December 2021

Friends of the Earth

The future of Drax: old, inefficient, damaging and expensive

Drax power station in Selby, Yorkshire is old, inefficient, environmentally damaging and will need £billions of subsidies to survive. We argue it should start preparing for closure and its workers retrained for decent jobs elsewhere.

Since this article was written, the government has proposed extending subsidies for Drax. It will provide around £470 million a year between 2027 and 2031, but only for periods when wind and solar power isn't abundant and only for a maximum of 25% of the hours in the year. While this will reduce the environmental harm, it won't eliminate it.

Summary

Since 2012, Drax Power Station has received more than £4 billion in direct subsidies to convert four out of its six boilers to burn wood pellets instead of coal to produce electricity. And by the time its subsidies expire in 2027 it will have received another £6 billion. Since Drax began its coal-to-biomass conversions, the costs of wind and solar electricity have fallen dramatically. So the electricity that Drax now generates is more expensive than these other forms of electricity generation.

To survive, Drax will need further subsidies. It is hoping that by installing equipment to capture carbon dioxide from its smokestacks and burying it under the North Sea it will get more money - because, in theory, this is extracting carbon from the atmosphere and contributing to the UK's net zero ambitions. One analysis suggests Drax might need £31.7 billion over the next 25 years, which is equivalent to almost £500 per person in the UK, directly adding more than £16 a year to each household's energy bill.

In a recent government Biomass Policy Statement, the government says it will financially support the burning of biomass as long as carbon capture and storage is fitted (a technology called BECCS). Although the government also says that strict biomass sustainability criteria will need to be developed to ensure BECCS genuinely removes carbon from the atmosphere and doesn't harm biodiversity. Currently Drax obtains its wood pellets from wildlife-rich forests in North America and the Baltic states which are also important carbon stores. It is highly doubtful that these sources of wood pellets would pass any reasonable sustainability criteria test.

Friends of the Earth argues that the government should not provide Drax - nor other old coal-fired power stations such as Lynemouth - with further funding. They are old and inefficient power stations. For example, Drax wastes 60% of the energy created by burning wood pellets through waste heat to the atmosphere and as cooling water to the nearby river; and its current source of wood pellets is not sustainable.

The same level of funding could generate many more jobs if invested in climate solutions such as offshore or onshore wind, home insulation, or the production of green hydrogen.

Instead, we argue that these old converted coal-fired power stations should prepare for closure and its workers retrained so they can get new jobs.

Questions and answers about Drax

How many workers does Drax employ?

Drax employs just over 3,000 people, 90% of which are in the UK. 700 are employed at Drax Power Station in Selby, 1,071 are customer service workers, 723 are central and administrative functions, 968 are in generation, and 253 are in wood-pellet production. Friends of the Earth argues that Drax should prepare to close and that a 'just transition plan' is needed so that its workers can be retrained for decent jobs elsewhere.

Drax should prepare to close and a just transition plan should be developed so its employees can get equally skilled jobs in other industries, like offshore wind.

How much wood does Drax burn each year and why?

Drax burns over 7 million tonnes of wood pellets each year to produce electricity. This requires 14 million tonnes of green wood, because pellets must be dried and compressed before they can be burned as fuel. This exceeds the UK's total annual wood harvest, which is 11 million tonnes.

Despite the fact Drax is heavily subsidised by the UK government, it has still chosen to import wood pellets rather than invest in UK wood pellet production. 4.6 million tonnes of wood pellets come from the USA, 1.2 million tonnes from Canada, and 0.8 million tonnes from the Baltic states, with the remaining amounts mostly from other European countries. It says around 60% of this wood pellet feedstock is from sawmill residues, "thinnings" (small trees removed), branches, tops, and bark. More than one-third of the wood it burns is from large whole trees.

Drax is an old power station that opened in 1974. It has a thermal efficiency of around 38%, which means for every 10 trees burned, 6 are wasted as uncaptured heat, which is released into the atmosphere or to the nearby River Ouse as cooling water. More modern biomass energy plants, fitted with technology to capture waste heat, are up to 90% efficient.

Drax uses more than twice the amount of wood pellets to produce the same amount of usable energy as a modern-day plant. It buys 99% of its wood pellets from abroad.

What is the climate impact of burning wood?

Drax produces electricity for the national grid. It claims that for every kilowatt hour (kWh) of electricity it produces it releases around 124 g of carbon dioxide, although this is disputed, with American research suggesting the true figure may be 4 times as much. Transportation of the wood pellets to Drax accounts for around a half of this. This is within the government limit of 200 g CO2e for every kWh of electricity produced. For comparison, it is more than ten times that of offshore wind or solar power, which produces electricity at around 8 g CO2e per kWh, including the energy involved in manufacturing, construction and maintenance.

According to Drax, in 2020 its facility emitted more than 13 million tonnes of carbon dioxide from the combustion of biomass alone. However, in this calculation Drax ignores emissions from changes in carbon stored in forests. It argues that trees growing elsewhere capture an equivalent amount of CO2. They say "the CO2 emissions are absorbed by new forest growth" and that the forest area

where it gets its pellets from is growing. But this claim is strongly contested by both many scientists and environmental groups near the forests. They say that Drax's activities are increasing harvesting and even with `regrowth there is a lower amount of carbon stored in the forest than if the forest was left to grow undisturbed. The UK government's official wildlife watchdog Natural England says, "Left to natural processes, woodlands will go on taking up carbon for centuries, although the net rate of uptake declines. Even after trees reach maturity, they continue to take up carbon, new trees fill gaps and organic matter builds up in the soil and dead wood".

A comprehensive report for the government says that – while caveating the need for caution in interpreting results due to their complexity – that when including impacts on carbon storage in the forests, burning sawmill residues or other types of wood that would otherwise be wasted (e.g., trees removed due to pests and disease) is better than burning gas for energy production. But the authors also say that burning stem wood (also called round wood) is worse than burning gas. Drax burns a lot of round wood, partly because there isn't enough genuine sawmill residue or waste wood to keep its furnaces burning, but also because of the chemical harm that burning only waste wood could do to its furnaces.

Drax is at least ten times more carbon polluting than wind or solar. The true impact is likely much more because the harvesting of some of the wood that Drax burns also reduces the amount of carbon stored in forests.

Is there a biodiversity impact from harvesting the wood Drax burns?

Drax claims that its activities do not harm protected or vulnerable wildlife and that it sources wood pellets from areas that are sustainably managed. But conservationists and scientists disagree. They say that these areas are wildlife hotspots, are poorly protected, and wildlife is declining. The decline in wildlife is not just because of clear-cutting whole trees for Drax and other uses, but also removal of dead wood, branches, and other forest residues, which impacts the food chain for birds and reduces the availability of nesting sites. A healthy biodiverse forest includes lots of dead wood, which shouldn't be classified as waste wood for burning.

Drax is the biggest of a growing number of old and inefficient coal-fired power-stations worldwide converting to biomass. The demand for wood pellets is rising fast, leading to much more forest being exploited than left for wildlife. We need to protect our natural world and as much as possible leave wildlife-rich forests undisturbed, especially when we can produce electricity much more cheaply and cleanly.

The UK government, in its Biomass Policy Statement, has said it will develop new sustainability standards for biomass use in BECCS plants to ensure they genuinely lead to net negative emissions and that biodiversity is not harmed. However, whether these new standards will be robust and enforced remains to be seen.

Wildlife-rich forests should be left to thrive and not exploited to provide wood pellets for Drax or other converted coal-fired power-stations, because electricity from wind and solar is cheaper and cleaner.

Is air pollution from burning wood harmful to health?

The government is encouraging householders not to drive diesel cars, burn wood in fuel stoves or have bonfires, because of the harmful impacts of particulates, tiny particles that get deep into lungs. There is evidence that short- and long-term exposure to particulate matter causes respiratory and cardiovascular illness and premature death. New research by scientists suggest 1 in 5 deaths across the world are due to particulate air pollution. The World Health Organisation has said there is no safe level for particulates in air. Despite being subsidised as a clean energy source, Drax releases more than 400 tonnes of particulates into the atmosphere each year.

While the human health impact from this pollution hasn't been independently assessed, the government shouldn't be subsidising energy sources that increase particulate emissions when genuinely cleaner electricity from wind and solar is readily available at a fraction of the cost of biomass.

Drax's wood pellets come from mills emitting dangerous particulates and other hazardous air pollutants and are often located in low-income and communities of colour.

Particulate air pollution is known to cause around 29,000 premature deaths each year in the UK. Drax should not be subsidised to add to this pollution given electricity can be produced using cleaner, cheaper, and abundant wind and solar power.

How much money does Drax get in subsidies?

Drax admits that without subsidies from billpayers, it would be uneconomic to operate. It has already received over £4 billion in subsidies and it's estimated it will get almost £6 billion more by the time its subsidy agreement with the government ends in 2027.

Unlike gas-fired power stations Drax doesn't pay a carbon tax for the carbon emitted from its chimneys. This is because it's assumed within the law that it's carbon neutral with new trees absorbing the same amount of carbon as is released, but as stated above, this is contested. If it's true emissions are 468 g/kWh, as suggested in 2017 by American research, then it would be paying £246 million in carbon taxes per year.

If Drax asked for subsidies now for the electricity it produces, it would be refused. The government provides subsidies via auctions called Contracts for Difference and agrees contracts with the lowest bidders. The cost of offshore wind has now fallen so much, it costs less than £60/MWh, and the government estimates this will fall to less £50 by 2030. Onshore wind and solar are cheaper still. Electricity from Drax costs £100/MWh. The government has also said it will not provide subsidies for new coal-to-biomass conversions.

By 2027 Drax would have received around £10 billion to produce electricity based on subsidies agreed years ago. If it asked now, the government would turn it down, because the electricity it produces is almost twice as expensive as wind or solar.

Doesn’t Drax say it wants even more public money?

Drax is hoping the government will pay it to become a BECCS plant. The company has already started consulting on plans to do so. The government has also announced plans to support carbon capture and storage technology in Humber, which Drax would link to.

One challenge to Drax’s ambitions is the amount of public subsidy it would need to operate and return a profit. One estimate says that fitting carbon-capture technology will reduce the efficiency of the plant by 25%, with the knock-on impact of increasing the price of its electricity to 3-4 times higher than wind or solar. Drax says the cost of its electricity will be £150/MWh, although this is probably optimistic. The long-term average cost of electricity is around £50/MWh (although currently the price is much higher). This means that Drax could not operate without subsidies.

The government is committed to financially support BECCS but has not decided how. It commissioned a report from Element Energy and Vivid Economics which identified two possible approaches. The first was a Contract for Difference that guarantees a price for electricity produced plus a payment for every tonne of carbon captured and stored. The second was a guaranteed payment for every tonne captured but the amount of subsidy provided linked to the carbon price in the UK Emissions Trading Scheme. Both are forms of public subsidy with the cost falling on taxpayers and/or through energy bills.

If the UK government were to subsidise Drax to capture carbon it could cost over £31.7 billion over 25 years, according to one analysis. This amount of money could create many more jobs and reduce carbon emissions by a greater amount if invested in wind or solar or energy efficiency or tree planting or other nature-based climate solutions.

By 2027 Drax will have received a staggering amount of subsidy, around £10 billion. It shouldn’t get any more subsidies after 2027.

Conclusion

We do not need Drax to provide electricity, not other old converted coal-power stations. There are cheaper and cleaner ways to do so. We do not need them to drawdown carbon dioxide from the atmosphere. It is cheaper to stop releasing the pollutant in the first place, through insulating homes or building more renewable energy capacity, for example. Planting trees or restoring salt marshes and peat bogs would be more cost-effective ways of drawing down carbon dioxide.

Drax and other old converted power stations should prepare to close and a transition plan should be urgently developed to ensure that its workers can get good jobs elsewhere.