



Please note:
Current building regulations require all new gas and oil boilers to be condensing. This publication remains available for information only.

Domestic condensing
boilers – the benefits and
the myths



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Introduction

Home energy use is responsible for 27 per cent of UK carbon dioxide (CO₂) emissions which contribute to climate change. By following the Energy Saving Trust's best practice standards, new build and refurbished housing will be more energy efficient – reducing these emissions and saving energy, money and the environment.

Condensing boilers are highly efficient boilers that have much lower fuel and running costs than non-condensing boilers. Take up has been slow ever since they were first introduced in the early 1980s due to a number of misconceptions and a general lack of awareness. Since then the technology has improved and there has been an increase in the number of trained installers.

The objective of this guide is to provide concise information on the benefits associated with condensing boilers and to help dispel the popular myths surrounding them. This should help those (particularly within local authorities and housing associations) who have to respond to critics and others as yet unconvinced by condensing technology.

In dispelling the misconceptions or 'myths' associated with condensing boilers, it is hoped that the barriers to specifying and installing condensing boilers will be finally removed. This will result in a sustained increase in market share throughout the UK, benefiting both householders and the environment.

Benefits of condensing boilers

Condensing boilers offer tangible benefits by:

- Reducing CO₂ emissions and helping to combat climate change.
- Improving household efficiency thus reducing fuel bills.

Condensing boilers work on the principle of recovering as much as possible of the waste heat which is normally rejected to the atmosphere from the flue of a non-condensing boiler.

This is accomplished by using an extra-large heat exchanger or sometimes two heat exchangers within the boiler which maximises heat transfer from the burner as well as recovering useful heat which would normally be lost with the flue gases.

When in condensing mode (for condensing boilers do not condense all the time) the flue gases give up their 'latent heat' which is then recovered by the heat exchanger within the boiler. As a result the temperature of the gases exiting the flue of a condensing boiler is typically 50-60°C compared with 120-180°C in a current non-condensing boiler. At the same time, an amount of water or 'condensate' is produced.

A condensing boiler will always have a better operating efficiency than a non-condensing one, due to its larger and more efficient heat exchanger. The benefits of condensing boilers are therefore quite clear, and in order to encourage greater take-up of these benefits we now need to address the myths surrounding them.



Certification mark

The myths surrounding condensing boilers

Myth 1: They are only efficient when fully condensing

Response: Not true. Due to its larger heat exchanger, a condensing boiler does not have to condense in order to be more efficient. Typically a new gas condensing boiler will have a seasonal efficiency of between 86 per cent and 92 per cent compared with a new non-condensing boiler at 78 per cent or an older boiler at 55-65 per cent. See table on page 4 for typical annual fuel costs for condensing and non-condensing boilers.

The SEDBUK (Seasonal Efficiency of Domestic Boilers in the UK) rating is the average annual efficiency achieved in typical domestic conditions and is quoted in a series of bands (from 'A' at 90 per cent or over, to 'G' at below 70 per cent).

The SEDBUK is linked to current building regulations in England, Wales^[1] and Scotland^[2], (and Northern Ireland^[3] as of June 2006) and some boilers which are rated A for gas and A-B for oil are endorsed as 'energy saving recommended'.

Myth 2: They are too expensive

Response: In the past, condensing boilers were more expensive, mainly due to the materials used in the construction of the heat exchanger. However, as with all new things, the cost of technology reduces over time, and some regular condensing boilers can now be obtained for no more than a regular non-condensing boiler.

In some cases, the difference can be offset by grants that are available from local authorities, energy companies or via Energy Efficiency Advice Centres (EEACs) (see back page). The payback period will then be minimal (0-4 years) and the net savings in fuel costs will be greater in the long term.

Myth 3: They need larger radiators

Response: No change necessary. In most systems, radiators are already oversized for all but the severest weather. A marginal benefit of approximately 3 per cent may be obtained from oversizing radiators for a new system, as this will allow slightly cooler return water to the boiler and maximise time spent in condensing mode, but this is usually uneconomic and impractical.

Myth 4: They are less reliable

Response: Not true. This was true with the early models of condensing boilers, but through improvements introduced as a result of this early experience, the components in modern condensing boilers are as reliable as those in the equivalent non-condensing models.

Myth 5: They are difficult to install

Response: Not true. The only difference compared with non-condensing boilers is the requirement for a condensate drain.

A competent installer will have no problem in deciding on a suitable location for the drain and fitting a normal, plastic overflow pipe. Condensate pumps are available where a boiler is sited in a basement or a drain point cannot be reached for gravity. For further information see Section 9 in the following guides; 'Domestic heating by oil; boiler systems' (CE29) and 'Domestic heating by gas: boiler systems' (CE30).

Flue locations will also need consideration – see Myth 9 on 'plumbing'.

Myth 6: They are harder to maintain

Response: Not true. The only minor difference is the need to ensure that the condensate drain is clear when servicing.

Myth 7: They cannot be fitted to existing systems

Response: Not true. Condensing boilers are suitable for replacing most existing boilers. As with any replacement boiler, the effectiveness of the control system and type of hot water cylinder should be assessed when conducting a site survey.

Central heating systems should be thoroughly cleansed and flushed before installing any new boiler and a corrosion inhibitor suitable for the system added; see 'Central heating system specifications (CHeSS) – Year 2005' (CE51/GIL59) note 3 for further information.

Wall hung condensing boilers are readily available, with extended fluing options if required.

Myth 8: They have limited availability

Response: Not true. All manufacturers now offer a wide range of both regular and combination condensing boilers.

Myth 9: The plume is a nuisance

Response: Because the flue gases leaving a condensing boiler are cool, they tend to produce a noticeable mist or plume of water vapour around the flue terminal itself (as they condense upon contact with the atmosphere), especially under cold conditions. This is not a problem and in fact indicates that the boiler is working as intended. However, consideration should be given to boiler and flue location prior to installation so that the plume will not be too close to neighbouring properties or windows, doors and paths regularly used in the winter.

There are a wide range of flue options available for high level discharge through vertical flues or with extended plume management kits and diverters. For further information see Section 4 of 'Domestic heating by gas: boiler systems' (CE29) and 'Domestic heating by oil: boiler systems' (CE30) and refer to manufacturers' availability.

Myth 10: The condensate is a problem

Response: Not true. With modern systems, only about one litre per hour of condensate is produced, which has a pH in the range of 3.5 to 5 – about the same acidity as tomato juice. As previously discussed, this is carried to a normal drain by means of a simple plastic overflow pipe.

Boiler type	New non-condensing	New condensing
Seasonal efficiency (SEDBUK)	78 per cent (Band D)	90 per cent (Band A)
Flat	£172	£149
Bungalow	£292	£253
Semi-detached	£320	£277
Detached	£424	£368

The Central Heating System Specifications

CHeSS are a set of basic and best practice specifications for the components of domestic wet central heating systems that are critical to energy efficiency. For further information see 'Central heating system specifications (CHeSS) – Year 2005' (CE51/GIL59) where the basic and best specifications are described. The specifications take into account recent changes to building regulations (see References).

References and contacts

[1] England and Wales

The Building Regulations 2000. Conservation of Fuel and Power, are detailed in Approved Document L1A – Work in new dwellings, (2006 edition) and Approved Document L1B – Work in existing dwellings (2006 Edition). In addition there is a second tier document: The Domestic Heating Compliance Guide. www.dclg.gov.uk/buildingregs

[2] Scotland

Section 6: Energy, of the Domestic Technical Handbook on possible ways of complying with the Building (Scotland) Regulations 2004.

[3] Northern Ireland

Building Regulations (Northern Ireland) 1994, are detailed in Technical Booklet F, Conservation of fuel and power (December 1998) – currently under revision. www.dfpni.gov.uk

The Government's Standard Assessment Procedure for Energy Rating of Dwellings, 2005 Edition, is available from: www.bre.co.uk/sap2005 or call 0845 120 7799

For information on grants to offset the cost of condensing boilers, contact your local Energy Efficiency Advice Centre on Freephone 0800 512012 or visit www.est.org.uk/myhome

For comparing individual boiler efficiency results and SEDBUK figures visit www.boilers.org.uk

The 'Little Blue Book of Boilers' is useful in identifying energy efficient models of gas, LPG and oil fired boilers. To order a free copy, contact the Energy Saving Trust on 0845 120 7799.

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Further information

The Energy Saving Trust sets energy efficiency standards that go beyond building regulations for use in the design, construction and refurbishment of homes. These standards provide an integrated package of measures covering fabric, ventilation, heating, lighting and hot water systems for all aspects of new build and renovation. Free resources including best practice guides, training seminars, technical advice and online tools, are available to help meet these standards.

The following publications may also be of interest:

- Domestic heating by oil: boiler systems (CE29)
- Domestic heating by gas: boiler systems (CE30)
- Central Heating System Specifications (CHeSS) – Year 2005 – (CE51/GIL59)
- Seasonal efficiency of domestic boilers in the UK (SEDBUK) flyer
- Whole house boiler sizing method for houses and flats (CE54)

To obtain these publications or for more information, call 0845 120 7799, email bestpractice@est.org.uk or visit www.est.org.uk/housingbuildings

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