

# Taking control of carbon

Being comfortable at home,  
being kinder to the environment.





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In his budget speech of April 2009, the Chancellor outlined targets to cut carbon emission by 34% by 2020. The way we use energy in our homes can have a large impact on this target. The statistics are quite shocking when you consider that energy we use at home accounts for over a quarter of our carbon dioxide emissions. But this picture can be changed, and I'm delighted that this document raises this hugely important issue and puts practical solutions into the public domain. I hope we will see not just industry professionals, but households across the UK respond to the carbon problems that exist and take positive steps to save energy and reduce emissions.

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## Our energy consumption at home

Most of the energy we use in our homes is produced using processes that release carbon dioxide into the air – the main greenhouse gas and the most significant cause of climate change. In fact, energy used in homes is responsible for over a quarter of the UK's emissions of carbon dioxide.

Making homes as energy efficient as possible reduces carbon emissions and helps fight climate change. It can also save consumers a substantial amount of money every year.



### Facts and figures at-a-glance

- *The energy used to heat homes in the UK is greater than the usable output of all our power stations added together*
- *Homes all across the UK are falling short of the Building Regulations requirements*
- *Approximately 80% of homes do not have basic heating controls*
- *12.5 million households have boilers that do not switch off*
- *8.5 million homes do not have a room thermostat*
- *30% of condensing boilers do not have room thermostats – without proper controls a new, high efficiency boiler won't run efficiently*

**Figures from:** the Energy Saving Trust, TACMA (The Association of Controls Manufacturers) and BERR (The Department for Business, Enterprise & Regulatory Reform), 2008.

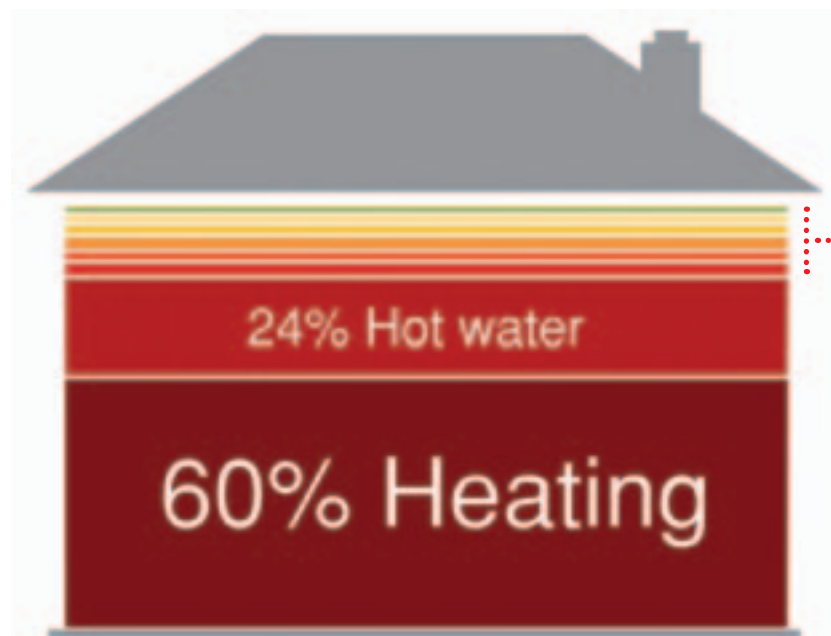
## How can we be more efficient in the way we use energy?

When the idea of energy efficiency in the home comes up, people usually think of changing to low energy light bulbs or switching electrical equipment off instead of leaving them on standby. Better insulation is also considered; but controlling heating and hot water does not come to mind.



Heating and hot water actually account for over 80% of energy use in our homes<sup>(1)</sup>. So better plumbing and heating systems can play a significant part in the fight against carbon dioxide emissions.

The easiest and most effective way to reduce energy consumption is to reduce the energy we use to supply heating and hot water.



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Other 2%  
Wet appliances 2%  
**Lighting 3%**  
Cooking 3%  
Consumer electronics 3%  
Cold appliances 3%

Source: BERR

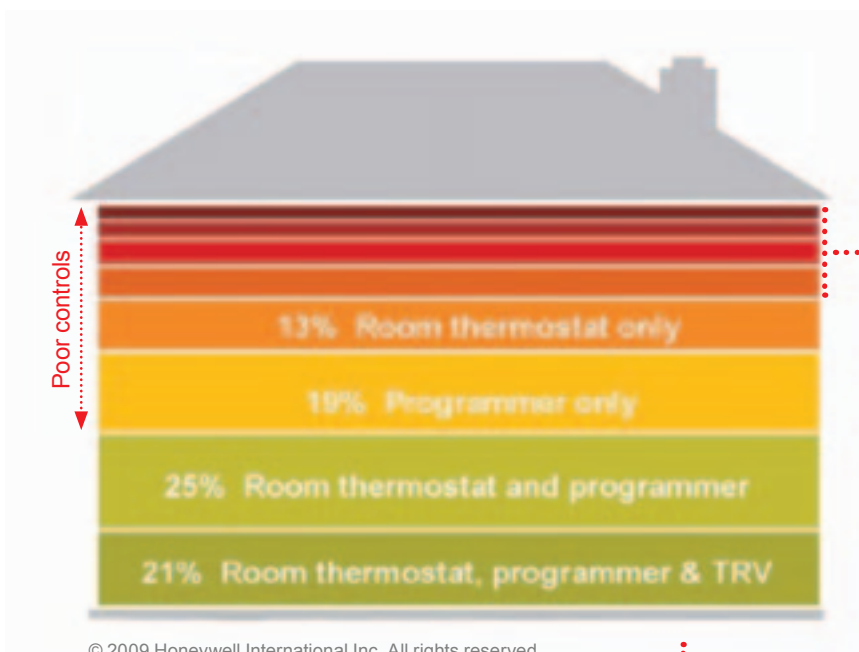
This diagram shows that heating and hot water account for 84% of energy consumption within a typical home in the UK (figure taken from research by The Department for Business, Enterprise & Regulatory Reform).

Research from The Department for Business, Enterprise & Regulatory Reform shows that improving the energy efficiency of your heating system by just a small amount will have a far bigger effect on the environment than making changes to your lighting. Reducing the energy used to supply heating and hot water doesn't mean being colder at home, it just means controlling energy use better. Turning a room's thermostat down by just 1°C can reduce heating bills by 10%.<sup>(2)</sup> The difference in temperature isn't noticeable, but the difference to your heating bill is; and it will be bigger than turning off all your lights – forever.

# Releasing the potential of heating controls

Today, more and more people are aware of the importance of helping to protect the environment. In fact, 66% of UK consumers are more likely to buy products with a low carbon footprint.<sup>(3)</sup>

Modern condensing boilers are designed to run efficiently, but they cannot if they're connected to an inefficient system. These boilers need intelligent control technology to help them operate more efficiently, save energy and prevent overheating. Without the right controls in place, households are limited in the way they can reduce their energy use. Installing the right controls reduces carbon emissions and makes a big difference to the overall energy performance of your home.



Poor controls 4%  
Room thermostat & TRV 3%  
TRV 6%  
Programmer & TRV 9%

Source: TACMA 2008  
Figures from: BERR

This diagram represents Government figures for the heating controls in an average home and demonstrates that over half of heating systems are missing vital components. Only the two bottom green sections get anywhere nearer being complete control systems, which is achieving only the minimum standard.

Heating controls allow you to choose when your heating is on, how warm it is and where you want the warmth. Plus, they make sure the boiler is only turned on when it needs to be. These controls also dictate when the boiler will produce hot water, so you can set the boiler to fire up at the time you need it (for showers in the morning, for example).

**Heating controls are just as essential as the right kind of boiler, creating greater efficiency all round. And it's not just good for the environment – it's good for your pocket too.**

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## Three ways fitting controls reduces energy consumption

### REDUCED WASTE

*Heat only the parts of the home that are being used.*

### REDUCED DEMAND

*Use a programmable room thermostat to heat only when people are at home.*

### INCREASED EFFICIENCY

*Convert fuel to heat more efficiently by fitting controls that allow condensing boilers to condense.*



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## Meeting the requirements of the Building Regulations with simple upgrades

Old heating systems run more efficiently when they're controlled. It's not always necessary to change the boiler – it's a case of improving the way it works.

A heating system should only burn fuel when there is a demand for heat from the boiler, either for heating or hot water. When this demand is satisfied, then the boiler should switch off again – it should not be able to fire until a new demand is created by the controls. This is called Boiler Interlock and represents the minimum standard required under Building Regulations for new and existing heating systems.

**The Building Regulations apply whenever a boiler or cylinder is changed. Heating and hot water should be controlled by both time and temperature: a programmer to control time and thermostats for temperature.**

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### WHAT DO YOU NEED FOR A FULL SET OF HEATING CONTROLS?

**A programmer and room thermostat** – A programmer lets you set the times when the heating and hot water come on and go off again. A room thermostat measures the air temperature of a space and can be set to the temperature you want. When the temperature falls below this setting, the thermostat switches on the central heating. Once the room reaches the right temperature, the thermostat switches the heating off.

#### OR

**A combined programmable room thermostat** – With this you choose the times you want your home to be heated and the temperature you want it to reach while it's on.

#### PLUS

**A cylinder thermostat** – This keeps a constant check on the temperature of the water in a hot water cylinder, switching the heat supply from the boiler on and off to keep the water at a set temperature (this is only required if you have a store of hot water).

**Thermostatic radiator valves (TRVs)** – TRVs sense the air temperature around them and regulate the flow of hot water entering the radiators. This keeps a room at a set temperature, so you can set lower temperatures in rooms that you don't use so much.

## GOING WIRELESS IS QUICKER AND CLEANER

If you don't have a thermostat fitted in a room, it's now easy to have a wireless one installed. This option has numerous benefits over a traditional wired approach: no rewiring around the home, no lifting floorboards, no re-plumbing and no chasing cables into walls. The adaptability of the wireless option means you can easily control your heating, rather than being restricted by what was originally fitted.

## ON/OFF CONTROL

This is the method of control used by the majority of heating systems. Controls simply switch the mains current supplied to the boiler on or off at different times.

For a traditional system with stored hot water, the time control (programmer) and temperature control (thermostats) operate zone valves.

These have a switch inside them that controls both the boiler and the pump. For 'combi' boiler systems, the time and temperature controls switch the boiler directly.

## TPI CONTROL

TPI stands for Time Proportional and Integral control, and is a method of calculating the demand from a room thermostat. It controls the boiler so that it fires for shorter periods as the temperature approaches the desired level.

TPI allows the flow temperature from the boiler to fall as demand reduces, which in turn helps the return temperature to stay below the dew point (55°C). This means the boiler can operate in condensing mode more frequently, resulting in a 3% increase in boiler efficiency.



# How plumbing and heating professionals can help

Plumbing and heating professionals play a vital role in helping to reduce carbon emissions from households, making a difference to our overall environment. Professionals who are voluntarily registered and regulated by the CIPHE are proficient in these new, 'greener' technologies.

They're on hand to advise you on choosing the systems and controls that are right for your home, fit them safely and correctly and then help with any ongoing maintenance.

## The benefits of taking control

- Making your home as energy efficient as possible will reduce carbon emissions and could also save you over £300 a year on your fuel bills.
- If every home had a high-efficiency boiler installed, the energy saved would be enough to provide heating and power for almost two million homes.
- Efficient thermostat and thermostatic radiator valves can reduce the energy your existing boiler consumes by up to 40%.
- Replacing a boiler that's 10 years old with a new, more efficient boiler could reduce your energy consumption at home by a third.
- Just applying the minimum standard of controls to homes would save over 2000 million tonnes of carbon dioxide and over 600 million tonnes of carbon every year (this is an average of over 100 tonnes of carbon dioxide per house, per year).<sup>(4)</sup>

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## About the Chartered Institute of Plumbing and Heating Engineering

Founded in 1906, the Chartered Institute of Plumbing and Heating Engineering (CIPHE) is the professional body for the UK plumbing and heating industry. Its membership of around 12,000 is made up of individuals from a wide range of backgrounds, including specifiers, designers, public health engineers and trainers. In addition, 260 manufacturers and distributors support its work as Industrial Associates.

(1) Domestic data tables 2008 update, BERR

(2) Government statistic at [www.energysavingtrust.org.uk](http://www.energysavingtrust.org.uk)

(3) Statistic from [www.co2balance.uk.com](http://www.co2balance.uk.com)

(4) This section refers to BERR figures for total energy load for heating.

BERR uses the VhK model for boiler efficiencies, developed for the EU as part of the development of the 'Energy Using Products' directive.