

Drax's BECCS project climbs in cost to the UK public

Rising costs of wood pellets mean the subsidy required for Drax's BECCS plant could reach £1.7bn each year

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Drax is searching for a new subsidy

Drax, the world's largest burner of woody biomass, [receives hundreds of millions of pounds in subsidies each year](#) to fund its operations. In 2027 the UK will end its support for burning unabated biomass to generate electricity. Without significant cost-savings, Drax will not be able to continue to operate its power plant without this public support given the expense of wood as a fuel source. To prevent its closure after 2027, Drax is looking to secure a new long-term subsidy for its wood-burning operation.

Drax aims to achieve this through its [planned Bioenergy with Carbon Capture \(BECCS\) project](#). This project proposes to initially add carbon capture storage (CCS) to half of its existing capacity, which Drax claims will generate 8 Mt of 'negative emissions' each year, with the ultimate goal of adding CCS to all of its capacity. Drax would likely seek [subsidy for generation of both electricity and negative emissions](#).

A £1.7 billion annual bill

If it were to go ahead, Drax's proposed BECCS project would be extremely costly. Burning wood is already a very expensive method of generating electricity: Drax's Contract for Difference (CfD) [currently guarantees it a price of £132/MWh](#) for the electricity it generates. By comparison, the most recent contracts for offshore wind are [limited to £73/MWh](#). A significant contributing factor to the elevated costs of generating electricity from biomass is the rising price of wood fuel. Because CCS is such an energy-intensive technology, when added to a biomass plant it would consume some of the heat from the burning of the biomass that would otherwise be used to generate electricity. This means that to produce the same amount of electricity more wood would need to be burnt, further inflating fuel costs. As a result, Drax's proposed BECCS plant would require far more than the £785 million the biomass-only plant currently receives each year (mean annual subsidy 2018-2022).

Previously, Ember has estimated that Drax's proposed BECCS plant [would cost the UK energy bill payer £31.7 billion](#) across a 25 year contract, equal to around £1.3 billion each year. However, recent price increases in wood pellets (which are likely to persist for at least the next two to three years and potentially further into the future) and new forecasts of future wood prices elevates our estimate to £1.7 billion each year (a description of the methodology behind this calculation is included below). This doubling of the current subsidy would continue to be drawn from an additional cost on UK energy bills.

[According to recent guidance](#), the UK Government expects initial contracts for greenhouse gas removals projects (which BECCS would be classified under) to last for 15 or 20 years, and remain open to considering extensions. However, UK thermal power stations commonly generate for a longer timescale than this (the current average of operating life of a UK CCGT plant is 24 years). In order to recover the high costs of converting its power plant units to BECCS and maximise profit, Drax would likely require a longer contract, or would subsequently look for a contract extension, as they are doing with their current power plant. It is not unreasonable to assume that Drax would seek a 25 year long contract. A range of possible contract lengths and their associated subsidy cost is presented in the table below.

Contract length	Annual cost	15 years	20 years	25 years
Cost - not accounting for inflation	£1.73bn	£26.00bn	£34.68bn	£43.34bn

BECCS is an expensive gamble

Drax’s proposal would be the first commercial-scale BECCS plant in the world. This is an unproven technology that has not been demonstrated to work in practice.

Crucially, the ability of BECCS to deliver genuine negative emissions relies on the assumption that burning wood to generate power is carbon neutral. However, a large and growing majority of scientific evidence shows that burning wood for power is [often not carbon neutral](#), and in some circumstances can be a worse polluter than coal. There is also [strong evidence](#) that wood-sourcing practices are damaging to natural forests, risking further ecological harm. The [European Academies Sciences Advisory Council](#) (EASAC) states that using woody biomass for power “is not effective in mitigating climate change and may even increase the risk of dangerous climate change”.

Drax’s BECCS project therefore presents a very risky proposition to the UK energy bill payer. Not only is there a strong chance it will fail to deliver its promised negative emissions, but it may also be environmentally destructive all while demanding huge long-term financial commitment.

More thought is needed before investment

Drax's BECCS project is an environmental, climate and economic risk for which we have neither the time nor money to gamble on. Before the UK government commits any funding, a trial BECCS plant at a smaller scale than proposed by Drax must prove beyond reasonable doubt, and achieve a consensus among the scientific community, that it can deliver genuine negative emissions.

We also recommend that Drax should publish estimates for the subsidy requirements for its BECCS project and provide a full lifecycle assessment of the current carbon impact of their wood pellet supply, with realistic counterfactuals.

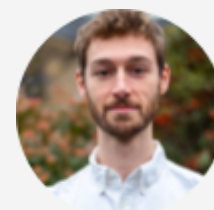
It is important to recognise that current plans for net zero by 2050 rely upon greenhouse gas removals. Given that BECCS cannot yet be relied upon to provide genuine negative emissions, there's an urgent need to understand other routes to provide negative emissions, and give more consideration to the potential for further emissions mitigation to minimise the requirement for negative emissions.

In the meantime, the UK should invest in clean power like wind, solar, hydro, nuclear and energy storage, and focus on building a modern, pollution-free electricity grid.

UK energy bill-payers have already given Drax billions to burn wood for electricity, a practice that is unlikely to be carbon neutral and in fact could be a significant source of emissions that contribute to climate change.

If Drax's BECCS project goes ahead, the UK energy consumer could be locked into decades of even higher bills without any guarantee that the negative emissions they are paying for are actually being delivered.

Tom Harrison
Analyst, Ember



Supporting Materials

Methodology

Establishing the future cost of wood pellets

The biggest uncertainty in forecasting the cost of a BECCS project is the future price of wood pellets. The wood pellet market is far less liquid than many other commodity markets with many private bilateral deals between companies. As a result market price data for wood pellets is less transparent than for other commodities.

We have based our future wood pellet price on the [forward price projections of Argus Media](#) which forecasts prices out to 2026. We take a price of \$235 per tonne (this is the mean of the 'bid' and 'ask' prices for North West Europe in 2026). These price projections are from January 2023 and are the latest publicly available data from Argus Media.

Calculating a levelized cost of electricity (LCOE)

[In 2018 the UK Government calculated the LCOE of BECCS](#) based on three scenarios - Low, Medium and High - of future wood pellet 'fuel cost' (given in units of £/MWh rather than \$/t). The three scenarios and the corresponding LCOE are given in the table below.

Scenario	Fuel cost (£/MWh)*	LCOE (£/MWh)
Low	49	149
Medium	82	181
High	131	230

To find the appropriate fuel cost assumption we use the following factors to convert wood pellet price projections from \$/t into £/MWh:

- A US dollar (\$) to GBP (£) currency exchange rate of 0.8
- A wood pellet heating value of 17 GJ/t (0.2117 t/MWh)
- A BECCS plant net efficiency of 30.6% (as per [UK Government documentation](#))

The conversion from \$/t to £/MWh fuel cost is therefore as follows:

$$1\left(\frac{\$}{t}\right) \times 0.8\left(\frac{\pounds}{\$}\right) \times 0.2117\left(\frac{t}{MWh}\right) \times \frac{1}{0.306}\left(\frac{1}{BECCS\ net\ efficiency}\right) = 0.554\left(\frac{\pounds}{MWh}\right)$$

When this calculation is applied to our 2026 wood pellet price projection of \$235/t we find a fuel cost of £130/MWh. This is in-line with the UK Government's 'High' fuel cost scenario and corresponds to a BECCS LCOE of £230/MWh.

* In the UK Government documentation, the fuel cost scenarios are given for wood pellets 'pre-combustion' as follows: Low £15/MWh, Mid - £25/MWh, High - £40/MWh. The costs presented in this table have been converted to wood pellets 'post-combustion' using a BECCS net efficiency of 30.6%.

Calculating Drax's annual subsidy

We assume that Drax would seek a Contract for Difference (CfD) to top-up the difference between the LCOE and the wholesale electricity price (although it should be noted that Drax would also seek compensation through a negative emissions market). According to [UK Government documentation](#), the projected mean wholesale price of electricity between 2025 and 2040 is £62/MWh. Drax would therefore require a top-up subsidy of £168/MWh to operate their BECCS plant.

Drax have expressed their [ambition to convert all of their four biomass-burning units](#) to BECCS. The mean generation output of Drax's four units over the past five years for which [most recent data is available \(2018-2022\)](#) is 13.8 TWh. The carbon capture component of a BECCS project uses a significant amount of electricity, which Drax estimates will reduce usable capacity by ~25% (this figure is taken from 'Baringa Partners LLP (2021), Value of Biomass with Carbon Capture and Storage (BECCS) in Power - Summary Report' which until recently was available from the Drax website).

As a result we assume the annual generation output of Drax's BECCS project to be 10.3 TWh.

Therefore, to run its four BECCS units profitably, Drax would require an annual subsidy of £1.73 billion.

A note on long-term wood pellet prices

While current and near-term forward wood pellet prices suggest the UK Government's 'High' fuel cost scenario should be used to calculate the annual required subsidy for Drax's BECCS project, these elevated prices may ease in the long term. However, [analysis from the Climate Change Committee](#) suggests that, due to rises in the value of carbon as part of the UK's efforts to meet its 2050 net zero commitment, the price of wood pellets could rise to an equivalent of £390/MWh (£33/GJ) - triple our estimated fuel cost. This would of course

result in the cost of Drax's BECCS project to inflate even further. Hence, our estimate of a £1.73bn annual subsidy could be an underestimate.

A note on UK government estimates for the cost of carbon capture and storage

There are no examples of commercial scale BECCS plants elsewhere in the world, and only a handful of carbon capture and storage (CCS) plants, so we recognise that estimates from the UK government and other institutions come with a very significant degree of uncertainty. The CCS projects that are in existence do suggest actual costs are likely to be much higher than we have indicated here.

Acknowledgements

Cover image

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