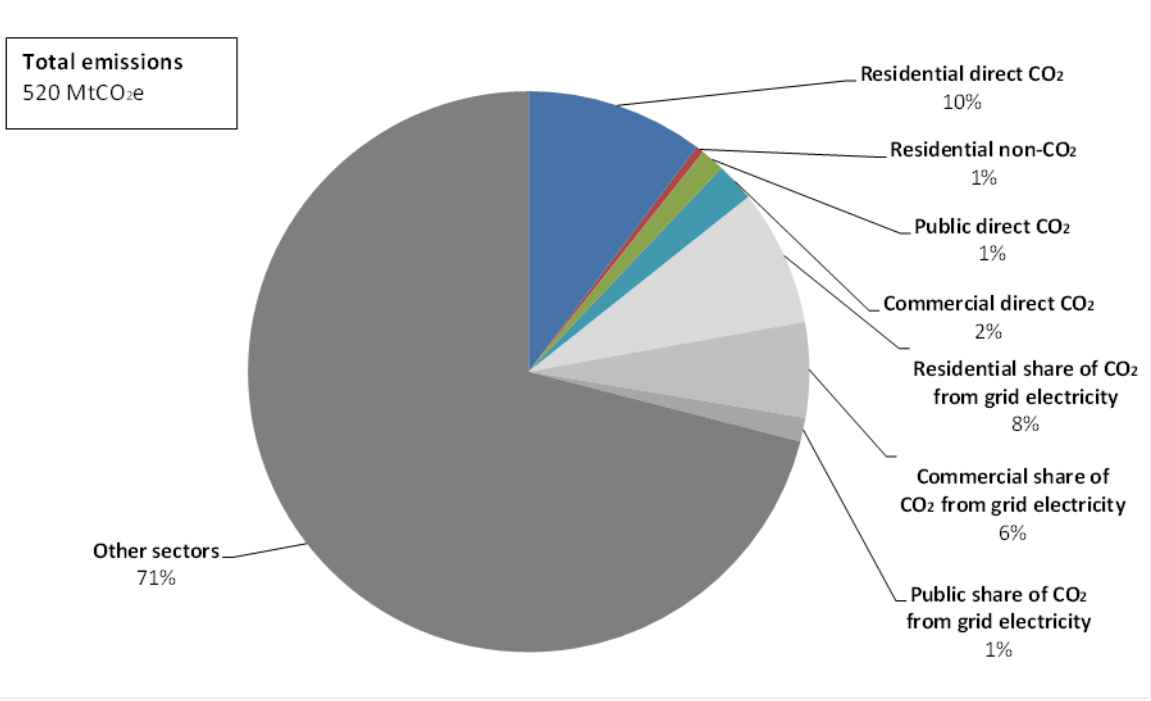
What does this sector include?

Emissions from buildings accounted for 34% of total UK greenhouse gas emissions in 2014 (Figure 1). Direct emissions, resulting from use of fossil fuels (primarily gas) for heating, make up almost half of buildings emissions. The other half is electricity-related, resulting from lighting and the use of appliances, as well as some electric heating (especially in the commercial sector).

On a sector basis, residential emissions account for 64% of buildings emissions, with commercial and public sector emissions accounting for 27% and 10% respectively. Buildings emissions have declined by 21% (19% weather adjusted) since 2007 due to a combination of high energy prices, improved energy efficiency and the recession.

Figure 1. Greenhouse gas emissions from buildings (2014)



What can be done to reduce emissions in this sector?

Buildings emissions can be reduced through a combination of energy efficiency measures and switching to low-carbon heat sources:

- Energy efficiency: building insulation, more efficient lights, appliances and boilers, as well as behavioural measures (i.e. switching off lights and appliances, turning down the thermostat). Energy efficiency is also an effective way of reducing fuel poverty levels, as it brings down energy bills. In the commercial sector, effective building energy management systems (e.g. through zoning and better timing of energy services) can often yield large savings.
- Low-carbon heat options include air and ground-source heat pumps, district heating systems using low-carbon sources such as waste heat from power stations, along with biomass boilers and solar thermal

hot water. Meeting the 2050 target will require near- complete decarbonisation of heat by switching away from gas boilers.

Our assessment suggests that direct buildings emissions could fall by 33 MtCO2 by 2027 to 62 MtCO2 by as part of a cost-effective path to meet carbon budgets. This is despite a substantial rise in the number of homes as a result of population growth. This reduction can be achieved at a cost of less than 0.1% of GDP in 2030.

It is important to manage climate change mitigation and adaption policies for buildings in an integrated way. For example, passive cooling should be implemented alongside measures to increase the energy efficiency of the residential building stock, to avoid the latter increasing overheating risk.

What is Government doing?

The policy framework covering buildings is complex, with different measures applying to homes than to commercial and public sector buildings. Key measures include:

- **Energy Company Obligation (ECO):** The ECO, which is due to run until 2017, requires energy suppliers to deliver energy efficiency improvements for domestic consumers. Scotland and Wales have their own energy efficiency schemes (generally fuel poverty focused) to supplement the ECO. Northern Ireland has a supplier obligation scheme similar to the ECO, as well as an additional boiler replacement and fuel poor energy efficiency scheme.
- **Green Deal**: a financing mechanism which enables accredited providers to offer residential consumers a range of energy efficiency improvements at no upfront cost. The costs of the measures is paid back over time through electricity bills and payments are supposed to be less than savings through reduced energy bills (the 'Golden Rule').
- **Products policy:** energy labelling and appliance efficiency standards under the EU energy labelling and Ecodesign directives. Minimum energy efficiency standards have so far been agreed for a range of appliances including white goods and TVs, while energy efficiency labels have to be displayed in shops to help consumers to choose more efficient appliances.
- **CRC Energy Efficiency Scheme:** this scheme is mandatory for large private and public sector organisations. It requires them to monitor their energy use and then report the associated emissions. Allowances (currently at a cost of around £16 per tonne of CO_2) have to be purchased to cover the emissions reported.
- **Renewable Heat Incentive (RHI):** a feed-in type mechanism that provides long-term support to producers of renewable heat. It supports a range of renewable and low-carbon heat options.
- **Building regulations:** These set energy efficiency requirements for new buildings and refurbishment to existing buildings. From 2016, new homes built in England will have to be built to a zero carbon standard.

What is the CCC's position?

- **Low-carbon heat** provides one of the biggest challenges for carbon budgets. In 2013, it accounted for only 1.6% of buildings heat demand. Low-carbon heat policy constitutes most of the gap between what current policies are expected to deliver and what our cost-effective trajectory for meeting the fourth carbon budget requires. The CCC recommendation is to develop an action plan to address the significant shortfall. Short-term, this should commit to extend the Renewable Heat Incentive to 2020, or until a suitable replacement is found; longer-term it should link support for low-carbon heat with energy efficiency, support for heat networks and wider decisions about infrastructure for heat.

- **Insulation**. In 2014, the second year of the new policy to drive energy efficiency in the residential sector (the ECO and the market-based Green Deal) there was an improvement in installation rates for insulation measures compared to 2013. However, uptake continued to remain well below rates under the previous national schemes (CERT and CESP). Uptake of insulation will need to increase in order to achieve cost-effective emissions savings and to meet targets to alleviate fuel poverty.
- **Efficient lights and appliances**. Potentially, savings of 80% or more are available when replacing inefficient lights and appliances with the most efficient on the market (e.g. halogen lights with LEDs). Under the Ecodesign directive, new minimum energy efficiency standards for appliances have been set, but at levels considerably below the 'best in class'. Uptake of the most efficient appliances (A+ and above) remains very low.
- **Non-domestic buildings**. Although significant potential remains to improve energy efficiency in the non-residential sector, the current policy framework is overly complex and should be simplified.

Links to recent work by the CCC

- **2015 Annual Progress Report**, Chapter 2 – Progress reducing emissions from buildings. http://www.theccc.org.uk/publication/reducing-emissions-and-preparing-for-climate-change-2015-progress-report-to-parliament/
- **Fourth Carbon Budget Review, part 2, technical report,** http://www.theccc.org.uk/publication/fourth-carbon-budget-review/
- **Fourth Carbon Budget**, Chapter 5 – Reducing emissions from buildings and industry through the 2020s. http://www.theccc.org.uk/reports/fourth-carbon-budget
- **The 2050 target**, Chapter 3 – Reducing emissions from buildings http://www.theccc.org.uk/reports/international-aviation-a-shipping