



CONDENSING BOILERS

Centre for
Alternative
Technology

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What is a condensing boiler?

These boilers increase efficiency by recovering heat that is normally wasted in the hot flue gases given off by a conventional boiler. Flue gas from a conventional boiler will be at a temperature of about 150 degrees Centigrade, and sometimes much more than this, but a condensing boiler will reclaim most of this heat, and give off flue gases at about 50 degrees Centigrade.

Around 20% of the UK's carbon dioxide emissions come from domestic heating systems. Depending on the efficiency of your old boiler, a replacement condensing boiler will reduce carbon dioxide emissions from your central heating system by 15 to 30%. Building Regulations now require all new boilers to have an efficiency rating of A or B, and at the moment only condensing boilers achieve this. Installing only high-efficiency boilers will help the UK to achieve reductions in carbon emissions and so reduce the impact of climate change. If everyone in the UK had a condensing boiler our annual carbon dioxide emissions would be reduced by 17.5 million tonnes, and it would also result in a saving of £1.3 billion on energy bills every year.

If your old boiler is still working well, then there are plenty of other efficiency measures you can take to reduce your personal carbon emissions. See our *Energy efficiency in the home* sheet for lots of ways to save energy and money. Another option that you may be able to consider is carbon-neutral wood fuel heating - see our *Home heating with renewable energy* information sheet for advice.

Are Condensing Boilers more expensive?

Heating with a condensing boiler is cheaper than with a non-condensing model. The condensing boiler itself may cost a little more (between £100 and £300) to install, but will use less fuel.

The highest-rated condensing boilers are about 15% more efficient than the best non-condensing units. This means that if your fuel bill is about £400 per year, you will save about £60 per year. A condensing boiler that cost £250 extra will therefore recover this amount after 4 years, and over a 10 or 15 year period it will be much cheaper. As gas prices are currently rising above inflation, payback could come much sooner. There may be local grants available to reduce the cost still further, especially if you are on benefits. Contact your local Energy Efficiency Advice

Centre (see below) to find out what you are entitled to.

But won't it only be more efficient when in condensing mode?

No - a condensing boiler will always be more efficient than a non-condensing, as even when it is not in condensing mode it will still give about 85% efficiency - going up to well over 90% when condensing. A brand new conventional boiler will be at the very most 78% efficient, and old ones will be between 55 and 65% efficient. This is why only condensing boilers meet the criteria for grade A or B efficiency that are required by the latest version of the building regulations.

In order to gain maximum efficiency from a condensing boiler, a good control system must also be in place. A basic room thermostat and fixed boiler temperature setting will not get the very best out of a boiler. A better approach is to have an outdoor weather sensor (known as 'weather compensation') which enables the boiler to run the central heating only as hot as is necessary, rather than going for the set temperature each time, irrespective of whether or not it is a milder day outside. When water at a higher temperature is needed for the hot water cylinder, the controls will take this into account and produce hotter water until the demand is met.

By using such a control system, the water returning to the boiler will more often be in the range needed for it to condense - around the mid 50s degrees centigrade (just below the 'dew point' of the flue - 58 degrees). The boiler will then be in condensing mode for most of the time it is operating, so will run at maximum efficiency almost all the time.

Don't I need to run my heating on full or put in bigger radiators?

If an installer tells you this, then either the boiler is not being installed properly, or is oversized. As mentioned above, a condensing boiler will always be more efficient, so does not have to be run at full pelt all the time. It is important to make sure that any boiler is not too big - they are often overspecified. Make sure that all efficiency measures (insulation, windows, etc) are taken first, then size the boiler to meet the remaining heat demand and fit good heating controls (see above). If a boiler is too big it will be operating inefficiently. Larger radiators will increase the

efficiency of most heating systems by a small amount (3%), but it will often be neither cost-effective nor practical to change them and achieve this small gain.

Are they unreliable?

In the early days of the technology (over 20 years ago), condensing boilers did have some teething problems, and this impression has persisted. But the technology is now well developed, and modern units are as reliable as any other new boiler. Most of the components in either type will be identical.

One initial problem was with the type of heat exchanger used. If flue gases condense within a ferrous metal heat exchanger they can cause corrosion. New boilers should all have a heat exchanger made of a non-ferrous material such as stainless steel (this is what accounts for most of the extra cost of the appliance).

What about the steam coming out of the flue?

Because they leave a condensing boiler at a lower temperature, flue gases will condense as they exit the flue. This can be unattractive, or a nuisance, so take care to put the flue in a place where it will not cause inconvenience. If there's not much space outside the building, an internal vertical flue can be used, with gases exiting near or through the roof.

So what should I look for?

Before thinking about getting a new boiler, make sure that you have maximised the efficiency of your home. Then if your boiler does need replacing in the future, you'll be able to get a smaller one to meet your reduced energy demand. See our *Energy efficiency in the home* sheet or get our book *The Energy Saving House* for more advice.

If your old boiler needs replacing, then look for a boiler that is rated 'A' for efficiency. Also, look for 'Energy Saving Recommended' logos on both boiler and associated heating controls. A long warranty gives an indication that the manufacturer has faith in their product. Make sure that the heat exchanger is made of a non-corrosive material such as stainless steel (see above). Getting your pipes and radiators flushed out (to remove built-up gunge) will cost a few hundred pounds, and should be done while fitting any replacement boiler.

All modern boilers are complex pieces of equipment and it is worth spending time choosing the right one for you. As with most appliances, annual servicing will ensure that the boiler remains operating efficiently. It is also worth ensuring you use a reliable installer. If an installer does not think much of condensing

boilers, then it would probably be pointless asking them to install one - they are unlikely to put in place the heating controls that will get the most from the system. Instead, seek out an installer who is knowledgeable about the technology and confident that they can give you an efficient and convenient heating system.

If unable to get a personal recommendation from a friend (often the best way), then try looking for a tradesperson who belongs to one of the bodies listed below, and so has signed a code of conduct.

If you are thinking about getting solar water heating, you'll need a hot water cylinder. A combi boiler does not need water storage, so cannot be easily combined with a solar panel. See our *Solar water heating* information sheet for more advice.

Further Information

Contact **CAT's Information Service** with further questions about energy use and efficiency.
Tel: 01654 705989; email: info@cat.org.uk

More detailed technical advice on the heating options available in your specific circumstances is available from through **CAT Consultancy**
Tel: 01654 705991; www.cat.org.uk/consultancy

Energy Saving Trust: *www.est.org.uk*
Or ring your local Energy Efficiency Advice Centre on 0800 512 012. Advice on home energy efficiency, and the grants you could claim.

Boiler information website:

www.boilers.org.uk

The relative efficiencies of central heating boilers.

Heating & hotwater information council

Tel: 0845 600 2200; www.centralheating.co.uk
Information on central heating systems & products.

Trade Associations

Institute of Domestic Heating and Environmental Engineers

Tel: 02380 66 89 00; web: www.idhe.org.uk

Association of Plumbing & Heating Contractors

Tel: 024 7647 2503; web: www.aphc.co.uk

The Institute of Plumbing and Heating Engineering (was The Institute of Plumbing)

Tel: 01708 472791, web: www.iphe.org.uk

Scottish and Northern Ireland Plumbing Employers Federation

Tel: 0131 225 2255; web: www.snipef.org

The Worshipful Company of Plumbers

Tel: 0207 796 2468

Web: www.plumberscompany.org.uk