



Department for  
Business, Energy  
& Industrial Strategy

# HEAT IN BUILDINGS

Boiler Plus

October 2017

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# Foreword from Claire Perry

We need to begin preparing for a shift to cleaner and smarter ways of heating our homes to keep household energy costs down, maximise comfort and reduce carbon emissions. The Industrial Strategy green paper set out our objective to revitalise economic growth and improve living standards by increasing productivity, and driving growth across the whole country. The Clean Growth Strategy provides a blueprint for delivering changes that will stimulate economic growth while reducing carbon emissions. Consumers, and their homes, are at the heart of this strategy. Everyone should have access to a decent home that is affordable to run, comfortable to live in, and sustainable for the future. This is a challenge and will require making improvements to the homes we live in now and building new homes that are fit for the future.

In December 2016, we consulted on a range of policy proposals to give consumers more choice over the way they heat their homes and more control over their energy bills. We need homes with energy systems that are interconnected, smart, and versatile to meet this challenge. We start from a position of strength – the UK boiler market is the biggest and most valuable in the world. At the same time, there are opportunities to boost productivity, particularly through better technical training and a higher standard for installers. While the standards for boiler installations have been higher here than most places in the world since 2005, many older systems are still in use meaning millions of households may be spending more than necessary to keep comfortable in their home.

In the last few years, new and better technology has come forward and so the time is right to raise standards for consumer homes and expectations for our installers. Over the last decade we have seen great changes in the way people engage with their living environment. Buildings and consumers are becoming more connected, with access to smarter technology and more information than ever before. This is supporting them to make better informed decisions about the products that best meet their needs, and how to use them most effectively.

The new 'Boiler Plus' standards we have outlined will improve the way many people use energy in their homes by giving them greater choice, greater control, and tangible savings on their energy bills.

# Contents

Foreword from Claire Perry	2
Executive Summary	4
Investing in household wellbeing	6
Our objective	6
What we learned from our consultation	7
Raising standards for comfort	9
New standards for conserving fuel	9
Boiler performance	9
Control of space heating	9
Going further	10
Deferring further ambition	13
Raising expectations	15
Current standards	15
Working with industry	16
Consumers and Installers	17
Encouraging consumer engagement	17
Resources for consumer and installers	17
Annex A: Summary of consultation responses	19
Annex B: Amendments to domestic building services compliance guide	32

# Executive Summary

Everyone should have access to a decent home that is affordable to run, comfortable to live in, and sustainable for the future. Installing an energy efficient boiler can save some households hundreds of pounds a year, while effective use of controls can enable consumers to remain safe and comfortable, while minimising energy consumption.

Consumers and their homes are a key part of the Government's vision for the future set out in the Industrial Strategy and the Clean Growth Strategy. The Industrial Strategy green paper set out our objective to revitalise economic growth and improve living standards by increasing productivity, and driving growth across the whole country.<sup>1</sup>

In 2005, Building Regulations guidance was amended to set new performance standards for boiler replacements. This increased the number of more efficient boilers, bringing down costs for consumers and cutting carbon emissions. We want to build on this success by once again raising standards for heating systems, to reflect the advances in technology, skills, and consumer engagement that have occurred over the last decade. In the last few years manufacturers have developed more innovative products and control devices to help reduce the amount of fuel used by boilers to heat a home.

The UK boiler market is the biggest in the world (the annual market value for boilers in the UK is around £2.5-£3 billion) and has some of the most experienced manufacturers and installers.<sup>2</sup> In the area of controls, there are a number of UK players with a strong UK base. By drawing on the technical innovations of manufacturers and the skills of our workforce, this sector can drive inward investment to boost productivity while keeping household bills and carbon emissions as low as possible.

In December 2016, the Government consulted on a range of policy proposals, collectively known as 'Boiler Plus', to give consumers more choice over the way they heat their homes and more control over their energy bills<sup>3</sup>. This document sets out a synthesis of consultation responses, and the new standards for domestic heating that will come into force from April 2018. We will:

- Require all gas boilers installed into existing systems in England to have an ErP<sup>4</sup> efficiency of at least 92%;

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<sup>1</sup> <https://www.gov.uk/government/consultations/building-our-industrial-strategy>

<sup>2</sup> Delta Energy & Environment Ltd: Heat Insight Service, August 2016 Briefing note

<sup>3</sup> <https://www.gov.uk/government/consultations/heat-in-buildings-the-future-of-heat>

<sup>4</sup> As of April 2016, all boiler manufacturers in the UK have started using a new model for calculating performance, the Energy Related Products methodology (ErP). It is in use across the EU and enables the UK market to trade effectively with Europe.

- Require time and temperature controls to be installed at the same time, if not already present and working;
- Require combination boiler replacements to include the provision of an additional energy efficiency measure to be installed at the same time. But to reflect the diverse needs and circumstances of our homes and our households, the requirement will flex to allow a wide range of technology options to be considered.

A number of other technologies or installation practices were considered in the consultation, which the Government is keen to support. The Government will work with consumer advocacy groups to provide more information to consumers and enable them to hold trades people to account if they do not consider whether homes would benefit from:

- Individual radiator controls;
- Balancing the system so that all radiators get as warm as each other;
- Suitable levels of cleaning and protecting the heating system from debris.

Our consultation sought views on the best way to provide consumers with access to the information and guidance they need to make effective decisions about heating their homes. It is clear that there is a key role for the Government, manufacturers, installers and other groups in supporting consumer information. We will continue to work with consumer groups and all parts of industry to ensure that there is accessible, trusted guidance available that will cover the new standards and enable greater consumer interaction with their heating systems. Further details are set out later in this document.

Our consultation also called for evidence on ways to decarbonise heating and cooling in properties not connected to the gas grid. More details on the next steps in this area can be found in the Clean Growth Strategy.

# Investing in household wellbeing

## Our objective

- 1.1. The cost of heating a home, particularly during the colder winter months, makes up about 60% of household energy bills.<sup>5</sup> Consumers can keep heating costs down and still keep their homes comfortable by making smart heating choices. Installing an energy efficient boiler can save some households hundreds of pounds a year, while effective use of controls can minimise energy consumption by ensuring the right temperature for comfort, while avoiding overheating.
- 1.2. Outdated central heating system components can lead to wasted energy, costing money and increasing the risk of respiratory problems in the winter. These health risks are a particular concern for older people who tend to be more vulnerable to cold-related afflictions that can become dangerous. Overheating is both wasteful and expensive, and under heating can be dangerous both for personal health and the condition of our homes.
- 1.3. Many householders do not notice these issues in their homes, but they are common occurrences. Consumer advocacy groups such as Citizens Advice and Which? offer valuable advice on how to remain safe and comfortable.<sup>6</sup> But much of this advice relies on householders having the means to control their heating system effectively. Nearly a quarter of our homes are without a room thermostat to set the desired level of comfort.<sup>7</sup> Nearly a third of the homes in England are heated by older, inefficient boilers.<sup>8</sup> And many of us have heating systems that run far more intensively than necessary all year round, meaning the condensing action that makes modern boilers so efficient may not operate.<sup>9</sup>
- 1.4. Through the new Boiler Plus standards outlined in this document we aim to:
  - Drive the market for the highest performing boilers, providing clear expectations and standards as to the levels of efficiency we expect;
  - Ensure all households have a reasonable level of choice and control to enable them to achieve comfort and efficiency without increased bills; and
  - Support manufacturers and installers and facilitate exports by aligning the metric for minimum standards with the European Energy Related Products Directive (ErP).

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<sup>5</sup> <https://www.gov.uk/government/statistics/energy-consumption-in-the-uk>

<sup>6</sup> For example: <http://www.which.co.uk/reviews/boilers/article/boiler-controls-and-thermostats>

<sup>7</sup> English Housing Survey 2015 (<https://www.gov.uk/government/collections/english-housing-survey>)

<sup>8</sup> English Housing Survey 2015 (<https://www.gov.uk/government/collections/english-housing-survey>)

<sup>9</sup> [http://www.centralheating.co.uk/system/uploads/attachments/0000/6128/Pathways\\_2.pdf](http://www.centralheating.co.uk/system/uploads/attachments/0000/6128/Pathways_2.pdf)

## What we learned from our consultation

- 1.5. A full assessment of consultation outcomes can be found in Annex A. An overview and a summary of the most important findings are below.

### Overview

- 1.6. Almost a thousand people across the United Kingdom responded to our consultation, representing a cross section of society including consumers, manufacturers, trade bodies, local authorities, and many others. This included over 700 responses directly from boiler installers, ranging from individuals to large businesses, and heat specialists to general plumbers. Installers First<sup>10</sup> found that most boiler installers do not feel involved in decisions that affect their profession, so these responses were particularly helpful. BEIS officials held in-depth conversations with close to 100 installers through a series of workshops during the consultation period, and we will continue to engage tradespeople to monitor the on-going success of the new standards. We also undertook direct engagement with consumers and consumer advocacy groups, and worked closely with leading manufacturers and the supply chain operating in the UK.
- 1.7. Generally we found consumers and their representatives were highly supportive of updating standards in line with today's technology, provided a sufficient range of products exists to suit all circumstances and budgets. The supply chain was consistently supportive of our overall objectives and core proposals and constructive debate over the detail has helped Government to form its final position. Installers' views were more polarised. Some expressed views that growth, for individual traders and the economy as a whole, cannot occur without:
- Recognising the need to possess skills that are consistent with today's market and the needs of today's consumers;
  - Understanding that action is needed now to reduce bills and drive low carbon systems, to underpin an economy that works for everyone in the long term;
  - Appreciation of the integral importance of robust information and advice.
- 1.8. Others advised caution about new technologies such as smart controls:
- “Many heating engineers struggle with the wiring of heating control systems... Most householders struggle to understand the current system of control, so to add to it will simply make the problem worse.”*
- 1.9. Both perspectives are important. There is no benefit to the economy or consumers if standards are set at a level that is beyond the capability of our installers. As a result of our extensive engagement with the industry we believe the standards set out in this document strike the right balance between ambition and deliverability.

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<sup>10</sup> An installer trade portal created by the Heat and Hotwater Industry Council.

## Responses to consultation questions

- 1.10. Our consultation set out three main proposals:
- Updating the minimum efficiency standard for domestic boilers to 92% ErP;
  - Enhancing the requirement for heating controls to include time and temperature control as standard;
  - Further improve efficiency by requiring weather compensation, devices that automatically adjust the output of the boiler depending on the external temperature.
- 1.11. Nearly 90% of consultation respondents support the change to 92% ErP, including all manufacturers, on whom most of the burden would fall. However, the industry has consistently responded that this is too high for oil boilers, for which they recommend 89% ErP.
- 1.12. Over 90% of respondents support a requirement for time and temperature control.
- 1.13. Opinion was significantly more divided on the subject of weather compensation. While many advocated in favour of the requirement, others raised concerns about compatibility with the entirety of England's housing stock. A range of additional measures will be allowed instead, so that weather compensation will be installed only where it is in the best interests of the household. Where weather compensation is unlikely to meet the needs of the household there are other options, set out in sections 2.8-2.21, that will ensure cost effective savings for consumers.
- 1.14. The consultation also explored the role of additional energy efficiency measures:
- Thermostatic radiator valves (TRVs);
  - Time proportional and integral (TPI) controls;
  - Flue gas heat recovery systems (FGHRS);
  - Smart controls with automation and optimisation functionalities
- 1.15. Overall there was widespread support for additional energy saving measures, although some strong views about the technologies on the list. We have taken these views into account by amending the list as set out in the next chapter.
- 1.16. We asked whether landlords should be offered an exemption. 91% of respondents were against this suggestion and it has not been adopted.

# Raising standards for comfort

## New standards for conserving fuel

- 2.1. The new standards set out in this section will come into force from 6 April 2018. From that date all boilers installed in existing dwellings in England, either as a new installation or as a replacement to an existing boiler, will need to comply with these minimum requirements. An amendment to the Domestic Building Services Compliance Guide 2013<sup>11</sup> has been published alongside this policy document, and can be found in Annex B.

## Boiler performance

### Gas boilers

- 2.2. In response to overwhelming support we are updating the minimum efficiency standard for all gas boilers to 92% ErP. Roughly a third of boilers on the market today fall short of this standard, and by setting the standard at this level we will remove the lowest performing products from the market. Because the majority of new boilers already have an efficiency rating of 92% or more, there is no reason for any additional costs to the consumer. This means the benefits derived for householders and the environment come at no additional expense. Consumers will nearly always derive efficiency savings by replacing an older boiler with a new one.

### Oil boilers

- 2.3. There are 1.8 million households with oil heating in the UK, and heating these households resulted in emissions of 8 MtCO<sub>2</sub>e in 2013, representing a good opportunity for decarbonisation. Consultation responses indicated that the highest attainable standard for oil boilers would be unlikely to offer savings for consumers or the environment. Rather than setting an unambitious efficiency standard for oil boilers, we will therefore be focussing policy in this area on measures to improve the consumer proposition for moving from oil heating to low carbon alternatives. More details can be found in the Clean Growth Strategy.

## Control of space heating

- 2.4. From April 2018 gas **and oil** boiler installations in English homes must include devices that enable the consumer to:
- programme the system to come on and off at set times, and

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<sup>11</sup> <https://www.gov.uk/government/publications/conservation-of-fuel-and-power-approved-document-l>

- set the temperature to achieve the greatest comfort in the home.
- 2.5. The advice available for consumers highlights the potential benefits of setting heating to come on only when needed, and adjusting the temperature with a thermostat. Energy Saving Trust advises that turning down your thermostat by just 1°C can save households £80 to £90 a year. As most heating systems are already equipped with time and temperature control there is no additional cost for the vast majority of households.
- 2.6. We are aware that many installers already consider time and temperature controls to be an essential system component. Making this a mandatory requirement will mean that all installers follow this good practice, to the benefit of consumers.
- 2.7. There is a very wide range of control devices to suit all circumstances and budgets. Consumers, and their installers, should consider their options to find a product that meets their needs. It is equally important that controls are accessible for householders, both in terms of physical access to devices and individuals' capabilities. Manufacturers and installers have a responsibility to ensure they offer products and services that are accessible to their customers.

## Going further

- 2.8. From April 2018, when a gas combination boiler is installed in a domestic property in England, an additional energy efficiency measure will be mandatory. The English housing stock is diverse, so this requirement is flexible to allow a suitable choice to be made that reflects the nature of the building and the needs of the household.
- 2.9. We have listened to feedback from industry, from consumers and from experts on the proposal in the consultation, and we have improved the final list of energy saving technologies to be suitable for all circumstances and budgets. The energy saving technologies that can be used to comply are:
- Flue gas heat recovery systems
  - Weather compensation
  - Load compensation
  - Smart controls with automation and optimisation functions

### Flue gas heat recovery systems (FGHRS)

- 2.10. FGHRS recover heat from waste flue gases to preheat the cold water entering the boiler, lowering the amount of energy needed to warm the water up to the required level. Almost all modern boilers already have some sort of heat recovery built in, making condensing boilers much more efficient than older ones. Even so, FGHRS can further increase the efficiency of these condensing boilers in most cases, delivering the same amount of heat with up to 4% less gas.
- 2.11. This technology may not be suited to all households. Benefits are greatest where the hot water demand is relatively high compared to space heating, such as in highly efficient properties or particularly large households. It can also be one of the more costly options, with prices starting at around £300 on top of the existing cost of the

boiler, although this may fall to £130.<sup>12</sup> This option is most likely to appeal to households who are undertaking wider renovation rather than just replacing their boiler. Wide scale renovation to a property would quickly absorb the extra cost of FGHRs. With significant uptake the cost is likely to half.<sup>13</sup>

- 2.12. Unlike some heating controls, the effectiveness of FGHRs does not depend on householders using it in certain ways or making any sort of adjustments to their behaviour. It is likely to appeal to households that wish to save energy without having to adjust their usage in any way.

### Weather compensation

- 2.13. Modern condensing boilers are most efficient when the central heating system runs at lower temperatures, but many never achieve condensing mode as the operating temperature is set too high. Weather compensation interacts intelligently with the boiler to reduce water temperatures, which increases efficiency without compromising user comfort. Many users have reported significantly improved comfort, as the boiler is better able to maintain a steady internal temperature by adjusting boiler output to account for changes in the weather.
- 2.14. Weather compensators can be a simple external sensor feeding weather data back to the boiler, which can be purchased for as little as £25.<sup>14</sup> There are also more sophisticated, digital products on the market that combine weather compensation with other functions and tend to draw weather data from the internet. As well as greater comfort benefits, these wireless options enable households to benefit from weather compensation even if it is not practical to attach an external sensor. Costs are likely to fall dramatically as more and more people choose to install weather compensation, and several manufacturers have told us they may include weather compensators with their boilers at no additional cost.
- 2.15. Bill savings will vary significantly from home to home, with the greatest savings for those households with the highest bills in the first place.
- 2.16. It is clear that weather compensation is better suited to some circumstances, such as more thermally efficient properties and relatively constant use of the heating system. Under such circumstances it is entirely possible for bill savings to be much higher than the conventional average. Competent installers and reliable consumer advice will be key to ensure this technology is deployed where the greatest benefits can be rewarded to the household (more on this in sections 4.1-4.10).

### Load compensation

- 2.17. Another way of driving efficiency through low temperature operation is by using load compensation. Load compensation is a common function in many smart controls and programmable thermostats, which may cost just £25 more than a thermostat without load compensation (estimated to fall to £15 with sufficient uptake). These devices measure the gap between what the internal temperature is and what the user wants it

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<sup>12</sup> <https://www.gov.uk/government/consultations/heat-in-buildings-the-future-of-heat>

<sup>13</sup> <https://www.gov.uk/government/publications/evidence-gathering-passive-flue-gas-heat-recovery>

<sup>14</sup> <https://www.plumbcenter.co.uk/>

to be, and modulates the boiler so that it only uses as much fuel as necessary to close the gap.

- 2.18. As well as improving comfort and improving the longevity of the boiler, this technology reduces fuel consumption and bills. The actual savings will depend on what type of boiler is being used and what type of thermostat is being replaced. Under the right circumstances savings may be significant, with the greatest financial benefit to those whose bills are currently highest.<sup>15</sup>

### **Smart controls featuring automation and optimisation functions<sup>16</sup>**

- 2.19. Smart thermostats are products that let consumers remotely control their home temperature via a tablet, smartphone or desktop for greater control over the central heating system. There has been a growing market for smart controls over the last few years, with almost 400,000 new customers in 2016.<sup>17</sup> They work in a variety of ways and it is believed that many have the potential to significantly reduce bills and improve comfort. Smart controls offering load compensation or weather compensation would be fully compliant with the new standard, as they would offer the same benefits listed above. Installations can also comply by using other varieties of smart thermostat, provided they offer both automation and optimisation.
- Automation is a function that allows the device to automatically control the heating system output in response to programmed demand or occupancy detection. Advanced examples detect where householders are, such as through sensor data or geolocation based on smart phone data. This means the heating system will not operate more than necessary when it isn't needed, and if householders are away for an extended period the heating can be switched off remotely or automatically.
  - Optimisation means the device calculates how long it takes the property to reach the desired comfort level, and times the system's operation to minimise the amount of work it has to do. Usually it also modulates the output of the boiler in a similar way to load compensation, so as little fuel as possible is consumed.
- 2.20. Smart thermostats can be more expensive than basic load compensators or weather compensators, but they are likely to pay for themselves through reduced heating bills faster than any other technology in the new standards.
- 2.21. As with the other technologies, it is important for consumers and installers to consider the circumstances of the individual household. Smart products do not appeal to all demographics, and automation may add little value in households with very fixed, consistent routines. Good quality consumer advice remains paramount.

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<sup>15</sup> BRE: Heating Controls Evidence Gathering, 2016. Commissioned by BEIS.

<sup>16</sup> The Government published its Smart Systems and Flexibility Plan in July 2017, which provides further information on plans going forward in relation to smart appliances: [Upgrading Our Energy System: Smart Systems and Flexibility Plan](#).

<sup>17</sup> Delta Energy & Environment Ltd: Connected Home Service, Annual 'state of the market' 2017

## Deferring further ambition

- 2.22. There are a number of opportunities for further energy savings which we have considered, and decided not to include in new standards at this time. Consumers have told us they see it as Government's responsibility to keep standards up to date with modern technology, and we intend to do that. We will monitor the success of these new standards and consider the ongoing role for the technologies involved, and the potential future role for those listed below.

### Regular boilers and system boilers

- 2.23. Many system boilers and most regular boilers on the market today are either incompatible with FGHS and compensation controls, or require an additional component. In some cases additional installation work is required, so that the boiler can differentiate between space heating and hot water demand. Without this extra work there is a possibility of under heating stored hot water, creating the risk of Legionella. There are different views on the probability of this occurring, but the health and safety of householders is paramount and no such risk should be tolerated.
- 2.24. The consultation reinforced our understanding that the greatest efficiency savings to be made in homes using a system boiler is through changes to the hot water tank. Cylinder insulation or a cylinder thermostat can have a significant impact on fuel consumption and comfort. Many low or zero carbon heating technologies also depend on an effective thermal store. From September this year, under the European Ecodesign Directive, any storage tank installed in the EU requires an ErP label of D or above.
- 2.25. For these reasons the additional efficiency measures set out in sections 2.8-2.21 will initially only apply to combination boilers, which make up 78% of gas boilers sold in the UK. We will review this decision after one year and again after five years.

### Time proportional and integral controls (TPI)

- 2.26. It is clear from consultation responses that TPI controls have a valuable role to play under the right circumstances. Many respondents highlighted the research conducted by the University of Salford on behalf of BEAMA.<sup>18</sup> High savings are possible under the right circumstances, but it appears those circumstances are very limited. The research compared TPI energy use with households that have no thermostat in place and are subject to significant overheating. This is not the case for the majority of households,<sup>19</sup> which is why TPI controls are no longer part of the new standard.
- 2.27. A key risk stakeholders raised for TPI controls is associated with the additional wear and tear on the boiler arising from the increased cycling on and off. The consultation in 2016 highlighted consistent views from installers and consumers that standards should not reduce the lifespan of the boiler.
- 2.28. That notwithstanding, there remain circumstances under which TPI controls may offer value. This is particularly true of oil boilers, which tend to be on/off devices rather than

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<sup>18</sup> <http://www.controlyourhome.org.uk/about-us/research.html>

<sup>19</sup> BRE: Heating Controls Evidence Gathering, 2016. Commissioned by BEIS.

more advanced modulating ones. Competent installers will be able to advise consumers if a TPI control is the best way of meeting their needs.

### Thermostatic Radiator Valves (TRVs)

- 2.29. TRVs are already a mandatory requirement when new heating systems are installed, and there is a strong case for also requiring TRVs when a boiler is replaced in an existing system. Many installers see TRVs as a necessary component which they encourage their customers to take up even when not mandated. It is also already required when replacing a radiator.
- 2.30. Perhaps as a result of this, deployment of TRVs in English households continues to grow rapidly. Nearly half a million TRVs were sold<sup>20</sup> in 2016, and while there is some concern that TRV sales fall short of radiator sales (0.63 million), it is clear that support is not needed to drive uptake.<sup>21</sup>
- 2.31. There can be no doubt that TRVs can have a significant impact<sup>22</sup>, but controlled test environments depend on many assumptions, and real world trials have not observed the same benefits.<sup>23</sup> This may be due to the building fabric and occupants not behaving as standard models predict.
- 2.32. It is clear that the priority with respect to TRVs should not be to mandate installation, given that deployment is high and increasing year on year, but rather should focus on improving consumers' awareness of how to get the best use out of them (discussed later in this document). Through concerted effort from Government, installers and trusted advisers, consumers may begin to make better use of TRVs. We may then be able to close the gap between the impressive theoretical benefits observed by BEAMA and the apparent negligible benefits observed in the current reality.

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<sup>20</sup> Across the UK

<sup>21</sup> Sales data provided by BEAMA and Manufacturers' Association of Radiators and Convectors

<sup>22</sup> <http://www.controlyourhome.org.uk/about-us/research.html>

<sup>23</sup> <https://www.gov.uk/government/publications/scoping-review-of-heating-controls>

# Raising expectations

## Current standards

### Clean and effective systems

- 3.1. When replacing a boiler, a heating engineer is required to thoroughly clean the system to comply with Building Regulations. Failure to do this will often mean any sludge or debris that has accumulated in the pipework since it was installed, maybe half a century ago, will remain where it is. As well as causing the heating system to not work properly, this sludge can get pumped through the new boiler causing internal damage.
- 3.2. Existing standards explicitly compel installers to:
  - Thoroughly clean and flush the central heating system before installing a new boiler;
  - Add a chemical water treatment when filling the system to control corrosion and prevent the formation of scale and sludge.<sup>24</sup>
- 3.3. A conscientious heating engineer will also consider power flushing the heating system. Power flushing physically removes all the sludge from the system more effectively than the basic cleaning process set out in existing standards. Our consultation found that bill savings are likely to outweigh the initial expense in some cases, while not in others. Many installers highlighted risks associated with power flushing systems with old or leaky valves, which may result in damage or additional costs. Installers should be mindful of specific circumstances and discuss the options before taking action.
- 3.4. Similarly, for some households there may be real economic benefits from installing a magnetic filtration device. Magnetic filters can be used to remove ferrous sludge from the central heating system before it reaches the boiler. As with power flushing, very rewarding claims are made by some advocates for magnetic filtration. Installers should consider whether this is a technically effective and cost effective solution for customers' heating systems.

### Hydraulic balancing

- 3.5. When a central heating system is properly balanced radiators will heat up throughout the house at the same rate. If the system is out of balance the hot water may not reach some radiators as quickly as others, or in some cases not at all. We have heard accounts of householders having to turn off radiators in adults' bedrooms in order for any heat to reach children's rooms in winter.
- 3.6. Industry advocates claim balancing a system may improve performance, with a corresponding impact on bills and emissions.<sup>25</sup> Building Regulations (2010) explicitly require repetitive adjustments to be made to ensure the system uses no more fuel and

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<sup>24</sup> [Domestic Building Services Compliance Guide](#)

<sup>25</sup> Evidence supplied by Grundfos GB

power than is reasonable. Many installers consider this to constitute a legal requirement to balance a heating system when commissioning a boiler. However, our consultation revealed that most installers do not have a common understanding of hydraulic balancing, with only 18% claiming to undertake it as a standard practice. As many as 44% of installers charge £50-£300 for the service, and it is not clear whether the remaining 38% are able to offer it.

- 3.7. We would like to put beyond doubt that hydraulic balancing is an expected practice. Consumers should expect their installer to undertake this, and not to charge excessive fees. There are a variety of methods used to balance systems, the most effective of which may incur some capital costs for installers choosing to invest in hardware and/or software that will assist them. More basic methods incur no investment, and depend instead on the skill of the installer.
- 3.8. However, this practice is not currently enforced. For now, while many installers are not familiar with the practice and many more are overcharging consumers, it does not feel right to impose it upon households. It is likely that we may seek to enforce hydraulic balancing at a future date and installers who are not currently familiar with this practice are advised to take appropriate action to address this skills gap.

## Working with industry

- 3.9. The UK boiler industry is the largest and most valuable in the world, due in part to effective competition and strong collaboration. A key component of this is the Benchmark scheme, which has been in operation since 1999. Benchmark places responsibility on manufacturers and installers to ensure best practice is followed.
- 3.10. Benchmark takes the form of a checklist that installers are required to complete when commissioning a new heating appliance installation. Failure to complete it will invalidate the warranty, so it helps to protect the consumer.
- 3.11. The scheme is continually added to and improved in order to help the heating engineer keep up to date with Government or industry standards. The industry has plans to make Benchmark an electronic platform that can be completed online and stored centrally. This will allow customers to retrieve their form if it is lost and for installers to have a comprehensive record of installs. It will also make it possible to inform consumers on an annual basis that their boiler requires a service, this makes sure the product is safe, working efficiently and ensures the boiler meets the terms of the warranty. It is hoped this scheme will liaise with other mandatory gas safety schemes to provide a more uniform service to both installers and consumers.

# Consumers and Installers

## Encouraging consumer engagement

- 4.1. These proposals put a lot more choice and decision-making in the hands of householders. Consumers are more equipped to make effective decisions than ever before. Installers have told us their customers are more engaged, more informed, and increasingly wish to choose the product rather than defer to the installer's judgement.
- 4.2. This increasing awareness can make a real difference to the quality of service people receive. Informed consumers are less likely to accept poor quality and bad advice. This encourages installers to recommend the most appropriate technologies for each customer's individual circumstances, and increases the likelihood that mandatory requirements are met.
- 4.3. Most information still comes from installers, which means it is not only consumers who need to be targeted directly. When commissioning a boiler, installers are already required to ensure the customer understands how to use it.<sup>26</sup> The industry-led Benchmark scheme further prompts the installer to demonstrate operation of the boiler and system controls.<sup>27</sup> Our consultation revealed that some installers are more compliant than others.
- 4.4. There is a significant appetite amongst consumers for a greater level of impartial advice on heating systems. There is a joint role for Government, manufacturers and installers in addressing this need for better information. It is the responsibility of all parties to ensure that consumers are empowered with the information they need to make informed choices about their heating system.

## Resources for consumer and installers

- 4.5. A great wealth of advice already exists, but much of it is inconsistent, inaccurate or confusing. For conscientious consumers the greatest challenge can be in determining which sources can be trusted. This is particularly true with respect to TRVs. The results on the first page of a simple online search include a variety of sources, with conflicting recommendations.

### Energy Saving Advice Service

- 4.6. The Energy Saving Advice Service provides a hotline service offering independent, expert advice on saving energy in the home. This service can help householders make effective decisions about their heating and make the best use of TRVs and other controls. BEIS is undertaking scoping work on the future of energy efficiency advice.

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<sup>26</sup> [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/540327/BR\\_PDF\\_AD\\_L1B\\_2013\\_with\\_2016\\_amendments.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/540327/BR_PDF_AD_L1B_2013_with_2016_amendments.pdf)

<sup>27</sup> <http://www.centralheating.co.uk/benchmark-member-scheme/Benchmark>

We will replace the existing, telephone-only Energy Saving Advice Service with a digitally led-service by Spring 2018, offering tailored advice on improving the energy performance of people's homes. The Department is working closely with the implementation of the Each Home Counts review in scoping this service.<sup>28</sup>

### Consumer advocacy groups

- 4.7. Groups such as Citizens Advice, Which? and Age UK are devoted to supporting consumer rights, and wellbeing. Each of them offers advice regarding practices or products that can help consumers keep bills down. BEIS is working with consumer advocacy groups and the Heat and Hotwater Industry Council to ensure this advice is accurate and consistent, and updated to incorporate the new standards. For consumers, this will help provide the confidence that they need in making decisions about their home, as well as peace-of-mind that their installer is carrying out an installation to a high standard. For installers, it may encourage them to focus on ensuring that the consumer understands the information that they need to manage their heating system in an effective manner, as well as providing reassurance that their competitors are giving similar advice.

### Manufacturers

- 4.8. Responding to our consultation, many installers applauded manufacturers for the training they offer. Many explicitly referred to instructional videos that some manufacturers place on-line, to support some of their products. It was repeatedly suggested that this is a practice that should increase. It highlights that manufacturers are best positioned to provide information about individual products that may be pivotal in deciding whether it is the right solution for a particular home. Such information, whether as a video or otherwise, can also instruct both installers and consumers on the proper use of the product. This is a valuable tool for combating misconceptions, such as with respect to the best use of TRVs.
- 4.9. Further recommendations from the consultation urged manufacturers to:
- Make heating controls easier to programme, use and install;
  - More internet chat rooms dedicated to discussing technical matters.

### Working together

- 4.10. Government, industry and consumer advocacy groups all have a role in supporting a well-informed consumer base and we continue to work together to ensure that consumers will have the guidance necessary to make effective decisions about their heating systems.

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<sup>28</sup> Each Home Counts made recommendations to Government regarding the quality and standards for home energy efficiency and renewable energy installations in the UK.

<https://www.gov.uk/government/publications/each-home-counts-review-of-consumer-advice-protection-standards-and-enforcement-for-energy-efficiency-and-renewable-energy>

## Annex A: Summary of consultation responses

The Department for Business, Energy and Industrial Strategy consulted from 8 December 2016 to 27 January 2017. A total of 890 responses were received. With help from the Energy and Utilities Alliance and their members, the consultation was distributed to thousands of heating engineers, resulting in over 700 responses from boiler installers.

1.	Is a three month coming into force period sufficient?
	<p>796 responded.</p> <ul style="list-style-type: none"> <li>• 53% (422) answered 'yes'</li> <li>• 46% (366) answered 'no'</li> <li>• 10 respondents qualified their answers, indicating the time needed for industry to prepare would depend on how successfully the new standards are publicised.</li> <li>• On the basis of this advice Government has decided a 6 month coming into force period represents a realistic compromise.</li> </ul>
2a.	Do you agree the minimum standard for domestic boilers in England should be changed to 92% ErP?
	<p>707 responded.</p> <ul style="list-style-type: none"> <li>• 87% (603) answered 'yes'</li> <li>• 10% (72) answered 'no'</li> <li>• Some respondents highlighted that 92% ErP is suitable for gas boilers but overly ambitious for oil.</li> <li>• On the basis of this advice Government has decided to set 92% as a minimum standard for gas.</li> </ul>
2b.	If not, what ErP rating is appropriate for each fuel type, and are there risks?
	<p>78 responded.</p> <ul style="list-style-type: none"> <li>• No answer received a statistically significant level of support, however 14 respondents, equivalent to 19% of those answering 'no' to question 2a, suggested 90%.</li> <li>• The lowest performance rating suggested was 80% ErP, and the highest was 98% ErP.</li> </ul>

- Several respondents reiterated their answer to question 2a without additional insight, including some who support the 92% ErP proposal.
  - Several respondents indicated 89% ErP would be an appropriate standard for oil boilers.
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2c. What can be done to further improve the efficiency of a boiler beyond 92% ErP and what are the technical and cost implications for the industry and the consumer?

260 responded. The five most common responses were:

- Better controls – 52 respondents (20%)
  - FGHRs – 33 respondents (13%)
  - Weather compensation – 26 respondents (10%)
  - Nothing – 26 respondents (10%)
  - Insulation – 14 respondents (5%)
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3a. Do you agree that functional timers and thermostats should be a mandatory system component when a boiler is installed?

222 responded.

- 94% (208) answered 'yes'
  - 5% (12) answered 'no'
  - Two responses commented on the proposal without a clear positive or negative.
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3b. Will increased demand lead manufacturers to diversify designs to make it easier for consumers to find a product that suits their needs?

217 responded.

- 71% (153) answered 'yes'
  - 26% (56) answered 'no'
  - Other respondents challenged whether this was a relevant or desirable outcome, suggesting for example that consumer understanding of controls is a higher priority.
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3c.	<p>What would be the advantages and disadvantages of mandating that all relevant heating system components be capable of communicating using an open communication protocol (e.g. OpenTherm)?</p>
	<p>256 responded.</p> <p>Most responses commented on the value of smart controls in general, with recurring concern for older consumers who may be less attracted to some products. Responses that addressed the question were too diverse for quantitative assessment. Recurring themes included:</p> <ul style="list-style-type: none"> <li>• The advantage of increased choice for consumers, but concern that even with open communication some controls may be more/less well suited to some boilers than others;</li> <li>• Potential value from remote monitoring and diagnosis, but a corresponding security risk if systems are hacked;</li> <li>• General recognition that interoperability in the domestic market will eventually become indispensable, as in non-domestic HVAC systems. But similarly there is recognition that this market needs time to develop, and open communication protocols should be market-led at this stage.</li> </ul>
3d.	<p>Do consumers engage effectively with installed timers and thermostats to maximise efficiency?</p>
	<p>214 responded.</p> <ul style="list-style-type: none"> <li>• 25% (53) answered 'yes'</li> <li>• 71% (151) answered 'no'</li> <li>• Other respondents largely took the view that engagement levels are too varied and mixed to answer 'yes' or 'no' to this question. Some identified that more sophisticated controls require less engagement, due to greater automation.</li> </ul>
4a.	<p>Do you agree that weather compensation should be a mandatory system component when a boiler is installed in a domestic building in England?</p>
	<p>191 responded.</p> <ul style="list-style-type: none"> <li>• 39% (75) answered 'yes'</li> <li>• 59% (112) answered 'no'</li> <li>• Other respondents indicated that suitability depended on the circumstances of the property, the heating system, and/or the specific product in question.</li> </ul>

4b.	Are boiler installers qualified and confident to install weather compensators and set compensation curves?
	<p>191 responded.</p> <ul style="list-style-type: none"><li>• 28% (53) answered 'yes'</li><li>• 70% (134) answered 'no'</li><li>• Other respondents indicated that installers may not have experience in this practice, but with limited training and modern products very little is required of them.</li></ul>

Question 4c called for further evidence to support questions 4a and 4b.

4d.	What alternative solutions can minimise return temperatures in response to variations in heat demand?
	<p>114 responded.</p> <p>Responses were very diverse, and many did not address the question. The five most common relevant responses were:</p> <ul style="list-style-type: none"><li>• Radiator sizing – 20 respondents (18%)</li><li>• Load compensation – 13 respondents (11%)</li><li>• Smart controls – 9 respondents (8%)</li><li>• Hydraulic balancing – 6 respondents (5%)</li><li>• Insulation – 6 respondents (5%)</li></ul>

5a.	Do you agree that Government should explore options to incorporate... additional [energy saving] technologies into minimum standards?
	<p>366 responded.</p> <ul style="list-style-type: none"><li>• 73% (266) answered 'yes'</li><li>• 26% (96) answered 'no'</li></ul> <p>Other respondents tended to express support or criticism for one or more of the technologies in scope, without explicitly stating a view on whether there is a role for additional energy saving technologies in minimum standards.</p>

5b.	Should the private rented sector be permitted to opt out of more costly policy options, if undertaken?
	<p>82 responded.</p> <ul style="list-style-type: none"><li>• 7% (6) answered 'yes'</li><li>• 91% (75) answered 'no'</li></ul> <p>One response was not clearly in favour or opposed.</p>
5c.	If an opt out is offered to the private rented sector should a similar opt out be extended to the social rented sector?
	<p>77 responded.</p> <ul style="list-style-type: none"><li>• 13% (10) answered 'yes'</li><li>• 86% (66) answered 'no'</li></ul> <p>One response was not clearly in favour or opposed. Several of those answering yes were explicit that they would only support this in a scenario where an opt-out existed for private landlords.</p>
6a.	Do installers have sufficient familiarity, training and experience to properly install each of the technologies listed above?
	<p>349 responded.</p> <ul style="list-style-type: none"><li>• 33% (115) answered 'yes'</li><li>• 65% (228) answered 'no'</li></ul> <p>Respondents generally indicated that some installers will be familiar with all technologies, and all installers will be familiar with some.</p>

6b.	Can installers and consumers make confident decisions regarding which technology is an appropriate solution for a given household?
	<p>357 responded.</p> <ul style="list-style-type: none"><li>• 48% (170) answered 'yes'</li><li>• 50% (180) answered 'no'</li></ul> <p>Remaining respondents were uncertain or vague in their answers.</p>
6c.	Is there evidence to suggest that any of these technologies are incompatible with each other or with any of the technologies mentioned in this consultation?
	<p>314 responded.</p> <ul style="list-style-type: none"><li>• 32% (100) answered 'yes'</li><li>• 65% (205) answered 'no'</li></ul> <p>Other respondents generally indicated the issue was not incompatibility, rather that the combined impact of these technologies in tandem may be greater/less than expected.</p>
6d.	Do consumers understand how to use TRVs effectively?
	<p>354 responded.</p> <ul style="list-style-type: none"><li>• 40% (143) answered 'yes'</li><li>• 57% (203) answered 'no'</li></ul> <p>Remaining respondents were non-committal in their answers.</p>
6e.	Are there other technologies that should be considered on an even footing with those listed above?
	<p>120 responded.</p> <ul style="list-style-type: none"><li>• 37% (44) reiterated support for the technologies already identified in the consultation</li><li>• 18% (21) explicitly stated that there are no additional technologies to be considered</li><li>• 15% (18) indicated that other technologies should be considered, but did not specify any technologies or products in particular</li></ul>

- 8% (10) referred to at least one form of renewable heating
- 7% (8) specified insulation, of any kind

A number of respondents identified additional technologies to consider, such as micro CHP, gas heat pumps, and others. None of these additional technologies were identified by more than two respondents.

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Question 6f called for further evidence to support questions 6a-6e.

7.	What evidence is there that TPI control can deliver energy savings in English households, and what is the range of energy savings (%) across various property types and circumstances?
	<p>103 responded.</p> <p>The aim of this question was to identify any additional evidence to corroborate findings from test environments. No further evidence was identified. 11 respondents referenced the evidence already in our possession. Additionally:</p> <ul style="list-style-type: none"> <li>• 46% (47) said they were not aware of any evidence regarding the energy savings from TPI controls</li> <li>• 14% (14) speculated positive results, in some cases from personal experience</li> <li>• 10% (10) speculated no savings or adverse consequences, in some cases based on personal experience.</li> </ul>

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8a.	Do the functionalities of automation and optimisation effectively describe the 'smart' controls that offer the greatest benefit? Should there be greater focus on remote access?
	<p>162 responded. Of these 25 answered 'no' and 13 answered 'yes' without specifying which part of the question their answer addressed. A further 28 were non-committal or ambivalent in their responses.</p> <p>Of the remaining 107 responses:</p> <ul style="list-style-type: none"> <li>• 12% (13) explicitly agreed that automation is one of the 'smart' functions that provide the greatest benefit, while 2% (2) explicitly disagreed</li> <li>• 14% (15) explicitly agreed that optimisation is one of the 'smart' functions that provide the greatest benefit, while 2% (2) explicitly disagreed</li> <li>• 12% (13) believe remote access offers real value, while 26% (28) feel that remote access is irrelevant to effectiveness – some of these views suggest the</li> </ul>

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technology itself is flawed, while others see the potential but do not believe consumers will use remote access optimally.

The remaining 34 responses offered other insights that did not address the question.

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8b. In what ways could greater uptake of these functionalities promote smart control innovation?

100 responded. The four most common responses were:

- 19% (19) anticipate simpler interaction, both at the time of installation and with respect to daily use
- 16% (16) anticipate cost reductions
- 7% (7) believe innovation will lead to better advice, guidance and feedback for the end user
- 4% (4) believe there will be no innovation resulting from greater uptake of smart controls.

8c. What evidence is there to indicate how long a smart heating control lasts?

84 responded.

- 70% (59) did not have a view, nearly half of which indicated these products have not been on the market long enough to say for certain.
- 12% (10) expect smart controls to last up to 15 years.

Other views varied.

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9. Is there demand for consumer advice, and how should it be delivered? What more can the industry do to encourage consumer engagement with heating controls and their heating system?

185 responded. The five most common themes were:

- 26% (48) highlighted the key role of installers as sources of information
- 23% (42) referred to some form of impartial advisory service
- 14% (26) commented that advice in any form needs to be simple and accessible
- 12% (22) recommend more or better advertising
- 9% (17) felt that installers need better quality training to deliver good advice

Other themes included a need for advice to focus on costs and benefits (9%) the role of

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manufacturers in providing instructional information for installers/consumers (8%) and mixed views on the extent to which installers currently provide adequate advice.

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10a. Do you agree with our understanding of the costs associated with each of the technologies in scope?

273 responded.

- 65% (177) answered 'yes'
- 34% (94) answered 'no'

Very few respondents provided additional information. Of the 94 answering 'no', 3 believed our estimates were too low while 2 believed they were too high.

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10b. Do you agree with our understanding of the way costs may change, and the reasons why they may change?

272 responded.

- 78% (213) answered 'yes'
- 21% (56) answered 'no'

The remaining three responses offered insight that did not address this question.

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10c. Would consumers be willing to accept the additional upfront costs of technologies listed in the consultation, on the basis of reducing their annual energy bills and benefiting the environment?

283 responded.

- 34% (97) answered 'yes'
- 63% (178) answered 'no'

Remaining responses indicated that different households will be motivated by different things, making it impossible to predict consumer attitudes overall.

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10d.	What evidence is there on the impact of each technology on the performance of domestic heating systems? How might this change with further innovation?
	The aim of this question was to identify any additional evidence to corroborate findings from test environments. No further evidence was identified. Several respondents highlighted the important of raising consumer awareness of the various technologies.

10e.	Our Impact Assessment currently only considers natural gas. How might consequences be different for oil or LPG boilers?
	<p>115 responded.</p> <ul style="list-style-type: none"> <li>• 34% (39) stated that costs and benefits for LPG would be the same as for natural gas. 18% (21) said savings would be greater, largely due to LPG bills being higher initially, making each % saving equivalent to a higher cash value. 4% (5) thought LPG savings would be less, or initial costs greater than natural gas.</li> <li>• 29% (32) suggested the costs and benefits for oil would be the same as natural gas, however 13% (15) identified that this only applies to modulating oil boilers. 5% (6) thought oil savings would be greater than natural gas, while 3% (4) believe oil savings would be less or cost more initially.</li> </ul>

Question 10f called for further evidence to support questions 10a-10e.

11a.	Do heating engineers share a common understanding of what hydraulic balancing entails, and is it undertaken regularly when a boiler is replaced or serviced?
	<p>283 responded.</p> <ul style="list-style-type: none"> <li>• 39% (111) answered 'yes'</li> <li>• 56% (158) answered 'no'</li> </ul> <p>It is clear that many believe heating engineers do share a common understanding of hydraulic balancing, but believe that it is rarely undertaken in practice. Several respondents indicated that this is something 'real' engineers do as standard, while less competent installers will avoid it.</p>

11b.	What practical barriers might prevent a central heating system from being hydraulically balanced (e.g. system size)?
	<p>163 responded. The five most common responses were:</p> <ul style="list-style-type: none"> <li>• 58% (94) identified problems arising from the condition or design of the existing system components, particularly valves, pipework, and radiator sizing. A risk of leaks was raised</li> <li>• 26% (43) suggested the time taken to do the work, and/or the associated cost was the main barrier</li> <li>• 9% (15) believe the greatest barrier is installer competence</li> <li>• 8% (13) identified the accessibility of valves and pipework as a major barrier</li> <li>• 6% (10) referred to the age of the system, however this may indirectly also refer to the condition of existing components.</li> </ul> <p>Other themes referred to the presence of dirt in the system as a barrier. Only 5 respondents thought no barriers to hydraulic balancing exist.</p>
11c.	What is the average cost to a consumer when hydraulically balancing a central heating system?
	<p>151 responded.</p> <ul style="list-style-type: none"> <li>• 19% (29) do not charge for hydraulic balancing, generally because they view it as a necessary and inclusive part of commissioning a boiler</li> <li>• 25% (37) charge £50-£150</li> <li>• 19% (28) charge more than £150, with 3% (5) charging more than £300</li> <li>• 5% (7) charge up to £50</li> </ul> <p>The remaining responses tended to focus on the time taken rather than the cost, with almost half such respondents indicating up to two hours labour. 11% (16) did not know how much hydraulic balancing should cost or how long it should take.</p>
11d.	What evidence is there to demonstrate the impact that hydraulic balancing can improve the performance and/or carbon intensity of domestic heating systems?
	<p>The aim of this question was to identify existing evidence to help Government consider what level of support is appropriate for this practice. A small number of responses presented possible opportunities, which Government will pursue.</p>

12a.	What flow and return temperatures are typically set for a condensing boiler at the point of installation?
	<p>190 responded.</p> <ul style="list-style-type: none"> <li>• 19% (37) set temperatures within recommended guidelines: flow no higher than 75°C, and a difference between flow and return temperatures of at least 20°C</li> <li>• 11% (21) set a flow temperature above between 75% and the maximum</li> <li>• 28% (53) observe <math>\Delta T</math> of less than 20°C. 20% (39) less than 15°C, and 5% (9) less than 10°C</li> </ul> <p>Other respondents gave diverse views. Eight said they follow manufacturers' instructions, while seven said they do not set the flow temperature.</p>

12b.	Can lower return temperatures be implemented in the existing housing stock without upsizing radiators on a grand scale?
	<p>260 responded.</p> <ul style="list-style-type: none"> <li>• 46% (120) answered 'yes'</li> <li>• 51% (132) answered 'no'</li> </ul>

12c.	Should Government consider setting a maximum return temperature in the future?
	<p>270 responded.</p> <ul style="list-style-type: none"> <li>• 40% (107) answered 'yes'</li> <li>• 58% (156) answered 'no'</li> </ul>

Question 12d called for further evidence to support questions 12a-12c.

13a.	Do installers comply with requirements to treat systems for sludge and limescale when replacing a boiler?
	<p>270 responded.</p> <ul style="list-style-type: none"> <li>• 60% (170) answered 'yes'</li> <li>• 38% (106) answered 'no' or indicated this is not undertaken consistently</li> </ul>

13b.	What evidence is there to demonstrate the impact that these treatments can improve the performance and/or carbon intensity of domestic heating systems?
	A majority of respondents used this field to elaborate on their answers to question 13a. Limited additional evidence was offered.
14.	What action should Government take to reduce the use of coal and oil in buildings? Over what period of time should the transition occur? Which levers should be deployed to support homes that are harder to heat?
	<p>165 responded.</p> <ul style="list-style-type: none"> <li>• 25% (41) focused on the role of financial incentives, including grants, loans and subsidies</li> <li>• 12% (12) indicated their support for a transition away from oil, without specifying particular actions</li> <li>• 12% (20) were of the opinion that it would be a mistake to transition away from oil heating</li> <li>• 8% (13) suggested extending the gas grid to all parts of the country</li> </ul> <p>Other responses were diverse. Recurring themes included support for the Renewable Heat Incentive, the importance of insulation, and the possible use of legislation.</p>
15.	What other innovative solutions or opportunities exist that may have a tangible impact on emissions from heat in buildings, either in the next two carbon budgets or out to 2050? Please provide any supporting evidence.
	<p>129 responded.</p> <p>48 separate themes were identified, the most common being:</p> <ul style="list-style-type: none"> <li>• 22% (28) see a key role for one or more existing renewable technology</li> <li>• 21% (27) believe the greatest emphasis needs to be on insulating our buildings.</li> <li>• Six individuals explicitly identified new build properties as a key opportunity, and a further three proposed the reinstatement of Zero Carbon Homes</li> <li>• 9% (12) expressed support for decarbonising the gas grid in some form</li> </ul> <p>Other views included diverse ideas such as a role for hybrid systems, VAT reductions for particular products, district heating networks and micro combined heat and power.</p>

## Annex B: Amendments to domestic building services compliance guide

This document sets out amendments to the minimum standards in the compliance guide for installing gas-fired and oil-fired boilers in existing dwellings.

### Gas-fired boilers

Section 2.2 sets out the requirements for work on gas-fired wet central heating systems. There are no changes to standards for systems in new dwellings.

For gas-fired boilers installed in existing dwellings, either as a new installation or as a replacement to an existing boiler, the following standards apply. The following wording should replace the 'minimum standards' in section 2.0 of Table 4:

For all gas-fired boilers:

- a. The ErP<sup>1</sup> seasonal efficiency of the boiler should be a minimum of 92%<sup>2</sup> and not significantly less than the efficiency of the appliance being replaced – as set out in paragraph 1.8.
- b. Install a boiler interlock as defined for new systems.
- c. Time and temperature control should be installed for the heating system.

Additionally, for gas-fired combination-boilers:

- d. At least one of the following energy efficiency measures should be installed. The measure(s) chosen should be appropriate to the system in which it is installed:
  - i. *Flue gas heat recovery* – defined as a device which pre-heats the domestic hot water supply by recovering heat from the boiler's flue emissions.
  - ii. *Weather compensation* – defined as a control function which maintains internal temperatures by varying the flow temperature from the heat generator relative to the measured outside air temperature.
  - iii. *Load compensation* – defined as a control function which maintains internal temperatures by varying the flow temperature from the heat generator relative to the measured response of the heating system.
  - iv. *Smart thermostat with automation and optimisation* – automation is a control function that automatically adjusts time and temperature settings, based on occupancy detection and/or stored data from user adjustments

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<sup>1</sup> The Ecodesign of Energy Related Products Directive 2009/125/EC

<sup>2</sup> Table 1 in Section 1.9 should be updated to reflect this.

over time. Optimisation is a control function which starts the boiler operation at the optimum time to achieve the setpoint temperature at the start of the occupancy period.

**In the exceptional circumstances** defined in the *Guide to the condensing boiler installation assessment procedure for dwellings*,<sup>3</sup> the ErP efficiency standard would not apply and, instead, the boiler SEDBUK 2009 efficiency should be not less than 78% if natural gas-fired, or not less than 80% if LPG-fired. The requirements for time and temperature control, and the energy efficiency measures would also not apply in these circumstances.

The standards do not apply to heating boilers that are combined with range cookers.

The requirement for a boiler interlock to be installed remains.

### **Oil-fired boilers**

Section 3.2 sets out the requirements for work on oil-fired wet central heating systems. There are no changes to standards for systems in new dwellings.

For oil-fired boilers installed in existing dwellings, either as a new installation or as a replacement to an existing boiler, the following standard applies. This wording replaces the 'minimum standards' in section 2.0 of Table 13:

- a. The efficiency of the new appliance should be as specified for new systems in Table 11 and not significantly less than the efficiency of the appliance being replaced – as set out in paragraph 1.8.
- b. Install a boiler interlock as defined for new systems.
- c. Time and temperature control should be installed for the heating system.

### **Introductory section**

Section 1.7 sets out a summary of requirements when work is carried out on existing systems. This section is updated to include the following:

When replacing a boiler, the boiler controls are considered to be a part of the boiler installation, and should therefore meet the standards set out in the relevant sections of this document. For gas-fired combination boilers, certain energy-efficiency measures are also considered to be part of the boiler installation, and should meet the standards as set out in Section 3.

Section 1.8 sets out a summary of requirements when replacing primary heating appliances. This section is updated to state the following:

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<sup>3</sup> Guide to the condensing boiler installation assessment procedure for dwellings, ODPM, 2005.

For gas-fired boilers,<sup>4</sup> a minimum energy efficiency standard applies to the replacement appliance. For gas and oil-fired boilers, the installation of a replacement appliance should also include adequate controls. For gas-fired combination boilers, the installation of a replacement appliance should also include additional energy-efficiency measures. Full details of these requirements can be found in Section 2 for gas-fired boilers and Section 3 for oil-fired boilers.

Section 1.9 sets out a summary of minimum energy efficiency standards. This table is updated to reflect the amendments to system efficiency.

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<sup>4</sup> Except heating boilers that are combined with range cookers.

