The White Rose "CCS" project: Why its "carbon capture" plans are doubtful and why public subsidies should not be spent on Drax's new "White Elephant"

biofuelwatch

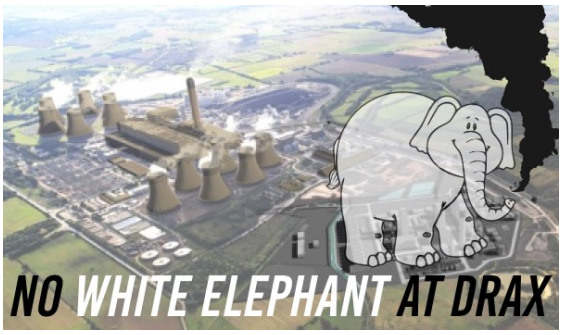
Summary

The White Rose Project by Drax, Alstom and BOC is a new coal power station (possibly to be co-fired with biomass) next to Drax's existing coal and biomass power station, for which a planning application has already been submitted. The White Rose plant would be capable of capturing carbon but it could technically be run more efficiently and cheaply as a conventional coal power plant without any CCS and it would be flexible to burn coal or wood pellets. A separate consent application for a related CO_2 pipeline has been submitted by National Grid.

The White Rose project is one of just two 'preferred bidders' for a £900 million capital grant from DECC and the developers have already received £50 million from DECC for a feasibility study. DECC also expects the project to attract a Green Investment Bank loan. If the plant was built and consistently run with CCS, it would be eligible for annual subsidies (Contract for Difference) and for up to €300 million from the European Commission.

However, there is no guarantee that the power station would operate with consistent, maximum CO_2 capture or indeed with carbon capture at all. The plant would be automatically exempt from any limits on carbon emissions (and thus any requirement to capture carbon) for a period of three years. After three years, they could legally operate by capturing just half the carbon, or by co-firing up to 50% wood pellets (without carbon capture) or a combination of co-firing and limited carbon capture.

No other country in the world is investing in a scheme like the White Rose project. The technology for capturing carbon this way has already been tested and shown to be too expensive and inefficient to be commercially viable. Only a technological breakthrough could change this situation. Major public funding for a technology which two large energy firms have tested and dismissed as commercially unviable will not make CCS any more commercially viable; it will merely increase the demand for coal and potentially for wood pellets, as well as increasing CO_2 emissions from coal mining, from logging and forest degradation (if wood pellets are co-fired) and from the new power plant's smokestack since, at the very most, only 90% of CO_2 can be captured, with no guarantee of any being captured at all.



What is the White Rose project?

According to its developers – Drax, Alstom and BOC – the White Rose project "*will comprise a state-of-the-art coal-fired power plant that is equipped with full carbon capture and storage technology*". The project will involve building a new 428 MW coal power station next to Drax's existing coal and biomass power plant, even though Drax could have chosen to use the same technology to retrofit their existing power station instead. National Grid has separately applied for planning consent for a CO_2 pipeline which would allow the carbon dioxide to be pumped beneath a saline formation around 65 km off the coast of Yorkshire.

Does Drax need to build a new coal power station in order to capture CO_2? Could they not capture it from their existing one?

There have been four pilot projects using the technology proposed for the White Rose plant. One of those has involved retrofitting an existing coal power station unit. There appears to be no technical reasons why Drax could not have chosen this option. Even if the new power station was consistently run with CCS, at least 10% of the CO_2 would still be emitted rather than captured – so overall, CO_2 emissions would still be increased.

Will the White Rose power station definitely capture carbon?

Different technologies for capturing carbon from power stations have been developed. The technology that the White Rose project would use is called "Oxyfuel Combustion". In a conventional coal power station, pulverised coal is burned with air (to supply oxygen) in order to power a steam turbine to generate electricity and different technologies are then used to reduce the amount pollutants in the exhaust gas before it leaves the stack. In an oxyfuel plant, pulverised coal is still being burned to power a steam turbine. However, it can be burned with a mixture of pure oxygen and re-circulated exhaust gases instead of having to burn it with air. This produces a gas which is very low in nitrogen and very high in CO_2, although dust and sulphur dioxide and the remaining oxides of nitrogen (NOx) would still have to be removed through 'conventional' technologies. The CO_2 can then be removed and compressed so that it becomes liquid (i.e. in a form that can be transported via a pipeline). Significant energy is needed to separate oxygen from air and significantly more coal needs to be burned per unit of energy using this process.

An oxyfuel plant is really a more flexible coal power station. It is a plant which ***can*** be run in a way which allows CO2 to be captured. ***It can also be run like a normal coal power station, i.e. with air rather than pure oxygen – this is cheaper, more energy efficient but allows no CO2 capture***.

Capturing carbon requires a lot of energy and running an oxyfuel plant in way that allows carbon to be captured is technically much more challenging than running the same plant the 'conventional' way, i.e. using air rather than pure oxygen and recycled flue gases and not capturing carbon***.***

The developers acknowledge the possibility that the plant could be run with air rather than pure oxygen and thereby without carbon capture, having based their Air Quality Modelling based on the 'worst case' assumption of it being

operated that way.

An energy company such as Drax can be expected to seek to run a power station in whichever way is most lucrative to them and meets legal requirements.

Under the terms of the Energy Act 2013, any new coal power station would need to meet a new Emissions Performance Standard, which means it could not emit more than 450 g/kWh. A non-CCS power station burning 100% coal could not achieve this. However, a plant built with CCS infrastructure is exempt from this standard for three years – i.e. it does not have to capture any carbon at all during that period. After three years, the operators would have the following options for legally meeting the emissions standard:

- Capturing a minimum of around 50% of CO_2 if the power station was run with coal only;
- Capturing no CO_2 but co-firing around 50% biomass which, under the Emissions Performance Standard, is automatically classed as 'carbon neutral', regardless of the carbon emissions from logging, fossil fuels burned for shipping, for chipping and drying and pelletising wood, etc;
- A combination of the above.

The planning documents for the project make no commitment to sequestering CO_2 from the plant, merely stating that doing so would be "technically feasible" and that it is "likely economically feasible". Furthermore, Drax has already invested heavily in building up import-reliant biomass supply chains, including investment in two fully-owned wood pellet plants in the southern US. If 50% co-firing with biomass proved a cheaper option than capturing carbon, they could easily secure the wood needed for this.

How much is the White Rose project expected to attract in public subsidies?

In 2013, the Department for Energy and Climate Change announced that two schemes – the White Rose project and a potential CCS project in Peterhead – were the 'preferred bidders' for a £1 billion grant for "CCS Commercialisation". The proposed White Rose project has already received £50 million for a feasibility study. A final decision regarding the remainder of the£1 billion grant is to be announced during 2015. So far, only the White Rose power plant proposal has progressed to an actual planning application. Conceivably, they could receive a capital grant of up to £900 million (with £50m having already gone to a feasibility study for the Peterhead proposal). In addition to the overall £1 billion grant, DECC has stated that the White Rose project will be eligible for a Contract for Difference, i.e. for annual subsidies, and that a Green Investment Bank loan can also be expected. The scale of the proposed annual subsidies and of a potential Green Investment Bank loan is not known.
The White Rose project has also been awarded up to €300 million by the European Commission. The EU funding is contingent upon CO_2 being sequestered from the plant and Biofuelwatch assumes that the same would be true for a Contract for Difference, i.e. for future annual subsidies. However, ***the £1 billion grant for CCS Commercialisation is a capital grant – it would be paid out without any guarantee that carbon would be captured. Any Green Investment Bank loan would also likely be for upfront capital costs, not for actual CO_2 sequestration***.

Do other governments support schemes like this?

So far, there have been four pilot plants testing the technology which Drax, Alstom and BOC want to use and the French and Australian governments have made limited grants available for one pilot plant each. However, those were small pilot plants for research and development purposes – not full-scale power stations such as the White Rose plant would be. Two of the companies involved in the previous pilot projects – Total and Vattenfall – concluded that the technology was simply too expensive to be commercialised under current conditions. Nobody has ever funded an oxyfuel plant bigger than 30 MW, 14 times smaller than the proposed White Rose project. The US government has just pulled the plug on a smaller but otherwise identical planned power station. Having spent $202.5 million (£131 million) on it already, they abandoned the project due to cost-overruns, delays and because no private sector investor had been prepared to contribute funds. Other than these examples, no project of this type has attracted any private or public sector funding.

Wouldn't UK funding for the White Rose project help CCS to become commercially feasible elsewhere in the world?

Total and Vattenfall invested in an oxyfuel pilot plant each and both concluded that such CCS projects were not economically viable due to the cost and additional energy required for capturing CO_2. By far the biggest energy requirement for the oxyfuel technology proposed for the White Rose project is for separating oxygen from air (essential for capturing CO_2). Reducing the energy and cost involved would require a technological breakthrough and therefore significant further research. Spending public funds on scaling up the use of a technology that has already been tested and shown to be far too expensive and inefficient to make any commercial sense will not help.

The wider environmental impacts of the White Rose power station

The White Rose plant will create a new long-term demand for coal, additional to that of the existing Drax power station units, 2-3 of which are to continue running on coal long-term. This will exacerbate the impacts of coal mining worldwide, including in northern Colombia where villages have been forcibly evicted for an opencast mine that supplies Drax, and where water depletion and pollution, and coal dust pollution, have devastated communities' ability to grow food and feed themselves. Moreover, the developers state that up to 15% of the fuel could be wood pellets. Drax already burns more wood than any other power station in the world. Scientists and US conservation NGOs have shown that Drax is sourcing pellets directly linked to the clearcutting of highly biodiverse and carbon rich swamp forests in the southern US. Regardless of whether the new plant would use CCS, building it will further boost carbon emissions from forest degradation and logging and from coal mining.

NOTE:

For full references, please see hyperlinks or email biofuelwatch@ymail.com .