



# Heating and Hot Water

## Introduction

Heating and hot water costs can account for up to 60% of a building's total energy costs. By understanding the systems installed, ensuring they are working efficiently, and only heating spaces to the minimum level to achieve comfort, it is possible to save up to one third on these costs.

## Understanding your Controls

The main controls used in a heating system are time, temperature and boiler controls and ensuring these are set correctly is the best place to start when looking for savings in a heating system. The key characteristics are described below:

## Major Opportunities for Savings

### Time controls

Simple time controls turn the heating on and off at pre-determined times. The on time needs to be set to ensure the building is up to temperature by the time the building is occupied. The off time can be before the building is vacated as it will take time to cool.

Advanced time controls, called optimum start controls, monitor internal and/or external temperatures and switch the heating on at the right time to ensure the building reaches the correct temperature by the time it is occupied. The "start" time set in this type of controller needs to be the occupancy start time.

- On and off times should be set according to the occupied periods on each day. Switch off, or at least turn down the heating on days that are not occupied. If your system uses simple time controls the warm up time on Monday morning may need to be longer than the rest of the week to ensure a comfortable temperature is achieved come 9.00am
- Areas with different occupancy times should, where possible, be controlled separately so heating only occurs when a location is occupied

- Buildings with different occupancy times on different days of the week should be controlled using a seven day timer (available at most hardware stores)

### Temperature controls

Temperature controls are essential to avoid space overheating and should be used to ensure the minimum comfort conditions for employees. The more active the employees, the lower the temperature can be to provide comfort.

- Reducing room temperatures by 1°C can reduce the annual heating bill by 8-10%

**Thermostats** should be clear of obstructions and situated where the temperature is representative (i.e. not influenced by draughts, direct sunlight, heat from radiators or office equipment etc). This is because thermostats are often used to control the whole heating circuit, or large areas of it. For example, if the thermostat is reading the temperature above a photocopier, the heating on that circuit will switch off, irrespective of the temperature of other areas on the circuit.

- Time switches can be used alongside thermostats to prevent the heating coming on unless it is the right time of the day and the temperature falls below the set minimum.

**Thermostatic Radiator Valves (TRV)** can be installed to individual radiators to control their temperature, which can be particularly useful if there are areas in the building that suffer from under or over heating. TRV's work by sensing the temperature by the radiator, and controlling the amount of hot water that is allowed to pass through the radiator to maintain the required temperature. They should not be used as an on/off switch, e.g. employees turn them to maximum at the start of the day to warm up the room faster and then turn them down later as the room overheats.

- Set the installed TRV to the level that consistently maintains a comfortable temperature
- If TRV's are often used as an on / off switch, consider installing tamperproof TRV's that will only allow a limited adjustments by the occupants
- Where possible do not remove complete control from employees, as a sense of control will often allow a greater temperature range to be tolerated. Employees with no control, are less likely to be satisfied with the heating

**Advanced temperature controls** include weather compensation, which can be used to minimise overheating by adjusting the water (or air) temperature in the heating circuit. During mild weather, space temperatures can be maintained with lower radiator temperatures than are required in cold conditions. The flow temperature is regulated by a control device known as a weather compensator, which will usually have two settings, the minimum flow temperature and the rate at which this increases as external temperature falls. It is best to make very small changes to one

of the settings at a time and then monitor results in order to fine tune the comfort experienced in the building.

## Identifying your heating system

Use the following section to identify what heating system is present in your building and what specific measures can be taken to minimise running costs. General measures to reduce heating running costs are:

- Improving the building insulation and reducing draughts, as this reduces the amount of heating required
- Replacing damaged or missing insulation on hot pipes and ducts

## Commercial Buildings

### Opportunities for savings

#### Boiler with radiators



This is the commercial version of the domestic central heating system. It consists of a boiler to heat water, pump(s) to circulate hot water around the building and radiators. Depending on the boiler type, the boiler may produce domestic hot water directly (combi boiler) or may heat a cylinder for domestic hot water.

- Turn off any electric immersion heaters in hot water cylinders when the boiler is in use
- Install TRV's on radiators where possible (very old radiators are not adaptable)
- Upgrade controls to include time controls, cylinder and room thermostats, and weather compensation
- Check that controls are preventing the boilers from firing when there is no demand for heat
- Have the boiler serviced annually and ask for a report on the boilers' combustion efficiency before and after the service as efficiency should be improved
- When existing boilers reach the end of their useful life, replace with high efficiency or condensing boilers. An Enhanced Capital Allowance (ECA) may be available for some boilers, allowing you to claim back the tax on the item in the first year. Check the ECA website ([www.eca.gov.uk](http://www.eca.gov.uk)) for a list of all qualifying systems

## Boiler with air handling unit



This system will consist of a boiler providing hot water as in a domestic situation, but instead of supplying the hot water to radiators, the hot water will be supplied to a heater battery in duct work containing a fan (similar to a car radiator). This allows heated air to be supplied heating the building. These systems can vary in complexity and may be used to provide ventilation during summer months. The boiler can also be used to heat a cylinder for domestic hot water.

- Turn off heating system fans that also provide ventilation when there is no demand for ventilation or heating
- Use local thermostats to control the operation of the air handling units

## Electric heating systems



This can either be in the form of electric wall heaters that heat elements and release it directly into the required space, night storage heaters that use overnight electricity to heat “bricks” within the heater that store the heat and release it slowly over a number of hours, or warm air heaters, which use electricity to heat incoming air and pump this round the building using the ventilation system.

- Electric heating can be very expensive to run when compared to gas or oil heating systems, so improving the building fabric to reduce the amount of heating required could be very cost effective
- Find out how your systems are controlled
- Install time switches and thermostats and check their settings regularly
- Improve controls to match the heating need, for example, installing controls to optimise the charging of night storage heaters based on external temperatures
- If a new system is required consider replacing with a fossil fuelled (gas or oil) fired system

## Industrial Buildings

### Opportunities for savings

#### Unit heaters from a boiler



The unit heaters are supplied with hot water or steam depending on the boiler installation. A fan is installed in the heaters to circulate warm air around the building.

- In a workshop area consider installing “interlock” controls, to switch the heating off when the doors are open

- If the site has steam, which is only being used within the heating system investigate replacing the whole system with a gas or oil fired one

### Gas or oil fired units



These are similar to the above, but have a gas or oil burner within the unit to supply warm air.

- In a workshop area consider installing “interlock” controls, to switch the heating off when the doors are open

### Radiant heaters



Radiant heaters are normally gas or oil fired, although in some circumstances electric radiant heaters are used in spite of their high running costs. Commonly known as ‘spot heating’, they work by heating people and not the air inside the building, so internal temperatures are much lower without causing discomfort to the occupants. This form of heating is ideal for large areas in buildings with poor insulation and for providing heating to localised areas within a wider open space.

- Black bulb thermometers should be used and set to the minimum appropriate for the activity undertaken in each area

Ensure the heaters have a clear ‘line of sight’ to the occupants normal working areas and keep at a safe height as the heaters can get very hot

### Further Action Energy support

- Further information and advice is available **free** from the Action Energy helpline - **0800 58 57 94** or visit the website at **[www.actionenergy.org.uk](http://www.actionenergy.org.uk)**

Action Energy is a programme run by Carbon Trust and funded by the Department for Environment, Food and Rural Affairs, the Scottish Executive, Invest Northern Ireland and the National Assembly for Wales. It is designed to help businesses and public sector organisations cut their energy costs through the provision of free, professional advice and assistance. Action Energy is an integral part of the Government’s climate change programme, aimed at meeting the UK’s carbon reduction obligations under the Kyoto Protocol.