

# PROTECTING OUR DRINKING WATER IN THE FACE OF CLIMATE CHANGE



In the UK we enjoy some of the highest quality drinking water in the world. However, water treatment is facing some key challenges including climate change, net zero targets, emerging contaminants, ageing assets, a need for behavioural change in how we use our drinking water and an urgent recruitment drive for STEM training and skills. How does the industry tackle these wide-ranging issues and what are the big questions we need to keep asking?



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## Climate change, here and now

We absolutely cannot ignore climate change and its effect on raw water quality, how water is treated and the potential impact of too much water where we don't want it. Whilst no area is immune from climate change, some water companies are going to see more of an effect, more quickly, than others.

The challenge of UK's water industry's net zero target of 2030 has an impact on all our systems and sectors in drinking water supply. Yet across the industry, does climate change and its impacts on raw water quality hold as great a concern as others, such as reducing energy and chemicals?

Colour and turbidity in raw waters are going to increase because of climate change but the effects won't be limited to these two, important as they are. What we're seeing is increasing levels of algae and its break-down products – MIB and geosmin – and these two can really impact the taste of the water and lead to customer complaints. Treatment is possible, but it comes at a high cost. We'll see this become a bigger issue for water companies and as customers' expectations of their drinking water grow. The recent EU directive on drinking water supplies includes a requirement that drinking water safety plans—the basis of safe drinking water—must include the impacts of climate change.

And as the raw water quality worsens, the more chemicals are required to treat it, putting pressure from an already stretched supply chain. Some chemicals are single source, and some are facing competing demands from other industries. The water industry is not in a robust position with respect to the supply of some treatment chemicals.

## Emerging contaminants, or regulation and analysis?

How the UK responds to the recent EU directive on drinking water is being considered by the Drinking Water Inspectorate (DWI). The EU directive sets standards for some new chemicals in drinking water. Some of these chemicals are receiving attention because we can measure ever lower levels of substances in the water and appreciation of their impact is evolving. One group receiving increasing media and industry attention is Poly and Perfluorinated Alkyl Substances (PFAS) - human-made chemicals widely used in both industrial and household products. Our North American colleagues have been concerned with PFAS for a couple of decades and have developed extensive experience. The DWI has recently set guidance to direct water companies to understand PFAS levels in their waters and propose treatment if these exceed the trigger levels.

Other contaminants may emerge in the future, but some old ones persist as understanding of their impact emerges, for example manganese. The standard for manganese is 50 µg/l but over the last few years, we've seen treatment standards tumble, in some water companies to as low as 1 µg/l. This dramatic lowering of the standard is related to customer perception of their water and is not health-based. Manganese in the network can build up where the flow is slow or the chemistry changes; if there is a sudden flow change, customers can experience discoloured water.

And, very significantly, the EU directive includes a new standard for lead of 5 µg/l at customers' taps. Historically water companies have dosed phosphate to stop the lead entering the water, but this new standard is very challenging to meet by treatment alone. Replacing our lead pipes is the only guaranteed way of dealing with lead; no easy task, requiring disruption to customers, potentially complex legal situations and involving significant financial costs.

## Asking the right questions: a systems approach

We can't just rely on a water treatment works to deliver high quality clean water, but need to take a more integrated, systems-based approach. We treat our water to the highest quality and standards before it passes through large trunk mains and massive service reservoirs, to reach customers' homes through increasingly small pipes of different ages and conditions.

Running for many thousands of kilometres, the network is extensive and underground, and to a large extent unseen and the condition unknown. The operation of the network, particularly when uncontrolled, can lead to all sorts of issues with turbidity, iron and manganese which could be avoided. A lot is being learnt about the impact of the network on water quality, and the situation has improved greatly over the last few years, but we must ask if we're doing all we can at the water treatment works to ensure the water arrives at the customers' taps in the same excellent condition it leaves the works.

Companies with softer, more poorly buffered waters face more issues than others. Sometimes simply adjusting the pH or the alkalinity could help the water resist the network influences and we need to refocus on the chemistry of the treated water and where water from one company blends with one from another.

## And what about the assets?

Safeguarding water quality includes being brave enough to ask the right questions about the state of our assets. Our aging assets need our attention; some are at the end of their life and in poor condition.

These huge, critical assets have done a fantastic job over the years and are being pushed many years beyond their design life. With climate change targets rightly in focus, we are very conscious to not build unnecessarily. Finding other solutions to reduce the need for treatment depends on thoroughly grasping the effect of the catchment on the raw water and realising the environmental triggers that lead to poor water quality.

But inevitably, when considering the assets' life span and condition and the continuing need for water treatment, we need to always be ready to ask: at what point do we move from looking for a creative

innovative solution, investing money in new technology or, whilst not a popular opinion, when do we need to start all over again?

## Changing our behaviour to save our clean water

Providing great water quality is not just a technical question for water companies; customers also have a role to play. How much can the customer help influence water quality, by linking quality to behaviour change to save water? How do we help customers use water differently?

Reducing the consumption of our highly treated water would give a lot of headroom back to water companies. We focus on the energy used to treat water, chemicals, and the environmental aspects, so any push towards water efficiency has got to be a good thing. But there is also a balance between local abstraction, with its energy advantages, and the need to protect our smaller streams, and leaving water in the environment. Some water companies have focussed on protecting the chalk streams, but this will lead to greater movement of water from the larger surface water sources.

This circles back to understanding what sort of water quality can be used in different situations for different purposes. Our drinking water is highly treated, fantastic quality, and we're using it to grow tomatoes.

## A driving workforce

There is a huge demand for technical skills generally in the UK and encouraging the younger generations into STEM subjects and the water industry is crucial. But we're also seeing a rapid loss of people with the expertise that the water companies need to operate. So, when highly experienced employees leave a water company, all that knowledge can be lost unless the process is managed very carefully. Strong mentoring programmes within companies can be an effective way of making sure that knowledge is captured and passed on.

But perhaps too the water industry has a task to be more enticing to a new workforce. Recently I saw an art installation dedicated to keyworkers during the pandemic, and one of the characters was a water treatment engineer - a brilliant recognition for the utilities sector!