

## Introduction and key messages

1. Building emissions trends
2. The Committee's buildings indicator framework
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4. Non-residential buildings
5. Low-carbon heat options



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# Chapter 3: Progress reducing emissions from buildings

## Introduction and key messages

In this chapter we look at emissions from buildings, which account for 37% of total UK greenhouse gas emissions. As a significant part of buildings emissions are related to space heating, they can fluctuate significantly year-on-year depending on winter temperatures. For example, in our 2012 progress report to Parliament, we documented a 12% fall in buildings emissions in 2011. We showed that this was mainly a result of reduced gas use due to milder winter temperatures compared to the unusually cold winter months of 2010.

Here we consider 2012 data on buildings emissions and energy consumption (with and without temperature adjustment), as well as data on the implementation of key abatement measures, with a focus on energy efficiency improvement and investment in low-carbon heat. We also discuss progress against policy milestones, given that we have previously highlighted the need for policy innovation to deliver the required abatement measures.

The key messages in the chapter are:

- Buildings CO<sub>2</sub> emissions increased by 10% in 2012. This reflects an increase in indirect (electricity) emissions due to higher electricity grid intensity (see chapter 2), as well as a rise in direct emissions due to lower winter temperatures than in 2011.
- In terms of the implementation of energy efficiency measures, there was good progress on cavity wall and loft insulation, as energy suppliers increased their activities to ensure they would meet their targets under the previous supplier obligations which came to an end in December 2012. However, we have previously pointed to the delivery risks (e.g. due to insufficient incentives for loft and cavity wall insulation) associated with the new policy approach – the Green Deal and the Energy Company Obligation. There is no evidence from the schemes' first few months of operation that these risks have subsided. Therefore, concerns remain about potentially low levels of delivery and the Government should consider further incentives.
- In the non-residential sector, simplification of the CRC energy efficiency scheme beyond our original recommendations has further eroded the incentives to improve energy efficiency it set out to provide. The abolition of the performance league table means that there is now no reputational incentive, while the financial incentive provided by the scheme remains weak. The non-residential Green Deal has been launched but uncertainty remains over minimum energy performance standards for the private rented sector, which will provide a crucial incentive for commercial landlords to engage in the Green Deal. The Government should conduct a comprehensive assessment of non-residential low-carbon policies to ensure they work effectively.

- Low-carbon heat uptake continues to be slow. In order to remain on track to deliver a 12% uptake in 2020, revisions to the non-residential scheme, the introduction of the residential renewable heat incentive, certainty of tariffs after 2015 and a range of supporting measures to overcome non-financial barriers are required.
- Overall, there is a need for policy strengthening and consistency across all buildings sectors and policies.

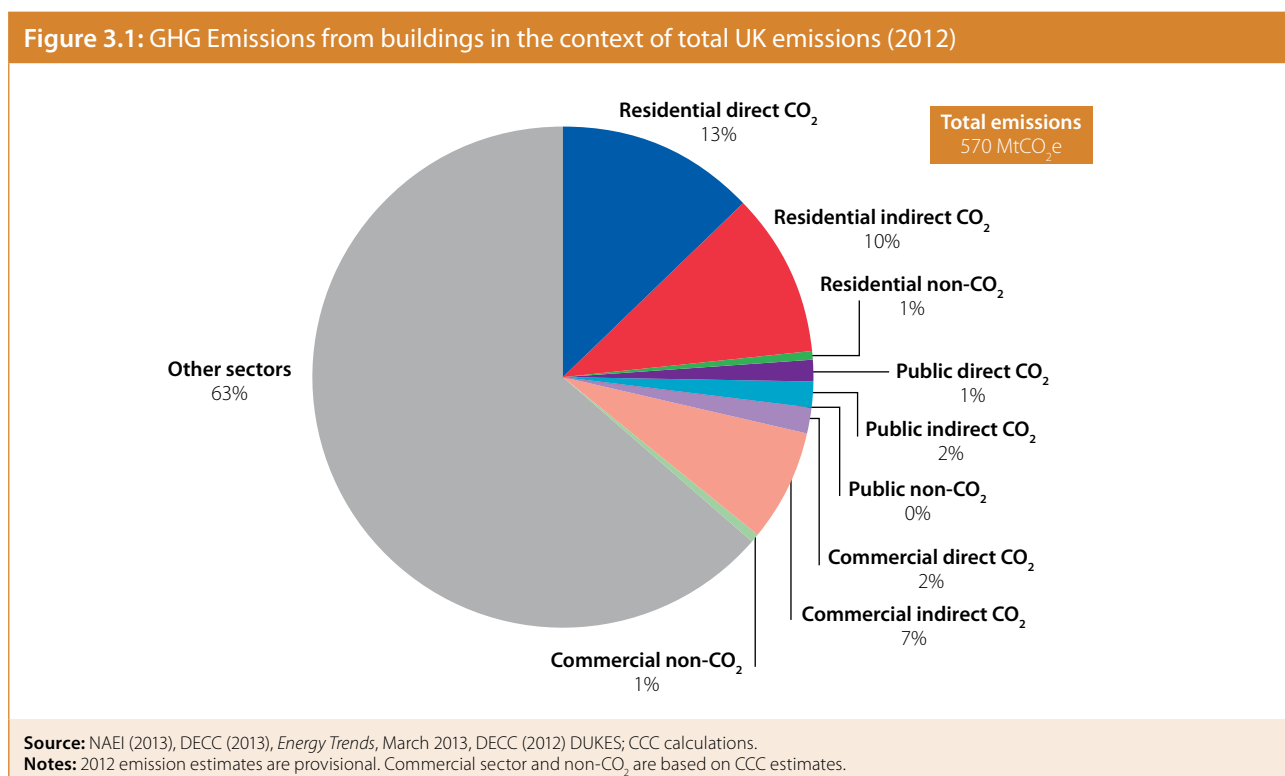
We set out the analysis that underpins these conclusions in five sections:

1. Buildings emission trends
2. The Committee's buildings indicator framework
3. Residential buildings
4. Non-residential buildings
5. Low-carbon heat options

## 1. Building emissions trends

### Overview

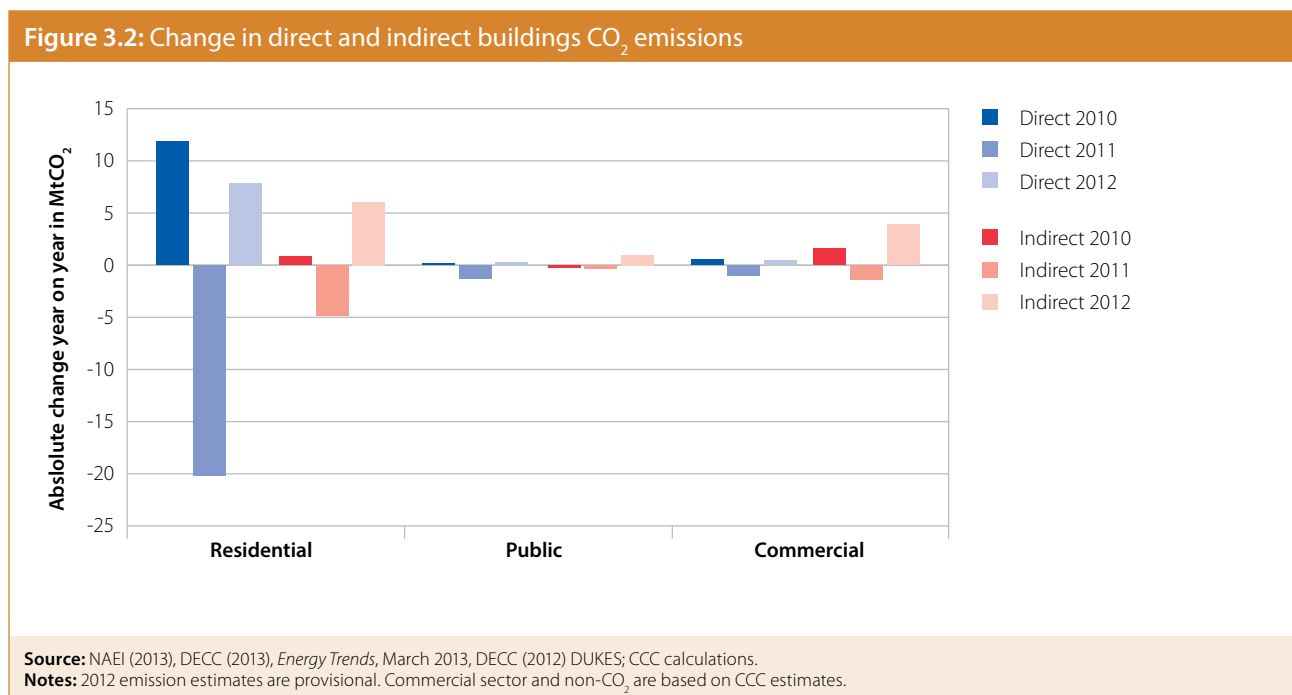
Emissions from buildings accounted for 37% of total UK greenhouse gas emissions in 2012 (Figure 3.1). Residential emissions account for 66% of buildings emissions, with commercial and public sector emissions accounting for 26% and 8% respectively. They comprise 45% direct CO<sub>2</sub> emissions (i.e. from burning fossil fuels) and 55% indirect (grid electricity-related) emissions.



Between 2003 and 2008, buildings CO<sub>2</sub> emissions fell by 3%, mainly due to improved energy efficiency. Since 2008, buildings emissions have fallen by 8% but have shown year-to-year fluctuations due to economic and temperature effects, i.e. while in 2009, emissions dropped 10% due to rising fuel prices and the recession, they increased by 7% in 2010 due to cold weather, but fell again (by 14%) in 2011 due to warmer winter months and rising fuel prices.

In 2012, preliminary data suggests that both direct and indirect emissions rose across all three buildings sectors by 11% to 202 MtCO<sub>2</sub> (Figure 3.2). Indirect emissions rose by 11 MtCO<sub>2</sub> (11%), largely due to an increase of highly carbon-intensive coal generation at the expense of gas in the power sector (see chapter 2). This was driven by a low global wholesale price of coal and a low carbon price, which increased the carbon intensity of electricity by 10%.

Although temperatures in 2012 were not colder than the long-term average, direct emissions nonetheless rose by 10% due to the colder temperatures compared to 2011, which had particularly mild winter temperatures.



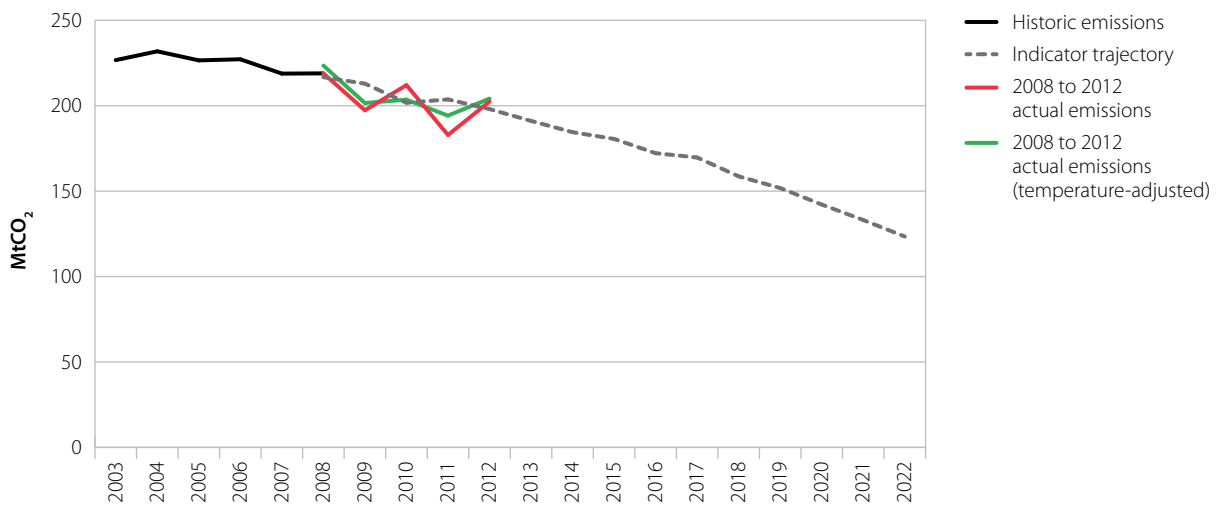
Overall, emissions were 2% above the level we envisaged when we set out our progress indicators in 2009:

- We first set out indicators in our progress report to Parliament in October 2009. These include emissions trajectories which were broadly consistent with the legislated carbon budgets. They did not allow for the impact of the prolonged economic downturn on emissions, which was particularly pronounced in the non-residential sector. They assumed temperatures as in a typical year (i.e. based on the average of the period 1971-2000), and therefore did not allow for fluctuations due to lower than average winter temperatures in 2010 and higher than average temperatures in 2011 (Figure 3.3).

- Emissions from buildings were 4 Mt CO<sub>2</sub> above our trajectory in 2012 despite the continued effects of the sluggish economy. Adjusting for temperature, emissions from buildings were 6Mt CO<sub>2</sub> above our trajectory, as temperatures in 2012 were just above average.
- Without the increase in emissions intensity from the electricity grid, emissions from buildings in 2012 would have been 3% below the 2009 trajectory (or 2% when also adjusting for temperature).

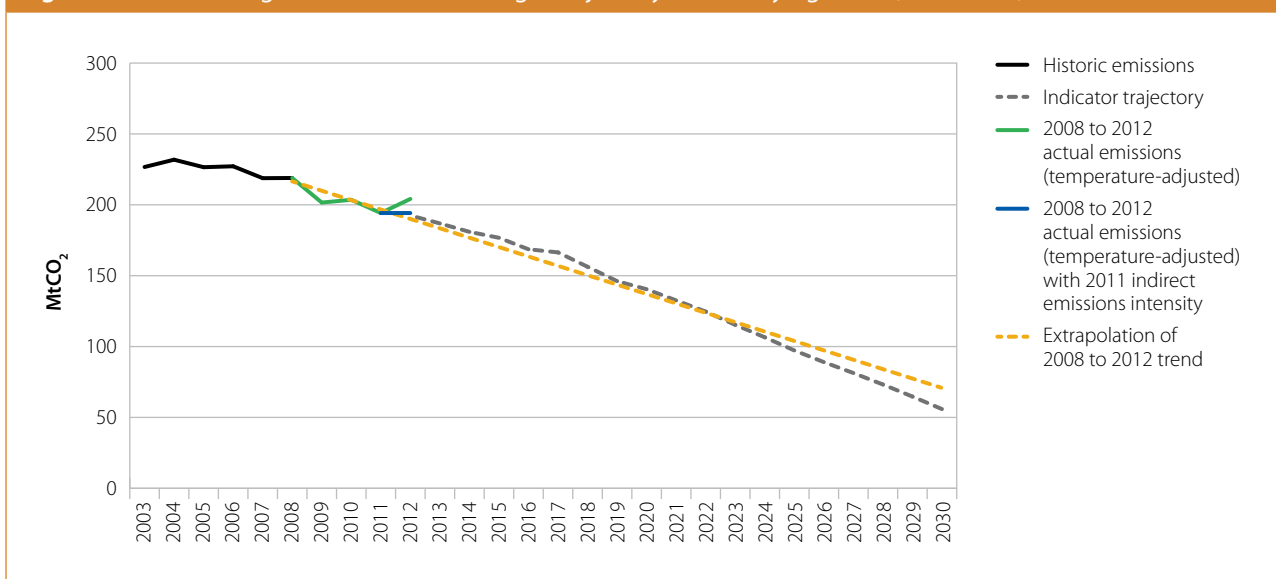
Our assessment (see chapter 2) is that it is unlikely that the increase in coal burn will be sustained in the medium-to-long term, due to the age of existing plants, existing environmental legislation and the UK's carbon price floor. However, even if the higher grid intensity is a temporary effect, it remains the case that the implementation of measures at current rates is not sufficient to meet the fourth carbon budget, notwithstanding the impacts of the economic downturn (Figure 3.4). Furthermore, there are significant risks that the new policy framework (especially in the residential sector) will result in an even lower implementation rate for key measures.

**Figure 3.3: All buildings – historical emissions vs original indicator trajectory (2003-2022)**



**Source:** NAEI (2013), DECC (2013), *Energy Trends*, March 2013, DECC (2012) DUKES; CCC calculations.  
**Notes:** 2012 emission estimates are provisional. Temperature adjustment is based on CCC calculations.

**Figure 3.4: All buildings – fourth carbon budget trajectory vs underlying trend (2003-2030)**



Source: NAEI (2013), DECC (2013), *Energy Trends*, March 2013, DECC (2012) DUKES; CCC calculations.

Notes: 2012 emission estimates are provisional. Temperature adjustment is based on CCC calculations.

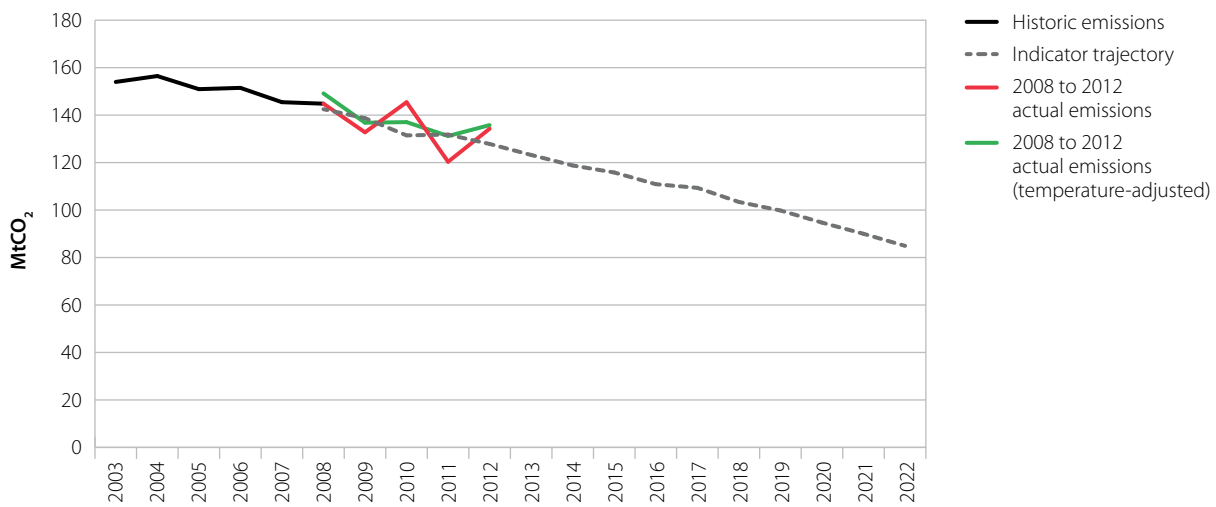
## Residential buildings

Total residential emissions increased by 12% to 134 MtCO<sub>2</sub>, largely due to the 10% rise in the grid emissions intensity and the reduction in temperatures between 2011 and 2012:

- Direct residential emissions account for 55% of total residential emissions and increased by 12% in 2012. Gas consumption increased despite a sustained increase in gas prices in 2012. Adjusting for the colder temperatures in 2012 accounts for nearly all the increase in direct emissions. This suggests that taken together the implementation of measures and the increase in gas prices did not have a significant impact on emissions.
- Indirect residential emissions account for 45% of residential emissions and increased by 11% in 2012. Electricity consumption increased despite an increase in electricity prices of 4%. The increase in emissions is mainly (10%) due to the higher carbon intensity of power generation, with the remainder due to the colder temperatures compared to 2011.

Overall, residential emissions were above our indicator trajectory (Figure 3.5). This is of concern, in particular in relation to the recent transition in energy efficiency policy, which creates a high degree of delivery risk (see section 3). This means that from 2013 onwards it is likely that there will be a much slower delivery of measures than is implied by our trajectories.

**Figure 3.5: Residential sector – historical emissions vs original indicator trajectory (2003-2022)**



**Source:** NAEI (2013), DECC (2013), *Energy Trends*, March 2013, DECC (2012) DUKES; CCC calculations.  
**Notes:** 2012 emission estimates are provisional. Temperature adjustment is based on CCC calculations.

## Commercial buildings

After a 5% fall in emissions in 2011, total commercial emissions increased by 9% in 2012.

- Direct commercial emissions account for 18% of total commercial emissions and increased by 5% in 2012.
- Indirect commercial emissions account for 82% of commercial emissions and increased by 10% in 2012, reflecting the 10% increase in electricity grid carbon intensity.

Stripping out grid-related and temperature factors, commercial sector emissions have stayed broadly flat in the last two years, continuing a trend observed in the five years before the economic crisis.

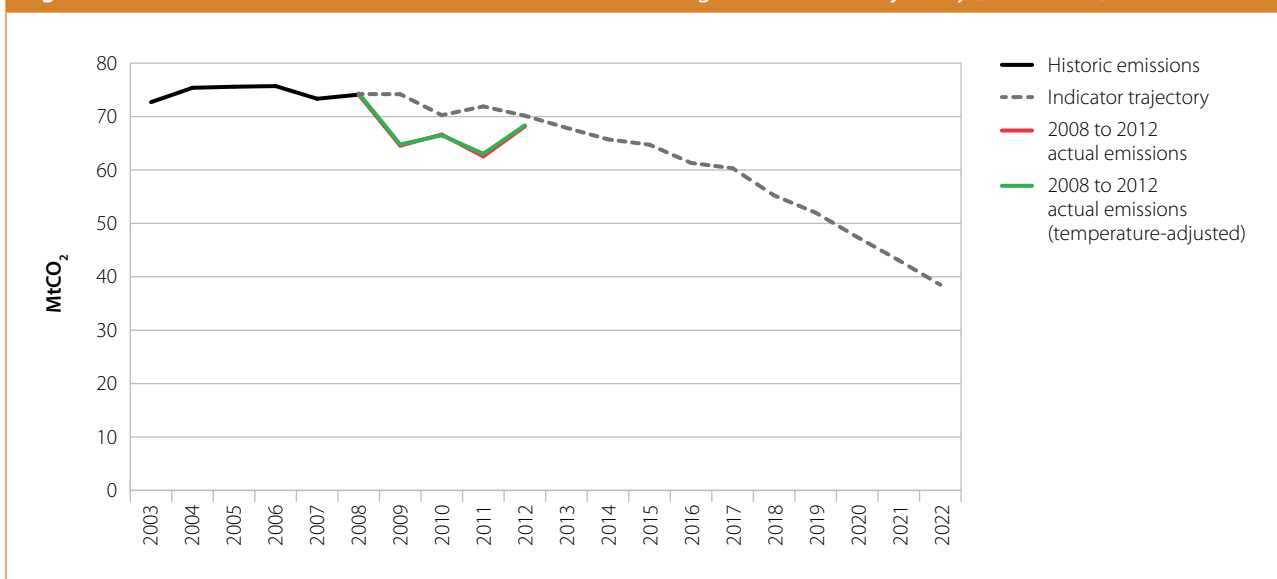
## Public sector

Public sector CO<sub>2</sub> emissions in 2012 increased by 8% due to the higher grid intensity and the lower temperatures in 2011:

- Direct public sector emissions account for 43% of total public sector emissions and increased by 4% in 2012.
- Indirect public sector emissions account for 57% of public sector emissions and increased by 11% in 2012, mostly due to the rise in the electricity grid emissions intensity.

Despite the increases in 2012 in both public and commercial emissions, the emissions from the non-residential sector are still below our indicator trajectory for 2012 (Figure 3.6), following on from the sustained year-on-year decreases in emissions between 2008 and 2011. This is likely to be due to a mix of factors, including the recession. When accounting for temperatures and the increase in emissions intensity of electricity, non-residential emissions have been fairly flat since 2011. This reinforces the fact that further efforts are required in order to unlock the significant abatement potential in the sector.

**Figure 3.6: Non-residential sector – historical emissions vs original indicator trajectory (2003-2022)**



Source: NAEI (2013), DECC (2013), *Energy Trends*, March 2013, DECC (2012) DUKES; CCC calculations.

Notes: 2012 emission estimates are provisional. Temperature adjustment is based on CCC calculations.

## 2. The Committee's buildings indicator framework

Our indicator framework – set out in the 2009 progress report to Parliament – includes a range of measures to reduce buildings emissions:

### Residential indicators

- Insulation of all lofts (10.5 million) and cavity walls (8.1 million) by 2015.
- Insulation of 2.3 million solid walls by 2022.
- Replacement of 12.6 million old inefficient boilers by 2022.
- 58% of the stock of wet appliances rated A+ or better and 45% of cold appliances rated A++ or better by 2022.

### Non-residential indicators

- Implementation of all cost-effective measures to reduce emissions from lighting, appliances, heating and cooling in the public and commercial sector by 2018.

### Low-carbon heat indicators

- Increasing investment in low-carbon heat to achieve a 12% penetration of total heat.

The indicator framework also includes policy milestones to support the implementation of measures, including the extension of energy performance labelling to all buildings and accelerating the introduction of minimum standards for privately rented residential properties.



In assessing progress towards meeting carbon budget in the buildings sector, we first consider the residential sector, where we consider implementation rates for measures such as energy efficiency improvement and look at key policy milestones. We then turn to developments in the non-residential sector, and finish by assessing progress towards ramping up levels of low-carbon heat.

### 3. Residential buildings

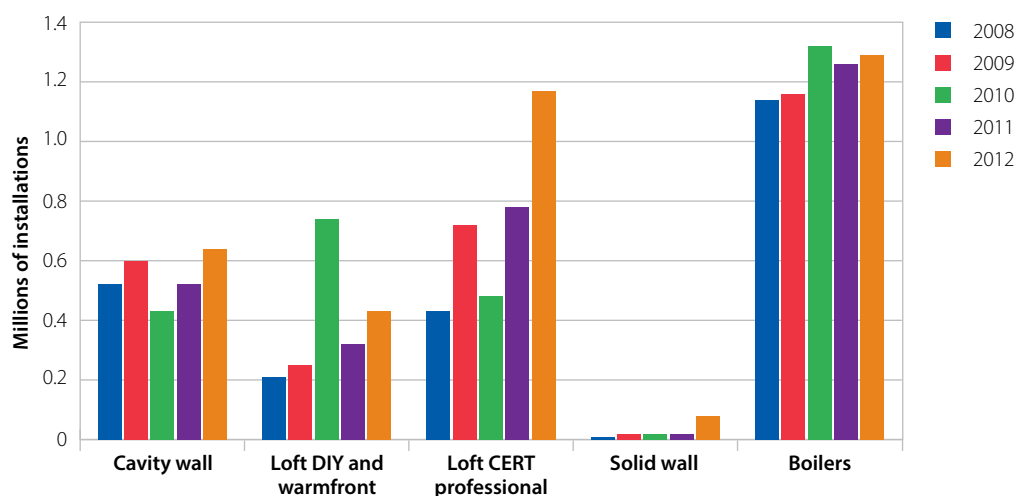
#### Implementation of insulation measures

Improving energy efficiency through home insulation is important both for reducing emissions and for reducing energy bills.

2012 was the final year of operation for the Carbon Emission Reduction Target (CERT) and the Community Energy Saving Programme (CESP). Energy companies had to deliver large numbers of installations to ensure they met their targets. This meant that installation numbers were up on 2011:

- **Lofts.** Rates for professionally installed loft insulation increased by 50% in 2012 to 1.17 million. DIY loft installations also increased by 35% to 433,000, together giving an installations figure of 1.6 million, up from 1.1 million in 2011 (Figure 3.7). This was despite a 95% drop off in loft installations under the Warm Front programme which came to an end in early 2013 (see below). As noted in our previous report, professional installations give greater confidence in the associated levels of carbon savings being achieved, whereas DIY installations numbers might be subject to some double counting and lower carbon savings.
- **Cavity walls.** Installations of cavity wall insulation measures were also up in 2012 by 22%, with a total of 637,000 installations, almost exclusively under CERT.

Figure 3.7: Installation of residential insulation measures (2008-2012)



Source: Ofgem (2012 and 2013), DECC (2012) Estimates of home insulation levels in Great Britain; CESP data; CCC Calculations.  
Notes: 2012 CERT professional includes 0.02 million lofts insulated under CESP.

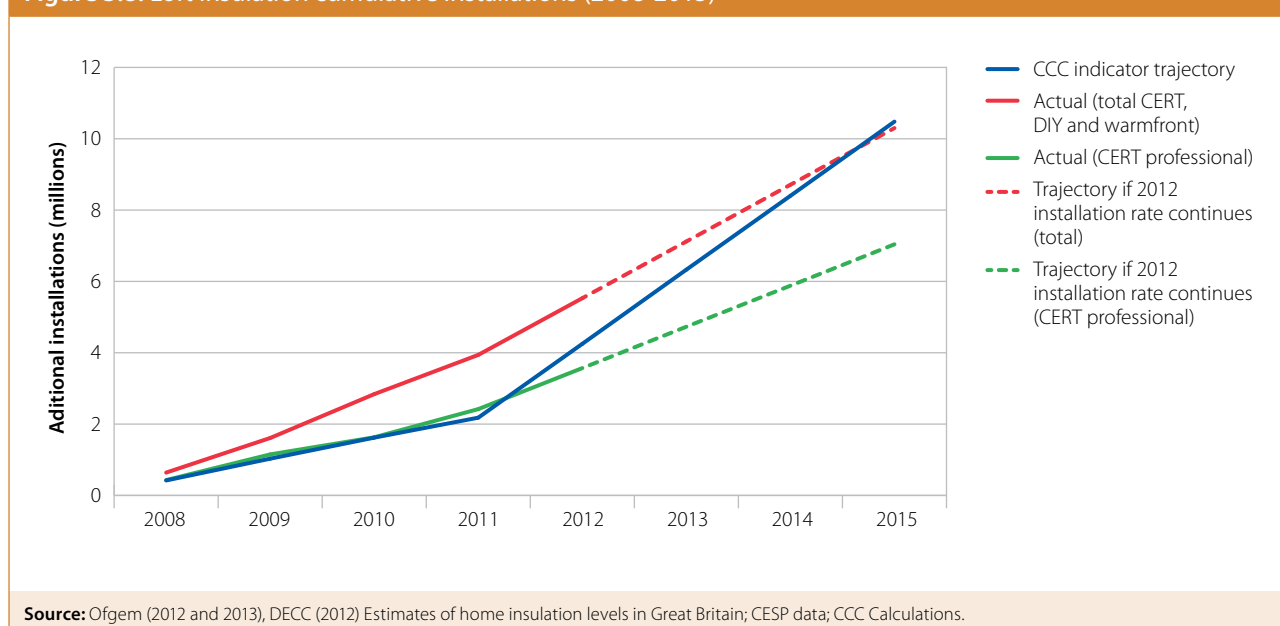
- **Solid walls.** Overall, around 68,000 solid walls were insulated under CESP, compared to just 14,000 under CERT. Although the levels remain low, this represents a fourfold increase from installation rates in 2011.

While 2012 saw a ramp-up in activity, this is likely to have slowed considerably in 2013 as the new market-based policy framework (see below) became operational, which has ended the large subsidies previously provided for loft and cavity wall insulation. For example, industry figures suggest that in the first three months of 2013, less than 44,000 cavity walls were insulated compared to more than 140,000 in the first three months of 2013.

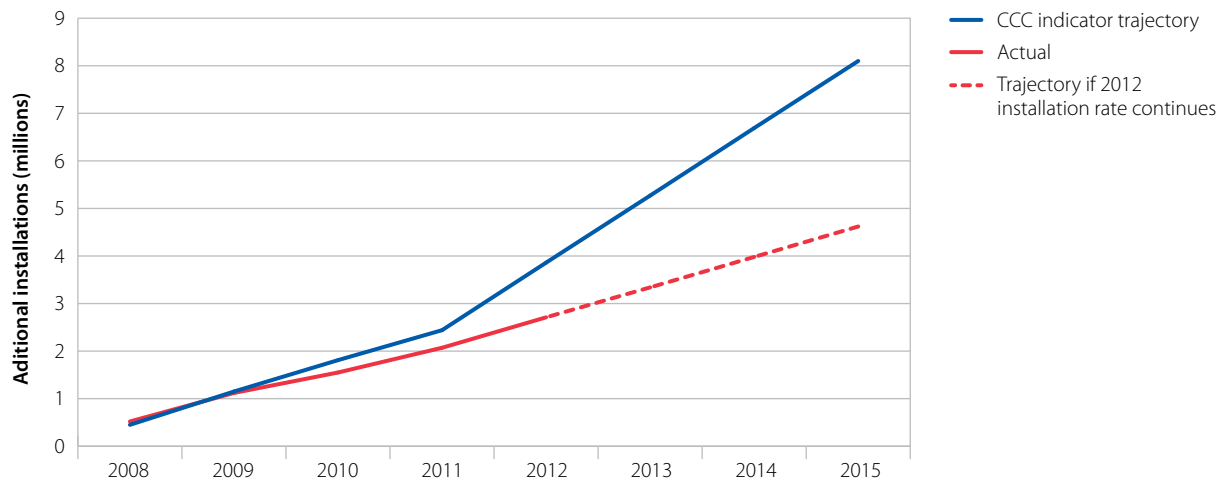
- The rate of loft insulation is above our indicator trajectory when including DIY figures (Figure 3.8), reflecting the success of the CERT policy. Whilst installations increased under the final year of CERT and CESP with suppliers expending efforts to meet CERT targets, it will be difficult to maintain these rates under the Green Deal and the Energy Company Obligation (ECO), particularly as no clear targets are in place for the Green Deal and the ECO has less focus on lofts and cavities than CERT and CESP.
- Cavity wall insulation figures remain below the trajectory (Figure 3.9). This is in part due to an increase in uptake rates envisaged in our indicator trajectory from 2011 which has not occurred in practice. When we developed the indicators in 2009, the trajectory was based on forecast uptake under CERT and CESP, with an increase in rates from 2012 in order to meet the previous government’s policy commitment of insulating all lofts and cavities by 2015.

There is some uncertainty about the number of uninsulated lofts and cavity walls that remain. DECC has recently undertaken research under the National Energy Efficiency Database (NEED) framework which has led to revised Government estimates of the number of remaining lofts and cavity walls that can practicably be insulated. We will review this evidence and our indicator trajectory as part of the fourth carbon budget review later this year and next year’s progress report, where we will undertake a full evaluation of the first carbon budget.

**Figure 3.8: Loft insulation cumulative installations (2008-2015)**

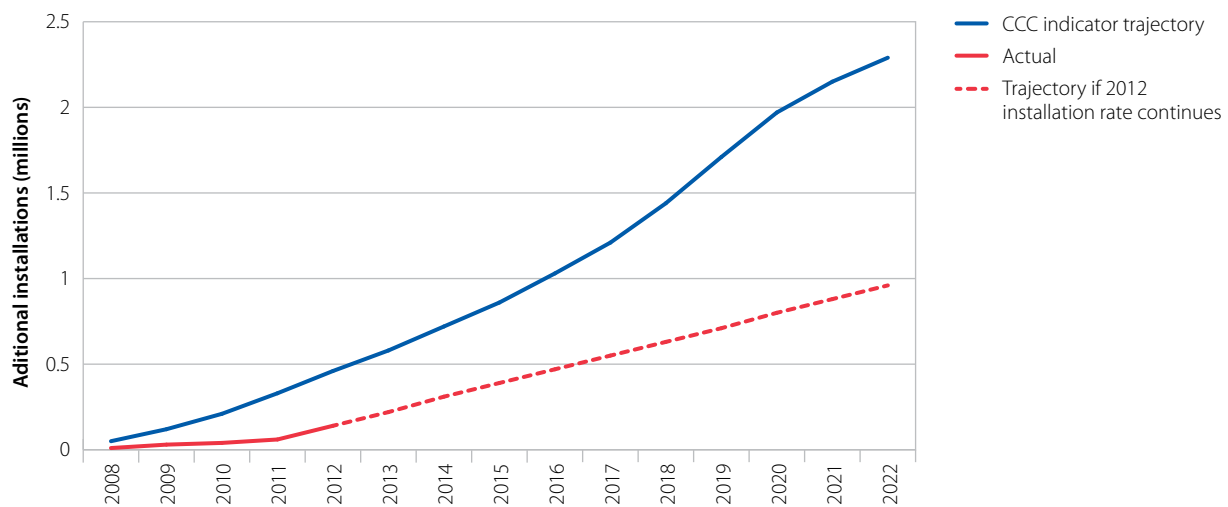


**Figure 3.9: Cavity wall insulation cumulative installations (2008-2015)**



Source: Ofgem (2012 and 2013), DECC (2012) Estimates of home insulation levels in Great Britain; CESP data; CCC Calculations.

**Figure 3.10: Solid wall insulation cumulative installations (2008-2022)**



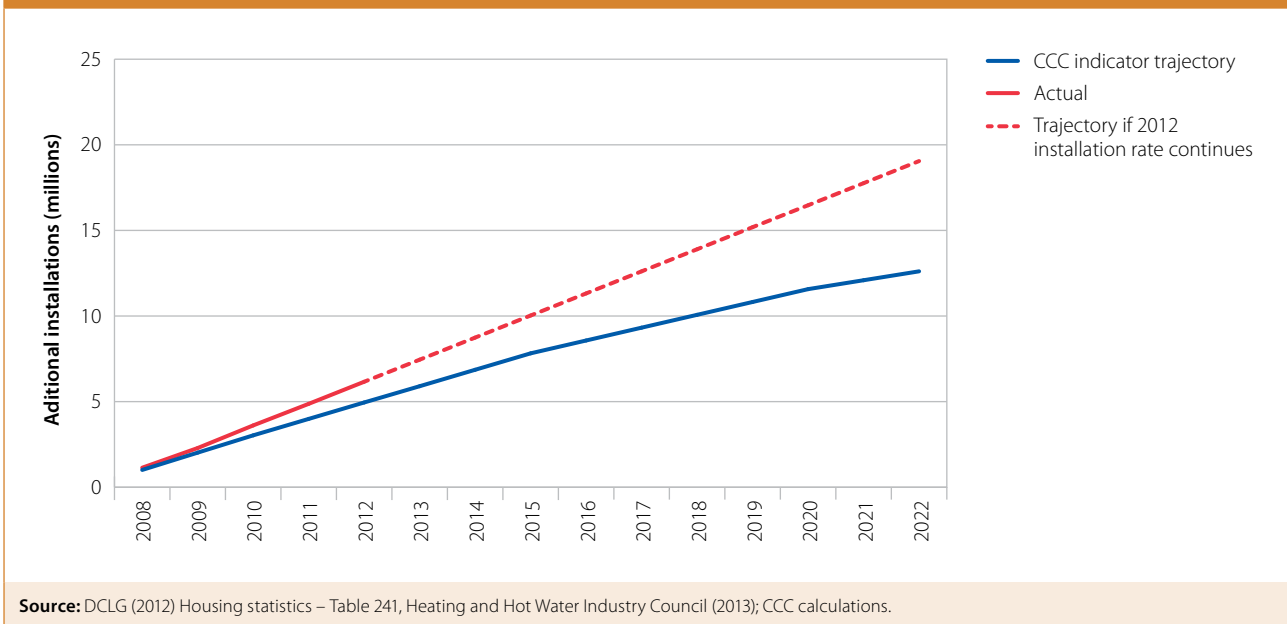
Source: Ofgem (2012 and 2013), DECC (2012) Estimates of home insulation levels in Great Britain; CESP data; CCC Calculations.

Solid wall insulation continues to be well below the trajectory (Figure 3.10), despite the increase in rates of uptake. The new policy framework of the Green Deal and ECO is expected to deliver increased numbers of solid wall installation, although still significantly below our trajectory.

### Boiler replacement

As in previous years, boiler replacement continued at a steady pace. In 2012, 1.3 million efficient boilers were installed, up 2% from 2011 levels (Figure 3.11).

Figure 3.11: A-rated boilers cumulative installations (2008-2022)



In future, we would expect the pace of boiler replacement to be maintained, or possibly to increase, given that it is a qualifying measure under the Green Deal. This may encourage homeowners to replace their inefficient boilers before the end of their life.

## Energy efficient appliances

As we noted in our 2012 progress report, the Government no longer monitors the sale of energy efficient appliances. It has therefore not been possible to access appliance data to monitor progress against our indicators.

Considering the large savings expected from products policy (e.g. the Government expects energy savings of 20% from more efficient appliances and lighting in the residential sector by 2020), we strongly recommend that the Government establishes a monitoring programme to ensure product policy meets its objectives.

## Policy milestones

### Final year of delivery under CERT & CESP

From 2008 to 2012, the main policy instrument for delivery of residential energy efficiency measures in Great Britain<sup>1</sup> was the Carbon Emission Reduction Commitment (CERT), requiring energy suppliers to deliver a range of carbon saving measures, with specific targets for insulation measures and assisting fuel poor and vulnerable households. In addition, the Community Energy Saving Programme (CESP), required suppliers and generators to deliver area-based energy efficiency programmes. Both programmes finished at the end of 2012 and broadly were successful:

<sup>1</sup> Northern Ireland has a separate scheme (Box 3.1).

- 99% of CERT and CESP targets were achieved, with some companies overachieving some of their targets by up to 20%. However, six energy companies will be investigated by Ofgem for failing one or more of their targets.
- While in the early years, lighting was a particular focus of CERT (with almost 304 million compact fluorescent lamps delivered to Britain's 25 million households), since 2010 the focus has been on insulation.
- Since 2008, CERT and CESP resulted in more than 4 million lofts being insulated professionally (and many more on a DIY basis through subsidised loft insulation material), as well as 2.5 million cavity walls and almost 150,000 solid walls.

However, at the end of the CERT and CESP period, there were still an estimated 5-7 million lofts with insufficient levels of insulation, as well as 4-5 million unfilled cavity walls. While the programmes made a start in insulating the UK's 7-8 million inefficient solid walls, much larger installation numbers will need to be delivered to help meet carbon budgets.

## Green Deal and ECO

As of early 2013, CERT and CESP have been replaced by the Green Deal and the Energy Company Obligation (ECO):

- **Green Deal:** This is a new financing framework to facilitate energy efficiency improvements and low-carbon heat in homes and non-residential properties, funded by a charge on electricity bills that avoids the need for consumers to pay upfront costs.
- **Energy Company Obligation (ECO):** ECO creates a legal obligation on energy suppliers to improve the energy efficiency of households through the establishment of three distinct targets – the Carbon Emissions Reduction Obligation (20.9 million 'lifetime' tonnes of CO<sub>2</sub>, i.e. savings over the lifetime of the measures installed), the Carbon Saving Community Obligation (6.8 million lifetime tonnes of CO<sub>2</sub>), and the Home Heating Cost Reduction Obligation (£4.2 billion of lifetime cost savings, focused on fuel poor households).

The two mechanisms are expected to work hand in hand, with the Green Deal for example helping to finance solid wall measures which also receive support under the ECO.

## Finance

Financing for the Green Deal is being provided through the Green Deal Finance Company, which initially has £244 million available, provided by:

- Committed funding of £69 million from 16 members of the Green Deal Finance company and other stakeholders (including energy suppliers, potential Green Deal installers and DECC)
- An additional Junior Capital Facility of £20m and a Contingent Capital Facility of up to £30 million provided by DECC
- A senior debt facility of £125 million provided by the UK Green Investment Bank.

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However, interest rates charged for Green Deal plans are close to 7%, which earlier consumer research had suggested would be unattractive to householders. It is also a major change from CERT and CESP where measures were given away for free or a very low fee.

To provide incentives for early adopters, the Green Deal has also received a £200 million support package from the Treasury which is being used for cashback incentives and to support local authorities. The Government has also run an advertising to promote the Green Deal.

### **Local authority involvement**

In our 2012 local authorities report, we highlighted the importance of local authorities in delivering the Green Deal and the need for some Government funding to support local authorities in becoming engaged in the Green Deal. DECC has since provided £13 million for eight Green Deal Low Carbon Cities (Birmingham, Bristol, Leeds, Liverpool, Manchester, Newcastle, Nottingham and Sheffield) to test elements of the Green Deal framework such as assessment and installation between October 2012 and May 2013.

In addition, in late 2012, DECC established a Green Deal Pioneer Places Fund of £10 million for additional local authorities to demonstrate ambitious approaches to kickstart local activity in the residential and non-residential sector, including:

- Promoting Green Deal-ready plans through creating a portfolio of households willing to enter Green Deal plans
- Adopting a street-by-street/area-based approach to projects
- Establishing the basis and developing innovative approaches for driving future Green Deal demand
- Developing strong local Green Deal delivery networks and partnerships.

Forty local authorities/consortia were allocated funding. However, the funding had to be spent in a very short time period (January to May 2013) and no further funding has been made available.

Several local authorities have announced major Green Deal plans, for example:

- Birmingham City Council has partnered with Carillion to launch Birmingham Energy Savers, potentially worth £600 million over eight years and aiming to retrofit 60,000 homes.
- Leeds City Region (11 local authorities) are looking to work with one provider to deliver Green Deals for 12,000 homes over three to four years, estimated to be worth £100 million.
- West Sussex Council is currently procuring for a £750 million contract. The Council will directly provide £75 million, with the rest to be leveraged through the Green Deal and ECO.

To encourage local authority involvement in energy efficiency delivery, DECC published revised Home Energy Conservation Act (HECA) guidance in July 2012 outlining new responsibilities and reporting requirements for local authorities. Local authorities were required to submit new reports by the end of March 2013 setting out practical and cost-effective energy efficiency

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measures in residential buildings. Subsequent progress reports must be published at two-year intervals.

To date, around 75% of local authorities have submitted reports outlining current trends in emissions, energy use, and demographics, uptake of energy efficiency measures, energy efficiency ambitions and priorities, and action plans to deliver measures (including summary of local and regional schemes such as ECO and Green Deal). DECC will publish a full analysis of these reports by the end of June.

These are encouraging developments and we will monitor in future progress reports how local authority schemes deliver.

### Initial take-up

In our 2012 progress report, we pointed out that there is a set of risks around the new market-based policy and that the estimated installation numbers under the Green Deal and ECO are substantially below our insulation indicator trajectories, thus resulting in a potential carbon gap of at least 3 MtCO<sub>2</sub>. This is due to insufficient incentives under the Green Deal and ECO, especially for lofts and cavity wall insulation (e.g. high interest rates under the Green Deal and much more restrictive criteria for cavity wall insulation support under the ECO compared to CERT).

DECC is planning to publish the first actual take-up figures for the Green Deal and ECO at the end of June 2013. In the absence of this, only limited data is available on the first few months (until April 2013) of the Green Deal/ECO operation:

- 152 Green Deal Assessor Organisations and the 1,274 Green Deal Advisors they employ had been accredited
- 18,816 Green Deal Assessments had been lodged
- £85.5 million worth of contracts had been let through the ECO brokerage system.

It is too early to assess how these initial activities will translate into actual measures. However, there are signs that compared to 2012 the implementation of measures in early 2013 has proceeded at a slow pace. For example, registration figures for cavity wall and solid wall insulation under the official guarantee schemes suggest that uptake has been very low in the first few months of 2013, with a drop of more than 60% compared to the same period in 2012. According to industry sources, a similar drop has been seen in loft insulation when comparing sales in the period March to May 2013 to the last quarter of CERT.

Overall, despite some positive signs such as local authority involvement, the initial evidence from the operation of the Green Deal and ECO does not suggest that the delivery risks have subsided. Additional incentives are likely to be needed. The Government should therefore carry out an early review of the policies.

## Supporting measures

We suggested in our 2012 progress report that incentives need to be strengthened to ensure the remaining potential for loft and cavity wall insulation is exploited. Wales and Scotland have additional energy efficiency policies, while Northern Ireland operates a totally separate scheme (Box 3.1). As yet, it is too early to assess how successfully the Scottish and Welsh schemes will interact with the Green Deal and ECO. In England, no further incentives have been introduced.

- One future driver for the Green Deal could be minimum energy performance standards for private rented sector homes, which account for around 15% of the UK's housing stock and have a higher than average incidence of low energy efficiency performance (e.g. in England in 2011, 11% of privately rented homes had the lowest F and G ratings compared to 8% on average and 2% in social housing). Minimum standards from 2018 were provided for in the 2011 Energy Act and DECC has set up a working group with the aim to develop proposals for publications later in 2013. We urge the Government to come forward with ambitious standards to send a clear signal to private landlords about the need to make energy efficiency improvements.
- Smart meters may play a role in improving energy efficiency but their roll-out has been delayed by one year and will now begin in 2015 rather than 2014.
- We have previously recommended additional incentives such as provisions for consequential improvements through the buildings regulations and/or stamp duty relief but none of these have so far been implemented.

Overall, additional incentives that could drive Green Deal and ECO uptake remain weak and Government needs to address the emerging gap between what is needed to achieve carbon budgets and what is being implemented.

### Box 3.1: Devolved administration energy efficiency and fuel poverty programmes

#### Scotland

In April 2013, the Scottish Government launched the new Home Energy Efficiency Programmes for Scotland (HEEPS). £60 million have been made available in 2013/14 for area-based energy efficiency schemes, £46 million of which have been allocated to all Scottish local authorities. Another £16 million will be available for energy efficiency grants to vulnerable households under the Energy Assistance Scheme, as well as £4 million for gas grid infill and extension projects. The Scottish government also aims to leverage £125 million per year from the ECO, thus achieving a total spend of £200 million.

#### Wales

The Welsh government is providing £30 million in 2012/13 to support two programmes, Nest and Arbed. Nest provides funding for a range of energy efficiency improvements in low-income households. Arbed is an area-based scheme (focused on deprived areas) and its second phase (2013-2015) will see £45 million investment over three years (£35 million of which is funded by the European Regional Development Fund) to improve energy efficiency and develop renewable energy in a further 5,000 homes in Wales. The aims of the scheme cut across carbon reduction, regeneration of the local economy and reduction of fuel poverty.



### Box 3.1: Devolved administration energy efficiency and fuel poverty programmes

#### Northern Ireland

The Green Deal and ECO do not operate in Northern Ireland. Instead, the Northern Ireland Sustainable Energy Scheme is funded through a levy on all electricity customers, and totalled just under £8 million in 2011/12. 80% of the scheme is aimed at low-income households. These are also the focus of the government-funded Warm Homes scheme, which improves the energy efficiency of at least 9,000 homes a year. Additional measures include targets for energy efficiency standards in new social homes, and a £1,000 boiler scrappage scheme available to households earning less than £40,000 (over 6,000 applications have been approved). There is also a Heating Replacement Scheme which since 2001, this has seen the number of homes using coal reduced from 56,000 to 6,900 and the number using electric heating from 21,560 to 9,280.

## Fuel poverty

Fuel poverty affects a large number of households in the UK and is particularly extensive in the devolved administrations. Current levels of fuel poverty are the result of a combination of low household incomes and a relatively inefficient housing stock, with fuel bills accounting for a significant proportion (10%+) of fuel poor households' costs. While low-carbon policies have to date had little effect on fuel bills (and hence fuel poverty levels), by 2020 we expect low-carbon measures to increase average bills by 10% (compared to 2011), in addition to a 6% increase due to fuel price rises. We have previously highlighted the importance of addressing fuel poverty through energy efficiency improvement, to ensure price rises from low-carbon policies are offset.

The Government has yet to publish its response to the consultation on a new measure for fuel poverty, in light of the Hills Fuel Poverty Review which was published in 2012. The latest fuel poverty statistics report both on the current 10% definition<sup>2</sup> and the Hills Low Income High Cost (LIHC) measure<sup>3</sup>:

- **10% definition.** In 2011, there were 4.5 million households in the UK in fuel poverty, down by 0.25 million from 2010. In England, there were 3.2 million fuel poor households, 0.3 million lower than in 2010. The devolved administrations had a much higher proportion of households in fuel poverty than England (15%) – in Northern Ireland fuel poverty levels reached 42% (mainly due to lower incomes and higher fuel prices, as most households rely on expensive heating oil). In Scotland fuel poverty stood at 25%, with fuel poverty levels in Wales slightly higher at 29%.
- **LIHC.** Under the low income high cost measure, 2.6 million households were fuel poor in England<sup>4</sup> in 2011, a decrease of 0.1 million from 2010.

The 10 per cent indicator shows a larger drop in the number of fuel poor households than the LIHC measure. This is mainly because the 10 per cent measure is absolute, whereas the LIHC is relative. Neither measure reflects year-to-year changes in temperature (and any associated rises in energy bills), as they calculate required fuel costs based on a long-term temperature average.

<sup>2</sup> Under the 10 per cent definition, a household is said to be fuel poor if it needs to spend more than 10 per cent of its income on fuel to maintain an adequate level of warmth.

<sup>3</sup> Under the **Low Income High Cost** definition a household is considered to be fuel poor where (i) they have required fuel costs that are above average (the national median level), and (b) were they to spend that amount, they would be left with a residual income below the official poverty line.

<sup>4</sup> The devolved administrations have not used this measure to produce fuel poverty estimates.

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The Government's analysis suggests that the decrease in fuel poverty in England between 2010 and 2011 was the result of a rise in income, and a reduction in energy use through improvements in the energy efficiency of housing. These combined to offset the price increases seen in 2011. The aggregate fuel poverty gap<sup>5</sup> however, increased in real terms from 2010 by £22 million to £1.15 billion, and the average gap increased by £26 to £448, largely reflecting the increase in energy prices.

However, it is unlikely that this fall in fuel poverty numbers will have been maintained since 2011, due to fuel price rises and with fuel poverty policy (in particular in England) undergoing major changes:

- In addition to the completion of CERT in 2012, the Warm Front budget was cut by more than two-thirds in financial year 2011/12 (from £345 million to £110 million). There was an even larger reduction in the number of insulation measures delivered under the scheme (in particular lofts) – just over 1,300 lofts were insulated under the scheme (compared to around 20,000 in the previous year).
- Warm Front funding was further cut in 2012/13 (to £100 million) and the scheme was closed at the end of March 2013, with ECO now being the sole policy for fuel poverty measures in England.

While the devolved administrations still operate separate government-funded fuel poverty schemes (Box 3.1), these policy changes mean a significant cut in support for the fuel poor in England. In future, the targeting of support under the ECO could offset the impact of rising electricity prices on the fuel poor as a group. However, ECO benefits will be unequally distributed, reaching only a proportion of fuel poor household over the next years. There are also particular issues for electrically heated households, where the impact of rising electricity prices will be felt disproportionately.

With household energy bills expected to increase further, additional intervention may be required, especially for electrically-heated households, either within the ECO, or otherwise. Furthermore, it will be important to ensure that the ECO continues to the point where all fuel poor households have benefitted from it. In the meantime, there may be a need for other policies to support energy efficiency improvement, and possible social tariffs or income transfers. All of these aspects should be considered in the Government's forthcoming fuel poverty strategy. We will continue to monitor the Government's approach to fuel poverty, in accordance with the Climate Change Act.

## **Zero carbon homes**

In the context of the 2050 target, it is important that new homes are built with high levels of energy efficiency. In addition, new homes are particularly suitable for the deployment of low-carbon heat. The Government has previously committed to implement a Zero Carbon Homes policy in England by 2016. It is important that the Government holds to this timetable and the

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<sup>5</sup> The amount by which the assessed energy needs of fuel poor households exceed the median level.

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milestones in between (e.g. the tightening of the building regulations which was supposed to be announced by May 2013).

## 4. Non-residential buildings

Our framework of indicators for non-residential buildings includes high-level trajectories and policy milestones (e.g. emission reductions of around 36% in 2020 relative to 2008). We do not include indicators for specific measures, as there is a lack of data on the installation of measures in the non-residential sector. Our approach has been to focus on policies that incentivise the uptake of measures.

A number of different policies impact on non-residential buildings, including the CRC Energy Efficiency Scheme, the Climate Change Levy, Energy Performance Certificates, the Green Deal, mandatory carbon reporting and (in the future) energy audits under the EU Energy Efficiency Directive. However, these policies do not necessarily apply consistently across the sector and it is not clear that they provide sufficient incentives for driving the uptake of measures.

### CRC Energy Efficiency Scheme

The CRC Energy Efficiency Scheme (formerly known as Carbon Reduction Commitment) is the main policy instrument covering the non-residential sector, focused on large commercial and public sector energy users. In our 2012 progress report, we described the Government's simplification proposals for the scheme and warned against the abolition of the scheme.

The Government has since finalised its simplification proposals. Changes include:

- The abolition of the performance league table, although the aggregated participants' energy use and emissions data will still be published.
- The withdrawal of all state-funded schools from the scheme.
- A reduction in the number of fuels covered from 29 to 2.
- Reducing the overlap with other schemes.

The Government expects that these changes will reduce the administrative costs of participants by more than half, which equates to around £272 million in administrative cost savings for CRC participants up to 2030.

While most of these changes are welcome, the abolition of the performance league table further erodes the potential effectiveness of the scheme. We have previously advised that the reputational aspects of the scheme are potentially useful. These are now missing without a benchmarking of participants against each other.

A final league table was published in February 2013, covering the financial year 2011/12. The table ranks participants on the basis of three weighted metrics (Early Action Metric, Absolute Metric, and Growth Metric), with the following results:

- Two construction companies are ranked at the top of the performance table (BAM group<sup>6</sup> and Skanska), with seven local authorities in the top 20 (13 in the top 30).
- Total CRC emissions were 56 MtCO<sub>2</sub>, 8% less than in 2010/11.
- Tesco recorded the highest overall level of emissions, followed by the Ministry of Defence and BT. Another four supermarket chains were amongst the top 10 largest emitters.

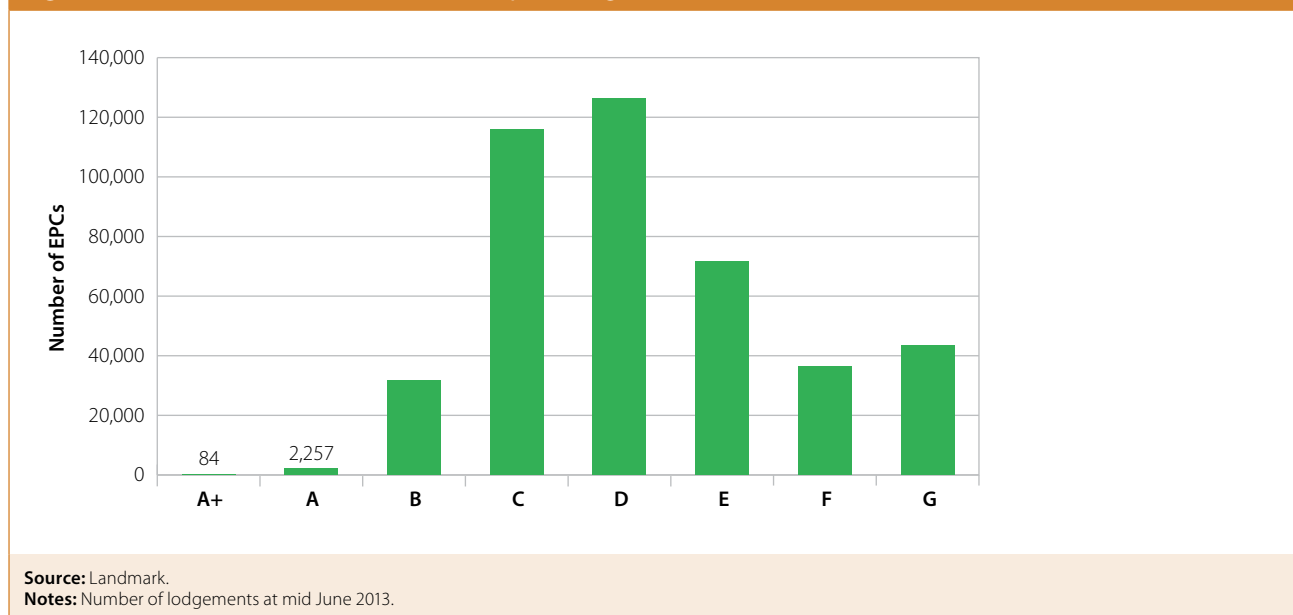
Without the league table and with other major changes (e.g. dropping revenue recycling after a previous review), the CRC is now essentially a modest carbon tax which is unlikely to provide major additional energy efficiency incentives in this sector beyond the price measures already in place (i.e. the climate change levy and the carbon floor price passed through in electricity bills). It no longer tackles the non-price barriers it was originally set up to address. We found in our 2010 CRC report that complementary levers and approaches will be required to ensure that the full abatement potential for the sector is unlocked. However, these are still lacking and energy performance in the sector has not improved in recent years (see below).

### Energy performance data

Recent data on Energy Performance Certificates (EPCs) and Display Energy Certificates (DECs) shows that there has been little progress on energy performance in the sector:

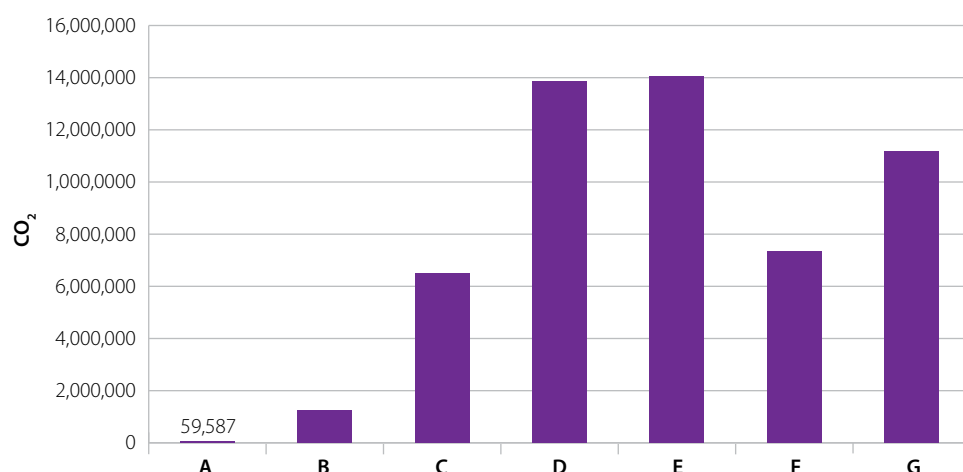
- Of the 427,814 EPCs that had been issued by mid-June 2013, more than 18% received the lowest (F and G) energy performance ratings. Only 8% of EPCs received a rating of B or above. Overall, there has been no improvement since 2012. While there is a large cost-effective potential for energy efficiency improvement, this appears not to be taken up.

**Figure 3.12: Number of non-domestic EPCs per rating**



<sup>6</sup> BAM has suggested that its ranking (and 65% emission reductions) is partially due to changes in the CRC which means it now only has to report gas and electricity use, rather than other fuels such as fuel oil. Clearly, there have been some issues with the way performance was calculated.

Figure 3.13: CO<sub>2</sub> emissions per DEC rating



Source: Landmark.

Notes: Number of lodgements at mid June 2013.

- DECs have to be displayed by public authorities in all their buildings over 500 m<sup>2</sup>. 154,515 DECs have been lodged to date. F and G-rated DECs still account for 20% of all DECs lodged, as well as for around one-third of CO<sub>2</sub> emissions. A recent Freedom of Information request by the Property and Energy Professionals Association (PEPA) suggests that 30% of councils in England and Wales were not even compliant with the requirement to display DECs.

This energy performance data suggests little progress in the non-residential sector. There are a number of retailers who have improved their energy efficiency significantly, for example through measures to improve the efficiency of heating, lighting and refrigeration. However, more generally complementary levers may be needed, such as minimum standards (see below).

### Non-residential Green Deal, minimum standards and energy audits

The Green Deal also covers the non-residential sector, with a range of eligible measures including lighting systems, heat pumps and mechanical ventilation with heat recovery systems. DECC has estimated that annual savings of 1.3 MtCO<sub>2</sub> will be delivered through the non-residential Green Deal and supporting policy.

In our 2012 advice to local authorities on reducing emissions, we raised concerns about the lack of information and financial incentives which is likely to limit uptake of Green Deal financing in the non-residential sector. Some limited funding has been made available through the Pioneer Places Fund, with some local authorities using this funding to raise awareness of Green Deal opportunities in businesses and pay for surveys.

To date, there is no available data on Green Deal uptake in the non-residential sector but it is likely to be low until minimum energy efficiency standards are introduced in 2018, as provided for in the 2011 Energy Act. DECC has set up a working group with key stakeholders and it is expected that proposals will be published later in 2013. As in the residential sector,

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the Government should ensure that ambitious standards are announced that send a signal to commercial landlords about the need to make energy efficiency improvements.

A further development is the requirement for energy audits for large enterprises under the new EU Energy Efficiency Directive. The Government will be consulting on the implementation of the Directive later this year. Public transparency will be important to ensure that the audits provide reputational incentives, especially in light of the CRC changes.

Overall, the non-residential sector is subject to a variety of energy efficiency and low-carbon policies but there is limited evidence of energy efficiency improvement and a risk that significant energy efficiency potential is not addressed. Therefore, the Government should consider a comprehensive review of non-residential low-carbon policies to ensure they work effectively.

### **Public sector buildings**

In 2011, central government set itself a target to reduce GHG emissions from its estate and transport conducted on central government business within the UK by 25% by 2014/15 (from a 2009/10 baseline). The Government produced the first annual report on this (and other 'greening government' commitments) in December 2012:

- A 12% reduction in GHGs was achieved across Government in 2011/12 against a 2009/10 baseline.
- Emission reductions were made by 20 departments, while 8 out of 21 departments met or exceeded the 2015 target.
- The Ministry of Defence, the largest public sector emitter covered by the CRC, achieved savings of 11%.
- Carbon reductions represent estimated energy and transport fuel cost savings of over £40 million across Government against 2009/10 figures.
- While reductions in the size of Government departments and spending restrictions have clearly played a part in departments' emissions reductions, the Government reports that behaviour change, better use of building management and capital investment have been important.

We have previously noted the importance of government setting an example and these reductions are very welcome. They also illustrate the effectiveness of simple and clear targets, with potential implications for approaches in the commercial and industrial sectors, as well as other public sector entities (e.g. local authorities).

Local authorities have been requested by DECC to measure and publish annual emissions data from their own estate and operations with the expectation that central government will further consider how the data can be used to help local authorities reduce their emissions. However, not all local authorities report (around 200 out of 353 local authorities reported on own emissions data in 2010/11). The reporting methodology also allows for significant variation

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as to what emissions should be included, making it difficult to assess progress and compare between local authorities.

We suggested in our 2012 local authorities report that Government should consider a statutory duty on local authorities to develop an area-wide low-carbon plan (including their own estate, with a consistent approach for reporting emissions). However, there has been no response from Government.

## 5. Low-carbon heat options

Our indicator framework and the Government's Renewable Energy Strategy reflect an ambition to increase renewable heat penetration from current low levels of around 2% to around 12% in 2020. Schemes have been put in place to drive uptake in both the residential and non-residential sectors. However, uptake is currently low and incentives weak, with potential implications for carbon budgets:

- **Residential sector.** A further delay in the introduction of the Renewable Heat Incentive (RHI) to 2014 has increased the need for faster uptake in the remainder of the 2010s.
- **Non-residential sector.** Tariffs in their first year of operation appear to not to be driving the levels of uptake expected. However, recently published proposals to increase tariffs for the non-residential scheme could provide the necessary incentives to deliver the required uptake.

In order to remain on track to deliver 12% uptake in 2020, revisions to the non-residential scheme, the introduction of the residential RHI, certainty of tariffs pre- and post 2015 and a range of supporting measures to overcome non-financial barriers are required.

### Renewable Heat Premium Payment (RHPP) and Renewable Heat Incentive (RHI)

The RHPP covering the residential sector in Great Britain began in August 2011, with a separate Northern Ireland scheme starting in 2012 (Box 3.2). It provides grants (in the form of vouchers) on installations in off-grid homes (except for solar thermal which is available in all homes) and funding for projects delivered by registered social landlords. Phase 1 (August 2011 to March 2012) delivered 7,253 projects, and Phase 2 (May 2012 to March 2013) delivered 5,758 projects. In phase 2, projects were 49% heat pumps, 39% solar thermal and 12% biomass. Both Scotland and Wales have an above average share of projects (compared to their share of the housing stock).

The first phase of the scheme (August 2011 to March 2012) was undersubscribed (£15 million was available but only £7.7 million was spent). Reasons for the underspend include the relatively low levels of grants available and the lack of certainty about future RHI payments for installations supported under the RHPP. The second phase of the scheme (May 2012 to March 2013) saw improved uptake, particularly in the household voucher scheme and social landlord competitions, with around £17 million of the £25 million available expected to be spent.



The Government announced an extension to the second phase in May 2013, comprised of another household voucher scheme to run during 2013/14 and two further social landlord competitions. The levels of the grants were also increased (Table 3.1).

<b>Table 3.1: RHPP voucher value</b>		
	<b>Old</b>	<b>New</b>
Air-to-water heat pump	£850	£1,300
Biomass boiler	£950	£2,000
Ground or water-source heat pump	£1250	£2,300
Solar thermal hot water	£300	£600
<b>Source:</b> DECC, 2013		

There remains a major challenge to support investment in residential sector renewable heat. Around 2.6 million installations are required by 2025 in our medium abatement scenario for the fourth carbon budget. In order to address this future challenge, the RHI will replace the RHPP in spring 2014, offering tariffs for residential installations. The RHI will be open to all households but offering the best deal for installations off the gas grid (Table 3.2).

<b>Table 3.2: Residential RHI proposed tariffs</b>	
	<b>Indicative tariff range (p/kWh)</b>
Air source heat pump	6.9-11.5
Ground source heat pump	12.5-17.3
Biomass boiler	5.2-8.7
<b>Source:</b> DECC, 2013	

In our 2011 Renewable Energy Review, we assessed the level of the tariffs required. The announced tariffs for heat pumps appear adequate compared with our existing analysis. However, the evidence base regarding costs, performance and barriers to uptake has progressed since this work, and we are currently reviewing our scenarios and costs as part of our fourth carbon budget review, to be published later this year.

Even with the implementation of the RHI, there remain barriers to uptake:

- High upfront costs are a barrier to uptake and Green Deal finance should be made available in conjunction with the RHI to cover at least the additional costs of renewable heat investment compared to conventional alternatives.
- There are other non-financial barriers to uptake of low-carbon heat, such as lack of trust in technologies and installers, and lack of consumer information. The requirement that RHI installations must be accredited under the Microgeneration Certification Scheme addresses the lack of trust issue to some extent; however Government should continue to develop approaches to address these barriers.

We will examine potential measures to overcome these barriers in our fourth carbon budget review.



### Box 3.2: Low-carbon heat in the devolved administrations

#### Scotland

- In Scotland, low-carbon deployment has continued to progress above the targeted level. The latest survey of heat capacity (EST, 2012<sup>7</sup>) found Scotland had around 2.3 TWh of low-carbon heat (around 3.8% of Scotland's total forecast heat demand in 2020) which is above the interim milestone set for 2011 (2%).
- In the non-residential sector, uptake under the RHI totalled 18% of the total (364 installations) to April 2013.
- In the residential sector, there is likely to be a greater opportunity for renewable heat than the UK as a whole, given there is a higher proportion of properties that do not have access to mains gas for heating. The RHPP uptake was above Scotland's share of the GB housing stock (9%), with 13% of the total (1391 installations) to April 2013.
- The Scottish Government has committed to developing a long-term renewable heat strategy in order to support the delivery of the RHI and RHPP in Scotland. It will be crucial that the renewable heat strategy sets out a framework for accelerating investment and addressing the barriers to uptake to achieve the target of 11% of heat demand by 2020. A Draft Heat Generation Policy Statement will be published by the end of 2013, which will set out the scenarios for how the low-carbon heat uptake targets will be achieved.
- In May 2013, the Scottish Government published a District Heating Action Plan to address the barriers and improve the uptake of district heating. Targets for district heating uptake in the public sector will be developed, and where viable the conversion of all multi-storey social housing to district heating will be explored. The action plan also identified areas for improvement of the evidence base, including heat mapping, and development of standards and regulation. Furthermore, a £5m District Heating Loan Fund was announced.

#### Wales

- In Wales, uptake under the RHI in the non-residential sector totalled 6% of the total (124 installations) to April 2013.
- Low-carbon heat uptake in households under the RHPP was above Wales' share in the GB housing stock (5%), at 8% of the total (816 installations). As grants are only available for off-grid properties, it is expected that the opportunity for Wales is above the GB total given the relatively higher proportion of off-gas grid properties (21% versus 16% in GB).
- We recommended in our 2013 Welsh progress report that the Welsh Government should develop a renewable heat strategy to ensure that uptake of incentives is maximised and to help overcome barriers to uptake.

#### Northern Ireland

- Northern Ireland has good opportunities for low-carbon heat as most of the country is off the gas grid.
- Northern Ireland introduced its own RHI in late 2012, also initially focused on the non-residential sector.
- For the residential sector, Northern Ireland is currently running a RHPP scheme, with higher grants for most technologies than in the GB scheme (e.g. £1,700 vs £1,300 for air-source heat pumps, £2,500 vs £2,000 for biomass boilers). To date over 950 applications have been received, and grants awarded worth over £1.4 million.

<sup>7</sup> Energy Saving Trust (2012) 'Renewable Heat in Scotland' available at <http://www.energysavingtrust.org.uk/scotland/Take-action/Get-business-funding/Renewable-Heat-in-Scotland-2011>

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## Heat strategy

In our 2012 progress report, we noted that the Government's heat strategy was broadly consistent with our emphasis on the importance of heat pumps and district heating based on low-carbon sources, but that the challenge was to move from the high-level strategy to detailed implementing arrangements for low-carbon heat.

Subsequently, the Government has launched a set of actions relating to low-carbon heat in buildings and district heating:

- **Buildings.** £250,000 for heating installers to subsidise the cost of renewable heating kit installation training and 100 green apprenticeships in small-scale renewable heat technologies
- **District heating.** A £9 million district heating package and an expert advisory Heat Networks Delivery Unit. £1 million has been awarded to help specific cities (Manchester, Leeds, Newcastle, Sheffield and Nottingham) develop heat networks.

Further detail is still required to address the challenges to uptake, particularly in the residential sector, where introduction of a RHI with adequate tariffs and further measures are needed to address the barriers to renewable heat uptake.

District heating should be based on sources from low-carbon fuels such as biomass. Further work is required to identify the potential for such sources. For example, in the London heat map produced by the Greater London Authority, the primary source was identified as waste heat from nuclear power, but further work is required to determine whether this is viable and the costs and barriers associated with this approach.

We noted last year that given the lack of a carbon price for heat, and the higher costs of low-carbon heat options, further funding will be required to support investment in low-carbon heat options in the period beyond 2015. Funding post-2015 need to be confirmed as early as possible.

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## Key findings

- Buildings CO<sub>2</sub> emissions **rose by 10% in 2012**, in equal parts due to the higher electricity grid intensity and lower winter temperatures than in 2011.
- There was an increase in insulation rates in the final year of the supplier obligation schemes (CERT and CESP), with **a total of 2.3 million** lofts, cavities and solid walls insulated.
- However, there is a significant risk around future delivery of these measures given weaker incentives under the new Green Deal and Energy Company Obligation. The Government should undertake an **early review of the Green Deal and ECO and consider further incentives** to encourage uptake of measures (especially lofts and cavity wall insulation).
- There was very limited improvement in commercial sector energy efficiency. The Government should make **a comprehensive assessment of non-residential low-carbon policies** to ensure they work effectively.
- There was some progress on fuel poverty in 2011, although it is unlikely that this will have been maintained since due to fuel price rises and given changes in fuel poverty policy. The Government needs to ensure measures are in place to adequately **support fuel poor electrically-heated households and ensure ECO continues to the point where all fuel poor households are covered**.
- The **Renewable Heat Incentive** should be extended to cover the residential sector as soon as possible, funding committed beyond 2014/15, Green Deal finance allowed to pay for the upfront cost of low-carbon heat investment and approaches to address non-financial barriers introduced.

Table 3.1: The Committee's buildings indicators

BUILDINGS	Budget 1	Budget 2	Budget 3	2012 trajectory	2012 outturn
<b>All buildings</b>					
<b>Headline indicators</b>					
CO <sub>2</sub> emissions (% change on 2007)	direct	-19%	-32%	-5%	-7%
	indirect	-25%	-53%	-13%	-8%
Final energy consumption (% change on 2007)	non-electricity	-20%	-25%	-8%	-10%
	electricity	-2%	-1%	-3%	-5%
<b>Residential buildings</b>					
<b>Headline indicators</b>					
CO <sub>2</sub> emissions (indicative minimum % change on 2007)**	direct	-22%	-29%	-8%	-5%
	indirect*	-28%	-56%	-17%	-11%
Final energy consumption (indicative minimum % change on 2007)	non-electricity	-18%	-19%	-6%	-4%
	electricity	-4%	-3%	-5%	-8%
<b>Supporting indicators</b>					
Uptake of solid wall insulation (million homes, total additional installations compared to 2007 levels)	0.5	1.2	2.3	0.5	0.14
Uptake of loft insulation (up to and including 100 mm) (million homes, total additional installations compared to 2007 levels)	2.3	5.6	5.6	4.3	5.5/3.6 (CERT professional)
Uptake of loft insulation (100 mm +) (million homes, total additional installations compared to 2007 levels)	2.0	4.9	4.9		
Uptake of cavity wall insulation (million homes, total additional installations compared to 2007 levels)	3.9	8.1	8.1	3.9	2.7
Uptake of energy efficient boilers (million homes, total additional installations compared to 2007 levels)	4.9	9.3	12.6	4.9	6.2
Uptake of energy efficient appliances – cold A++ rated (% of stock)	3%	18%	45%	3%	no data
Uptake of energy efficient appliances – wet A+ rated (% of stock)	16%	40%	58%	16%	no data
Every house offered whole-house energy audit		By 2017			Audits will be carried out for homes taking up the Green Deal.

Table 3.1: The Committee's buildings indicators						
BUILDINGS	Budget 1	Budget 2	Budget 3	2012 trajectory	2012 outturn	
New energy efficiency financing mechanism budgeted and legislation in place	2011				Green Deal scheme in place from January 2013	
Post CERT delivery framework legislation in place	2011				ECO scheme in place from January 2013	
Accelerate the introduction of minimum standards for privately rented residential properties	by 2012				Energy Act proposes introduction by 2018	
Introduce additional financial incentives (e.g. stamp duty rebates)		by 2016			n/a	
<b>Other drivers</b>						
Average SAP rating, implementation of behavioural measures, population (by age), number of households (by type – building and occupants), household disposable income, electricity and gas prices, appliance ownership, weather.						
<b>Non-residential buildings</b>						
<b>Headline indicators</b>						
CO <sub>2</sub> emissions (indicative minimum % change on 2007)*	direct	-9%	-43%	6%	-15%	
	indirect**	-21%	-49%	-8%	-4%	
Final energy consumption (indicative minimum % change on 2007)	non-electricity	-8%	-13%	-4%	-16%	
	electricity	-1%	-1%	-1%	4%	
<b>Supporting indicators</b>						
Develop policy on SMEs	by October 2010				Green Deal scheme in place from January 2013	
Accelerate the introduction of minimum standards for privately rented non-residential properties		By 2016			Energy Act proposes introduction by 2018	
Government decision on the following recommendations for EPCs and DECs:	by October 2010					
- All non-residential buildings to have an EPC		by 2017			No commitment to do this	
- All non-residential buildings to have a minimum EPC rating of F or higher			by 2020		No commitment to do this	

Table 3.1: The Committee's buildings indicators						
BUILDINGS	Budget 1	Budget 2	Budget 3	2012 trajectory	2012 outturn	
– Roll out of DEC's to non-public buildings		by 2017			No commitment to do this	
All public buildings covered by CRC to realise all cost-effective emissions change potential			by 2018		Ongoing	
<b>Other drivers</b>						
Emissions and fuel consumption by subsector, electricity and gas prices.						
<b>Renewable heat</b>						
<b>Headline indicators</b>						
Renewable heat penetration (% of heat demand from renewables) – total buildings and industry**	1%	5%	12% in 2020	1%	1.1%	
Buildings renewable heat penetration (% of heat demand)**	1%	4%	11% in 2020	1%	0.5%	
<b>Other drivers</b>						
Renewable Heat Incentive in operation	From April 2011				Non-residential RHI introduced November 2011. Residential sector RHI due to commence 2013.	
<b>Other drivers</b>						
Renewable heat penetration (% of heat demand from renewables) – buildings.						
Uptake and costs of renewable heat technologies in buildings: Biomass boilers, Solar thermal, GSHP/ASHP, District heating.						

\* These figures do not include renewable heat, which is included separately below.

\*\* CCC estimates for 2012 outturn based on DECC (2012) Energy Trends and BSRIA (2013) Heat pumps United Kingdom World Renewables 2013.

**Note:** Numbers indicate amount in last year of budget period i.e. 2012, 2017, 2022.

**Key:** ■ Headline indicators ■ Implementation indicators ■ Milestones ■ Other drivers