

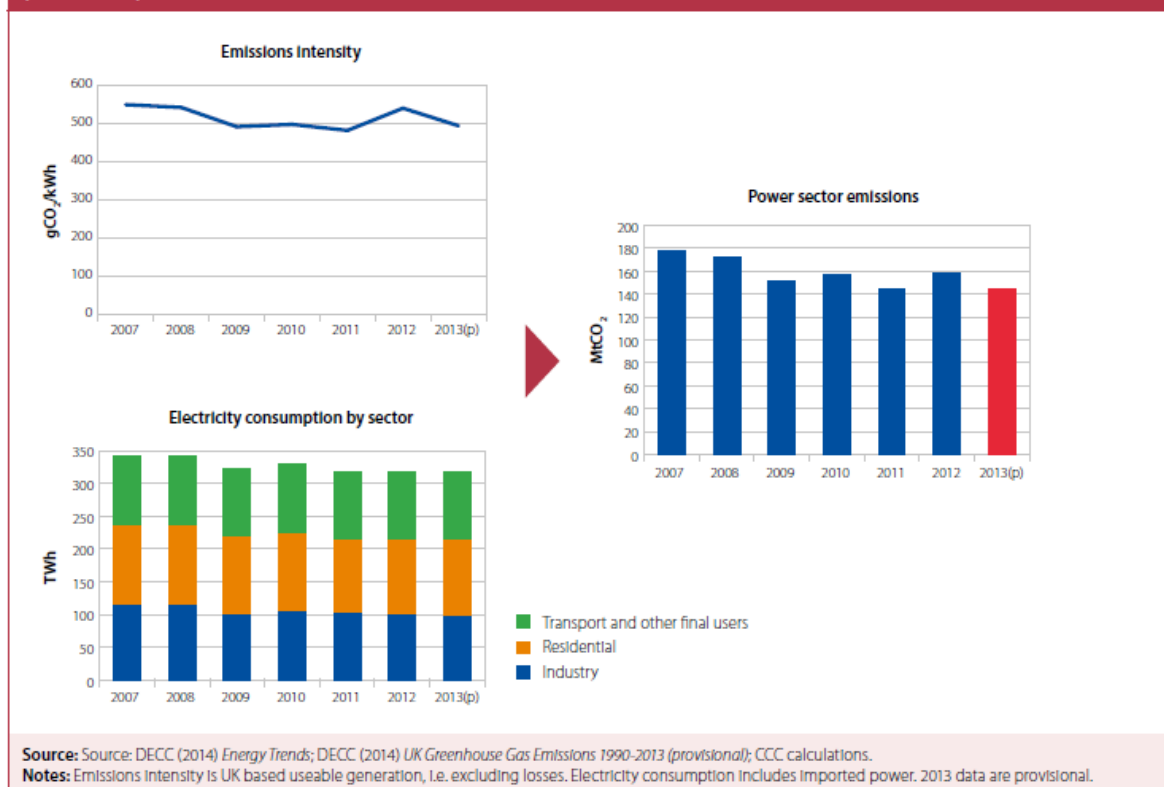
Fact sheet – Power sector

What does this sector include?

The power sector comprises the large-scale production of electricity for industrial, residential, and rural use. In 2013 the power sector accounted for 25% 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 2.1). 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 somewhat reversed in 2013 with emissions decreasing due to coal plant retirements (under EU legislation) and an increase in renewable generation. In 2013, 65% of power generation in the UK came from fossil fuels which emit CO₂. The remainder came from low-carbon technologies – 20% from nuclear and 16% from renewables (e.g. wind, biomass and solar).

Figure 2.1: Emissions intensity of electricity supply, electricity demand and CO₂ emissions from the power sector (2007-2013)



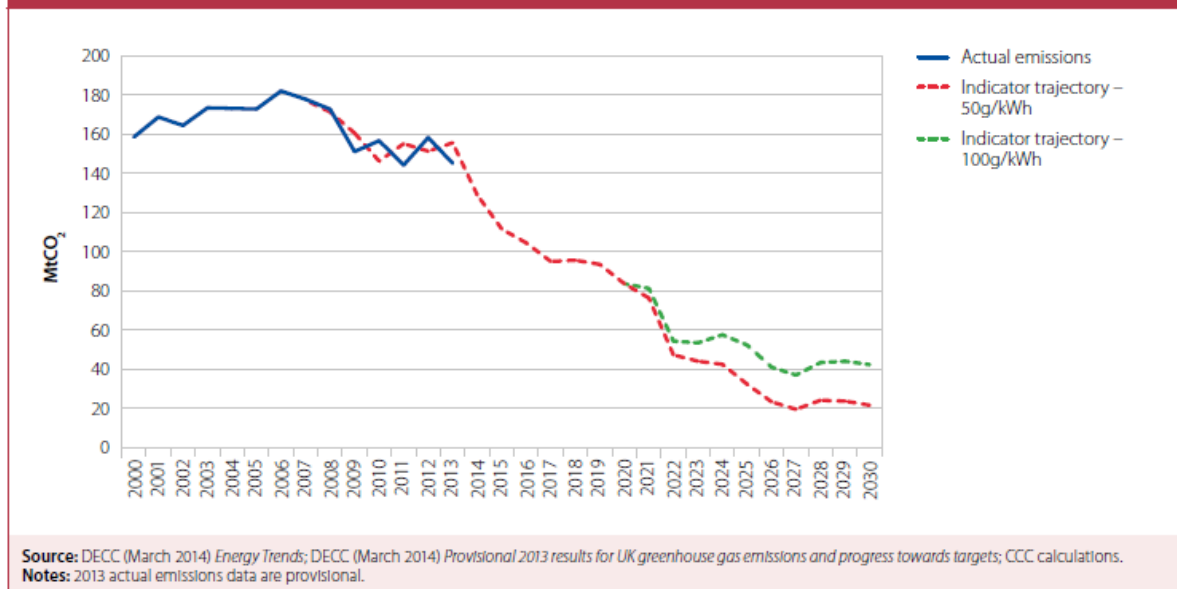
What can be done to reduce emissions in this sector?

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 marine), 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). 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; **Error! Reference source not found.** Figure 2.2 is a simple illustration 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 0.4% of GDP in 2030. Investment requirements in generation capacity through the 2020s are estimated to be of the order £100 billion.

Figure 2.2: Actual power sector emissions compared with our indicator trajectory (2000-2030)



Flexibility over the time of electricity generation and demand is important in a decarbonising electricity system with high levels of intermittent renewables, and can be provided by interconnection and 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/tCO₂ in 2013/14 and frozen at £18/tCO₂ for 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 on Electricity Market Reform (EMR). However, there is a high degree of uncertainty about investment in low-carbon capacity to come onto the system beyond 2020. Government should complete EMR (including setting a decarbonisation target, set out a strategy to commercialise offshore wind and an approach to CCS):

- **Complete implementation of Electricity Market Reform (EMR);** set appropriate strike prices and sign contracts for low-carbon capacity; ensure a suitable mix of low-carbon technologies is supported; ensure final market design recognises the value of demand-side measures, interconnection, storage and flexibility in generation; require that all biomass is sustainably sourced. In addition, the Government should resolve issues around uncertainty in the future of the power sector by setting a carbon intensity target of 50-100g/kWh by 2030 (as illustrated in Figure 2.2), and extending funding for low carbon technologies beyond 2020.
- **Offshore wind commercialisation.** Rates of deployment of offshore wind have been successfully increased, as required to meet the EU Renewable Energy Directive, and the Government has committed sufficient funding to continue deployment to 2020. To achieve the objective of commercialising this promising technology will require an ongoing programme beyond 2020. The Government should set out a strategy for that commercialisation that includes: a commitment to a critical mass of investment; a target cost-reduction schedule under which ambition will be maintained or increased; the point in time when the technology will be expected to compete with other low-carbon options without support; and any role for Government in driving cost reduction (e.g. investment in port infrastructure).
- **Carbon capture and storage (CCS).** Progress with CCS is well behind the schedule we set out in our earlier reports. However, an effective approach is now in place for the first two demonstration plants, which should be progressed urgently. The Government should also set out the approach to projects to follow these demonstrations and to development of a CCS infrastructure. It should include an approach to industrial as well as power sector CCS and complement approaches in other countries.

We will develop and recommended approach to commercialisation and cost reduction as part of our advice on the 2030 target range for power sector decarbonisation and update on progress under EMR in 2015.

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). 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.** Important milestones were passed in 2013 in agreeing the terms of contract for the development of a new nuclear reactor at Hinkley Point C, subject to state aid approval. Approval from the European Commission would allow for the new build nuclear program to progress, with scope for other contracts to be signed under the first EMR Delivery Plan period, of up to 6 GW by 2018/19, providing significant economic benefits for the UK.
- **Carbon Capture and Storage (CCS).** DECC's Commercialisation Programme has selected two projects to conduct Front-End Engineering and Design (FEED) studies, with a view to making final investment decisions in 2015.

Links to recent work by the CCC

- **2014 Annual Progress Report**, Chapter 2 – Progress decarbonising the power sector.
<http://www.theccc.org.uk/publication/meeting-carbon-budgets-2014-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/>