



THE CIRCULAR WATER ECONOMY

IDENTIFYING AND CAPITALISING ON
THE COMMERCIAL OPPORTUNITIES
FOR UK PLC

A Call to Action by the UK Water Partnership

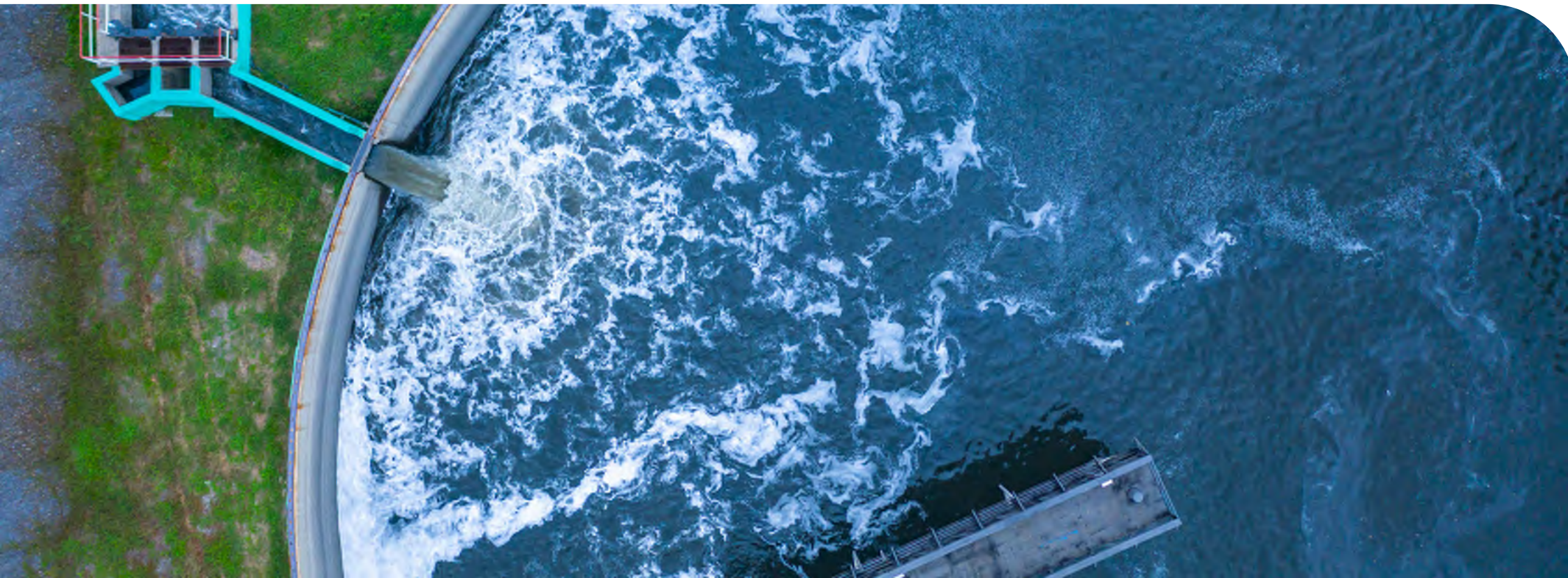
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PURPOSE

The Circular Economy (CE) covers three broad principles – eliminate, circulate and regenerate. The water industry is well placed to positively engage with all three principles – by minimising abstraction, implementing wastewater treatment solutions that return high quality effluent to the environment, by maintaining assets and recovering waste materials as useful resources, and by engaging with nature at catchment scales to improve biodiversity, water quality and water supply.

The scope and long-term approach to its activities provides the water sector with an unparalleled opportunity to take a leadership position in the transition to a circular economy, both as a consumer of raw materials and as a steward of natural resources. Many of the solutions that are central to a circular water economy, such as integrated water management and nature-based solutions, have the potential to deliver multiple benefits, including enhanced social amenity and gains in biodiversity and natural capital.

However, the potential system-wide value that circular approaches offer is at risk of being missed as the water sector – in common with most others – equates circularity with resource recovery. This paper explores the origins of the Circular Economy, the opportunities and barriers to resource recovery – and calls on experts, innovators and entrepreneurs to develop system-wide tools which can support the transition to genuine circularity in the water sector, allowing the UK to take a leadership position on this critically important topic.



FOREWORD

There is no doubt that within the water sector, we live in the most exciting times. At no point in history have we been able or asked to deliver so much, for so many, and at such a pace.

The urban water cycle is inherently circular, but this circularity relies on hydrological processes to ensure that aquifers and surface water bodies continue to provide sources of supply. This continuity of supply has meant that the UK has come to rely on linear approaches through the subsequent use, treatment and discharge phases. However, climate change and population growth are putting unprecedented stress on the water system. Whilst water may be in abundance in one part of the cycle (eg surface water flooding owing to increasingly extreme rainfall) it is potentially in short supply in another (eg freshwater levels in water bodies and aquifers due to drought). Continuity of sustainable supply can no longer be assured.

Demand for new and advanced water infrastructure, services, products and technology remains unyielding, and is correlated directly with the expanding and diversifying expectations, needs and capabilities of our society. Yet at this time we are also faced with the

unparalleled imperative to protect and nurture our global environment, the full breadth and depth of the communities we serve, and the economic systems from which we profit. In this, we also need to foster a future that is flexible and sustainable enough to respond to foreseeable changes, as well as those changes that have not yet even been conceived.

This creates a significant infrastructure investment challenge as we strive to maintain resilient water supplies, and it also places an ever-increasing pressure on natural resources, and in turn on the environment that we are striving to protect.

This paper introduces the important role that a circular water economy can play in protecting nature by minimising waste and resource consumption, whilst simultaneously regenerating natural systems. It highlights the need to think and drive change at a system level, and to do this collaboratively and innovatively, to optimise value through the solutions that are delivered. And importantly, it introduces a number of challenges to kick-start the process of shaping and delivering a Vision for a circular water economy.



EXECUTIVE SUMMARY

There is an ever-growing demand for the water sector to set clear and unbiased objectives and targets for truly sustainable outcomes. Ultimately, this means that in planning, designing, procuring, constructing and managing water assets, products and services, we are constantly challenged to consider and balance a wide range of (and sometimes competing) lifetime factors: how can we realistically continue to meet the long-term demands of different societies, whilst also achieving low carbon and net zero solutions, gains in biodiversity and natural capital, social and gender equality, and climate resilience? A significant part of solving this conundrum lies in realising a circular economy. In its simplest form, the circular economy asks us to look past our traditional 'take-make-use-dispose' linear approach, to create a less wasteful and damaging, regenerative system. It embraces three key principles, to:

- Minimise and eliminate waste and pollution;
- Keep resources in use, at their highest possible value; and
- Regenerate nature, and thereby preserve and enhance the earth's natural capital.

These principles can be applied at all points around the urban water cycle, from abstraction through use, treatment and discharge back to the environment. For example:

- Catchment management can improve surface water quality and reduce treatment costs for potable purposes whilst buffering water quantity and reducing surface flooding;
- Demand reduction, improved water use efficiency (WUE) and water re-use create cost-saving cascades throughout the urban water cycle; and
- Moderation of surface water flows through adoption of Nature-Based Solutions (NBS) improves biodiversity, increases system resilience and delivers high quality amenity value.

Another key aspect of the circular water economy is that water becomes a vector for other resources during use. Nutrients (including carbon in many forms), solid particulates and energy all find their way into the water matrix. Whilst these additions might previously have been considered 'pollution', requiring removal during wastewater treatment, there is an increasing tendency to see such inputs as recoverable resources with value – from heat to biopolymers.

Taken together, these aspects provide the water sector with multiple opportunities to transition to a circular economy, both as a consumer of raw materials and as a steward of valuable natural resources.

Opportunities are diverse, ranging from recycling or re-using water, seeking alternatives to traditional 'grey' infrastructure and the materials that enable them, opportunities for repair and re-manufacture of mechanical and electrical equipment, and the potential for resource recovery from wastewater and sewage sludge (**Figure 2-1**).

From a resource management perspective the water sector is primed to explore and embed circular economy opportunities but it cannot do it alone – it will be necessary to establish symbiotic relationships whereby organisations can directly source recovered resources from one another and create markets for recovered resources. Collaboration with partners from within and outside the sector will be essential to deliver the system-level change that is required as we transition to a circular water economy.

The Water Sector is not unique in this respect. In the Waste Sector the circular economy has become synonymous with recycling ('resource recovery'), and indeed, metrics developed and implemented at a European level to monitor circularity in the wider economy focus largely on recycling activities and not on waste minimisation or nature regeneration.

This is instructive on several levels, as enabling Policy and Regulatory frameworks have been put in place to facilitate recycling and resource recovery in the Waste Sector. These frameworks provide transparency and market certainty, facilitating investment and driving transformation. Contrast this with the Water Sector, where no such frameworks exist.

While it might be argued that 100% of the basic resource (water) is recycled and that there is no need for change, robust public discourse around the security of water supply and quality of treated wastewater suggests otherwise. Viewing

environmental destinations through a circularity lens would help to illuminate synergies and opportunities that are absent from linear models. Nonetheless, in common with the Waste Sector, the Water Sector would benefit from enabling frameworks to support recovery of resources including water.

Setting out a Circular Water Economy vision and transformation strategy are beyond the scope of this white paper. We focus instead on some of the resource recovery and re-use opportunities available to the sector, as a mechanism for stimulating value creation, carbon savings and dialogue around wider circular economy opportunities. We also highlight opportunities and challenges to bringing other aspects of the circular economy to life through the absence of enabling Policy, Regulatory and Commercial frameworks – and challenge stakeholders to collaborate on an appropriate Vision and Transformation Strategy to enable a circular water economy that supports the needs of all in society.

