

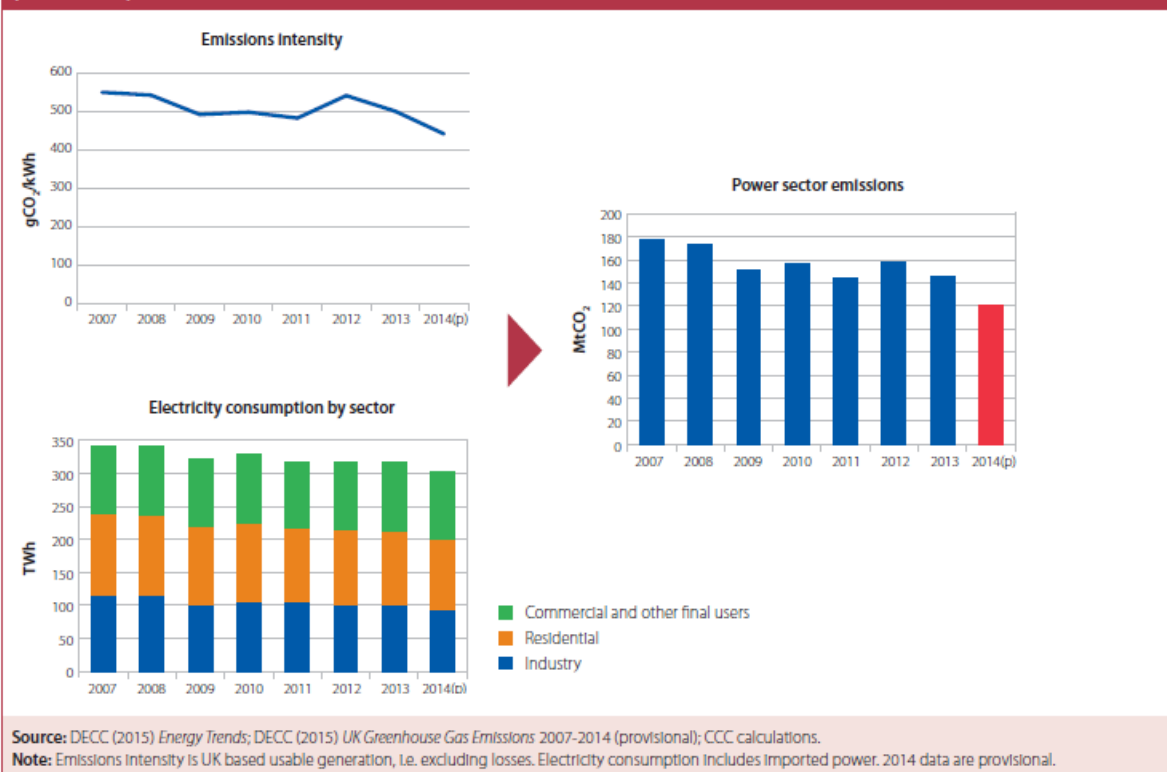
## Fact sheet – Power sector

### What does this sector include?

The power sector comprises the large-scale production of electricity for industrial, residential, and commercial and other use. In 2014 the power sector accounted for 23% of total greenhouse gas emissions in the UK.

Power sector emissions have been declining since 2007 due to increased low-carbon generation and a fall in consumption partly caused by the recession and improved energy efficiency (Figure 1.1). Though emissions increased by 10% between 2011 and 2012 as a result of a switch from gas generation to highly-carbon intensive coal generation, this trend was reversed in 2013 and 2014 with emissions decreasing due to coal plant retirements (under EU legislation) and an increase in renewable generation. In 2014, just over 61% of power generation in the UK came from fossil fuels which emit CO<sub>2</sub>. The remainder came from low-carbon technologies – 19% from nuclear and 20% from renewables (e.g. wind, biomass and solar).

**Figure 1.1. Emissions intensity of electricity supply, electricity demand and CO<sub>2</sub> emissions from the power sector (2007-2014)**



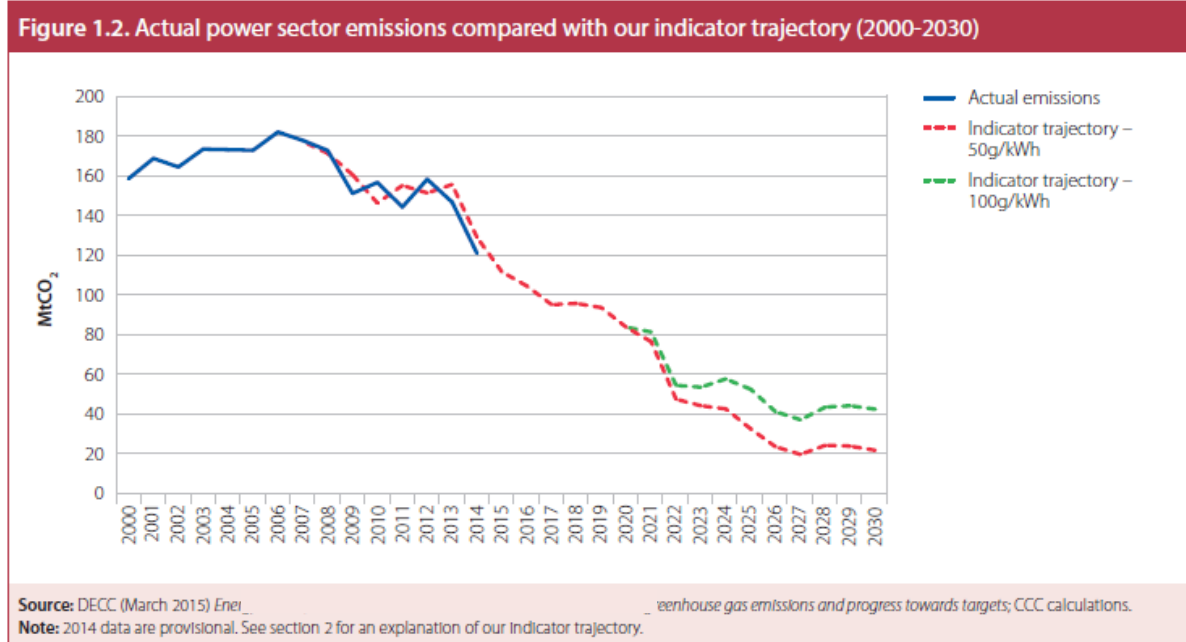
### What can be done to reduce emissions in this sector?

Reducing power sector emissions can be achieved from a combination of decreasing emissions intensity (increasing use of low-carbon generation) and reducing demand (energy efficiency).

- **Low-carbon generation** include renewables (such as offshore and onshore wind, hydro, solar, biomass, and wave and tidal technologies), nuclear and carbon capture and storage (CCS).
- **Energy efficiency** opportunities are available through a range of sources, including more efficient lights and appliances and small changes in how we use electrical products.

Power sector decarbonisation is a key step towards a low carbon economy, with knock-on effects for emissions reductions in other sectors (e.g. electric vehicles and heat). In order to achieve our 2050

emissions commitments, the power sector should be largely decarbonised by 2030, with emissions per unit of energy within a range of 50g-100g/kWh. Figure 1.2 is a simple illustration of our indicator trajectory for emissions in the power sector towards 2030. The CCC estimate that the costs of power sector decarbonisation would be of the order 0.6% of GDP in 2030. Investment requirements in generation capacity through the 2020s are estimated to be of the order £100 billion.



Flexibility over the timing of electricity generation and demand is important in an electricity system with high levels of variable renewable generation and inflexible generation such as nuclear. It can be provided, for example, by increased interconnection and demand-side response (which can be unlocked via smart meters):

- Interconnection to other electricity markets can help manage variability of demand and supply and reduce system costs by taking advantage of differences between linked jurisdictions (i.e. a market with high demand and limited available capacity can buy electricity more cheaply from a linked market with spare capacity).
- Smart meters provide information to energy users about their consumption, and lay the foundations for changing the time at which consumers use electricity (either through voluntary or automated services)

### What is the Government doing?

- **Renewables Obligation** is available to developers out to 2016/17. It is a requirement on electricity suppliers to source increasing amounts of electricity from renewable sources by purchasing Renewables Obligation Certificates (ROCs).
- The **EU Emissions Trading System** covers large industrial users of energy and power generators in the EU. The **Carbon Price Floor** is a UK policy covering electricity generation and designed to guarantee a minimum level for the carbon price by topping it up to a pre-determined target level, beginning at £16/tCO<sub>2</sub> in 2013/14 and rising to £30/tCO<sub>2</sub> in 2020. However in 2013 the Government announced that the top-up, or **carbon price support** will be frozen at £18/tCO<sub>2</sub> from 2016/17 onwards.
- **Electricity Market Reform (EMR)**: The Energy Act was passed in 2013, enabling a transition to a low-carbon power sector; this is a major step forward in the move to a low-carbon economy. This includes the introduction of long-term **Contracts for Difference (CfDs)**, which will replace the Renewables Obligation, and provide revenue certainty for low-carbon projects once contracts are signed.

### What is the CCC's position?

Good progress has been made in deploying renewables, most recently through the first auctions under Electricity Market Reform (EMR), and this is sent to continue to 2020. Evidence on cost reduction in low-carbon generation technologies is promising, with contracts awarded under the first auction for low-carbon power significantly cheaper than budgeted for. However, there is a high degree of uncertainty about investment in low-carbon capacity to come

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onto the system beyond 2020. These risks are increased by delays in previous years to carbon capture and storage and further delays to the new nuclear programme. The Government should provide more confidence on power sector decarbonisation beyond 2020 to support supply-chain investment, development of new projects, and cost reduction.

- **Ensure the power sector can invest with a 10-year lead time:** As soon as possible, set the Government's carbon objective for the power sector in the 2020s and extend funding under the Levy Control Framework to match project timelines (e.g. to 2025 with rolling annual updates).
- **Continue with auctions under Electricity Market Reform,** maintaining momentum by adhering to the proposed timings and working with industry to learn lessons from the first auctions.
- **Set out an approach to commercialise CCS through the planned clusters:** including a strategic approach to transport and storage infrastructure, completing the two proposed projects and contracting for at least two further 'capture' projects this Parliament.
- **Support offshore wind until subsidies can be removed in the 2020s:** set out intention to contract 1-2 GW per year and wider innovation support provided costs fall with view to removing subsidies in the 2020s.
- **Be transparent over the full cost of technology choices:** including the cost of alternatives if low-cost options are constrained, system integration costs and the full carbon cost of fossil-fired generation.

#### **Progress on specific Low-carbon technologies:**

- **Wind.** There has been a step-change in the rate of investment in wind over the first carbon budget period (2008-12) and this investment has continued in 2013 and 2014. There is enough in the pipeline to sustain this rate of progress to 2020 as required by the EU Renewable Energy Directive; however stronger signals are required over commitments beyond 2020.
- **Nuclear.** There have been ongoing delays in the new nuclear programme. While important milestones were passed in 2014 (e.g. the UK's first new build nuclear power station since 1995, Hinkley Point C, received State Aid clearance from the European Commission and other new build nuclear projects progressed through regulatory, financial, and design processes), a Final Investment Decision on Hinkley Point C has been pushed back to later in 2015 due to legal challenges and ongoing contractual negotiations.
- **Carbon Capture and Storage (CCS).** Government support has been provided for two plants (White Rose and Peterhead) to conduct Front-End Engineering and Design (FEED) studies, which are aiming to conclude and take positive investment decisions in 2015 and could therefore be operational by the end of the decade. In addition, a plant in Grangemouth has been awarded Government funding for research and feasibility studies.

#### **Links to recent work by the CCC**

- **2015 Annual Progress Report**, Chapter 1 – Progress decarbonising the power sector. <http://www.theccc.org.uk/publication/reducing-emissions-and-preparing-for-climate-change-2015-progress-report-to-parliament/>
- **Fourth Carbon Budget Review**, Chapter 2 – Reducing Emissions from the Power Sector. <http://www.theccc.org.uk/publication/fourth-carbon-budget-review/>
- **Next Steps on Electricity Market Reform (May 2013).** <http://www.theccc.org.uk/publication/next-steps-on-electricity-market-reform-23-may-2013/>