Frequently Asked Questions

The Peak Cluster is an innovative collaboration to capture, transport and permanently store carbon dioxide (CO_2) emissions from the cement and lime industry in Derbyshire and Staffordshire, as well as neighbouring industries in Cheshire.

Five cement and lime plants across Derbyshire, Staffordshire, owned by Tarmac, Breedon, Lhoist and Aggregate Industries, together with Lostock Sustainable Energy Plant in Cheshire, known locally as LSEP, have come together with Progressive Energy to form Peak Cluster.

Updated Apr 2024

Why do we need a pipeline?

We must reduce the amount of carbon dioxide which enters our atmosphere, whilst still allowing industry to continue to produce vital products - such as lime and cement. There are two main options available:

1. Move the cement and lime production plants to the coast, and transport the raw materials from where they are found naturally in the Peak District by rail or road in many thousands of journeys.

2. Capture and transport the carbon emissions to the coast via a new pipeline buried underground.

Having evaluated the options, we have determined that the preferred solution is an underground pipeline to transport CO_2 emissions from industrial plants in Derbyshire, Staffordshire and Cheshire to a permanent storage facility underneath the eastern Irish Sea.

Is CO_2 storage safe?

Carbon capture and storage is a well-established, proven technology. There are projects which have been successfully storing CO_2 for more than 25 years of demonstration.

CO_2 is stored safely offshore deep underground, typically between 0.8 – 3km down, for thousands of years.

CO_2 storage sites are carefully chosen to ensure the highest confidence in permanent storage and there is rigorous site characterisation, monitoring and verification procedures in place to ensure the CO_2 remains safely stored. These assessments and procedures are required by carbon capture and storage regulations before a project is allowed to proceed.

The potential storage site options for Peak Cluster are depleted oil and gas fields which are well understood, having been previously used to store natural gas for millions of years.

Are CO_2 pipelines safe?

Transporting carbon dioxide by pipeline has been in practise for many years both on and offshore. For instance, in the United States alone there are some 8,000km of pipelines actively transporting CO_2 today.

The UK has a wealth of experience, based on designing, constructing and operating approximately 6,800km of high-pressure gas pipelines, for which it has earned a global reputation for safety. The Code of Practice for pipelines to transport CO_2 streams are recognised as being the most cautious in the world, and the design and operation receives detailed scrutiny from the Health and Safety Executive.

We also will ensure rigorous monitoring mechanisms are in place along the CO_2 pipeline. The pipelines will be monitored both electronically and manually and block values will be used to safely shut down the pipeline should the need arise.

Will this bring new jobs?

The cement and lime industry has been a part of the region’s rich industrial heritage for more than a century. However, as we move into the future low carbon economy, the sector needs

to evolve by enabling it to operate sustainably as we journey to Net Zero carbon emissions by 2050.

Peak Cluster will enable this transition, ensuring the region remains an attractive location for the cement and lime plants, providing jobs and stimulating investment.

The impact of Peak Cluster could enable further growth in the supply chain of materials and skills, growing the local, regional and national economies.

Who is paying for this?

The UK's Government recognises that decarbonisation is vital as we play our part in the fight against climate change. It is also a huge economic opportunity for the UK's economy.

Peak Cluster is largely funded by the partners who make up the consortium.

Part of Peak Cluster's development is supported by government funding, designed to help businesses with high energy use to cut their carbon emissions through investing in low carbon technologies. The funding ensures individual companies do not face higher costs than their overseas competition as they take early action to decarbonise. Government is putting in place a support structure which means companies will not be placed at an economic disadvantage by undertaking CCS, ensuring UK jobs and preventing reliance on imports.

Where will the CO_2 be saved?

There are well understood geological formations which can store CO_2 in the eastern Irish Sea. This includes fields in both Liverpool Bay and Morecambe Bay with sufficient capacity for storage requirements for CO_2 from across the region for the foreseeable future.

Why do we need Peak Cluster?

Cement is essential for the UK economy, including the construction sector which produces mineral based products used to vital infrastructure. Around 40% of the UK's cement is manufactured in and around the Peak District. Lime is also a fundamental, but often unseen, ingredient for many key UK industries including purifying our water and environmental remediation.

However, as cement and lime are created, unavoidable CO_2 emissions are produced. Approximately two thirds of carbon dioxide emissions from cement and lime come from the raw materials themselves. This means that in order for the cement and lime industry to reach

net zero and decarbonise, switching their fuel won't be enough to tackle the vast majority of emissions they produce. The only option is to capture and store their CO_2 emissions in order to reach net zero.

Starting from 2030, Peak Cluster will prevent over 3 million tonnes of carbon dioxide emissions (CO_2) each year from across the Peak District, Staffordshire Moorlands and Cheshire. This represents a quarter of all of Derbyshire's and Staffordshire's CO_2 emissions and is the equivalent of taking 1.2 million cars off the road each year.

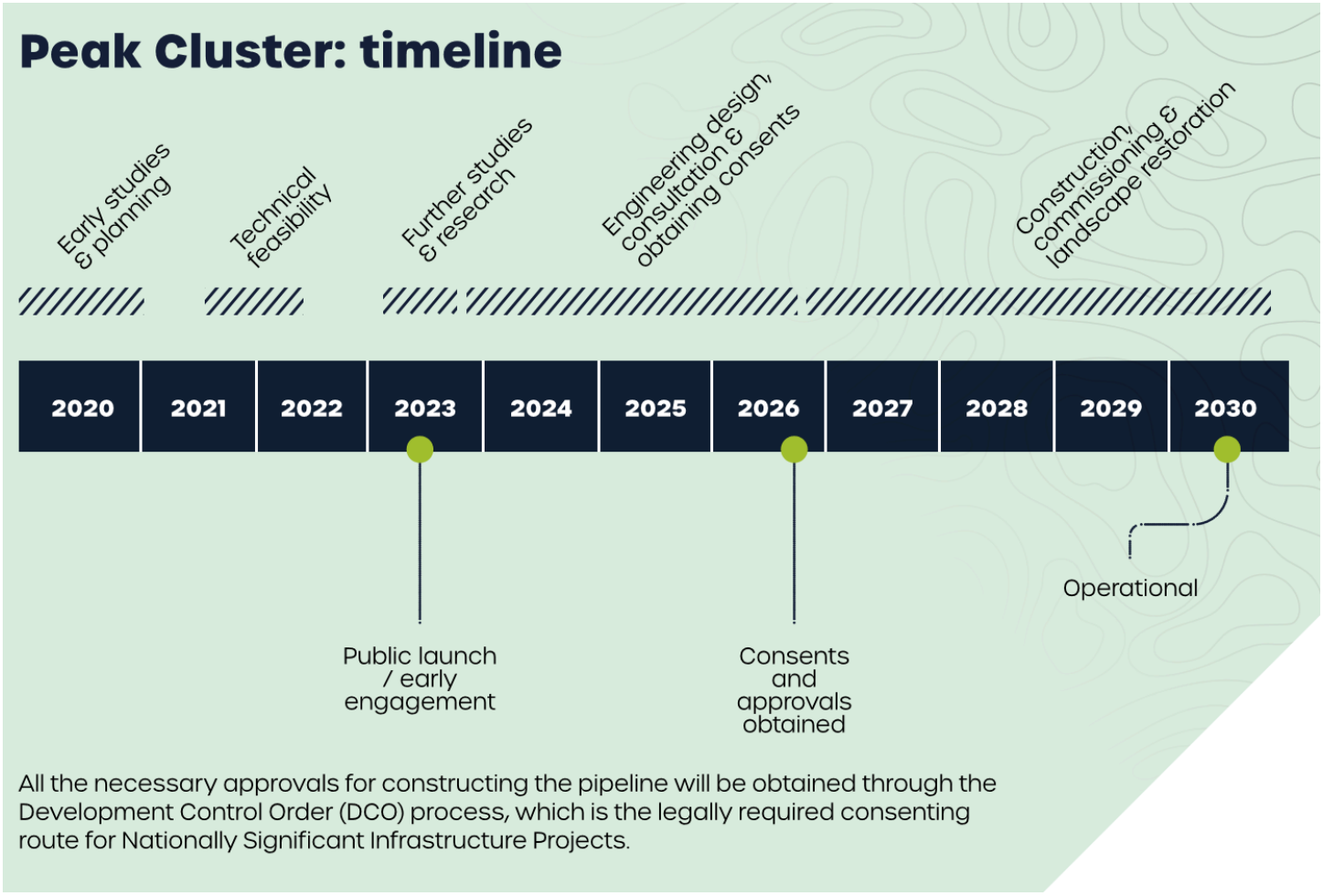
This will protect and safeguard 1,000 skilled jobs in the local region.

Who is developing Peak Cluster?

Progressive Energy is leading the development of the project alongside the Peak Cluster partners, Breedon, Lhoist, Tarmac, Aggregate Industries and Lostock Sustainable Energy Plant.

What is the timeline for the project?

A pioneering major infrastructure project, such as Peak Cluster, is a complex to design, develop and build. There are many stages to make it a reality. The diagram below explains the stages we will be working through.



What is currently happening on the project?

During the Spring and Summer of 2023, we are undertaking initial studies to determine where the infrastructure could be located. This includes the potential pipeline route corridors and 4 – 6 installations built above ground which would be spaced along the pipeline to allow inspection and maintenance.

In parallel, preliminary studies of the carbon capture facilities at the manufacturing sites are being undertaken to determine the most suitable technology and location.

In order to determine the best route within these ‘corridors’, and the potential proposed locations for the installations, we will be undertaking detailed environmental studies and asking for input from local communities and stakeholders.

Have a read of our ‘Consenting’ fact sheet for more information.

What is Carbon Capture and Storage?

Peak Cluster will use a technology called Carbon Capture and Storage – also known as CCS (or sometimes CCUS – with the 'U' standing for 'utilisation') to reduce carbon dioxide from entering the atmosphere. The CCS process locks away carbon dioxide emissions before transporting it to secure storage sites.

We will capture up to 95% of the CO_2 emissions produced on site in industrial processes of the existing cement and lime plants in the Peak District and other industry sites.

We will the compress the CO_2 so that it can be transported safely by underground pipeline, to be stored in carefully selected depleted gas reservoirs underneath the seabed in the eastern Irish Sea.

Read more about Carbon Capture and Storage in our fact sheet.

Why do we need to capture CO_2?

In most industry, CO_2 is emitted from the fuel burnt to power their processes. In order to decarbonise, many industries can simply switch to low carbon alternative fuel or electrify their processes.

However, in the production of cement and lime, the majority of the CO_2 emitted is a direct

consequence of processing the key raw material - limestone. Likewise with Energy from Waste facilities, the CO_2 is generated as a result of burning residual waste to create heat and power.

This means the only way CO_2 emissions can be reduced is by capturing the CO_2 and

permanently locking it away. This is why it is crucial to capture and safely store this carbon, preventing it being released into our atmosphere.

You can read more about how the cement and lime plan to decarbonise within the Mineral Products Association roadmap here:

- https://mineralproducts.org/MPA/media/root/Publications/2020/MPA-UKC-Roadmap-to-Beyond-Net-Zero_Oct20.pdf

Read more about Carbon Capture and Storage in our fact sheet.

Is carbon capture and storage the right technology to use?

The cement and lime manufacturers and the Lostock Sustainable Energy Plant will require technology at their plant to capture the emissions at source.

Carbon Capture and Storage (CCS) is widely recognised as an important technology to decarbonise industry. Both the Intergovernmental Panel on Climate Change and the UK's Committee on Climate Change agree that, to reach Net Zero, we need to use CCS to decarbonise our industry.

Capturing and storing carbon dioxide is a safe, proven process that is already being carried out in a range of industries around the world including Norway's Sleipner and Snohvit projects, which have been capturing a million tonnes of CO_2 each year for 27 years and 15 years respectively.

There are many other projects being developed globally including at the Hanson Cement plant at Padeswood in Flintshire and the Viridor Energy from Waste plant in Runcorn, both part of the HyNet project

- www.padeswoodccs.co.uk/en
- www.viridor.co.uk/news-and-insights/nearly-1-million-tonnes-a-year-of-avoided-co2-take-a-step-closer-as-viridor-s-04bn-uk-first-carbon-capture-project-selected-for-final-stage-of-government-competition/

Read more about Carbon Capture and Storage in our fact sheet.

Why do the cement and lime plants need to be in the Peak District?

The Peak District's unique geology and extensive mineral deposits mean that the cement and lime industries have been a feature of its landscape and part of its rich industrial heritage for more than a century.

The Peak District has the potential to produce what will be some of the first low carbon cement and lime products anywhere in the world.

The alternative, to relocate the production of cement and lime out of the Peak District would mean that quarried limestone and other materials would need to be shipped by road or rail from the Peak District to the production facilities. This would lead to a very substantial and unacceptable increase in the amount of road and rail freight, as well as additional transport emissions.

Why is cement and lime important?

Cement and lime are essential industries. The cement sector produces a vital material, essential to the production of concrete that is, in turn, used to build the nation's infrastructure including roads, railways, bridges, buildings and homes. 75-80% of the cement used in the UK (of which around 40% comes from the producers in the Peak District which this project will decarbonise) is produced in the UK, making us virtually self-sufficient. By comparison, 80% of timber and 60% of steel is imported from around the world, competing with UK manufacturing.

Lime is a strategically important product for the UK. It is a fundamental, but often unseen, ingredient for many key UK industries. Not only does lime production underpin the construction and manufacturing industries, but it is also used in many other industrial processes, such as drinking water purification, environmental remediation and sugar manufacturing. In addition, it is essential in the manufacture of vital materials such as steel and glass.

There are secure and long-term supplies of the raw materials required for lime and cement production readily available in many parts of the UK, including those in the Peak District, which can ensure the UK remains self-reliant.

These vital industries have provided jobs for generations of families and boosted the local economy. In the Peak District alone over 1000 people are directly employed in the production of cement and lime.

How much cement do we use?

Globally, we utilise around 4 billion tonnes of cement every year. This equates to approximately 14 billion cubic metres of concrete. By 2050 the Global Cement & Concrete Association expects the latter to rise to around 20 billion cubic metres as population growth and urbanisation increases in Latin America, India and Africa. This is often compared to the construction of a new New York every month between now and 2050. Having a lot of well-developed infrastructure, the UK utilises a much lower amount of cement and concrete each year per capita, but the UK cement market still equates to around 15 million tonnes per year.

Can't we just use less cement and concrete?

The short answer is yes although, it should be noted, that concrete is the second most used substance on the planet, after water! This means that, even after reductions have been made, concrete usage will still be incredibly large and so action beyond use reduction is essential for achieving net zero.

The sector is aiming to reduce the amount of cement used in concrete by improving efficiencies at every point along the value chain, from design, to construction, to reuse and recycling at the end of life. It is anticipated that this increased efficiency can offset increased demand to help net cement use remain static, otherwise the predicted use of cement would grow from 4 to 5 billion tonnes as the developing world increases its use of concrete.

What could we use instead of concrete?

Historically the two main alternatives to concrete for construction purposes, have been either steel or timber, though neither material can offer the versatility of uses that cement does. Currently, steel is even more carbon intensive per tonne than concrete, although that sector also has plans to decarbonise via both increased recycling rates and novel production methods.

Whilst timber can also be used, as stated elsewhere, currently around 80% of the UK's construction timber is imported. To reduce these imports would require huge areas of land to be dedicated to timber production, as timber requires around 50 times more land to support the same amount of construction as an aggregates quarry. If just 25% of the concrete used globally each year were replaced by timber, the total global forest cover would need to increase by about 14%, a land area one and a half times the size of India! Furthermore, these timber-producing forests tend to be monocultures, i.e., planted with just one species of fast-growing trees, and provide very limited amounts of biodiversity. Timber construction also poses other potential issues, such as flood- and fire-resistance.

How else is the climate impact of cement reduced now?

The term cement covers a family of materials that have varying climate impacts. The most basic is known as Ordinary Portland Cement, or OPC, consisting of just cement clinker (the carbon-intensive material produced in our kilns) and gypsum, which is used to prevent the cement settling as soon as water is added to it. Unsurprisingly this is the product with the largest carbon footprint.

The construction industry standards for cement generally permit the addition of other materials, such as limestone, fly ashes and blast furnace slags, either in isolation or as more complex, three-way blends or "ternary" cements. These act to both dilute and, in some cases, add to the strength of the final product, replacing a proportion of the clinker involved and hence reducing the carbon footprint of each tonne of cement and therefore concrete.

The main issue with this approach is that, for both slags and fly ashes, the absolute volumes available are reducing, as coal-fired power generation and blast furnace steel production

rates decline globally. In the UK, coal-fired power stations have ceased, and the remaining stockpiles will not provide sufficient reserves for more than a few years. Similarly, blast furnace slag is already fully utilised, and volumes cannot be increased without turning to imported material.

How might the climate impact of cement be reduced in the future?

Broadly speaking, the main options for the future fall into two categories.

The first is to use other available materials to replace the diminishing volumes of slag and ash. These might be naturally occurring, such as pozzolanic materials like diatomaceous earth, or manufactured by the heating of other minerals, the front runner of which is termed calcined clay. Natural pozzolans are distributed very unevenly around the Earth, whereas the raw materials for the clay calcination process are much more common. The first clay calcination plants are now in production in various countries, although there are none in the UK at present. The calcination of such clays still requires relatively high temperatures, of around 800°C and, hence, still have a reasonably large carbon footprint, albeit much less than that of cement. They can, therefore, only reduce the total carbon footprint by a marginal amount.

The second category are novel cements with an alternative chemistry to OPC (MPA report), with the objective to replace the carbon-intensive clinker with other minerals. There are many types of these clinkers and cements, such as belite, calcium sulphoaluminate and carbonised calcium silicate clinkers, as well as magnesium-silicate or alkali/geo-polymer-based-cements. Many of these have issues with scalability, as they require less commonly available raw materials (MPA report on UK availability), or compete between themselves for the same wastes, such as the slags and ashes already mentioned and most retain a significant level of CO2 emission and so will not deliver a Net Zero solution, unlike CCS.

For either set of materials, even if the raw material sourcing issues can be resolved, they will need to prove themselves in terms of safety, durability and service before they are brought to market (MPA report), to ensure that we are replacing like-for-like performance. Understandably, the specifications and standards related to construction materials that will create critical buildings or infrastructure, and can have service lives of up to and, in some cases, beyond, a century, are demanding. New materials must show that they will maintain their integrity, regardless of the conditions to which they are subjected. Rapidly switching to untested materials can lead to unforeseen safety concerns or even structures that finish up needing replacement in a much shorter timeframe than otherwise, which defeats the object of lowering emissions over the long term.

Do you need planning permission for the project?

As a major infrastructure project, Peak Cluster will need to submit a type of planning application called a Development Consent Order to the Government's Planning Inspectorate. The final decision on whether Peak Cluster will get approval will be made by the Secretary of State for the Department of Energy Security and Net Zero.

During the development of the project, alongside our continuous engagement, we will undertake periods of consultation.

We will liaise closely with stakeholders including local councils and the Peak District National Park Authority, Natural England and Historic England.

Read more about consenting in our fact sheet.

How will you work with local stakeholders?

The collective views and local knowledge of communities, stakeholders, industry and the supply chain across Derbyshire, Staffordshire and Cheshire are essential. We know that we can design and develop a better project which embodies needs and priorities by working together.

We are starting to work together early in the development process to ensure everyone has the opportunity to help shape the project to be the best it can be. Example of our engagement includes:

- Community drop-in events
- Webinars
- Attending community events
- Attending local meetings
- Consultations

How do I contact you?

If you have any questions, queries or comments on Peak Cluster, please do contact us. You can find the ways to contact us on our website: www.peakcluster.co.uk.