

# CP612 Carbon Capture in Water Industry

## Business Benefits

- Significant contribution to achieving Net Zero pledges by 2030.
- Catchment management solution with measurable impact on the environment.
- Phosphate recovery at wastewater treatment works and re-use of mineral wastes such as mine wastes.
- Leveraged funding by working collaboratively with Oxford University on the research project.

## The Need

The water industry has made an ambitious pledge to achieve net zero carbon by 2030. It's a big challenge, but water companies are committed to protecting and enhancing the environment and intend to be part of the solution to the climate crisis.

The water industry has already taken some significant steps to reduce gross operational emissions, cutting them by 43% since 2011 and is now working hard to develop a collaborative action plan to identify further options to reduce carbon.

Currently these concentrate on implementing existing best practice to reduce energy consumption, move to "greener" forms of energy, increase the availability of biogas to other industries and reduce emissions from wastewater treatment plant.

There is a need however to look at more radical and innovative solutions to ensure the industry meets the 2030 pledge.

## The Partners



**Leverhulme  
Centre for Climate Change  
Mitigation**

WRC have developed this project outline in partnership with the Leverhulme Centre for Climate Change Mitigation (LC3M) and will be working closely with the Department of Earth Sciences at Oxford University during delivery of the work.

## The Solution

Water companies are already embracing catchment management solutions to manage water quality and quantity at source thus avoiding expensive and carbon intensive treatment methods; a natural extension of this approach, increasing alkalinity in rivers, could provide an effective way of capturing and storing carbon, contributing significantly to the water industries efforts towards net zero carbon.

The water industry is well placed to provide strong leadership in developing this new technology by working with farmers to understand mineral fertiliser application, developing novel treatment works that can aid the transmission of alkalinity to the ocean and working with the relevant agencies to understand and control the impact of alkalinity in rivers. There could be side benefits to the water industry in terms of using silicates as a feedstock for phosphate recovery at wastewater treatment works.

Working along-side Oxford University this project will be carried out in 3 phases:

**Phase 1** – A scoping project to establish, further develop and quantify the benefits that this approach will offer to both meet carbon reduction targets over the next 10 years and to explore the potential added benefits to treatment processes.

**Phase 2** - Dynamic modelling to prove the benefits. Particular focus on river water quality & impact on water treatment processes downstream.

**Phase 3** - Field trials to prove the benefits & enhance the model calibration. Cost-benefit & carbon-benefit analysis associated with specific catchments and treatment processes.



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## The Science

In the natural system the weathering of silicate minerals plays an important role in removing CO<sub>2</sub> from the atmosphere. This process generates alkalinity which is transmitted through rivers to the ocean where it is stored (mainly as bicarbonate and carbonate).

However, this process is very slow so research is currently being carried out to understand the potential for enhancing the rate of silicate weathering as a technique for carbon capture and storage. This will likely involve using silicate material, which is produced as an industrial by-product, as a fertiliser to farmland, or the construction of engineered reactor vessels with discharges to the environment.

## Why WRC?

We have a collaboration with Oxford University which is seeking funding for a research project to develop the concept of Enhanced River Alkalinity to prototype demonstration (TRL 7/8).

WRC bring to this partnership our first class, readily available catchment modelling expertise and tools.

Our team have a detailed understanding of water industry asset operation and catchment management initiatives to ensure practical and implementable outputs are developed.

Our team will be led by David Hodkin, a data scientist and sustainability consultant who has worked with the Oxford University team previously.

Ian Codling and Dr Karen Murrell from WRC's Catchment Management team will also lead specific work packages.



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