

DEPARTMENT OF ENERGY AND CLIMATE CHANGE

**A Report on Progress in  
Decarbonising Electricity Generation  
in Great Britain during the Period  
2012-2014**



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Presented to Parliament pursuant of Section 5 of the Energy Act 2010  
December 2015

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URN: 15D/553

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# A report on progress in decarbonising electricity generation in Great Britain during the period 2012-2014

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**Under Section 5 of the Energy Act 2010, the Government is required to prepare a report on progress during a specified reporting period in decarbonising electricity generation, covering the period January 2012 to end of December 2014.**

## Introduction

1. The Energy Act 2010 requires that a progress report on decarbonising electricity generation in Great Britain is produced for set reporting periods. This progress report covers the period January 2012 to December 2014. It presents headline generation figures and details of policies introduced over the period to bring about further decarbonisation over time.
2. A more detailed breakdown of energy statistics is available in the Digest of United Kingdom Energy Statistics (DUKES)<sup>1</sup>. Where appropriate, recent updates to policies introduced over the reporting period are included<sup>2</sup>.
3. Where relevant, note is made of the recommendations of the Committee on Climate Change (CCC) and how these have been addressed.

## General progress – Decarbonisation statistics

4. Government's provisional estimates indicate that between 2012 and 2014 emissions from power stations decreased by 23 percent to 121MtCO<sub>2</sub>e<sup>3</sup>. Over 2009-13, the Greenhouse Gas Inventory<sup>4</sup> showed that annual power station emissions have averaged around 151 Mt CO<sub>2</sub>e. The 2015 Energy and Emissions Projections indicate that this will fall steeply in the next few years as a result of the Industrial Emissions Directive (IED), the carbon price support mechanism and other electricity market reform measures.
5. The carbon intensity for all fuels (including nuclear and renewables) was 394CO<sub>2</sub>/kWh in 2014, a reduction from 482 CO<sub>2</sub>/kWh in 2012<sup>5</sup>. The energy supply sector was the

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<sup>1</sup> All documents relating to Digest of UK Energy Statistics (DUKES):

<https://www.gov.uk/government/collections/digest-of-uk-energy-statistics-dukes>

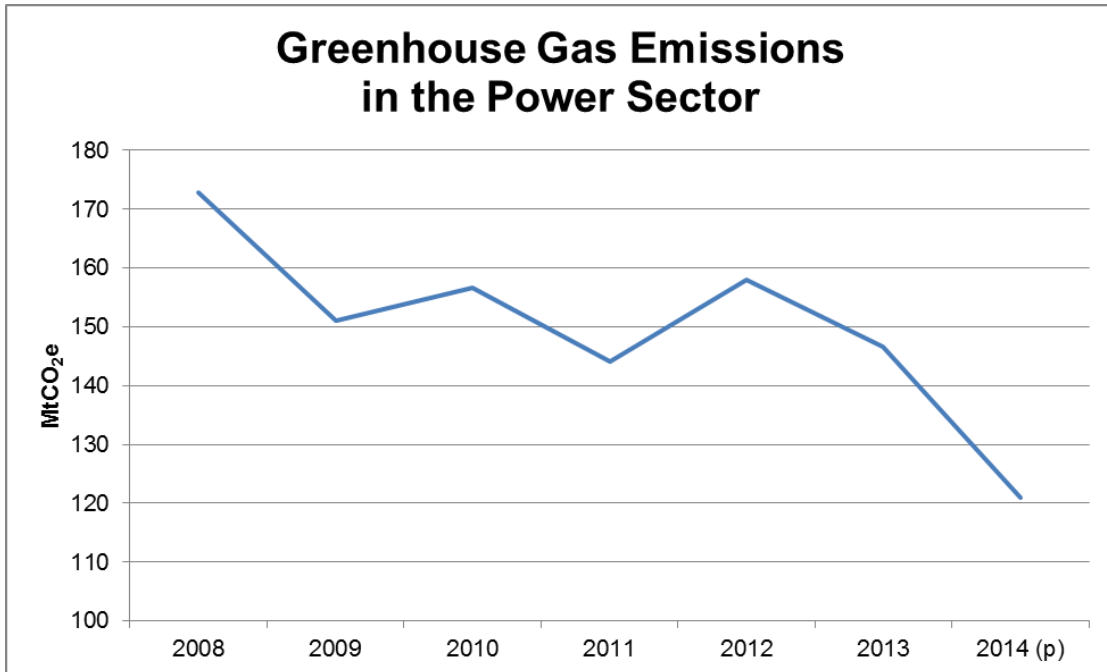
<sup>2</sup> As per section (3) of the reporting requirements

<sup>3</sup> Based on provisional estimates for 2014 from the UK Greenhouse Gas Emissions Inventory (<https://www.gov.uk/government/collections/provisional-uk-greenhouse-gas-emissions-national-statistics>).

<sup>4</sup> UK Greenhouse Gas Emissions Inventory, final estimates.

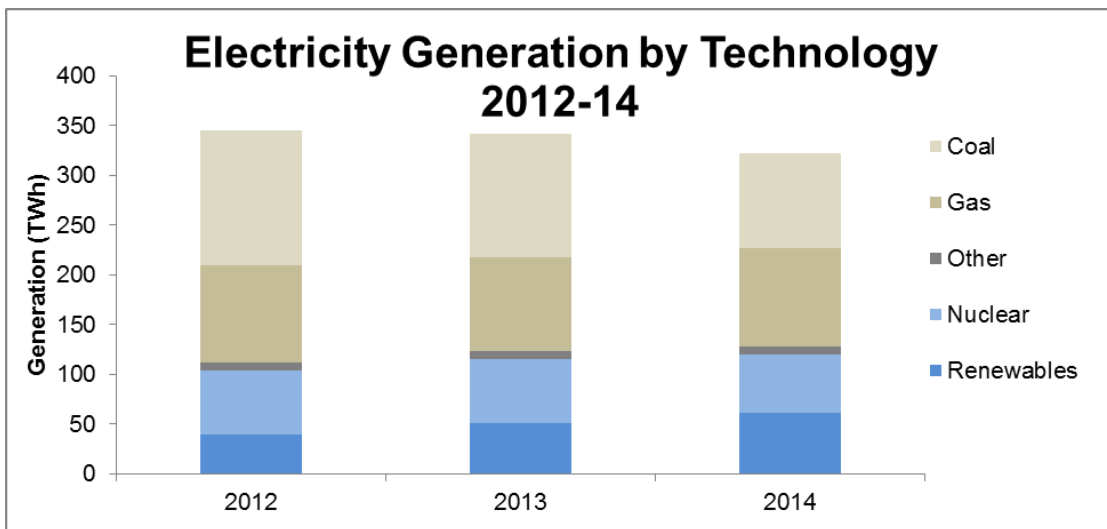
<sup>5</sup> DUKES 2015, Chapter 5

largest contributor to the decrease in carbon dioxide emissions between 2013 and 2014. Since 2013, emissions from power stations have decreased by 18 percent<sup>6</sup>.



Source: Provisional UK greenhouse gas emissions national statistics 2014

6. Low carbon electricity's share of generation increased from 30% in 2012 to a record 39% in 2014<sup>7</sup>. Renewables' share of generation increased from 11% in 2012 to 19% in 2014, also a record high.



Source: DUKES 2015

<sup>6</sup> 2014 UK Greenhouse Gas Emissions, Provisional Figures, March 2015

<sup>7</sup> DUKES 2015, Chapter 5.

## Generation by renewables

7. The contribution of all renewables to UK electricity generation was 19.1 per cent in 2014, a new record, 4.2 percentage points higher than in 2013. Renewable electricity generation was 64.7 TWh in 2014, an increase of 21%. This was due to increased wind and solar capacity, record high hydro generation, and – especially - the conversion of two units at Drax to biomass, in April 2013 and May 2014. Capacity grew to 24.6 GW over the same period, an increase of 24 per cent on the 19.8 GW at the end of 2013. Offshore wind generation was 17 per cent higher than in 2013, with capacity up 22 per cent<sup>8</sup>.

## Generation by nuclear

8. In 2014 there was a 9.7 per cent decrease in generation from nuclear, from 71 TWh to 64 TWh due to planned and unplanned outages affecting four nuclear stations. This was following successive increases in generation since 2010 (during which there had been extensive maintenance outages, particularly to Sizewell B which was offline for six months in 2010).<sup>9</sup>

## Generation by gas

9. Generation from gas increased by 5.1 per cent, from 96 TWh in 2013 to 101 TWh in 2014. This was mainly due to lower wholesale gas prices between June and August and to help meet the shortfall in generation caused by nuclear outages in the second half of the year.<sup>10</sup>

## Generation by coal

10. In 2014, generation from coal decreased 23 per cent, from 131 TWh in 2013 to 101 TWh due to the closure of several power stations and the conversion of a second unit at Drax from coal to biomass.<sup>11</sup>

## Supportive policy developments during 2012-14

11. During the reporting period the Government encouraged the decarbonisation of electricity through a package of policy interventions. The next section outlines the policies and reforms implemented during between January 2012 and December 2014, and where relevant, revisions and updates made to these policies since the end of the reporting period.

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<sup>8</sup> DUKES 2015, Chapter 6

<sup>9</sup> DUKES 2015, Chapter 5

<sup>10</sup> DUKES 2015, Chapter 5

<sup>11</sup> DUKES 2015, Chapter 5

## Electricity Market Reform

12. The Energy Bill received Royal Assent in December 2013. DECC published its EMR Final Delivery Plan shortly after, setting out final decisions on strike prices for renewable technologies up to 2018/19 and potential deployment rates to 2020. It also included an outlook to 2030 illustrating different decarbonisation trajectories and technologies scenarios.
13. Eight renewable electricity projects were awarded Investment Contracts (early Contracts for Difference - CFDs) in April 2014. The contracts were signed and laid before Parliament in June 2014. State Aid approval for the five offshore wind contracts followed in July; the biomass CHP project was approved in January 2015; Lynemouth's biomass conversion project was approved in December 2015. The European Commission is still considering the Investment Contract awarded to Drax. Together the projects could provide up to £12 billion of private sector investment by 2020.
14. In October 2014 the final CFD Allocation Framework for the first allocation round was published and the first application window for CFD applicants opened. The first allocation round was completed in March 2015, with a budget of £325m split across "established" and "less established" groups.
15. A total of 27 projects were successful in the auction and 25 went on to sign the contract. These contracts were offered to a range of developers and technologies, with sites across Great Britain. The competitive auction drove down the costs to consumers, resulting in the capacity costing up to £105m per year less than it would have done in the absence of competition. If they deliver and generate as expected these could lead to the UK emitting 4.2m fewer tonnes of CO<sub>2</sub> per year (relative to the current generation mix).
16. This was in line with the CCC's recommendation that implementation of EMR should be completed, appropriate strike prices set and CFDs signed covering a suitable mix of technologies. Further details on progress in implementing EMR can be found in the EMR Annual Updates for 2014 and 2015<sup>12</sup>. The Government Response to the CCC's 2014 progress report sets out more detail on their recommendations regarding demand side response, interconnection, storage and flexibility.

## Green Investment Bank

17. The Green Investment Bank (GIB) backed 26 new green projects in 2012-14, committing £1.3bn in new capital, and mobilised up to £3.8bn of private capital. For example, in 2014 GIB invested £241 million alongside Japan's Marubeni Corporation. The Corporation and Green Investment Bank jointly purchased a 50% stake in the Westernmost Rough offshore wind farm from DONG Energy. This project marked the first

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<sup>12</sup> EMR Annual Update 2015 <https://www.gov.uk/government/publications/electricity-market-reform-emr-annual-update-2015>



commercial deployment of the next-generation Siemens 6MW turbine and was the first project in which the Green Investment Bank took construction risk in an offshore wind project.

## **Biomass sustainability**

18. The CCC recommended in 2014 that Government require all biomass to be sustainably sourced. The UK Government introduced mandatory sustainability criteria for the use of home-grown, as well as imported, biomass by generators above 1MW capacity, in order to receive Renewable Obligation Certificates (ROCs) or support under Contracts for Difference. The criteria require those power generation stations using solid or gaseous biomass to achieve a minimum of 60% greenhouse gas saving, increasing to 72% from 2020 and 75% from 2025. Generators using wood are required to source feedstock from sustainably managed forests. Ofgem will monitor compliance with these criteria. These measures were included in the Draft Renewables Obligation Order 2015, and in the Contracts for Difference from the commencement of the contracts.

## **Nuclear**

19. Eight sites were identified in the Nuclear National Policy Statement as potentially suitable for the deployment of new nuclear. Industry set out its plans to develop approximately 18GW of new nuclear power on all but two of the sites as follows:
- EDF and China General Nuclear Corporation, to build four new EPR reactors at Hinkley Point and Sizewell, and two Hualong reactors at Bradwell.
  - NuGen, a consortium of Engie and Toshiba plans to build three reactors at Moorside near Sellafield.
  - Horizon Nuclear Power, owned by Hitachi Ltd, plans to build two reactors at each of its sites in Wylfa and Oldbury.
20. The Office for Nuclear Development (OND) in DECC continues its work on facilitative actions to enable developers to elaborate their proposed new nuclear projects. As part of this work, OND engages with potential developers and key stakeholders, to discuss their proposals and identify potential barriers to investment.

## **Carbon Capture and Storage**

21. Government stipulated that no new coal plant should be built unless equipped with at least 300MW of CCS. All new fossil fuel plants were subject to a limit on carbon emissions under the Emission Performance Standard (EPS) of 450g/kWh or around half the level of emissions from unabated coal.
22. Over the 2012-14 reporting period, the Government continued to work with two bidders to develop full-chain CCS power plant generation at commercial scale (to be operational

from 2020) as part of the CCS Competition, and in parallel Government continued to invest in CCS research and development.

23. In 2014 the Government provided £1m to Tees Valley Unlimited to explore the technical feasibility of industrial CCS on Teesside, as part of a £12m City Deal. This resulted in a concept scheme for industrial CCS on Teesside, alongside economic and commercial analysis and new evidence on an investment mechanism<sup>13</sup>
24. The 2015 Spending Review confirmed that the £1 billion capital funding for the CCS Competition was no longer available and that the CCS Competition projects could not proceed under the current framework. The Government continues to view CCS as having a potential role in the long-term decarbonisation of the UK and Government will be determining the detailed design and implementation of CCS policy changes.

## Looking ahead

25. Reliable, affordable, clean energy remains critical to the economy, national security and the budgets of hard-working families. On 18 November the Secretary of State set out Government's long-term vision for a secure, clean and affordable energy system. One where support is targeted at technologies that offer the greatest value, where the barriers to innovation are removed, and where costs are managed down through enhanced competition and innovation.
26. New nuclear, new gas and renewables will continue to be crucial to meeting the challenge of decarbonising the UK power sector. Replacing coal fired power stations with gas is one of the most cost-effective solutions to provide clean and reliable electricity. In spring next year the Government will consult on proposals to close all unabated coal-fired power stations by 2025.
27. Government will remove barriers and encourage greater competition to lower costs and create the right environment for new technologies to come forward. DECC is doubling its innovation programme to £500million, developing UK leadership on small modular nuclear reactors and providing seed funding for new technologies such as electricity storage, interconnection and demand side response.
28. Reducing electricity use is the most cost-effective way to cut emissions and help lower bills. The Government is committed to ensuring a million more homes get energy efficiency improvements, supporting businesses to reduce their energy use, and every household and small business will be offered a smart meter by the end of 2020.

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<sup>13</sup> <http://www.teessidecollective.co.uk/teesside-collective-blueprint-for-industrial-ccs-in-the-uk>

## Scotland

29. The Scottish Government aims to achieve full decarbonisation of Scotland's electricity supply by 2030, consistent with the recommendations of the CCC. The Electricity Generation Policy Statement (2013)<sup>14</sup> sets out the Scottish Government's objectives for an affordable, secure, low carbon electricity supply that generates new job opportunities through the ambitious targets for renewable electricity and decarbonisation through CCS.
30. The Scottish Greenhouse Gas Emissions Annual Target Report 2013 was published on October 2015. It estimated that the carbon intensity of Scottish electricity generation in 2013 was 229tCO<sub>2</sub>e/GWh. DECC estimate that 11.9 million tonnes of CO<sub>2</sub> were displaced by Scotland's renewable electricity in 2013. The breakdown of electricity generation by fuel type in 2013 in Scotland is shown below in Table 2.

Table 2: The breakdown of electricity generation by fuel type in 2013 in Scotland<sup>15</sup>.

Fuel type	2013 GWh
Coal	10,820
Oil	595
Gas	5,443
Nuclear	18,498
Thermal renewables	1,361
Other thermal	127
Hydro natural flow	4,366
Hydro Pumped Storage	615
Non thermal renewables	11,240
Wastes	6
<b>Total</b>	<b>53,071</b>

31. Finalised renewable electricity generation figures for Scotland during 2014 show that generation during that period was 18,962 GWh – up 11.9% on 2013, the previous record year for renewables. Wind generation in 2014 was 11,664 GWh, up 4.8% on 2013 (previous record year for wind) and Hydro generation in 2014 was 5,436 GWh, up 2.2% on 2011 (previous record year for hydro).
32. The Scottish Government's target for renewable electricity generation is for renewables to generate the equivalent of 100% of gross annual consumption by 2020, with an interim target of 50% by 2015. In 2014, around 49.6% of Scotland's electricity

<sup>14</sup> EGPS 2013: <http://www.gov.scot/Publications/2013/06/5757>

<sup>15</sup> [Scottish Greenhouse Gas Emissions Annual Target Report](#)

consumption came from renewables meaning that the 2015 50% renewable electricity target has almost been met one year ahead of schedule.

### **Carbon Capture Storage**

33. The Scottish Government supports CCS as a critical new technology that, if implemented on a commercial scale, could drive a significant reduction in carbon emissions from fossil fuels, increasing our security of supply, and presenting a future industrial opportunity for Scotland and the UK.
34. On 27<sup>th</sup> March 2015 the Scottish and UK Governments announced joint funding of £4.2m for Summit Power's Caledonia Clean Energy Project a full-chain 570 MW Carbon-Capture-Storage (CCS) coal-gasification power station.
35. The funding, £2.5 million from Scottish Government and £1.7 million from the UK Government, is allowing the Seattle-based Summit Power Group to undertake substantial industrial research and feasibility studies with the ultimate objective of designing, siting, financing, and building their proposed CCS Clean Energy Project in Grangemouth, Scotland.