

Bioenergy

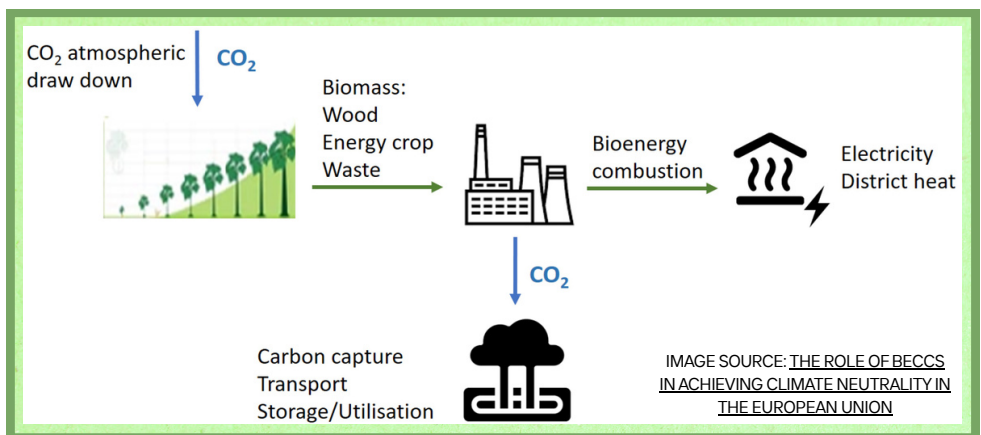
Carbon Capture and Storage

A SENIORS FOR CLIMATE ACTION NOW! BRIEFING

We know that trees absorb carbon dioxide from the air. So if we cut down lots of trees, burn them in a power station to generate electricity, and then capture and bury all the carbon dioxide, wouldn't this be a great way to pull CO₂ out of the atmosphere and help stave off global heating? After all, trees grow back, don't they? Welcome to BECCS: bioenergy, carbon capture and storage.

Forest biomass is a major source of renewable energy in Europe. These schemes receive substantial subsidies and exemptions from carbon pricing because they are supposedly 'carbon neutral'; meaning that the emissions from the generating station are considered to be equal to the amount of carbon that was absorbed from the air by the biomass. Even better, if these emissions are then captured and sequestered, the process becomes carbon *negative*: the technology is effectively pulling CO₂ out of the atmosphere. Sounds great! The concept is shown schematically above.¹

BECCS is already a favourite. It is



the only carbon dioxide removal technology that is explicitly included in many integrated assessment models (IAMs) where it is presented as an *essential* technology to stop the world overshooting global temperature targets. For instance, in the 5th Assessment Report of the IPCC², over 100 of the 116 low-emission scenarios rely on BECCS to reach their proposed target.³

The first problem with BECCS, if it is to be scaled up to a level where it will absorb substantial amounts of CO₂ from the atmosphere, is that an industry operating at this scale requires clearcutting millions of hectares of biomass. For example, to absorb 1 billion tonnes of CO₂ from the atmosphere (which is generally considered to be about

the minimum required if a technology is to make a global impact) would require a land area of over 100 million hectares to be made available for the feedstock.⁴ That's one third more than the total area of forest land in Ontario.⁵ In addition, the quantities of water required are enormous: about 60 cubic km of water a year for both crop production and cooling water for the carbon capture and storage part of the operation.⁶

Drax Power

In the UK, Drax Group has a vision. It plans to develop the world's largest carbon capture project by deploying a BECCS system at its power station in Selby, North Yorkshire. Once the largest coal-fired generating station in western

Europe, Drax has switched all six of its combustion units from coal to wood. The company either owns or has commercial interests in 17 pellet mills in the US and Canada with the capacity to manufacture almost 5 million tonnes of compressed wood pellets a year.⁷ The pellets are shipped from western Canada to Immingham on the east coast of England, and then by train to the Drax generating station; a distance of several thousand kilometres.

into an international logging operation in areas that include B.C.'s old growth and primary forest.¹²

“We need to see it for what it is: a money-making machine for a few people based on subsidies in the U.K. at the expense of British Columbia”

The mayor of the town of Quesnel, B.C.¹³

In the USA, Enviva Biomass is the world's largest producer of industrial wood pellets and one of the key players in the rapidly growing industry. The majority of the pellets are destined for the European market and the UK. In the US South in 2021, the industry was reportedly exporting more than 7.4 million tons of pellets a year.¹⁴ According to Kenneth Richter, a EU-based environmental consultant for the Natural Resources Defence Council, the term 'low-grade wood' is Enviva-speak for healthy trees that have no value for the industry; they are simply processed into pellets. Enviva's claim that the industry leads to increased areas of forests glosses over the fact that what is regrown is virtually monoculture; large areas of natural forest are

replaced by what are essentially plantations. One report estimates that since 1953, the US South has lost over 33 million acres of natural forest but gained 40 million acres of pine plantations.¹⁵ This is not a good deal; and for the forest ecology and its biodiversity, it is a disaster.

The Weakest Link in the Chain

Bioenergy carbon capture and storage is completely reliant on the last link in the chain: capturing and sequestering the carbon. If the CO₂ from the wood pellet-fired generating station isn't filtered out and pumped through a pipeline to be stored underground, the process isn't even carbon neutral, let alone carbon negative. But carbon capture and storage technology has never demonstrated that it can attain the levels of effectiveness promised by the industry. In fact, most of the CCS technologies operating around the world are used for enhanced oil recovery: where CO₂ is pumped into tired oil wells to perk them up into increased production. EOR does not permanently capture CO₂.



IMAGE SOURCE: WWW.DRAX.COM

The Drax generating station in North Yorkshire, U.K. The four containers in the foreground hold 80,000 tonnes of wood pellets.⁸

Generating electricity from wood pellets sourced in Canada is good business. The British government officially considers Drax's power to be carbon neutral and, due to an interesting perverse incentive of the European legislation, if the wood is sourced from abroad, the emissions from the generating station are recorded as zero in Europe.⁹ In addition, the company receives hundreds of millions of pounds a year in U.K. green subsidies. Little surprise then, that Drax has bought up two-thirds of British Columbia's wood pellet market as well as two pellet mills in Alberta, according to analysis by the Centre for Canadian Policy Alternatives.¹⁰ The biomass for the pellets is supposed to come from sawdust, offcuts, 'low-grade wood', and biomass waste that would normally be discarded, but

there are numerous reports of the industry clear-cutting areas of forest including, in some cases, old growth forest.¹¹

A 2022 investigation by the CBC's The Fifth Estate found that Drax has turned a small Canadian industry

In short, the CCS part of the BECCS operation will often result in an *additional* release of carbon dioxide into the atmosphere.¹⁶

In 2022, after a lengthy period of review and analysis of the technology, the European Academies Science Advisory Council concluded that bioenergy carbon capture and storage offered only limited potential to remove carbon dioxide from the atmosphere. The huge demand for biomass needed for large scale deployment of BECCS makes it both impractical and unsustainable at the scale required to substantially reduce the elevated levels of atmospheric carbon dioxide that the world will confront in the second half of the Century.¹⁷ The EASAC recommended that proposals for BECCS projects should be evaluated on a “case by case basis”,¹⁸ adding that “the assumption that BECCS is the pre-eminent carbon removal solution should be abandoned.”¹⁹

The analysts at the Grantham Institute were equally cautious, concluding that “Importantly, we have shown that BECCS cannot deliver the scale of negative emissions required in current emissions projections.” Adding that “we should expect BECCS to make a necessary but only limited contribution to meeting our climate change targets.”²⁰

This conclusion has serious implications. If keeping global temperatures below 2°C of warming depends on supposedly negative emission technologies like BECCS, and if the science and operational data now show that these technologies are simply not viable, then it seems very likely (in fact almost certain) that global temperatures will exceed the limit stipulated under the 2015 Paris Agreement. Once again, one of the fossil fuel industry’s much touted silver bullets has turned out to be a dud. On its present course, the world is well on its way to overshooting 2°C above pre-industrial levels by the middle of the century.

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About SCAN! and the Author



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