



The Coal  
Authority



By-Products  
Opportunities Framework  
**2024** to **2027**





## Who we are

The Coal Authority exists to manage the legacy from Great Britain's coal mining past. So much of our 3 nation's history has been shaped by the natural minerals under our soil. None more than coal, which has provided heat, steam and power for hundreds and hundreds of years.

Coal was nationalised in 1947, which is why the UK Government own the majority of underground workings and remaining coal reserves under England, Scotland and Wales, along with the responsibility for many of the associated challenges and hazards.

As domestic coal mining has reduced, and humanity recognises the impacts of burning carbon on our climate, we are seeking alternative ways to maximise low carbon opportunities from closed and abandoned mines such as mine water heat networks. These can provide heat for homes and businesses, across communities whose identity was shaped by coal, while also supporting decarbonisation and levelling up outcomes for communities who could now benefit from low carbon, social and economic benefits from the warm water in the historic mining assets.

We work with partners, communities and customers to listen, learn and take practical action to support them to create safer, cleaner and greener communities.

We are a 24/7 emergency response organisation, with staff across Great Britain ready to respond and take action to keep people safe and provide peace of mind.

Extensive coalfields exist across Great Britain and it is estimated that 25% of homes and businesses are located above former coal mines. The vast majority of people will never experience any problems from that, but for those who do we are here to provide support and expertise.

The Coal Authority is a non-departmental public body and partner organisation of the Department for Energy Security and Net Zero.



Click or scan to view  
our Business Plan

# Foreword



**Richard Bond**  
Innovation and  
Engagement Director



**David Brooks**  
Non-Executive Director

We are pleased to share our By-Products Framework for 2024 – 2027. This explains our work to date in using our By-Products to create value in line with our 2022–2025 Business Plan and demonstrates how we will work with others to develop further opportunities over the next 3 years.

The Coal Authority are a practical operational organisation and focus on using our technical expertise and professionalism to keep coalfield communities and environments safe. This includes treating over 122 Billion Litres of Mine Water a year, removing iron ochre to protect clean drinking water and aquifers.

Our ongoing innovation programme continues to consider opportunities for creating financial, social and environmental value from mine water and the ochre we remove. This framework outlines how we are addressing these prospects within our operations to make it easy for interested parties to understand areas where we can potentially work together.

Our value creation aims are to minimise costs for the taxpayer, reduce waste, support the circular economy and contribute to our ambition to be a net zero organisation by 2030. This is in line with the priorities outlined in our Sustainability Plan 2023 – 2026, our Business Plan and our 10 year vision.

To help achieve this we recognise that working with public and private organisations possessing complementary skills and expertise will allow us to maximise value and impact.

Whilst this framework outlines our existing routes for by-product development, we will actively engage with new organisations to develop applications or geographical locations where we can begin to work together. To facilitate this we will remain an organisation that encourages innovative approaches and that is easy to work with.

Our people remain core to the delivery of this framework. We know it is important that everyone understands the opportunities that are available to the organisation and that they are critical considerations as we evolve of our ways of operation and service deliver in response to the changing world around us.

Over the next three years, we will continue to develop and nurture the markets and relationships that have already been created in England, Scotland and Wales, whilst continuing to explore new opportunities for value development across our environment.

We know we maximise by-product opportunities by learning from what we do and also by engaging with others. We always welcome approaches on how you think we can work together and how we can do better.



Click or scan to  
learn about ochre



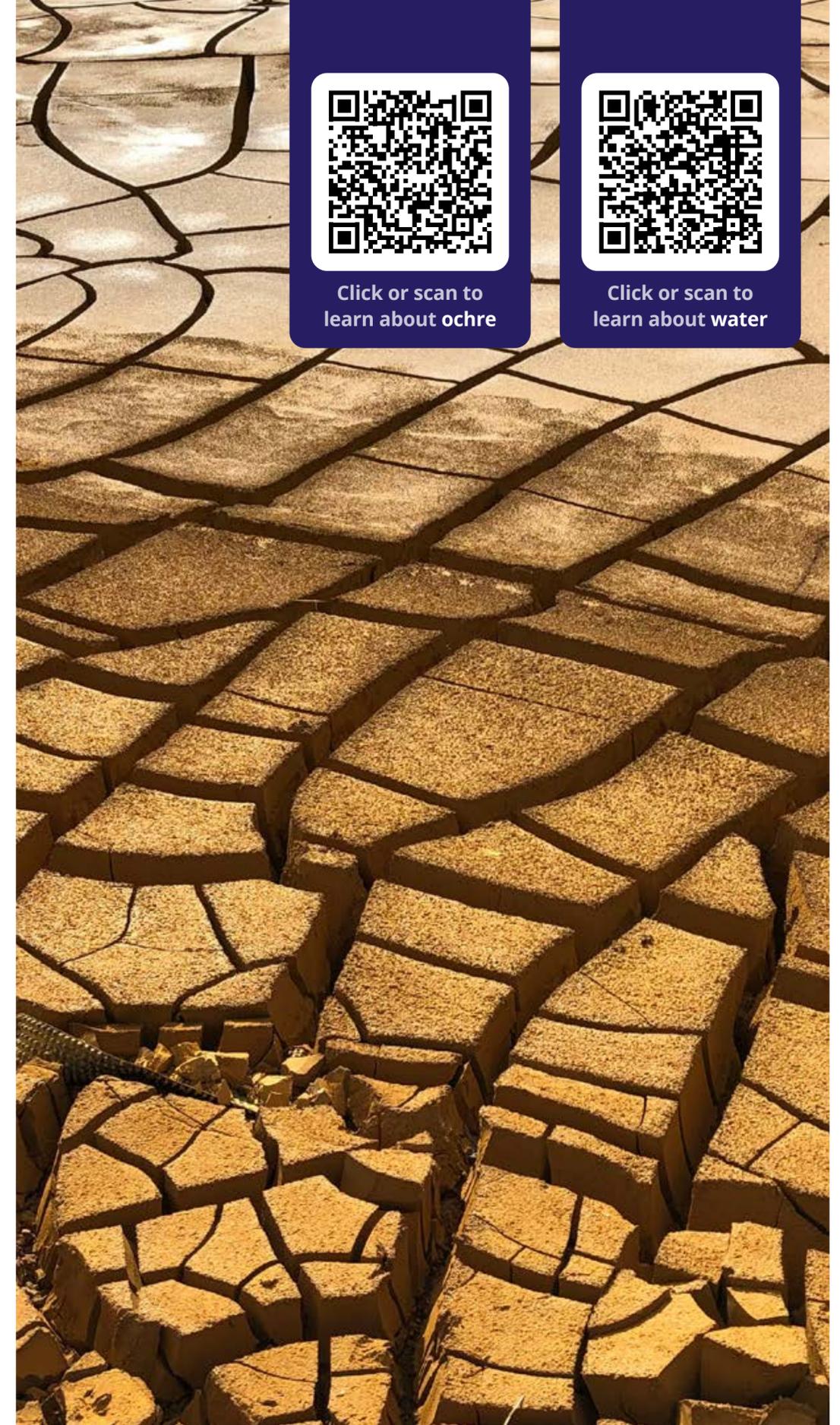
Click or scan to  
learn about water



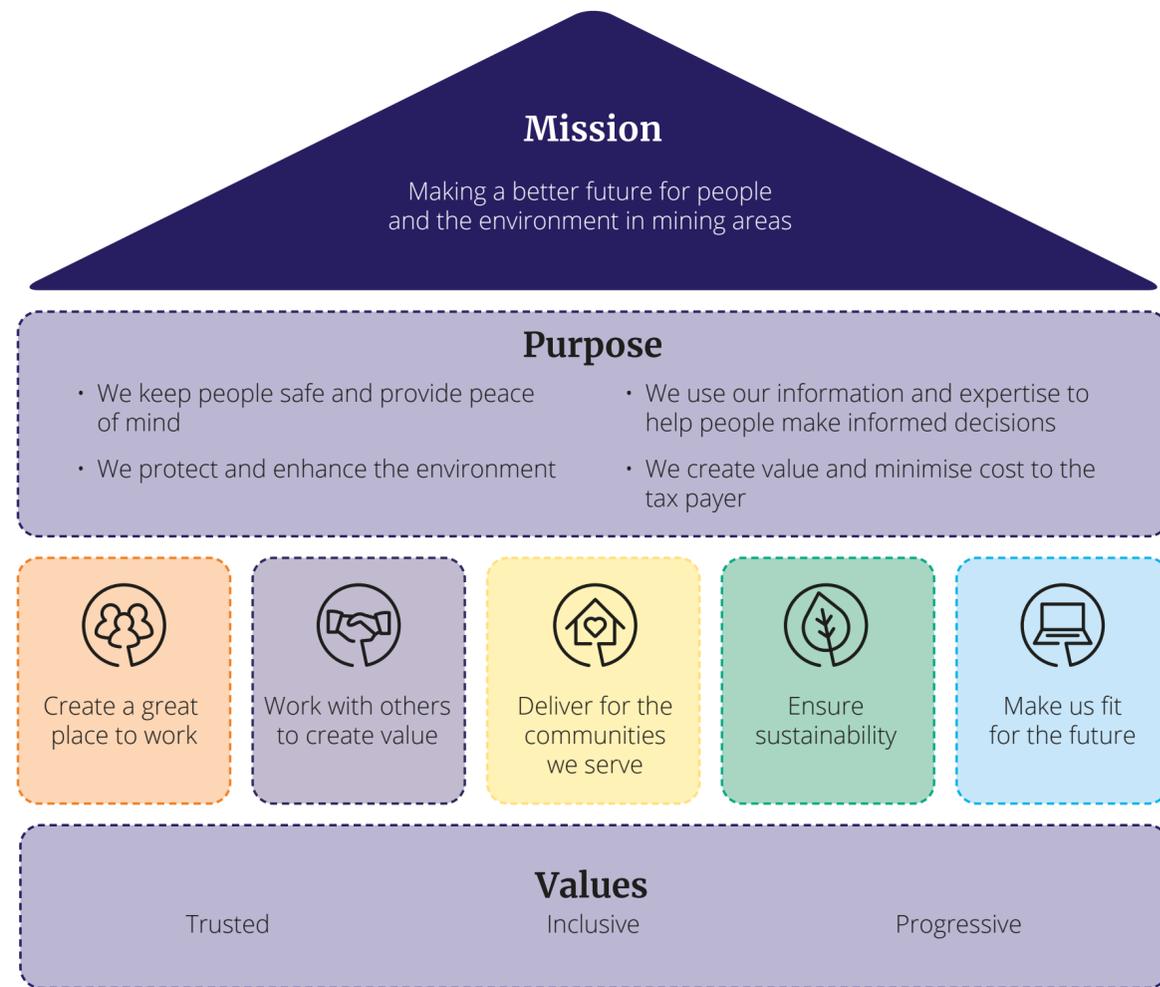
Click or scan to view  
our Business Plan



Click or scan to view  
our Sustainability Plan



# Our mission, purpose and values



## Our values

### Trusted:

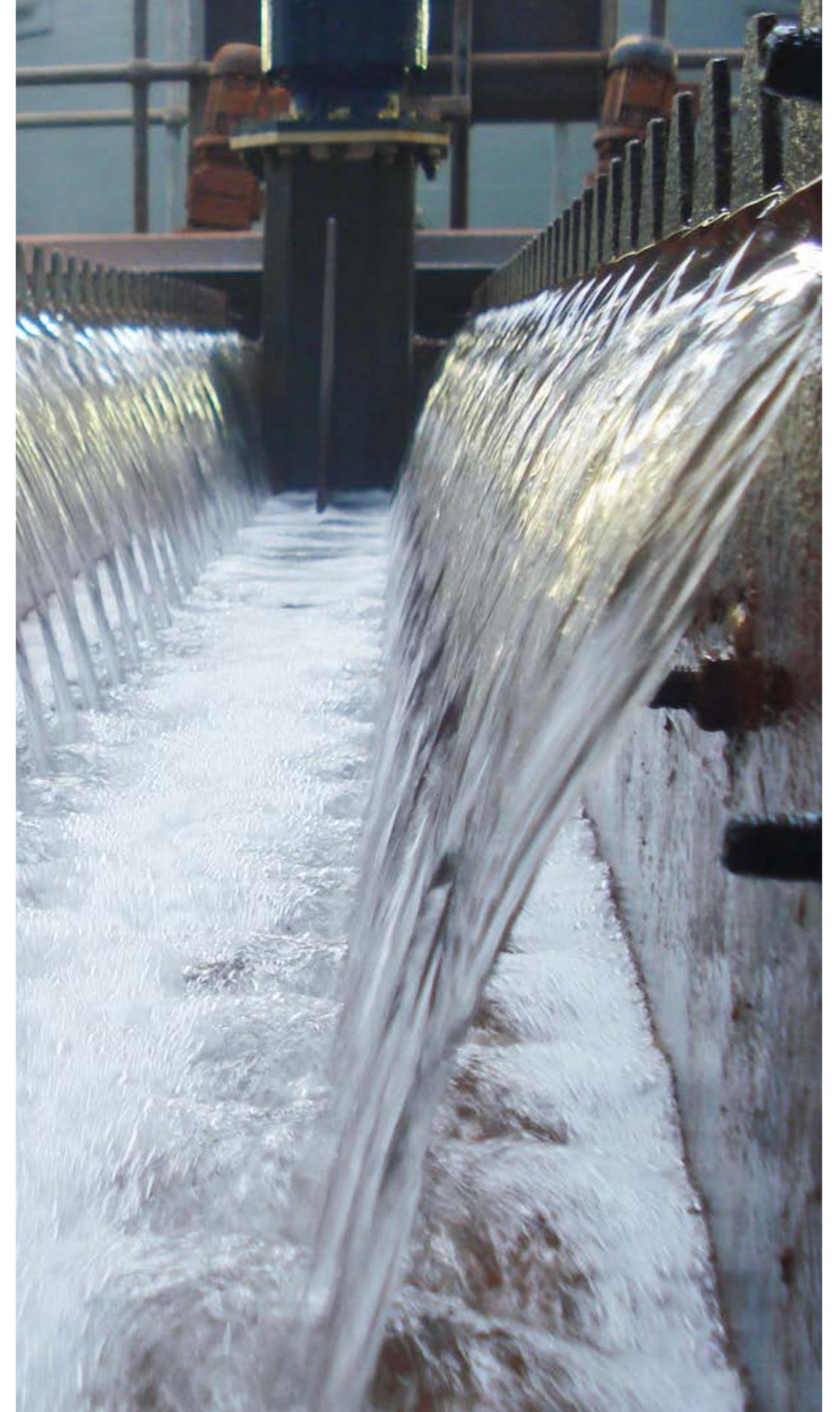
- we act with integrity
- we are open and transparent
- we deliver on our commitments

### Inclusive:

- we promote a culture of mutual respect
- we recognise that our differences make us stronger
- we work with others to achieve our mission

### Progressive:

- we are open minded and innovative
- we recognise that the past can help us shape the future
- we listen and learn



# Our by-product priorities

Through research and development, partnership working and industry engagement, we have identified water and ochre as the by-products which will currently make the greatest contribution to delivering our purpose of protecting and enhancing the environment, creating value and minimising cost to the tax payer. To achieve this, our By-Products Framework will underpin our activities between 2024 and 2027, with our work focusing on 5 priorities.



Create a great place to work



Work with others to create value



Deliver for the communities we serve



Ensure Sustainability



Make us fit for the future

## Contributing to net zero and acting sustainably

We will build upon our achievements to date, and continue to review and evolve the way we work – including continuing to rollout solar scheme opportunities to reduce operating costs and our use of the national grid. We will continue to develop new routes to market for our by-products, and grow further those we have already developed, to avoid the creation of waste wherever possible.

We will share our successes with our customers and the communities we serve by having robust reporting mechanisms in place to track and monitor our carbon savings, and clearly demonstrate the value we have created.

[Click for more information](#)

## Work with partners

We will continue to work with those who complement the skills and knowledge we hold, to allow us to explore new opportunities and ways to innovate, supporting the creation of economic, environmental and social value from our by-products and provide savings for the taxpayer.

We will review how we can deliver value, using and sharing our knowledge and experiences, to support the delivery of key government priorities across the three nations we serve.

[Click for more information](#)

## Supporting the circular economy and reducing waste

We will continue to focus on how we can best use the by-products we produce to reduce our waste, and keep this at the forefront of our approaches to operational tasks.

Taking lessons from our experiences so far, we will develop further ways of repurposing our by-products to support our goals of reusing or recycling 95% of our iron ochre. Our research and development will continue to be a key activity to support this goal, and we will use our findings to demonstrate where we can supply products in to new areas to create further value.

[Click for more information](#)

## Using mine water

We will continue to conduct research to understand the value of mine water and how it can contribute to the UK's needs for drinking water and industrial provision. We will use our relationships with water companies and regulators to explore new opportunities, and formulate robust plans for moving projects forward in future.

We will build on the work we've conducted so far, and review the data we hold, to make it available as a key resource to support and enable the use of mine water by others. We will complement this by drawing attention to our mine water treatment schemes which present the best opportunities, and engage with those wishing to explore their use.

[Click for more information](#)

## Improving our understandings

We will build further on our successes of working with universities and partner organisations to continue our research and development activities, to better inform the work we conduct and the decisions we make.

We will innovate and apply our research to new opportunities to create value from our by-products, and further develop our understandings and development of the applications our by-products can support, to reduce our waste materials and create financial, environmental and social value.

[Click for more information](#)

Back to our by-product priorities

# Contributing to net zero and acting sustainably

We will work with others, sharing learnings and taking practical action to move towards our ambition to be a net zero organisation by 2030 as has been committed to by our Board.

We are committed to becoming a more sustainable organisation, and want to use our work to help deliver positive change in the communities we support. This includes consideration of environmental and social sustainability as key factors to our decision making and reporting.

We fully understand all of our waste streams and want to ensure they are minimised, managed or, if necessary, disposed of in the most appropriate sustainable way. By continuing to find ways to innovatively re-purpose the by-products we produce, we can help to minimise our impact on the environment and contribute to our net zero goals.



## What have we achieved so far?

We have reviewed how we operate and have changed the way we work, so that acting sustainably is at the forefront of our thought processes and how we repurpose our by-products.

We have developed routes to market for our ochre, reducing the amount of waste materials disposed of in landfill, and will continue to grow the amount of ochre sold as a by-product as our understanding of the markets evolves.

We have carefully considered the approaches we take when developing our end-user products, and use natural processes where possible to avoid the need for industrial processes.

We've introduced solar schemes on land adjacent to our mine water treatments schemes at 8 locations, to provide the energy used to pump mine water to the surface, reduce the demand from the national grid and generate financial value through selling any unused energy in to the grid.



## What are our aims for the future?

We will explore how others measure carbon savings and use these learnings to develop models and reporting which enable us to track the carbon savings associated with our work.

We will have a clear understanding of the amount of ochre and mine water available within our estate, and ensure robust systems and reporting is in place to understand the positive impacts our activities are having on repurposing our by-products.

We will evolve our decision making and reporting to more clearly demonstrate our environmental, social and other impacts, challenges and benefits, alongside financial aspects.

We will develop our understanding about the impacts of climate change on our mine assets and estate and the potential impacts this may have on the volume of by-products we produce.



Click or scan to find out more about our use of solar

# Work with partners

We will work with both public and private sector partners, to provide better and faster outcomes, combining our skills and expertise to deliver our priorities.

We are passionate about mining communities both on the coalfield and beyond and use our information, skills and expertise to give confidence to those who live and work in these areas. We enable opportunity and benefit, where possible, from our mining legacy.

Value creation is key to our thinking and we continue to research new innovations and develop efficiency to deliver better outcomes, new opportunities and/or savings for the taxpayer.

We consider financial, environmental and social aspects as key areas for value creation. These include elements such as our abilities to drive income, savings and improved efficiencies, through to providing environmental improvements, reducing waste and contributing to our net zero goals. We also consider how our work can provide social value creation by way of creating jobs and improving living standards for the local communities in the former coalfields.

We hold unique knowledge, assets and data, but recognise that other bodies may have additional skills or influence needed to maximise the value we can generate. Our experience over the past few years shows that working with both public and private sector partners on joint projects benefits both parties and can provide better and faster outcomes.

Back to our by-product priorities



## What have we achieved so far?

We have worked with partners to explore new options for reusing or recycling our by-products. As a direct result of this, we've successfully created a commodity from our ochre – a by-product from treating mine water – providing income from sales as well as financial savings and environmental value through not sending materials to landfill.

We've developed social value by using local small to medium sized companies (SME resource) to provide the services needed to conduct our activities, such as transportation and storage of materials.



## What are our aims for the future?

We will continue to work with partners, where their strengths and values are complementary, to seek out new opportunities to contribute further to the value we create from our by-products. We will build on this by seeking to deliver value to support the delivery of key government priorities across England, Scotland and Wales.

To support our activities, we will explore alternative funding and enabling options and/or pilots working with public and private sector organisations. This will allow us to build on our successes of the past and deliver further success in future.



Click or scan to find out more about our work with partners

[Back to our by-product priorities](#)

# Supporting the circular economy and reducing waste

We will re-use or recycle 95% of the iron ochre and iron solids generated from our mine water treatment schemes to prevent disposal in landfill.

We are already working and innovating with others to build new circular systems that redefine our waste as a resource, reduce the need for raw materials to be used and avoid waste. As well as reusing our iron ochre, we are continuing to develop our use of mine water to support drinking water and industrial provision in water scarce catchments.



## What have we achieved so far?

We have undertaken an extensive innovation programme to identify ways our by-products can be used to generate value and which sectors they can support.

We have refined this to identify the opportunities with the biggest impact and our work in the next three years is focusing on delivering these to generate financial, environmental and social value. Our work to date has also given us strong foundations to seek out opportunities for reusing the water in abandoned coal mines and mine water treatment schemes.

We've reviewed how we can get the best out of our mine water treatment schemes, looking at how they operate, and focusing on adaptations to our designs to improve the quality of our ochre product. This has included making enhancements to our operational processing on site, and using natural ways to dry ochre, reduce water content and make it easier to process ready for sale.



## What are our aims for the future?

We will continue to actively seek opportunities to develop different uses for our by-products to further reduce our waste.

We will build on our understanding of the by-products we create and additional markets we could enter to further reduce the need for any of the material that we produce to go to landfill. This will underpin us achieving the re-use or recycling of 95% of the iron ochre and iron solids we generate from our mine water treatment schemes.

We are using our current learnings from using ochre as a by-product to inform our thinking on future treatment scheme designs. This aims to allow us to scale up our production and further reduce the amount of waste sent to landfill without affecting our ability to protect drinking water and the environment in the former coalfield.

We will develop how we most effectively remove ochre from our treatment schemes, process and store the product, and make it available for distribution across Britain, continually repurposing the material rather than a linear lifecycle that ends in disposal.



Click or scan to  
find out more about  
our innovate solutions  
for re-using materials

# Using mine water

We will use the water from our mines to support drinking water and industrial provision in water scarce catchments and we will be actively working with partners at a catchment level to consider coal mines as a core part of the catchment – with flood storage and water use amongst those considerations.

We recognise that water scarcity is increasing and view the opportunity of using mine water as a means to address this. We currently handle over 122 billion litres of mine water each year which, depending on the location of the mine water treatment scheme, has the ability to provide water ranging from freshwater standard through to agricultural or industry standards.



## What have we achieved so far?

We have used our existing relationships with water companies and regulators to explore opportunities for developing innovative solutions to allow the water we treat to contribute to the water catchment sustainability.

We have carried out research and development to understand the value mine water holds, and how it can contribute to the UK's needs for drinking water and industrial provisions. This has allowed us to seek out opportunities for providing mine water as a by-product and we have used our experiences to develop our business models to assess and deliver future opportunities.

We have reviewed the data we hold on mine water to ensure it is fit for purpose, and is readily available to those who wish to use it.



## What are our aims for the future?

We will use our past learnings to shape our future programmes and maximise opportunities to promote water sustainability.

We will use our knowledge and data to proactively use the mine water treatment schemes that present the best opportunities.

We will continue to use our existing relationships with water companies, the wider water industry and regulators to seek out opportunities for working together to develop innovative solutions, and deliver mine water to market.

We will engage across the different programmes we are undertaking, such as coal, metal mines and salinity, to identify opportunities, and share experiences and best practice.

[Back to our by-product priorities](#)



Click or scan to  
find out more about  
using mine water



# Improving our understandings

We will build on our understanding of the by-products that we create to open new markets and significantly reduce the need for any of the material that we produce to go to landfill.

Our 10 year vision remains focused on our mission of making 'a better place for people and the environment in mining areas' and we can only achieve our mission by continuing to listen and learn from what we do.

We recognise that we don't have all the skills or market knowledge needed to maximise the value we can generate, but by working with others, we can further develop our understandings.

[Back to our by-product priorities](#)



## What have we achieved so far?

We've worked with universities and partner organisations to undertake research and development, to inform our work and help give confidence to our customers.



## What are our aims for the future?

We will build on our research and development programmes and experiences to date to develop further value creation opportunities and continue to improve our service to our customers.

We will gather more data on the wastes and by-products we generate through our operations and activities so that we can ensure we focus on areas of greatest impact.

We will further develop our understandings and development of the applications of our by-products across different industries, to reduce our waste and create financial, environmental and social value.



Click or scan to  
find out more about  
our ground breaking  
developments



# Our progress so far

Over the course of the past 9 years we have focused our broad innovation programme of ideas in to a smaller number of purposeful projects. This has allowed us to build on our understanding of the by-products that we create, and consider opportunities for creating financial, social and environmental value from their use. In the next 3 years we will work to make more of these a reality and to scale up successful projects we have already delivered.

# 2015

We started a Coal Authority wide innovation programme which generated nearly 300 ideas to explore new ways to use our by-products



Click or scan to  
learn more about  
our history



The Coal  
Authority



Click or scan to  
learn about ochre



Click or scan to  
learn about water

Making a better future for people  
and the environment in mining areas