Carbon Capture | by drax

The promise of drax:
a lower cost, net zero future to help level up the Humber






Contents

Foreword

Will Gardiner, CEO, Drax

The science is clear – the world must now significantly reduce and remove carbon dioxide from our atmosphere to avert the climate crisis.

Around the world, governments, industries and communities have begun to set targets to reach net zero. However, we're not acting fast enough to keep global warming below 1.5 degrees celsius. Even in the UK, despite the Government leading the world in targets, the Climate Change Committee has found that we are not on track to reach net zero by 2050.[1]

It's often said we don't yet have the technologies we need to achieve net zero, with innovation still in progress. While this may be true in some cases, one crucial climate-saving technology is ready to go, and it's here in the Humber.

Every viable route to deliver net zero involves not only reducing emissions but actively removing them from the atmosphere. The processes of capturing and removing carbon dioxide which has already been emitted are collectively called 'negative emissions'. This includes methods that remove emissions from the atmosphere and permanently lock them away.

At Drax, alongside our partners, we have pioneered and proven negative emissions technology by combining bioenergy with carbon capture and storage – known as BECCS. BECCS is seen as the negative emissions process which has the most capacity for growth.

After years of testing and millions of pounds invested in research and development, BECCS at Drax is ready to be deployed at industrial scale by 2027.

By capturing up to eight million tonnes of carbon dioxide every year, BECCS at Drax would create the world's largest single site carbon capture project – significantly reducing the UK's carbon dioxide emissions and helping ensure we reach net zero in a fair and affordable way. Independent analysis shows that deploying BECCS technology could reduce the costs of getting to net zero by as much as £75bn, saving £85 every year for every UK household.[2]

By deploying this technology at scale now, BECCS at Drax can help Yorkshire and the Humber compete on the world stage. Protecting and creating thousands of jobs across the region, developing green skills, and giving industrial businesses more time and support to get to net zero themselves.

The global prize for the UK should not be underestimated either. By delivering the first commercial scale BECCS project, the UK will be in prime position to export this technology around the world – creating significant trading opportunities, jobs and growth. But other countries are also moving at pace, so the UK's competitive advantage on BECCS is not guaranteed.

Drax know how to deliver new technologies at scale. We have already transformed the UK's biggest coal-fired power station into the largest decarbonisation project in Europe by operating with sustainably sourced biomass. And we're working hard to deliver BECCS – signing landmark agreements with our partners, preparing our supply chain and advancing through the consultation process.

Now we're asking for your support in making BECCS at Drax a reality. Back BECCS at Drax to help deliver net zero, level up the North and make the UK a world leader in flighting the climate crisis.

[1] 2021 Progress Report to Parliament – Climate Change Committee https://www.theccc.org.uk/publication/2021-progress-report-to-parliament/" (June 2021). [2] Value of Biomass with Carbon Capture and Storage (BECCS) in Power, Baringa Report (August 2021).

As we embark on the delivery of bioenergy with carbon capture and storage (BECCS) at Drax, we want to ensure this important project benefits the widest range of businesses, sectors, and communities – while helping the UK reach our ambitious climate targets. To maximise the local, national and global benefits of this climate-saving technology, we pledge that BECCS at Drax will:

01 Help get the UK to net zero

- BECCS at Drax is critical to delivering the UK's 2030 target of reducing UK carbon dioxide emissions by 68%, an essential step on our journey to net zero.
- Alongside our East Coast Cluster partners, we aim to remove 50% of the UK's total industrial cluster CO2 emissions. [4]
- It will enable Drax Power Station to continue generating 12% of the UK's renewable electricity – vital power which will help deliver energy grid stability, enabling more wind and solar power while keeping the lights on across the UK. [3]

02 Significantly reduce the cost of achieving net zero

- Developing BECCS at Drax will save the UK energy system and consumers billions of pounds over the next decade as we transition to net zero.
- Without BECCS technology, getting to net zero will cost the UK an additional £75bn, or £85 per household, per year. [5]
- Without BECCS at Drax in 2027, the energy system would incur additional costs of c.£26bn to achieve net zero, making decarbonisation significantly more expensive. [6]

03 Help level up the North, creating thousands of new green jobs and skills

- Delivering and operating BECCS at Drax will protect and create over 10,000 green jobs.
- With our Zero Carbon Humber partners, we will support the green transition by helping to protect 55,000 industrial jobs across the Humber and make the region a home for international investment. [7]
- Our five year partnership with Selby College will boost skills, training and education across our region and will help make the Humber a green jobs hub.
- BECCS at Drax will be an anchor project, laying the foundations for the Humber – the UK's largest industrial cluster – to achieve net zero.

04 Boost UK suppliers and kick-start new industries

- During the construction phase, we will spend hundreds of millions across our supply chain – with an ambition that 80% of construction spend will go to UK companies. [8]
- To prepare UK suppliers to seize these opportunities we're hosting a series of nationwide events during 2022, in partnership with the British Chambers of Commerce.
- In partnership with the NFU, we are developing a roadmap for boosting the market in perennial energy crops, supporting Drax's ambition for British farmers to supply some of the biomass needed for BECCS.

05 Make the UK a global leader in climate-saving technologies

- As the world comes off coal, Drax Power Station will become a global showcase for climate-saving UK technology.
- BECCS at Drax will give the UK first-mover advantage in scaling up negative emissions – technology which could create 4–10million new jobs worldwide. [9]
- It will also create competitive advantage for UK suppliers by preparing them to deliver technologies like BECCS around the world as all nations work to achieve climate targets.
- In the year of COP26, this critical project will keep the UK ahead of our competitors in Europe and the US, who are rapidly developing their own BECCS technology.

06 Drive up sustainability standards and sustain healthy growing forests around the world

- Adhering to our world-leading sustainability standards in bioenergy, we will continue to follow the science, act transparently, and make a positive contribution to the communities where we operate.
- Working with governments, industry and our partners, we aim to raise bioenergy sustainability standards globally.

[3]Strategic Report from the Drax Group plc Annual report and accounts 2020 (Published 18th March 2021). [4]EastCoastCluster.co.uk.
[5,6]Value of Biomass with Carbon Capture and Storage (BECCS) in Power, Baringa report (August 2021) [7]Coalition for Negative Emissions Report – The Case for Negative Emissions (June 2021, p.128). [8]This 80% ambition excludes carbon capture and storage technology, where we have signed an agreement with Mitsubishi Heavy Industries (MHI). The ambition includes all other products and services for delivering BECCS including steel, pipes, heat pumps, electricals, insulation, and other equipment required to deliver this multi million pound project. [9]Coalition for Negative Emissions Report – The Case for Negative Emissions (June 2021, p.53).

The race to net zero

As the Intergovernmental Panel on Climate Change (IPCC) reported recently[10], human-induced climate change is already affecting weather and climate extremes across the globe.

Evidence of changes in extreme climate events, including heatwaves, droughts, and tropical cyclones, is growing increasingly clear – as is the evidence that these changes are caused by human influence. Sadly, some of the changes to our climate system are now irreversible.

It is therefore unsurprising that the IPCC's latest report in August 2021 – reported as a 'wake-up call for policy-makers' – suggests we may have to go beyond net zero by 2050 in order to avoid the worst effects of climate change.[11] At a global level, as well as reducing emissions, we must also capture carbon dioxide that has already been emitted and remove it from our atmosphere. The process is called negative emissions, which will be required in almost every pathway, to keep global temperature rises below 1.5 degrees.

To protect our planet and limit the effects of global warming, we must reduce and remove carbon emissions where possible, alongside strong reductions in other greenhouse gas emissions. We must act now to change the way we live, work, and use the earth's resources – change on a scale like never before.

2050

In 2019, the UK Government legislated to bring all greenhouse gas emissions to net zero by 2050.

The UK's race to net zero

The UK is playing its part. In 2019, the UK Government legislated to bring all greenhouse gas emissions to net zero by 2050. In 2021, Government set the world's most ambitious climate change target into law, to reduce emissions by 78% by 2035 compared to 1990 levels. This target will help ensure Britain remains on track to reach net zero and will influence the targets of other countries, too.

Reaching net zero requires a reduction in emissions across each sector of the global economy and where possible, to fully eliminate them. Scientists and engineers are finding new ways to reduce emissions everyday, but even so, by 2050 a large amount of emissions will still be emitted by hard-to-decarbonise sectors such as aviation, agriculture and heavy industry.

Negative emissions can mitigate the impact of these sectors and help the UK achieve our targets. Although challenging, the UK already leads the world in critical sectors. We are close to finishing the job of removing coal from our power system – with unabated coal to be removed from the UK's energy mix by the end of 2024. The UK has led the world in setting bold, stretching climate targets. To deliver them, it must urgently embrace and scale up solutions to remove emissions permanently.

[10, 11] IPCC report. Sixth Assessment Report 'Climate Change 2021: The Physical Science Basis' (August 2021, p.11)

Scaling up negative emissions technology is crucial to reaching net zero

According to the IPCC[12], negative emissions technologies could be required to capture 10 billion tonnes of carbon dioxide annually to help prevent catastrophic changes in the climate between now and 2050.

Different negative emissions solutions that exist today

BECCS

Bioenergy with carbon capture and storage is the process of capturing and permanently storing carbon dioxide (CO_2) from biomass (organic matter) energy. You can read more about how this works on page 15.

DACS

Direct air capture and storage is an alternative technological solution in which CO_2 is captured directly from the air and then transported to be stored or used. While this could offer huge potential, the technology is currently in its infancy and requires substantial investment to make it a more widespread practice. It also requires vast amounts of zero carbon power to operate.

NCS

Natural climate solutions such as reforestation where trees absorb carbon dioxide when they grow, converting it to energy and releasing oxygen or storing it over their lifetime, so planting new forests and regenerating existing ones has a positive effect. Vegetation underwater has the ability to absorb and store CO_2, while seagrasses can in fact store up to twice as much carbon dioxide as forests on land.

Negative emissions solutions are crucial in order to:

- Neutralise residual, hard-to-abate emissions, supporting industries and jobs whose path to decarbonisation will take longer than other sectors, such as agriculture, aviation and heavy industry.
- Reduce carbon dioxide if emissions reductions are not delivered quickly enough – giving us security and resilience on the path to net zero, while countries, businesses and individuals work hard to reduce emissions at pace.
- Ensure efforts to achieve net zero are affordable.
- Ensure that achieving net zero does not disadvantage or hold back developed and developing economies around the world, which will become ever more dependent on access to affordable, reliable power.
- Remove historic emissions already in the atmosphere.

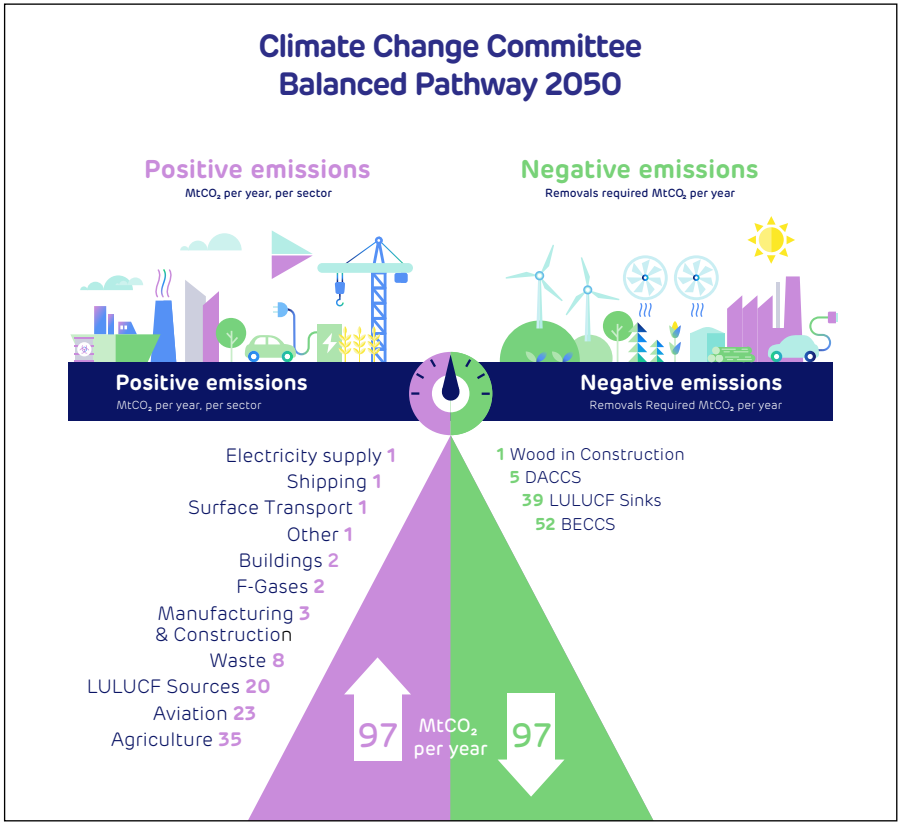
[12] Coalition for Negative Emissions – The Case for Negative Emissions (June 2021, p.9).

Unfortunately, global action to deliver negative emissions technologies is falling far short of what is required. Investment in negative emissions solutions must increase by approximately 30 times current levels to keep global temperature rises below 1.5 degrees.[13]

A combination of negative emissions solutions including BECCS, DACS and natural climate solutions is vital to achieving net zero.[14] Deploying this portfolio of solutions at the gigatonne (Gt) scale by 2030 would keep the planet on a 1.5C pathway.

As well as their criticality in the race to net zero, deploying these solutions at scale could create up to 10 million new jobs worldwide.[15]

According to the UK Climate Change Committee, one of the most crucial types of negative emissions technology, is combining bioenergy with carbon capture and storage (BECCS). The experts are unequivocal. BECCS is the major negative emissions solution capable of being deployed to help reach net zero by 2050.



Case study

Coalition for Negative Emissions

The Coalition for Negative Emissions aims to build momentum, shape policy, and develop the market for negative emissions globally. The group is made up of a diverse range of companies across industries, from landowners and environmental stewards, large users and generators of energy, to technology start-ups and large manufacturers. Drax is proud to be a founding member of this group.

The Coalition works across differing sectors of global economies but share a common vision: to develop and deploy negative emissions at a scale that will create genuine impact across the world.

BECCS, DACS and NCS are ready to be deployed but the current pipeline of projects is not enough and more investment is needed. The Coalition is calling for action from all parts of the negative emissions value chain – governments, negative emissions developers, corporate buyers, accounting standards setters, and financial institutions – to work together to scale up negative emissions solutions and tackle the climate crisis.

Visit
coalitionfornegativeemissions.org

"Negative emissions technologies are going to play a major role in helping the world decarbonise and businesses are advancing their development at pace. But unless urgent action is taken to support their deployment, we're on track to miss vital climate targets."

Tony Danker
Director General of the CBI, a founding member of Coalition for Negative Emissions

[13] Coalition for Negative Emissions – The Case for Negative Emissions (June 2021, p.6). [14] Coalition for Negative Emissions – The Case for Negative Emissions (June 2021, p.6). [15] Coalition for Negative Emissions – The Case for Negative Emissions (June 2021, p.88).

Carbon Capture by Drax

For over a decade, Drax has led the transition to clean energy. We converted the UK's biggest coal-fired power station to biomass and now we are ready to go further and scale up negative emissions technology.

Since 2018, Drax has tested cutting-edge carbon dioxide removal technology – bioenergy with carbon capture and storage, or BECCS. This will take carbon dioxide from the atmosphere and lock it away forever. Combined with the sustainable forests from where we source our biomass, we are creating a system that captures and then removes CO_2 from the atmosphere both as the forests grow and as we generate electricity.

Installing BECCS technology on our existing biomass power generating units at Drax Power Station will permanently remove 8 million tonnes of carbon dioxide from the atmosphere each year – around 40% of the Climate Change Committee's 2050 target for BECCS power in the UK. Scaling up this technology will make Drax Power Station the world's largest single site carbon capture project.

8m

BECCS at Drax will permanently remove 8 million tonnes of carbon dioxide per year.

We began to pilot the first BECCS project of its kind in Europe at Drax Power Station in October 2018.

In a world first, we demonstrated post-combustion carbon capture from 100% biomass feedstock. The pilot project with C-Capture technology captured its first carbon at our site in early 2019. C-Capture uses a unique, solvent-based technology which offers a safe, low-cost way to remove carbon dioxide from emissions sources.

A second BECCS pilot facility, installed by Mitsubishi Heavy Industries (MHI) within our North Yorkshire power plant in autumn 2020, enhanced our expertise in delivering negative emissions. In 2021 we became the first CCS project in the UK to licence capture technology through our long term agreement with MHI.

We are now applying for planning permission to scale up this technology, and calling on Government to bring forward an effective negative emissions policy and investment framework for BECCS. With these in place, we could deploy BECCS on two of our biomass generating units in the 2020s, with the first unit operational at Drax Power Station by 2027.

100%

In a world first, we demonstrated post-combustion carbon capture from 100% biomass feedstock.

How does BECCS work?

Bioenergy with carbon capture and storage (BECCS) is the process of capturing and permanently storing carbon dioxide (CO_2) from biomass (organic matter) energy generation.

There are a number of steps to this process.

- Units at Drax generate electricity by using sustainably sourced biomass.
- The CO_2 that is emitted from the BECCS process as part of the energy generation from biomass will be captured using carbon capture technology.
- The CO_2 emitted is carbon neutral because it is absorbed via the growth of the growing forests where we source our sustainable biomass. That CO_2 will then be safely stored in geological storage offshore, under the sea bed.
- We are proposing to install BECCS technology initially on two of our four existing biomass power generating units at Drax Power Station, helping us to permanently remove more CO_2 from the atmosphere than is produced across our operations. In doing so, Drax aims to become a carbon negative company by 2030.

The first phase of BECCS at Drax Power Station will deliver 8m tonnes of negative emissions a year, enabling the Humber to decarbonise faster than any other UK cluster.

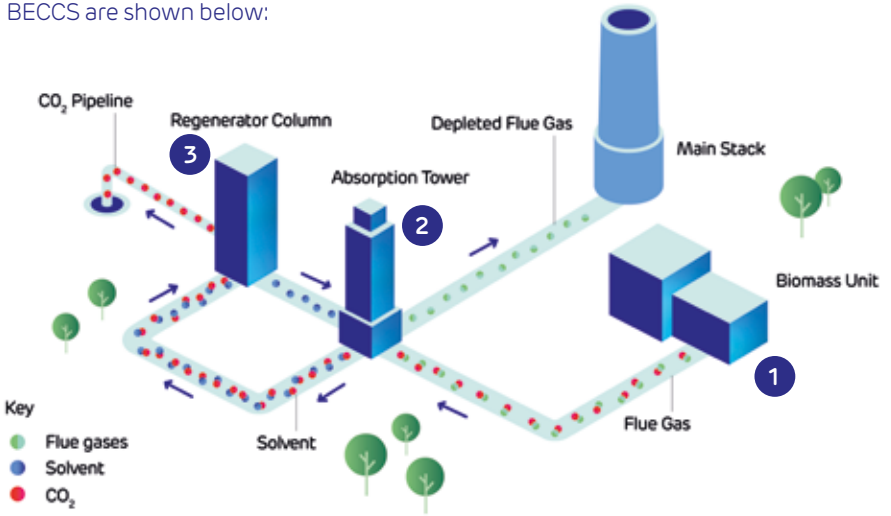
Deploying BECCS at Drax ensures the CO_2 pipeline is routed past all major industry in the Humber. This supports the value proposition for a transport and storage network that can decarbonise the UK's most emissions-intensive cluster.

40%

The first unit of BECCS at Drax will deliver 40% of the negative emissions which are required to reach net zero, according to the CCC

How BECCS removes carbon dioxide from the atmosphere

Our carbon capture technology uses complex processes and equipment. Some of the key components used for BECCS are shown below:



1

A flue gas pre-treatment section: flue gases are the gases which would usually be released into the atmosphere as part of the power generation process. This pre-treatment section will remove pollutants from the gas before the CO_2 is extracted.

2

An absorber column: to extract the CO_2 from the flue gas, a chemical reaction is started within the absorber column, using an amine solvent (this is a compound of ammonia).

3

Enhanced regenerator columns (or re-boiler): the solvent which contains the CO_2 is then re-heated in the re-boiler, separating the CO_2 from the solvent. The solvent is recovered so that it can be re-used.

"Drax gives great opportunities to people around here. I've been at the power station for 29 years, I've done a different job every 4 or 5 years, I've worked in every aspect of it, I've had international travel and assignments."

Steve Drayton
Director of Innovation

Case study

EAST CO_2AST CLUSTER

Our plans are a crucial part of the East Coast Cluster.

The East Coast Cluster is a partnership between Net Zero Teesside and Zero Carbon Humber, uniting the regions to offer the UK immense opportunities to; decarbonise industry; kick-start a sustainable economy; deliver world-leading projects; support levelling up; and lead the way globally to a net zero future. Drax is a proud member of Zero Carbon Humber, which has the ambition to make the Humber industrial region net zero by 2040 through a range of different technologies, including BECCS.

The UK needs to use every possible technology to green our economy. It must decarbonise industry to achieve its target of net zero emissions by 2050. And nearly half of carbon emissions from UK industrial clusters come from Britain's historic engine room: Teesside and the Humber. By its strength in diversity, the East Coast Cluster is ready to remove 50% of the UK's industrial cluster CO_2 emissions.

Visit
eastcoastcluster.co.uk

Working with communities to develop our plans

In order to deploy this cutting edge, negative emissions technology, Drax is working to secure a Development Consent Order (DCO) from Government. We've already kickstarted this process with an initial consultation in March 2021, which was a great opportunity for us to share our plans with local communities and understand their views and feedback. We will hold a further consultation in November 2021 to help us finalise our planning application, which we are on track to submit in 2022. Developing our plans alongside local communities is important to us.

- **Development Consent Order (DCO)** As part of the consenting process, it is important that we understand a wide range of views on our proposals for BECCS. Through the consultation, Drax is speaking to elected members, interested groups, regulatory organisations, advisory bodies, local communities and authorities to explain our plans and ask for feedback.
- **Drax Power Station Consultative Committee** Being open and transparent is an important principle at Drax. The Drax Power Station Consultative Committee (DPSCC) is a key way to ensure this principle is upheld in everything we do. Meeting once a year, the Committee brings together local stakeholders to help advise and consult on the way we work.
- **Drax Power Station Parish and Town Council Liaison meeting** Local councillors are joined by Drax representatives once every three months at the Parish and Town Council Liaison meeting. It provides an additional opportunity for us to discuss issues important to the local community.

"We welcome this ground-breaking project that would remove millions of tonnes of carbon dioxide from the atmosphere, putting the District and Drax at the heart of the governments' Plans for a Green Industrial Revolution."

Selby District Council

£26bn

With BECCS at Drax, net zero can be delivered at £26bn less than other alternatives.

Keeping the costs of net zero down

According to independent analysis by leading energy consultancy Baringa, developing BECCS technology could save the UK energy system and consumers billions of pounds over the next decade.

Baringa's report evaluates the impact of deploying BECCS at scale as part of achieving the country's climate change targets. The report concludes that without BECCS at Drax Power Station the energy system would incur additional costs of around £13 billion to achieve the UK Government's fifth carbon budget in 2028 to 2032 – making decarbonisation significantly more expensive.

Not developing BECCS at Drax, or more widely across the country, will also have significant cost implications for the UK reaching its net zero by 2050 target. The report estimates the target will cost £75bn more to achieve without deploying this essential negative emissions technology – or the equivalent of £85 a year per household, which would increase the costs of net zero for hardworking families across the UK.[16]

Leading the world in sustainable bioenergy

Experts, including the UN's IPCC, agree that sustainable bioenergy is critical to tackle climate change. Combined with carbon capture and storage, it is integral to the BECCS process which will help the world get to net zero quickly, and affordably.

Biomass is any organic matter that can be used to generate energy. It can include leftover wood, plant materials and even animal dung, and is used to fuel fires for warmth and cooking. However, by compressing organic matter like wood, forest residues and sawdust into energy-dense pellets, biomass can be used for heating or renewable bioenergy generation at a much greater scale.

As well as using sustainable wood pellets – formed from leftover materials from other industries such as construction which would otherwise be wasted – we are also increasing our research into additional options to generate bioenergy. This includes energy crops such as miscanthus here in the UK. This method could deliver further environmental benefits and create a new domestic feedstock at home, supporting British farmers and the wider agricultural sector.

Drax is a world leader in sustainable bioenergy. Having developed a global sourcing policy, we were able to convert the power station in Yorkshire from coal to sustainable bioenergy, transforming the business to become the largest decarbonisation project in Europe.

[16] Value of Biomass with Carbon Capture and Storage (BECCS) in Power, Baringa report (August 2021).

Sustainable biomass is drawn from sustainable forestry and agriculture which:

- Enables a stable, fossil-fuel-free energy system
- Protects healthy growing forests
- Enables negative emissions
- Creates jobs and protects communities

We know that the material we use for bioenergy at Drax is sustainable – we're independently audited and our sourcing policy goes beyond the stringent requirements of the EU and Ofgem.

Our sourcing policy is led by science, best practice and transparency.

We set up an independent advisory board of scientists and forestry experts (led by the UK Government's former chief scientific advisor Sir John Beddington) to ensure Drax's biomass sourcing is in line with latest scientific research and best practice. The IAB has found our sourcing policies are in line with the Forestry Commission's Forest Research report, which is widely considered to be the industry gold standard.

Case study

Pioneering partnership between Drax and the NFU

- Drax has partnered with the NFU to identify opportunities to sustainably scale up perennial energy crop production, and in doing so, help the UK to achieve its ambitious climate goals.
- Energy crops include perennials such as miscanthus and short rotation coppice willow. These are grown solely for energy production and processed into solid, liquid or gaseous fuels which are ultimately used to generate electrical power. These crops can therefore be used as sustainable biomass and could form part of the BECCS process at Drax, which when scaled up, will remove millions of tonnes of carbon dioxide from the atmosphere every year.
- The partnership will aim to develop a roadmap for boosting the perennial energy crops market. This could help diversify Drax's supply chain, but also provide vital opportunities for diversification and innovation within UK farming businesses.
- **NFU Deputy President Stuart Roberts said:** "There is a huge opportunity for the growth of perennial energy crops in the UK, with large areas of suitable land potentially available for diversification into the growing of sustainable biomass for renewable energy generation. This would support the UK's decarbonisation plans as well as our own agricultural net zero ambition, alongside continuing to provide quality, affordable and climate-friendly food for the nation."

Investing in the Humber

Government support will enable Drax to prepare our biomass units for BECCS, which will be capable of removing 8m tonnes of CO_2 a year.

During the BECCS construction phase, Drax will spend hundreds of millions across our supply chain – with an ambition that 80% of construction spend will go to UK companies. This will generate transformational opportunities for local and UK businesses – from large multi-nationals to the smallest SME.

To help realise this ambition, Drax will be hosting a series of nationwide events throughout 2022 in partnership with the West & North Yorkshire and Hull & Humber Chambers of Commerce, as well as further events across the wider North, Midlands and South of England. These will enable Drax to identify a robust supply chain for BECCS, ensuring the project can be accelerated as soon as planning approval is received.

The event series started with an introductory webinar on 23 September 2021, delivered with business support organisation NOF. The event gave new and prospective suppliers the opportunity to learn more about the BECCS project and how they can be involved in delivering this vital negative emissions technology.

"BECCS at Drax will bring a lot more jobs to the area and will future proof the company and hopefully for people like myself, give us jobs for the next 40 years"

Lewis Marran
Engineering Apprentice, Drax

80%

During the BECCS construction phase, Drax will spend £100millions across our supply chain – with an ambition that 80% of construction spend will go to UK companies

Developing world-class green jobs and skills across the Humber

Converting from coal to biomass was a bold decision which protected local jobs at a time when other coal fired power stations in the region were closing. Now, developing BECCS at Drax will spearhead a new world-leading green industry for Yorkshire and the Humber.

Today, Drax is proud to support 5,700 supply chain jobs in the North and generate £600m for the region's economy. Scaling up BECCS is an opportunity to go even further, help level up the North, and put the Humber on the world stage in developing green technologies, skills and jobs.

New skills are required as we look to develop new technologies, including BECCS. We are committed to ensuring that local people living close to our operations are equipped with the skills to take advantage of these opportunities.

Analysis by Vivid Economics estimates tens of thousands of jobs could be created and supported in the Humber if BECCS, as well as hydrogen and other carbon dioxide removal technologies, are deployed to decarbonise industry. With UK Government backing, these new jobs could begin to be created as early as 2024.

"My job makes me proud to work at Drax. BECCS is going to remove a hell of a lot of carbon dioxide. To be involved in this is something special. It's like a Yorkshire pride."

Cameron Shipstone
Engineering Apprentice, Drax

£600m

Drax is proud to support 5,700 supply chain jobs in the North and generate £600m for the region's economy.

Case study

Drax boosts skills and training with five-year Selby College partnership

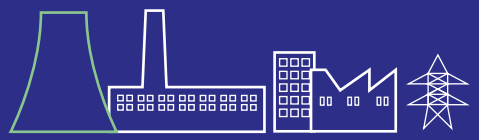
- Drax has reaffirmed its long-standing commitment to skills and training, supporting education across the North with a £180,000 partnership with Selby College.
- The five-year partnership will enable the college to deliver community education programmes, as well as support for retraining, to ensure students are developing the skills needed in innovative clean technologies which will help to drive a zero carbon economy.

Bruce Heppenstall, Drax Power Station Plant Director "Through this partnership with Selby College we are looking beyond the Covid crisis towards a green economic recovery, powered by talented people and exciting, innovative technologies, like BECCS which Drax is pioneering. This partnership with Selby College will help people in our communities to learn the skills needed to pursue jobs in the green economy, and enable companies like Drax to continue to grow, and build a strong regional economy with thriving communities."

Drax's journey to BECCS...

1967

Selby Coalfield discovered. Central Electricity Generating Board begins building Drax power station to use its coal.



1974

Drax begins generating electricity.

2012

Drax fully commits to transforming the business into a mainly biomass-fuelled generator using compressed wood pellets in place of coal It plans to upgrade the three generating units that came online in the early 1970s

2012

Drax Power Station completes five-year, £100 million plus project – the largest steam turbine modernisation programme in UK history – to upgrade its high- and low-pressure turbines, saving around 1m tonnes of carbon dioxide emissions which is the equivalent of taking 275,000 cars off UK roads.

2013

1

The first of three power generating units is fully converted to use compressed wood pellets in April

2014

2

Drax Completes construction of four large storage domes used to house the biomass supply.

The second power generating unit is upgraded to biomass in May.

2016

3

The group announces that 70% of the electricity it generates is through compressed wood pellets – around 20% of the UK's renewable power. Only 30% of its electricity is coal-fired.

The third power generating unit is fully upgraded to biomass

2018

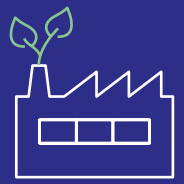
Drax given green light in December by European Commission to complete biomass upgrade, saving 12 million tonnes of carbon dioxide every year.

4

In May, Drax announced that it is to pilot the first bioenergy carbon capture storage (BECCS) project of its kind in Europe which, if successful, could make the renewable electricity produced at its North Yorkshire power station carbon negative.

Fourth coal unit is converted to biomass.

Drax's journey to BECCS... continued



2019

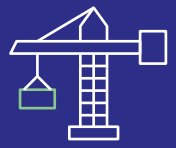
In a world first, research engineers at Drax Power Station capture the carbon dioxide (CO_2) from an operational plant fuelled by 100% biomass feedstock. The company records a 52% reduction in its carbon emissions in the first half of the year, compared to the same period in 2018.

2019

At COP25 in Madrid, CEO Will Gardiner announces that Drax's world-leading ambition is to be a carbon negative company by 2030.

2020

Second Drax pilot (with MHI) to capture CO_2 from biomass feedstock installed in the autumn.



2024

Construction of first two BECCS units underway at Drax Power Station, creating and protecting over 10,000 jobs across the Humber.

2030

BECCS installed on second biomass unit and Drax Group becomes a carbon negative company.

2040

Humber industrial cluster achieves zero carbon status.

2050

Net zero

2019

Drax announce that 94% of the electricity generated at Drax Power Station is now renewable. Drax partners with Equinor and National Grid Ventures in September, launching Zero Carbon Humber – a partnership to build the world's first net zero industrial cluster and decarbonise the North of England.

2019

Drax BECCS pilot (with C-Capture) started capturing CO_2 in world first with 100% biomass feedstock.

2020

In October Drax announces 5 year partnership with Selby College to boost skills and training.

Late 2021

COP26, Net Zero strategy, and expected interim Bioenergy Strategy.

2027

BECCS technology installed on a first biomass generating unit at Drax.

2035

UK Govt target – emissions cut by 78% by 2035 compared to 1990 levels.

Seizing the opportunity of BECCS to lead the world in tackling climate change

Developing BECCS at Drax would put the UK at the forefront of developing and exporting a vital technology needed to combat climate change.

The UK can seize this unique opportunity to lead the world in BECCS technology and tackle the climate crisis – as long as we move quickly.

There is potential for the UK to become a leader in carbon capture, usage and storage (CCUS); through the ongoing cluster competition, the UK Government is implementing one of the most ambitious programmes of CCUS deployment, and the North Sea provides the UK with vast untapped potential for CO_2 storage. But other countries are lining up to take advantage of developing this technology at scale too. If the UK wants to gain first mover advantage and be seen as leading the world in negative emissions, there must be bold and urgent action to get behind this crucial technology.

We want to play our part. At Drax, we stand ready to invest to scale up BECCS and put the UK at the forefront of global efforts to reach net zero emissions.

In the year of COP26, as the world looks at the UK to demonstrate climate leadership, Government can back BECCS at Drax to show that the UK is acting without delay to prioritise decarbonisation; keeping the costs of net zero down for hardworking families; and backing new British technology which can be exported worldwide.

Case study

Bechtel partnership to explore new BECCS locations globally

- Bechtel, a world leader in engineering, construction and project management has entered into a strategic partnership with Drax to explore options and locations to construct new bioenergy with carbon capture and storage (BECCS) plants globally.
- Bechtel will focus its study on strategically important regions for new build BECCS plants, including North America and Western Europe, as well as reviewing how to optimise the design of a BECCS plant using state-of-the-art engineering to maximise efficiency, performance and cost.
- Bechtel's study for Drax will:
  - Establish an integrated design for new build BECCS power plants.
  - Assess viability of strategic locations for new build plants.
  - Provide strategic information to enable Drax to build the business case.

"Tackling the big global challenges related to climate change is key to meeting aggressive environmental targets and we are proud to partner with Drax to optimise design and explore locations for the new generation of BECCS facilities."

Jamie Cochrane
Bechtel Manager of Energy Transition

BECCS technology is crucial to decarbonisation, and will need to be scaled up urgently over the coming years.

BECCS is increasingly being explored and deployed around the world at heat and power stations, factories and waste-to-energy plants as countries and organisations aim to achieve net zero through negative emissions.

Sweden, Norway, Denmark, the US and UK all have projects either piloting or developing BECCS.

Other countries are looking to seize the opportunity to take advantage of the export potential of BECCS technology. If the UK acts now to supports the delivery of BECCS at Drax in the 2020s, we can lead the world in developing this planet-saving solution which can be exported internationally.

"The fact that we've got such an environmental issue that we're trying to solve is really key. If we can do it here, there's a lot of other countries that can follow suit."

Jennifer Blyth
Project Architect, Drax

United States

- In Mendota, California, a partnership between Schlumberger New Energy, Chevron, Clean Energy Systems and Microsoft aims to remove as much as 300,000 tonnes of CO_2 annually – the equivalent emissions created generating electricity for more than 65,000 US homes using almond trees and other agricultural industries.

Denmark

- Renewable energy company Ørsted operates six biomass-fired units that provide around one quarter of Denmark's district heating. Through combined heat and power stations, BECCS can decarbonise both utilities simultaneously. Ørsted, Aker Carbon Capture, and Microsoft are partnering to explore ways to do just that. The partnership is exploring the potential to store captured carbon dioxide in the North Sea-based Northern Lights project, which is expected to have the capacity to transport, inject, and store 1.5 million tonnes of CO_2 per year.
- HOFOR, a not-for-profit utility company, is investigating the addition of BECCS to its combined heat and power (CHP) station. By partnering with other local utilities as part of the C4: Carbon Capture Cluster Copenhagen, the company is looking to share the costs of carbon dioxide transport and storage infrastructure, keeping heat prices low, while delivering negative emissions.

Norway

- At HeidelbergCement Norcem's plant in Brevik plans to become the first industrial-scale CCS project at a cement production plant in the world. The project aims to capture 400,000 tonnes of CO_2 per year, which will be stored beneath the North Sea bed.
- The FOV (Fortum Oslo Varme) plant in Oslo delivers heat and power to the Norwegian capital by incinerating waste. The plant currently treats 400,000 tonnes of waste per year that can't be recycled and has already conducted a 5,500-hour pilot with a 95% capture rate.

Stockholm

- Stockholm Exergi has bold ambitions to become 'climate positive' by 2025. Since December 2019, the company has trialled BECCS at its heat and power cogeneration plant in the Värtan area of Stockholm, where it calculates there is potential to capture 800,000 tonnes of CO_2 per year.

The prize to be won with BECCS at Drax, and the cost of delay

BECCS at Drax will:

01
Help get the UK to net zero

To be won:

The first phase of BECCS at Drax alone will permanently remove 8 million tonnes of carbon dioxide from the atmosphere each year.

To be lost:

The Climate Change Committee estimates that 53MtCO$_2$ of BECCS is needed by 2050 to reach net zero. Without BECCS at Drax, the only shovel-ready industrial scale UK BECCS project, this will be put at risk.

02
Significantly reduce the cost of achieving net zero

To be won:

Delivering the UK's net zero target with BECCS at Drax will be £26bn less than alternative options – saving money for Treasury, bill payers, and hardworking families.

To be lost:

The cost for the UK of delivering net zero without BECCS at Drax will be an additional £26bn.

03
Help level up the North, creating thousands of new green jobs and skills

To be won:

BECCS at Drax will protect and create over 10,000 green jobs and make the Humber a hub for green skills and investment.

To be lost:

Thousands of UK jobs including across the North could be put at risk, if we let other countries charge ahead in the race to scale up BECCS.

04
Boost UK suppliers and kick-start new industries

To be won:

During the construction phase, we will spend £100millions across our supply chain – with an ambition that 80% of construction spend will go to UK companies. We are partnering with the NFU to scale up perennial energy crop production and help the UK meet its ambitious climate goals.

To be lost:

Without BECCS at Drax in the 2020s, the UK will lose the opportunity to become a centre of excellence for BECCS and build mature supply chains and technology.

05
Make the UK a global leader in climate-saving technologies

To be won:

Use BECCS at Drax as showcase for UK to export negative emissions technology internationally, and show leadership in investing in green technology.

To be lost:

Delay will mean international projects will build this technology first, and become leaders in BECCS projects ahead of the UK.

06
Drive up sustainability standards and sustain healthy growing forests around the world

To be won:

With BECCS at Drax, we will work with governments, industry and our partners to aim to raise bioenergy sustainability standards globally. We will continue to follow the science, act transparently, and make a positive contribution to the communities where we operate.

To be lost:

Lose the opportunity to showcase the UK's world-leading sustainability standards while scaling up crucial BECCS technology.

How you can help deliver BECCS at Drax

There are a number of things you can do to support BECCS at Drax to remove carbon emissions form the atmosphere, protect British industries across the Humber and create thousands of new green jobs across the UK.

To show your support and learn more, you can:

- Visit our website drax.com/BECCS to learn more about our plans
- Make your support known to the Government
- Pledge support on our website drax.com/backBECCS
- Follow us on social media: Facebook, Twitter or Instagram

Thanks to our supporters and partners

British Chambers of Commerce

CBI

Coalition for Negative Emissions

EAST CO_2AST CLUSTER

HULL & HUMBER Chamber of Commerce

THE NORTHERN POWERHOUSE PARTNERSHIP

selby college

SELBY DISTRICT COUNCIL

West & North Yorkshire Chamber of Commerce

ZEROCARBON HUMBER

York & North Yorkshire LOCAL ENTERPRISE PARTNERSHIP

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