



WIND AND SOLAR POWER CONTINUE TO CONTRIBUTE MUCH MORE TO THE UK'S PHASE OUT OF COAL THAN BIOMASS

biofuelwatch

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Executive Summary

In the last ten years the UK has almost entirely phased out the use of coal for electricity generation, thanks mostly to large increases in output from wind and solar power, and a decrease in electricity demand.

Bioenergy has been a far smaller factor in the UK's coal phase out than either of these two and is only producing around 12% of the UK's electricity. This is despite the UK burning more wood and importing more wood pellets to be burnt than any other country on the planet, and spending billions of pounds of bill-payers' money on subsidies for the biomass industry.

Other countries would benefit from learning lessons from the UK's experience. In particular, they should not invest huge amounts of time and resources into this dirty and destructive technology, when the return they will see in terms of energy generated is so small.

“Money and other resources invested in biomass burning would be better utilised further levelling up wind and solar, and on energy-saving technologies like better insulating buildings.”

Introduction

In 2017 Biofuelwatch published a report which investigated the extent to which biomass burning had assisted with the UK’s phasing down of coal use for electricity generation. The report concluded that while increases in biomass combustion, mostly wood, had played a small role (21%), increased generation from renewable sources (41%) and overall electricity demand reduction (22%) were far more significant.¹ It also highlighted that, contrary to what many had feared, the reduction in coal power generation had not been accompanied with an increase in fossil gas burned in power plants.

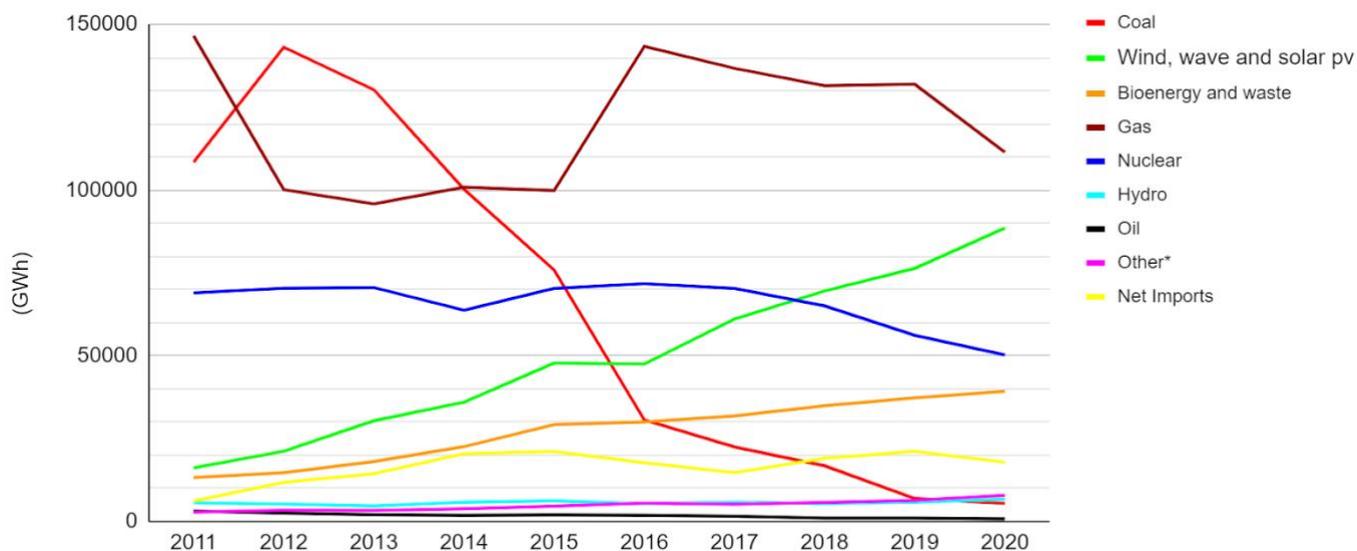
Almost five years on it appears that many of the positive trends we observed in 2017 have continued. Coal use for all purposes, but particularly electricity generation, has continued

to shrink. Meanwhile, generation from wind and solar has carried on its steady increase.

Some encouragement can also be taken from the UK’s continued decrease in electricity demand, as it suggests much-needed progress is being made on increasing energy efficiency. However, it also suggests that there has not been any meaningful electrification of heating, which is also vital for decarbonisation.

Energy from so-called “thermal renewables”, including bioenergy and waste incineration has also continued to grow, but it has not kept pace with wind and solar or demand reduction, and has therefore contributed to an even smaller proportion of the UK’s coal phase out than it had 5 years ago. This is despite UK government subsidies of over £1 billion per year and burning many millions of tonnes of wood, causing serious environmental harm.

Commodity Balances Over Time²



*Non-biodegradable waste, coke oven gas, blast furnace gas and waste products from chemical processes

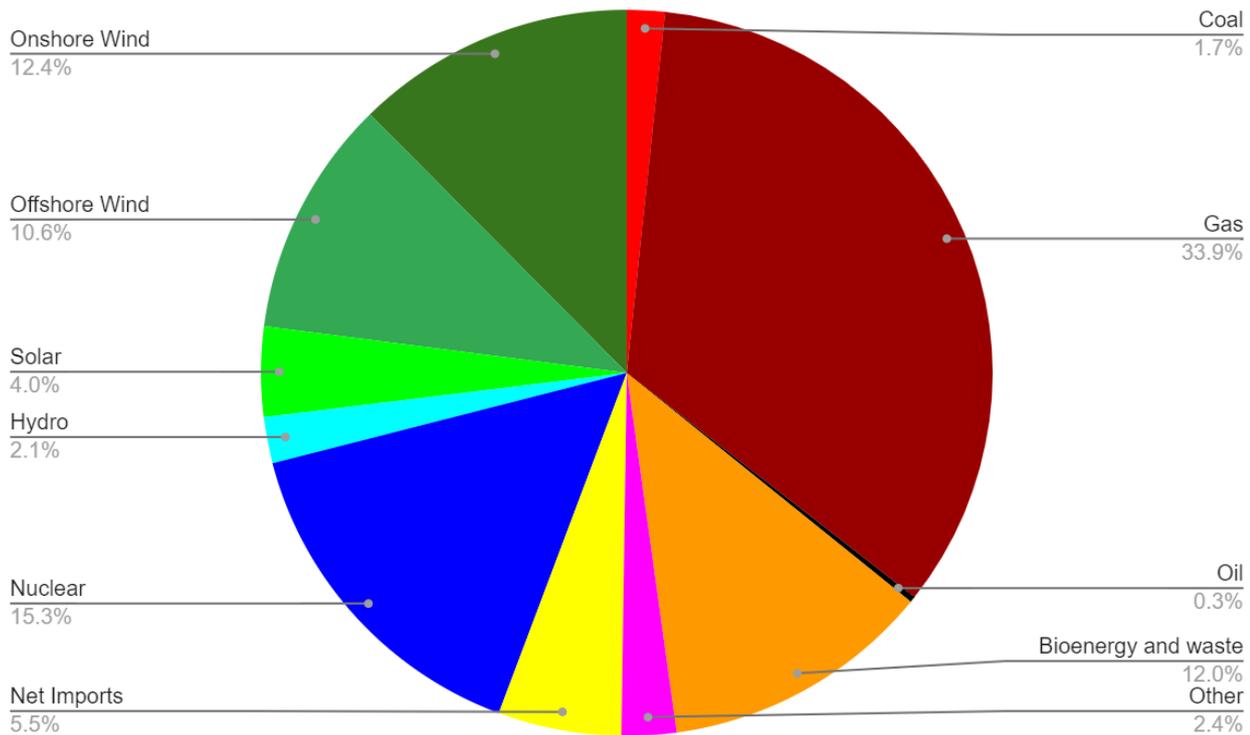
Source: Digest of UK Energy Statistic 2021 Chapters 5.6 and 5.13

By 2020 the UK had almost entirely stopped burning coal for electricity

According to the digest of UK energy statistics released in 2021, between 2011 and 2020 coal use in Britain dropped by 86% overall and by 94% for electricity generation.³ This resulted in coal generating 100,000 gigawatt hours (GWh) less

electricity in 2020 than it did in 2011, which also represents a decrease of nearly 95%. Coal now produces just 1.68% of the UK's electricity and the government has pledged that Britain will have completely phased out coal for all energy generation by October 2024.⁴

UK Electricity Generation from All Generating Companies in 2020



Source: Digest of UK Energy Statistic 2021 Chapters 5.6 and 5.13⁵

“Burning wood produces more greenhouse gas emissions per unit of energy than coal, and Drax, the UK’s biggest wood-burning power station, is also the UK’s single biggest emitter of CO2.”

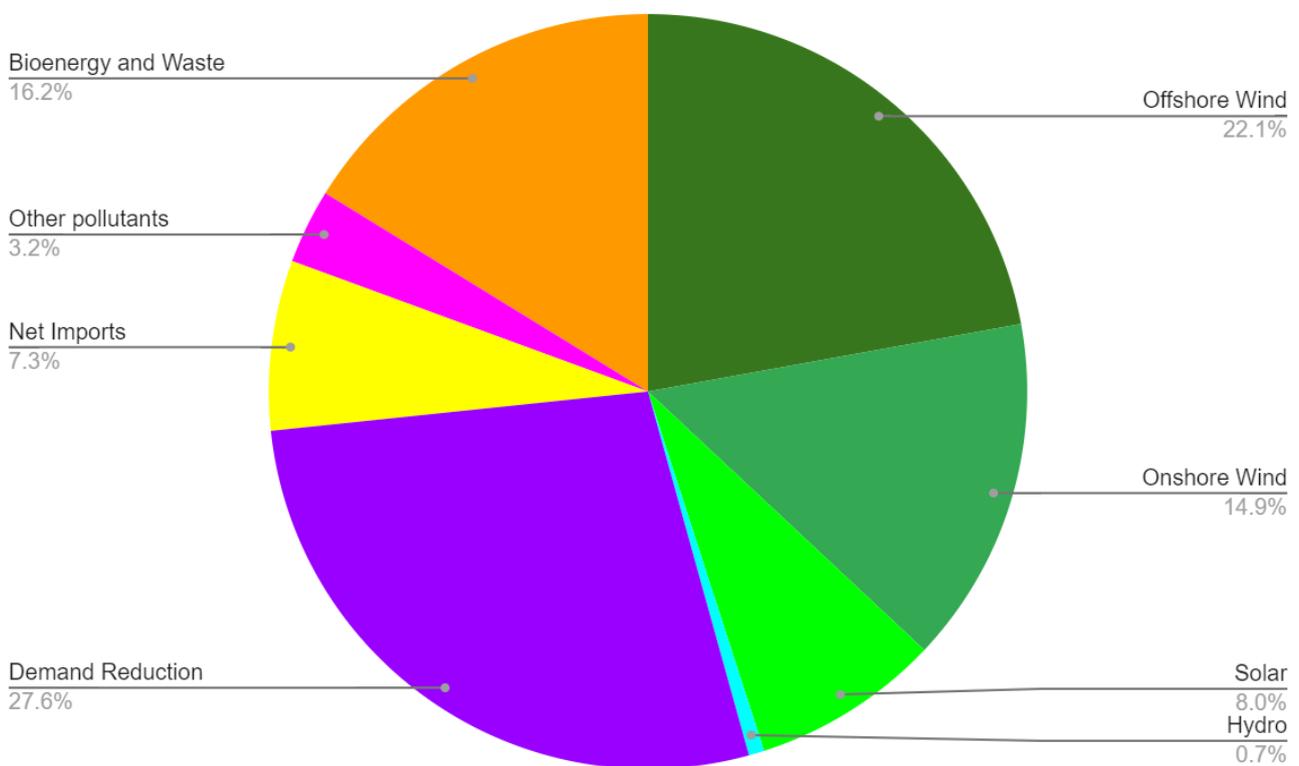
What has compensated for the fall in coal-generated electricity?

By far the largest growth area within UK energy generation has been wind and solar. Between 2011 and 2020, electricity generation from solar photovoltaic and wind energy more than quadrupled, and these sources combined are now easily the UK's second largest source of electricity (26.95% in 2020) behind fossil gas (33.92% in the same year).⁶

Solar and wind have been a bigger contributor to electricity generation in the UK than bioenergy every year since 2011, and the gap is continuing to grow. In 2020 the government revised its target for electricity capacity from offshore wind alone by the end of the current decade, from 30 gigawatts to 40 gigawatts.⁷

Renewables are growing especially quickly in Scotland where wind power now accounts for close to half of Scotland's total generation.⁸ Growth in renewable energy can be credited with 45.1% of the UK's coal phase out.

Contributions to the UK's Coal Phase Out

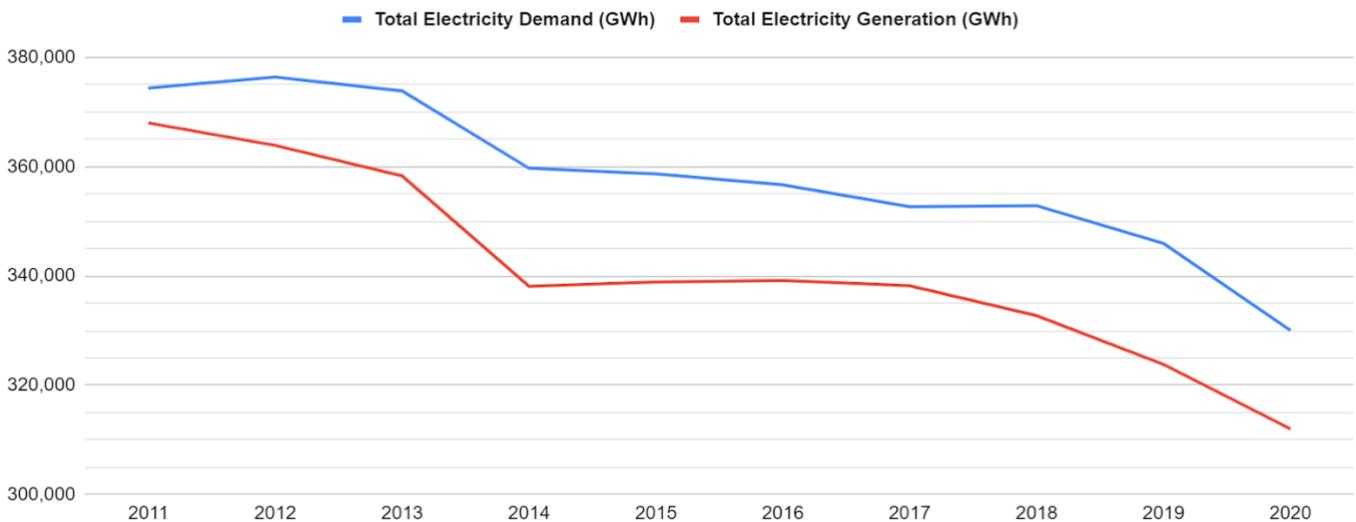


Also in a repeat from our 2017 report, the second greatest contribution has come from decreased demand for electricity (27.6%). This once again leaves “thermal renewables” in third place, responsible only for less than one sixth (16.2%) of the UK's coal phase out.

Almost all of the remainder of the UK's coal phase out is thanks to an increase in net imports of electricity. This is an issue because the exact origin of this imported electricity is unknown, and if the source is non-renewable, which is quite likely, the emissions produced in the production of that electricity is not being accounted for in the UK - it is only accounted for in the country in which it was generated.

However, while imports in 2020 (almost 18,000 GWh) were certainly a lot greater than in 2011 (just over 6000 GWh), imports have not significantly increased since 2014, with the peak in 2019 coming in at just 65 GWh higher than the total for 2015.

Total Electricity Demand and Generation⁹



Source: Digest of UK Energy Statistics 2021 Chapters 5.1 and 5.6

The real cost of bioenergy

Forest biomass burning is not a zero carbon or even a low carbon form of energy generation. Burning wood produces more greenhouse gas emissions per unit of energy than coal, and Drax, the UK's biggest wood-burning power station, is also the UK's single biggest emitter of CO₂.^{10 11}

In 2021 more than 500 scientists wrote an open letter to world leaders including EU Commission President Ursula Von der Leyen and US President Joe Biden, calling for an end to tree burning for energy. The letter said that even if new trees are planted as part of the bioenergy process, the carbon emissions produced create a carbon debt, which the world does not have time to pay off in order to fight climate change.¹²

On top of this, demand for biomass in the UK is driving more intense logging of forests, particularly in North America and the Baltic states which are the main sourcing regions for its pellet imports.¹³ This harms precious biodiversity at a time when scientists are warning that we need to protect forest ecosystems to stave off the burgeoning global ecological crisis.

Drax is also one of the top five emitters of fine particulate matter among power stations in

Europe.⁷ Particulate matter ten micrometres or less in diameter, commonly referred to as PM, is linked to early deaths from lung and heart disease, more severe symptoms in people with asthma, and results in more people with lung conditions (COPD, asthma, bronchitis) and heart conditions (heart attacks, strokes) being admitted to hospital.¹⁴ The American Lung Association has said it does not support biomass combustion for electricity, because of its tendency to release particulate matter and other carcinogens, which cause premature death and endanger respiratory health.¹⁵

Bioenergy also harms the communities that live near the forests it devastates and near the mills where the pellets are produced, with noise and pollution.¹⁶

This is what we're told we must accept if we want the UK to transition away from burning coal, but the truth is that it is a choice foisted upon us, in many cases by the same companies that were burning coal not too long ago. Despite receiving more than £1 billion in funding and burning more wood than the entire UK produces each year for all purposes, bioenergy only contributed to one sixth of the UK's coal phase out.¹⁷

Conclusion

There is much encouragement to be taken from the UK reducing its use of coal for electricity by 95% decrease between 2011 and 2020. What's more, this decrease has been achieved primarily thanks to the continued growth of UK wind and solar, which went from producing just 16,000 GWh in 2011 to producing 88,000 GWh in 2020.

Proponents of bioenergy often claim that wind and solar power are too intermittent to be relied upon fully, and that with coal use being phased out and the UK's existing nuclear power plants set to be closed down by 2030, we will need to burn more biomass to generate so-called "baseload" energy.¹⁸ However, Britain's electricity demand could also be met in the future through investment in improved energy storage, and less intermittent renewables, such as tidal, wave energy and pumped hydro, which do not rely on combustion.

In fact, in February 2022 the Department for Business, Energy and Industrial Strategy announced that almost £7 million had been awarded to accelerate renewable energy storage technology projects in the UK.¹⁹ Even Drax is investing in a pumped storage hydro station.²⁰

The reduction of UK demand for electricity shrinking from 374,000 GWh in 2011 to 330,000 in 2020 is certainly cause for mild celebration. However, as sectors such as transportation and heating become increasingly electrified, demand is projected to reach 460,000 GWh, an increase of almost 40% on 2020 levels, by 2035.²¹

The UK has almost entirely eliminated the use of coal for electricity generation, and the role of bioenergy in this has been greatly exaggerated by its supporters. However, the minor contribution that wood burning has made to UK electricity has come at the cost of the UK having to burn far more wood than it produces for all purposes, and having to import more wood pellets than any other country in the world.

There is more the UK must do to completely phase out coal usage by 2024, and much more will need to be done to get the UK onto 100% low-carbon energy, but the answer to this problem is not further investment in bioenergy. Money and other resources invested in biomass burning would be better utilised further levelling up wind and solar, and on energy-saving technologies like better insulating buildings.



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¹ Almuth Ernsting, "Wind and solar, not biomass, have been key to the UK's partial coal phaseout so far", Biofuelwatch, May 2017, <http://www.biofuelwatch.org.uk/wp-content/uploads/coal-phaseout3.pdf>
² Source: Digest of UK Energy Statistics 2021 Chapters 5.6 and 5.13
³ Department for Business, Energy and Industrial Strategy, "Electricity: commodity balances (DUKES 5.1) - Excel", updated 29th July 2021, <https://www.gov.uk/government/statistics/electricity-chapter-5-digest-of-united-kingdom-energy-statistics-dukes>
⁴ Department for Business, Energy and Industrial Strategy, "End to coal power brought forward to October 2024", 30th June 2021, <https://www.gov.uk/government/news/end-to-coal-power-brought-forward-to-october-2024>
⁵ Department for Business, Energy and Industrial Strategy, "Electricity fuel use, generation and supply (DUKES 5.6) - Excel", updated 29th July 2021, <https://www.gov.uk/government/statistics/electricity-chapter-5-digest-of-united-kingdom-energy-statistics-dukes>
⁶ Department for Business, Energy and Industrial Strategy, "Electricity: commodity balances (DUKES 5.1) - Excel", updated 29th July 2021, <https://www.gov.uk/government/statistics/electricity-chapter-5-digest-of-united-kingdom-energy-statistics-dukes>
⁷ Department for Business, Energy and Industrial Strategy, "New plans to make UK world leader in green energy", 6th October 2020, <https://www.gov.uk/government/news/new-plans-to-make-uk-world-leader-in-green-energy>
⁸ Department for Business, Energy and Industrial Strategy, "Energy Trends: UK, July to September 2021", 23rd December 2021, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1043311/Energy_Trends_December_2021.pdf
⁹ Source: Digest of UK Energy Statistics 2021 Chapters 5.1 and 5.6
¹⁰ John D Sterman *et al.*, "Does replacing coal with wood lower CO2 emissions? Dynamic lifecycle analysis of wood bioenergy", *Environ. Res. Lett.* 13 015007, 18th January 2018, <https://iopscience.iop.org/article/10.1088/1748-9326/aaa512/meta#erlaaa512s2>
¹¹ Tomos Harrison, "UK biomass emits more CO2 Than Coal", *Ember*, 8th October 2021, <https://ember-climate.org/commentary/2021/10/08/uk-biomass-emits-more-co2-than-coal/#references>
¹² WWF, "500+ scientists tell EU to end tree burning for energy", 11th February 2021, <https://www.wwf.eu/?uNewsID=2128466>
¹³ Sasha Stashwick *et al.*, "Global Markets for Biomass Energy are Devastating U.S. Forests", *Dogwood Alliance* *et al.*, [Biomass-Investigation-Booklet-2019.pdf](https://www.dogwoodalliance.org/Biomass-Investigation-Booklet-2019.pdf)
¹⁴ British Lung Foundation, "Air Pollution and Your Lungs", April 2017, https://www.blf.org.uk/sites/default/files/Air%20Pollution_v4_2017_PDFdownload.pdf
¹⁵ American Lung Association, "Public Policy Position - Energy and Transportation", 25th June 2021, [Public Policy Position - Energy and Transportation | American Lung Association](https://www.americanlung.org/Policy-Positions/Policy-Positions/Policy-Position-Energy-and-Transportation)
¹⁶ Majlie de Puy Kamp, "How Marginalised Communities in the South are Paying the Price for 'Green Energy' in Europe", *CNN*, 9th July 2021, [How the American South is paying the price for Europe's 'green' energy \(cnn.com\)](https://www.cnn.com/2021/07/09/europe-green-energy/index.html)
¹⁷ Biofuelwatch, "Biomass Basics", <https://www.biofuelwatch.org.uk/2018/biomass-basics-2/#easy-footnote-bottom-3-12922>
¹⁸ Southeast Biopower Coalition, "What is Biomass Power?", 2021, <https://sebiopower.org/biomass-power>
¹⁹ Department for Business, Energy and Industrial Strategy, "Government boost for new renewable energy storage technologies", 23rd February 2022, <https://www.gov.uk/government/news/government-boost-for-new-renewable-energy-storage-technologies>
²⁰ Drax, "Crucachan 2 planning application", June 2021, <https://www.drax.com/uk/about-us/our-projects/crucachan-2/>
²¹ Rob Davies, "The UK's 2035 net zero electricity target: how could it be achieved?", *The Guardian*, 5th October 2021, <https://www.theguardian.com/business/2021/oct/05/the-uk-2035-net-zero-electricity-target-how-could-it-be-achieved>