How to Embed Circular Economy Principles

in the Australian Water Sector

What is a circular economy?

"A circular economy is one that is restorative and regenerative by design, and which aims to keep products, components and materials at their highest utility and value at all times, distinguishing between technical and biological cycles".
Ellen MacArthur Foundation.

Why do we need to transition to a circular economy?

The UN World Water Development report described wastewater as one of the world's largest untapped resources.

The water sector has traditionally operated under a 'take-make-consume-dispose' model. However, the impending challenges of climate change, population growth and increased costs have made it increasingly, and rapidly, obvious that urgent changes need to be made to transition to a circular economy model.

What role can the water sector play?

There are benefits to the Australian economy as a whole from adopting circular economy principles, and the water sector in Australia and New Zealand has a key role to play in reducing emissions by embedding the circular economy principles model, with the potential for the industry to become carbon neutral.

This requires the industry to adopt new business models, and a new mindset that shifts from the traditional view of water that is fit-for-purpose.

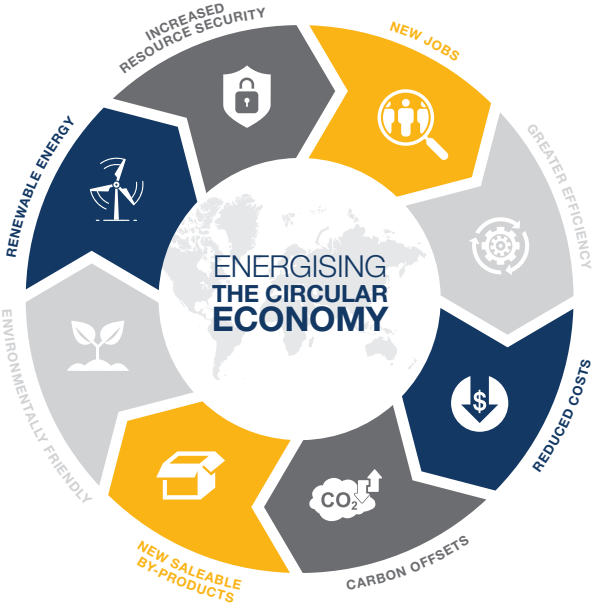
What are the **5 key outcomes** of a wastewater-based circular economy?

1. soil fertility programs
2. carbon capture and sequestration
3. a regional methane economy
4. optimisation and sharing of assets
5. closing the energy loop with hydrogen

Closing the loops

The circular economy in the water sector can be broken down into three interrelated pathways: the water pathway; the material pathway and the energy pathway.

Closing the loops between these three pathways results in the products and by-products of each sustaining one another, instead of going to waste, and increasing carbon emissions.



Integrated biogas systems

- An integrated biogas system based on anaerobic digestion of biosolids produced in municipal wastewater treatment could help close the material and energy loops and maintain economic sustainability.
- Anaerobic digestion with recuperative thickening digesters is globally recognised as a cornerstone technology to enable a circular economy to be established in the water sector. The new process can double treatment capacity and daily biogas output while halving production costs.
- Co-digestion of sewage sludge and regionally specific organic waste streams can be used to create a circular economy in which biofuels, bioplastics, biochar, enzymes, water and nutrient concentrates are recovered at increased rates using digestates, processed digestates, carbon storage materials and value-added fertilisers.
- Wastewater and sewage sludge have enormous potential for agriculture and industry under circular economy principles, which increases significantly when partnered with co-digestion.

The economic benefits of transitioning to a circular economy are self-evident. Treatment plants can be retrofitted with recuperative thickening digesters capable of energy self-sufficiency and deliver rapid payback on investment of less than four years.

The environmental benefit is the creation of a carbon neutral Australasian water industry. However, the key to doing so successfully, is for industry to adopt new business models.

About Us

Calibre provides a comprehensive interdisciplinary approach, combining engineering practice with biotechnology knowhow.

Our team specialise in:

- **Feasibility Studies**
- **Business Case**
- **Performance Assessment**
- **Cost Benefit Analysis**
- **Concept & Detail Design**
- **Engineering Support**
- **Commissioning**
- **Biological Process Optimisation**
- **Operations Support**

If you would like to find out more about building circular economy thinking into your projects, contact our expert team.

Contact Us

Jurgen Thiele

Business Unit Leader - Waste Recovery

P +64 21 780 727

E Jurgen.Thiele@calibregroup.com

Ragini Prasad

Water & Environment Leader

P +61 3 9203 9040

E Ragini.Prasad@calibregroup.com