

Coal in 2015

Introduction

This article gives an overview of UK coal production and consumption up to the end of 2015.

Key points

- In 2015 UK coal production fell to an all-time low of 9 million tonnes.
- UK imports also fell and were 24 million tonnes, a decrease of 43 per cent on 2014.
- This was due to lower demand for coal, which decreased by 23 per cent compared to 2014 as demand for coal used in electricity generation fell.
- 8GW of coal fired electricity generation capacity have closed since December 2012 due to the Large Combustion Plant Directive (LCPD), with further closures anticipated by the end of 2023 under the Industrial Emissions Directive (IED).

Background

Until the late 1960s, coal was the main source of energy produced in the UK, peaking at 228 million tonnes in 1952. Ninety-five per cent of this came from around 1,334 deep-mines that were operational at the time, with the rest from around 92 surface mines. As UK energy started to become more diverse from the early 1970s (initially, through primary electricity via hydro schemes followed by natural gas and crude oil and renewable & waste in later years), production of home-produced coal has significantly declined. However, there remains a significant demand for coal in this country. Before 1970, it was used as a fuel source in the industrial sector, for fuelling trains and used within households for cooking and heating. Since then, it has mainly been used by electricity generators, who on average consume around 80 per cent of total UK coal supply¹ each year. Therefore, to meet this demand during the last 40 years the UK has become increasingly reliant on coal imported from other countries, specifically steam coal, which is used at coal-fired power stations to generate electricity.

Coal-fired power stations capacity

Coal use has remained significant in the electricity generation sector due to fluctuations in gas prices; where these fell coal-fired stations generated electricity at a lower cost than some gas-fired stations. In 2006, coal use by electricity generators peaked at 57 million tonnes, representing 85 per cent of total coal demand. Coal use gradually fell between 2007 and 2010 before increasing again in 2011. In 2012 coal use rose to 55 million tonnes, just below the 2006 peak. Since then coal used for electricity generation fell again and was 29 million tonnes in 2015 (a new record low). Electricity generation represented 78 per cent of total coal demand in 2015.

In 2015 the UK had 19 GW of coal fired capacity. There have been a number of coal plant closures (totalling 8 GW of coal capacity) since December 2012 due to the Large Combustion Plant Directive (LCPD), which came to an end in December 2015. The only station to opt out of the LCPD that closed in 2015 was Ironbridge, although this had converted to biomass after opting out and closed for reasons unrelated to the LCPD. 2015 also saw the conversion of a third unit at Drax from coal to high-range co-firing (85% to <100% biomass), taking total coal capacity converted at Drax to 1.9 GW. 2016 has seen a further reduction of 3 GW of coal capacity due to the closures of Ferrybridge units 3 and 4² (1GW) and Longannet (2.3 GW).

The LCPD was superseded by the Industrial Emissions Directive (IED) from the 1st January 2016. The IED places more stringent emissions requirements on power plants between 1st January 2016 and 31st December 2020, and affects all coal and oil plants (including those that opted in to the LCPD), as well as other combustion plants, such as gas and biomass. One coal plant, operational

¹ Coal Supply is calculated as sum of production, net imports and stock

² Ferrybridge units 3 and 4 were opted in to LCPD and closed for reasons unrelated to the LCPD. Ferrybridge units 1 and 2 were opted out and closed in winter 2013/14 after exhausting the running hours available under the scheme

Special feature – Coal in 2015

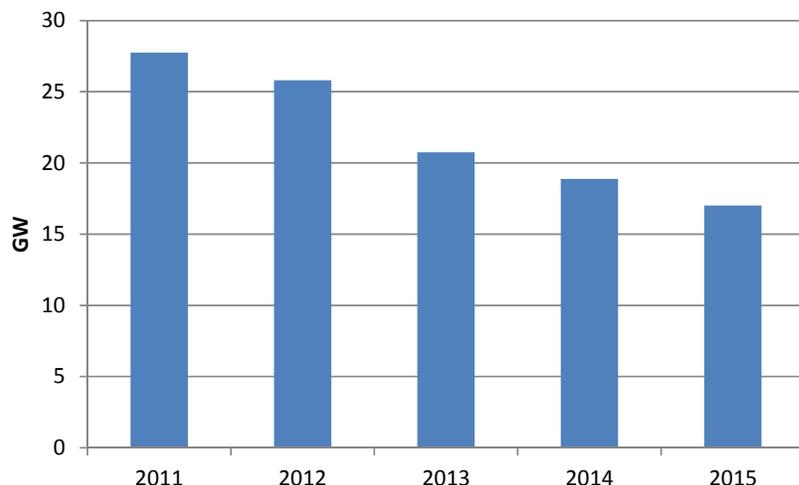
as of September 2016 with a capacity of 2 GW, opted out of the IED and must therefore close after 17,500 running hours or by the end of December 2023, whichever is reached first.

Details of the LCPD, the IED and the remaining coal plants subject to the IED can be found in the September 2015 article 'Large Combustion Plant Directive (LCPD): Running hours during winter 2014/15 and capacity for 2015/16', available at :

www.gov.uk/government/uploads/system/uploads/attachment_data/file/462364/LCPD.pdf

Please note that Aberthaw, Cottam, Uskmouth and West Burton A ultimately opted into the IED under the Transitional National Plan after that article was published.

Chart 1: Installed coal-fired capacity of UK transmission network 2011 to 2015



Deep mined production

Generally, since the peak levels reported in 1954 (217 million tonnes), deep mined production fell by an average of 2.6 per cent each year between 1954 and 1983 (102 million tonnes)³. Although the 1984 miners' strike had a substantial effect on the amount of coal produced in the UK, which saw deep-mined production falling by 66 million tonnes (65 per cent) between 1983 and 1984, the UK coal industry recovered and returned to the long term trend in 1985 producing more than double the levels of 1984 (an increase of 40 million tonnes). Thereafter, deep-mined production decreased on average by 11 per cent a year with figures in 2015, showing a record low of 2.8 million tonnes, 99 per cent less than the post-war peak during 1954 and a 24 per cent decrease on 2014 (3.6 million tonnes). This was due mainly to the closure of Hatfield and Thoresby in July 2015. In addition Kellingley, the last remaining large deep mine closed on 18 December 2015.

(Chart 1)

Surface mine production

Surface mine production (including recovered coal) increased on average by 3 per cent a year between the late 1940s and late 1980s, with production peaking in 1991, to stand at 21 million tonnes. Thereafter, although surface mine production declined by an average of 5 per cent between 1991 and 2005, it exceeded deep-mined production for the first time in 2005, accounting for 53 per cent of total production (21 million tonnes). This share continues to grow as deep mined production has been steadily declining. Surface mine production fell by 27 per cent in 2015 compared to a year earlier due to the closure of a four mines in 2015 and other mines producing less coal as they are coming to the end of operation. However, its share of all coal production was unchanged compared to 2014 at 68 per cent. **(Chart 2)**

³ Between 1972 and 1974, deep mined production on average decreased by 9 per cent a year as a result of miner's striking over pay

Remaining operating deep mines as at the end of December 2015

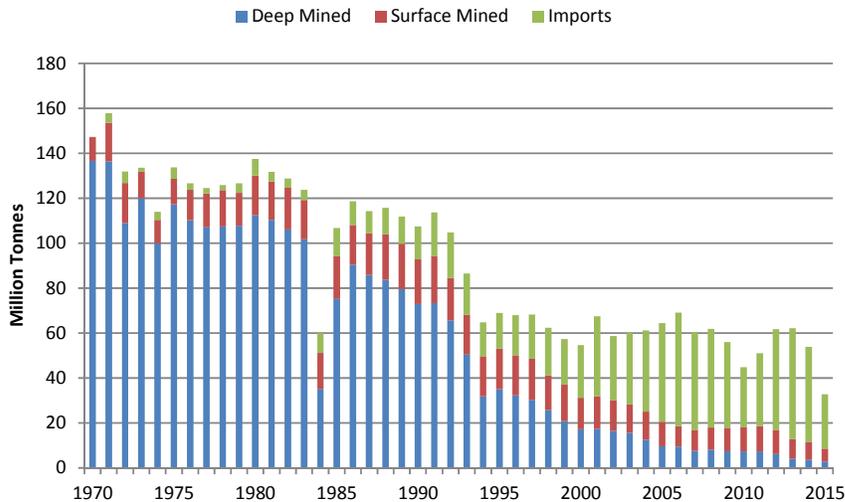
Name	Region
Ayle Colliery	Northumberland
Eckington Colliery	Derbyshire
Hill Top Colliery	Lancashire
Nant Hir No.2 Colliery	Neath Port Talbot
Dan-y-Graig No.4 Colliery	Neath Port Talbot
Aberpergwm Colliery	Neath Port Talbot
Monument Colliery	Gloucestershire

Remaining operating surface mines as at the end of December 2015

Name	Region
Glan Lash	Carmarthenshire
East Pit	Neath Port Talbot
Nant Helen	Powys
Selar	Neath Port Talbot
Brenkley Lane	Newcastle upon Tyne
Rusha Site	West Lothian
Shotton	Northumberland
Glenmuckloch Site	Dumfries & Galloway
Greenburn Project	East Ayrshire
Comrie Colliery Site	Fife
Ffos-y-Fran Land Reclamation Scheme	Merthyr Tydfil
Muir Dean Site	Fife
Netherton	East Ayrshire
Tower Colliery Surface Mining Site	Rhondda
Minorca	Leicestershire
Potland Burn	Northumberland
Broken Cross Site	South Lanarkshire
House of Water	East Ayrshire

In 2015 the last three large deep mines closed (Hatfield Colliery, Thoresby Colliery and Kellingley Colliery) and four surface mines closed (Earlseat, Laigh Glenmuir Site, Butterwell Disposal and Lodge House).

Chart 2: UK coal supply, 1970 to 2015



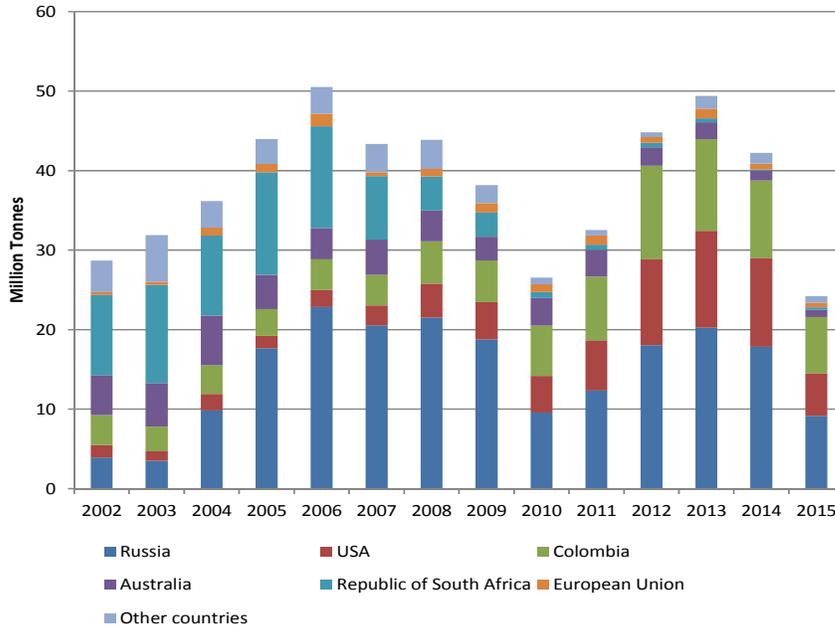
Coal imports

From 1970 imports, initially of coal types in short supply in this country, grew steadily to reach 20 million tonnes a year by the late 1990s. In 2001, the very rapid expansion of imports meant that imports exceeded the level of UK production in that year for the first time. As annual levels of UK coal production continued to fall, imports continued to grow rapidly and in 2006 reached a new record of 51 million tonnes, representing 75 per cent of total UK coal supply. From this point on UK imports fell, mainly as a result of lower demand by electricity generators, rather than higher indigenous production. However, in 2012, due to a greater demand by electricity generators and with UK production at an all-time low, imports increased by 38 per cent (+12 million tonnes) from the levels reported in 2011 (33 million tonnes). Imports continued to rise in 2013, before falling again in 2014. In 2015 coal imports fell 43 per cent from 2014 to 24 million tonnes (lowest value for 15 years). This was due to lower demand from coal overall. Imports from Russia fell by nearly half compared with 2014. **(Chart 3)**

Steam coal (used mainly by electricity generators) represents on average around 83 per cent of total UK imports each year and represented 80 per cent of total imports in 2015 (24 million tonnes). Russia has long been the UK's main source of imports, contributing 41 per cent of steam coal imports in 2015. In more recent years, steam coal has also been imported from Colombia and the USA, together contributing 53 per cent of total steam coal imported in 2015.

Twenty per cent of coal imported during 2015 was coking coal (5 million tonnes), which has been used in coke ovens and similar carbonising processes within the industrial sector. Ninety per cent of this total originated from three countries alone, USA (44 per cent), Russia (27 per cent) and Australia (19 per cent). Imports of anthracite (mainly used in the domestic sector) are negligible in comparison to steam and coking coal.

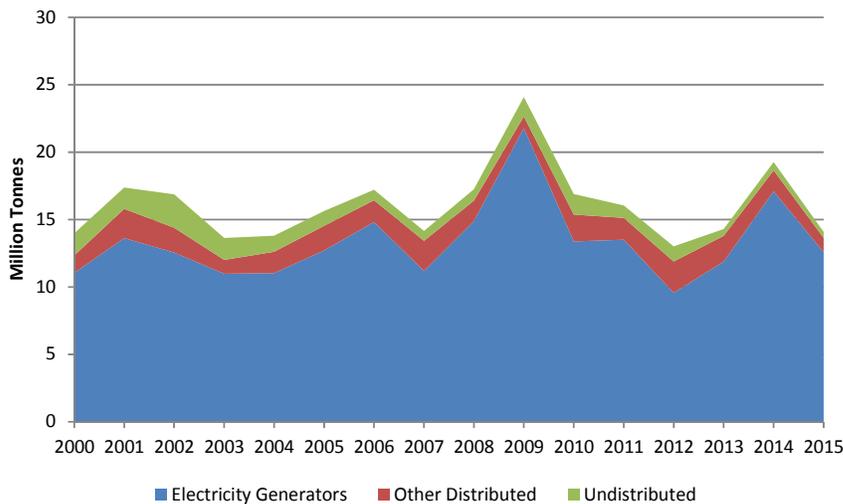
Chart 3: Total UK coal imports by country of origin, 2002 to 2015



Coal stocks

Most coal stocks in the UK are those held by electricity generators since this sector represents the largest share of the total demand for coal in the UK. From 2000 to 2015 coal stocks were between 13 and 18 million tonnes, with exceptions in 2009 and 2014. In 2009, coal stocks increased by 7 million tonnes (largest year-on-year increase) on 2008 to reach a record high of 24 million tonnes. In contrast, stocks decreased during 2010 by 7 million tonnes to 17 million tonnes as generators used their stocks as opposed to importing coal. This fall continued into 2012, where total coal stocks decreased to 13 million tonnes, the lowest level on record, of which 10 million tonnes were held by generators. Following stock rises in 2013 and 2014, stocks fell again in 2015 to 14 million tonnes. This was mainly due to generators using more coal stocks for electricity generation. (Chart 4)

Chart 4: Total UK coal stocks, 2000 to 2015



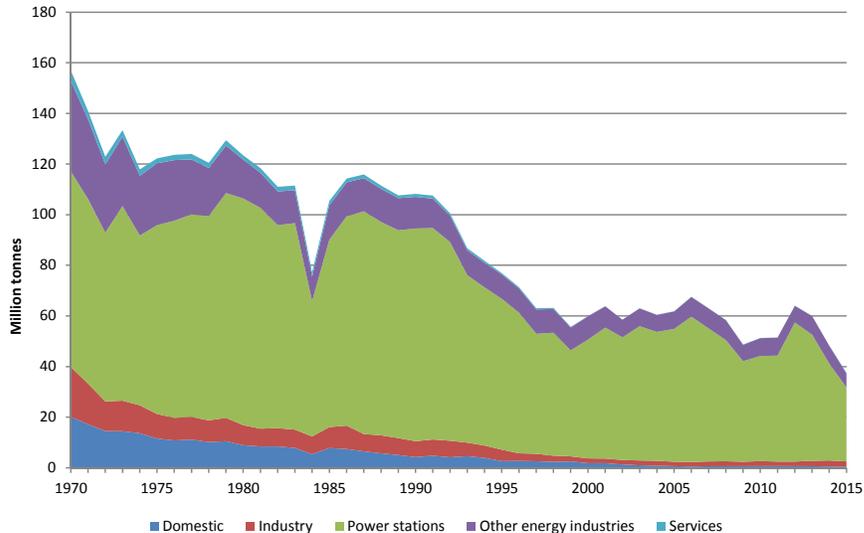
Coal consumption

Coal consumption fell gradually from 157 million tonnes in 1970. There was a large fall in 1984 due to the miners' strike. Consumption quickly rose again to pre-1984 levels before gradually falling again. In 2015, consumption of coal was 37 million tonnes, 76 per cent lower than in 1970 and 23 per cent lower than in 2014 (48 million tonnes). **(Chart 5)**

Consumption by electricity generators increased from 77 million tonnes in 1970 to a peak of 90 million tonnes in 1980 and continued in the 80 to 90 million tonnes range until 1991, with the exception of the miners' strike years. Coal consumed by generators fell steadily after 1991 until 1999, as the UK's energy mix became more diverse. Environmental regulations and high coal prices made natural gas more attractive to purchase for generation use. Coal consumption by generators broadly rose again after 1999 to 2006 as the price of gas encouraged generation from coal. From 2006 to 2010 the fall in consumption resumed. In the next three years, there was higher coal use due to higher gas prices making generation from coal more attractive. However, after 2013, the demand for coal decreased again and fell to 29 million tonnes in 2015 (a new record low). The decline was due to a number of reasons: increased availability of nuclear and wind generation, the conversion of a third unit at Drax from coal to high-range co-firing (85% to <100% biomass) in July 2015 and an increase in the carbon price floor (from April 2015). In previous years the price of gas relative to coal was a key reason for the decline, but in 2015 the price of coal purchased by major power producers fell by 14 per cent in 2015, while the price of gas fell by 17 per cent.

Other energy industries consumption fell gradually from 1970, with the exception of 1984 when there was a miners' strike. Consumption increased by 11 per cent in 2013 compared with 2012 mainly due to coking coal in blast furnaces increasing by 43 per cent from 1.0 million tonnes in 2012 to 1.4 million tonnes in 2013. This increase was due to the re-opening of Teesside steelworks in April 2012, which gradually increased operations over the next year and the newly opened blast furnace at Port Talbot in February 2013. In 2014, coking coal in blast furnaces increased further to 1.5 million tonnes, but fell again in 2015 to 1.4 million tonnes as steel production in the UK became less competitive and SSI steelworks closed in October 2015.

Final consumption has fallen continuously from 1970, with the exception of an increase for two years following the 1984 strike, as gas has taken over as the main heating fuel in the UK, and the demand from industry also declined (particularly from 1986). In terms of share, industry has overtaken domestic rising from 45 per cent share in 1970 to 78 per cent in 2015. Domestic's share has fallen from 46 per cent to 21 per cent. The service sector's share of final consumption has fallen from 9 per cent in 1970 to 1 per cent in 2015.

Chart 5: Coal consumption, 1970 to 2015

Manufactured Solid Fuels

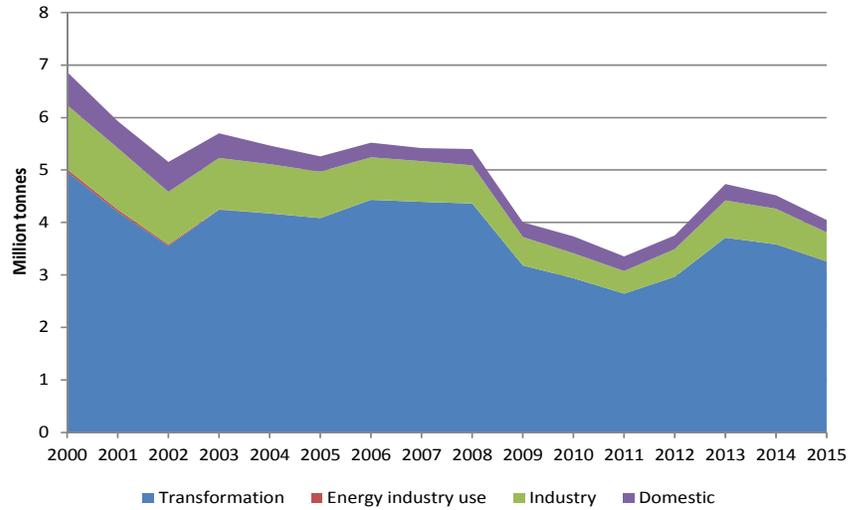
In 2015, around 92 per cent of manufactured solid fuel production was coke oven coke, a proportion that has remained the same for the past 16 years.

The main purpose of coke oven coke is for use in blast furnaces in the UK iron and steel industry. Between 1970 and 2013 there was an overall decline in coke oven coke production. However, in 2013 there was a 22 per cent increase in blast furnace consumption, which rose to 3.3 million tonnes from 2.7 million tonnes in 2012. This was due to the re-opening of Teesside steelworks in April 2012 which gradually increased operations over the next year, and the newly opened furnace at Port Talbot in February 2013. Demand has fallen since 2013. In 2015 blast furnace use had fallen to 2.8 million tonnes. This was due to reduced steel production in the UK, as a result of the UK steel industry becoming less competitive. Monckton Coke and Chemicals, the only dedicated coke plant in the UK closed in December 2014. SSI steelworks at Redcar ceased production in mid-September (with the subsequent closure in October). Blast furnace use represented 99 per cent of total demand (2.8 million tonnes), and was 10 per cent lower than in 2014.

Most of the supply of coke breeze is from re-screened coke oven coke, with direct production accounting for only 1.9 per cent of total supply in 2015. In 2015, 45 per cent of coke breeze was used in blast furnaces (0.4 million tonnes) for transformation and 55 per cent used for final consumption (Table 2.5).

Other manufactured solid fuels (patent fuels) are manufactured smokeless fuels, produced mainly for the domestic market. A small amount of these fuels (only 8.5 per cent of total supply in 2014) was imported, but exports generally exceed this. **(Chart 6)**

Chart 6: Total Manufactured Solid Fuels consumption in the UK, 2000 to 2015



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