings

Implement your energy saving actions and measure against original consumption figures. This will assist future management decisions regarding your energy priorities.

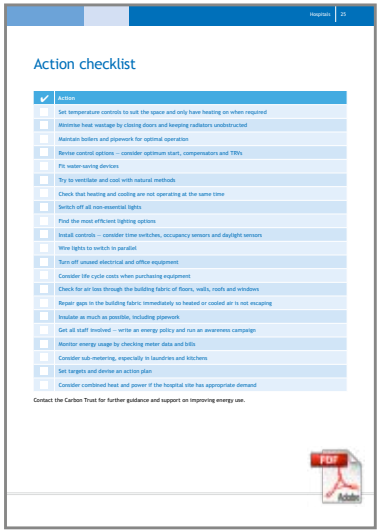
Step 6. Continue managing your business for energy efficiency

Enforce policies, systems and procedures to ensure that your business operates efficiently and that savings are maintained in the future.

HELP

Appendix

Action checklist



Download this checklist of energy saving measures to tick off as you go.

Download

Further information

Related publications

The following publications are available from the Carbon Trust:

Fact sheets

Assessing the energy use in your building (CTL003)

Technology overviews

Building fabric (CTV014)

Energy management strategy (CTV022)

Heating, ventilation and air conditioning (CTV003)

Lighting (CTV021)

Low temperature hot water boilers (CTV008)

Office equipment (CTV005)

Practical energy management (CTV023)

Refrigeration (CTV002)

Technology guides

Air conditioning (CTG005)

Creating an awareness campaign (CTG001)

Heating control (CTG002)

Variable speed drives (CTG006)

Health Technical Memorandum: Enco2de [Synopsis] (CTC605)

Useful websites

The full version of Health Technical Memorandum: Enco2de and its accompanying CD-ROM is available to purchase from the TSO. To order, visit www.tso.co.uk.

NHS Network

The NHS Network facilitates the exchange of experience and information relating to energy issues and the sustainable use of energy to help support NHS organisations.

Visit nhsnetwork.carbontrust.co.uk.

Go online to get more

The Carbon Trust provides a range of tools, services and information to help you implement energy and carbon saving measures, no matter what your level of experience.

Carbon footprint calculator – Our online calculator will help you calculate your organisation's carbon emissions.

www.carbontrust.co.uk/carboncalculator

Interest free loans – Energy Efficiency Loans from the Carbon Trust are a cost effective way to replace or upgrade your existing equipment with a more energy efficient version. See if you qualify.

www.carbontrust.co.uk/loans

Carbon surveys – We provide surveys to organisations with annual energy bills of more than £50,000*. Our carbon experts will visit your premises to identify energy saving opportunities and offer practical advice on how to achieve them.

www.carbontrust.co.uk/surveys

Action plans – Create action plans to implement carbon and energy saving measures.

www.carbontrust.co.uk/apt

Case studies – Our case studies show that it's often easier and less expensive than you might think to bring about real change.

www.carbontrust.co.uk/casestudies

Events and workshops – The Carbon Trust offers a variety of events and workshops ranging from introductions to our services, to technical energy efficiency training, most of which are free.

www.carbontrust.co.uk/events

Publications – We have a library of free publications detailing energy saving techniques for a range of sectors and technologies.

www.carbontrust.co.uk/publications

Need further help?

Call our Customer Centre on 0800 085 2005

Our Customer Centre provides free advice on what your organisation can do to save energy and save money. Our team handles questions ranging from straightforward requests for information, to in-depth technical queries about particular technologies.

* Subject to terms and conditions.

The Carbon Trust is a not-for-profit company with the mission to accelerate the move to a low carbon economy. We provide specialist support to business and the public sector to help cut carbon emissions, save energy and commercialise low carbon technologies. By stimulating low carbon action we contribute to key UK goals of lower carbon emissions, the development of low carbon businesses, increased energy security and associated jobs.

We help to cut carbon emissions now by:

- providing specialist advice and finance to help organisations cut carbon
- setting standards for carbon reduction.

We reduce potential future carbon emissions by:

- opening markets for low carbon technologies
- leading industry collaborations to commercialise technologies
- investing in early-stage low carbon companies.

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ACT ON CO_2 is the Government's initiative to help individuals understand and reduce their carbon footprint. Visit http://actonco2.direct.gov.uk for more information.

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