WATER SERVICES
ASSOCIATION OF AUSTRALIA

CIRCULAR ECONOMY ACTION PLAN

A COMPANION VOLUME TO TRANSITIONING THE WATER INDUSTRY WITH THE CIRCULAR ECONOMY

MARCH 2022

Acknowledgement of Country

When it comes to circular economy, we have much to learn from First Nations peoples everywhere, who have always understood and practised circular approaches. Their traditions, knowing, land and water management could be considered the original circular economies.

Water Services Association of Australia acknowledges and pays respect to the past, present and future Traditional Custodians and Elders of Australia, and New Zealand. We recognise their continuing connection to land and waters and thank them for protecting our waterways and environment since time immemorial.

Acknowledgements

Water Services Association of Australia acknowledges and appreciates the work and guidance of

Utility members of WSAA's Circular Economy Community of Practice

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Executive summary

Adam Lovell
EXECUTIVE DIRECTOR

The circular economy is gaining momentum, and the water industry is well positioned to be a leading player. We are custodians of the most circular substance on earth, plus waste, energy and materials. We are also trusted, enduring foundation members of our communities, businesses with solid balance sheets and strong customer relationships. The nature of our operations gives us huge scope to contribute to national and international decarbonisation and sustainability goals, and provide opportunities for others.

We need to be a strong voice with decision-makers, in identifying areas to prioritise and how to overcome roadblocks. We also need the internal know-how to bring circular initiatives to life. Our Transitioning report explains key concepts, provides case studies from around the world, and offers strategic guidance on transitioning to a more circular way of operating. Thank you to the Institute of Sustainable Futures at the University of Technology, Sydney, for partnering with us to prepare it.

This Action Plan aims to steer the water industry through specific steps to accelerate the transition to circularity. We are not starting from scratch: our industry began this journey long ago, and many of our standard practices are already circular, such as recycling water for environmental flows, biosolids application to land, and restoration of waterway environments.

Many of our member utilities practise further circularity in their strategies and operations, for example through waste to energy schemes and using recycled glass for pipe embedments. For utilities who strive further, it will deliver reputational and balance sheet benefits.

The 2021 IPCC AR6 report highlighted the urgency for catalysing and embedding circular approaches for decarbonisation, to act in the vanishingly small window of opportunity before irrevocable damage occurs. Action needs to start now, seizing opportunities quickly as Australia, New Zealand and the world gears up its transition.

But renewable energy will only address 55% of the world's emissions reduction targets – 45% must come from industry and hard-to-abate sectors. The circular economy can complete that picture and create a thriving and sustainable model, where we live within our planetary boundaries.

Following workshops with participants in our Transitioning the water industry with the circular economy project, the Institute of Sustainable Futures outlined four strategic directions the industry and stakeholders could pursue, to address current challenges and opportunities for transitioning to a circular economy:

The 'why' is clear: there is significant value in adopting circular economy approaches for water utilities, society as a whole, and our natural environment

STRATEGIC DIRECTION	DESIRED OUTCOME
1 **Building circular economy knowledge**	Water utilities, stakeholders and policy-makers understand circular economy concepts, know how to integrate them into water industry plans and operations, and are equipped to realise opportunities. Shared learning will accelerate the transition to circularity.
2 **Establishing new business models**	Like any true economy, the circular economy requires products, services, producers, consumers and markets. The water and resource recovery industry of the future will have made transformative shifts beyond our 'core business' – business models may merge water, waste, energy, agriculture, manufacturing and construction – in innovative local initiatives that produce valued outcomes.
3 **Measurement of the circular economy**	Metrics and frameworks are shared to measure individual utility and collective progress towards circularity in water industry operations. Ultimately, targets, benchmarking and reporting frameworks could be established to drive further progress.
4 **Institutional transitioning**	Fit-for-purpose regulation, governance, pricing and research frameworks are in place to support and sustain a successful circular economy, including stakeholder partnership and collaboration opportunities.

This Plan contains a series of actions WSAA can undertake to help achieve the strategic directions, working closely with our water utility members and relevant stakeholders. WSAA has a lead role in supporting industry knowledge and capacity. WSAA can also play a pivotal role in representing water industry opportunities at a national level, advocating for our needs, and ensuring we can maximise our contribution. We also look forward to supporting our member utilities who are producing their own circular economy plans.

A fundamental point is that no single entity can create a circular future on their own. Implementing the circular economy locally, regionally and globally, needs to be driven by widespread, multi-pronged cross-sectoral collaboration. A network of specialist organisations has emerged to help spark action and connectivity, incubate ideas, engage with communities and pinpoint funding opportunities. We will forge strategic partnerships with these players to aid collaboration and information-sharing. We will leverage our strategic position and national networks to amplify their work and help propel the industry forwards.

The coming years will feature opportunistic activity, hand in hand with well-planned initiatives at the strategic and tactical level. Careful research will also help determine the most effective ways forward; therefore, this Action Plan aligns with the National Research Priorities Agenda developed by WSAA and Water Research Australia in 2021.

There are some step changes on the horizon for the Australian/New Zealand water industry over the next few years. One is further tapping into the synergies of the water/climate/energy/food/waste/agriculture nexus – we expect to see a shift from sporadic collaboration, to systems-level cooperation. Water utilities will have a greater role to play in a green energy future that helps close the energy, water and materials cycles. The role of blue and green infrastructure for urban regeneration, cooling and heating, will become even more important.

We will progress the elements within our grasp, and work with others to create momentum. We warmly invite organisations who wish to collaborate, to join us on the journey and help us close the loop.

1 What is the circular economy?

The concept of the circular economy has been gaining traction globally over the past decade. The serious impacts caused by the linear practices of **take-make-use-dispose**, have pushed the demands of our society beyond the limits of our planet. The 2015 Planetary Boundary Analysis[1] showed a significant reduction in genetic diversity, depleted phosphorus and nitrogen stocks (with much lost to rivers and oceans), and falling efficiency of nutrient use in food production.

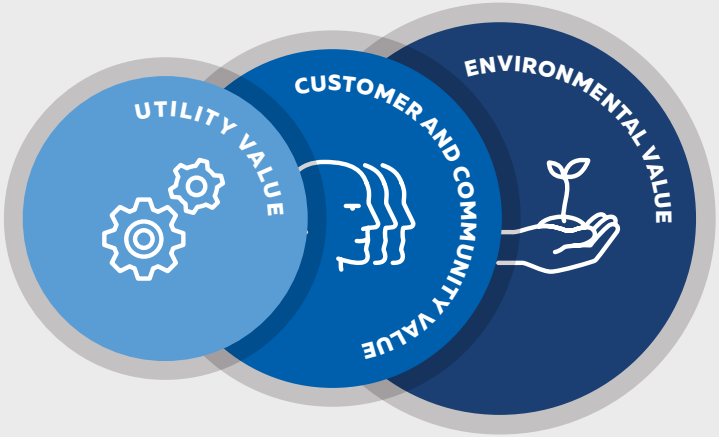
1 Steffen W et al, (2015), Planetary boundaries: Guiding human development on a changing planet, Science 347, Issue 6223.

The Ellen Macarthur Foundation[2] in the UK, the global thought-leader and advocate for the circular economy offers this definition:

> Looking beyond the current **take-make-dispose** extractive industrial model, a circular economy aims to redefine growth, focusing on positive society-wide benefits. It entails gradually decoupling economic activity from the consumption of finite resources and designing waste out of the system. Underpinned by a transition to renewable energy sources, the circular economy builds economic, natural and social capital.
>
> It is based on three principles:
>
> - Design out waste and pollution
> - Keep products and materials in use
> - Regenerate natural systems.

The shift from a linear to a circular economy has many economic, social and environmental benefits. It allows companies to create more value while reducing their dependence on scarce and costly resources. Once investment signals are aligned with circular principles, the circular economy will be autonomous and self-sustaining.

The value in adopting a circular economy approach



Utility value

- Leaders in innovation
- Drivers of transformational change
- Optimised operational cost
- Deferred capital investments
- Resilience to resource shocks
- Business diversification opportunities
- Increased adaptability
- Inspired workforce
- Community trust

Customer and community value

- Affordable services
- Reliable and resilient services
- Liveability outcomes – greening and cooling
- Increased local jobs

Environmental value

- Lower GHG emissions
- Reduced landfill disposal
- Improved waterways and ocean health
- Sustainable resources through reuse
- Ecosystem protection and regeneration
- Increased nutrient capture and soil health

2 Ellen MacArthur Foundation, ellenmacarthurfoundation.org (accessed 14/11/18); Ellen MacArthur Foundation, SUN, and McKinsey Center for Business and Environment, Drawing from Braungart and McDonough, Cradle to Cradle (C2C).

We already have a circular history to be proud of

Water managers have many materials that were once considered waste – nitrogen, phosphorus, hydrogen, cellulose, heat, plastic, organic waste and biosolids – in our grasp to transform and reuse again. Our opportunity to adopt circular economy principles to manage resources, make and use products, and regenerate natural systems is substantial.

In a circular economy transition, the focus is on achieving multiple benefits, watershed-scale thinking and action, supply and demand planning, cross-sector partnerships and engagement of all. We want our customers to know that we are striving, not just to minimise our impact, but to leave the world in a better state than we found it.

The journey began long ago: we have already transitioned from the delivery of basic centralised water, sanitation, and stormwater services as separate systems, towards the protection of waterways and in some cases a whole of water cycle approach, including water recycling for multiple end uses. Our wastewater business in particular, involves a lot of circularity already.

We collect a hitherto undesired waste product, and reuse it in a way that solves multiple problems:

- Regenerate the aquatic environment, by removing thousands of tonnes of reactive nitrogen and phosphorous each year
- Supply water, carbon and nutrients to farmers and land managers
- Supply water to industry and recreational facilities
- Process sewage sludge into biogas for renewable energy and heat generation, where feasible
- Lead the blue and green infrastructure revolution, to remove nutrients from waterways, sequester carbon, and provide the community with significant co-benefits like pleasant recreation sites, restored waterway habitats for flora and fauna, and urban cooling and greening.

Some Australian and New Zealand case studies of these practices can be found on the WSAA website, here, and some further global examples can be found in our Transitioning report.

Continuous improvement is deeply ingrained in water industry culture. For wastewater, the industry will build on its leadership and existing levels of circularity in future, while striving for greater opportunities and to shift innovative practices towards business-as-usual.

We expect to see more waste to energy schemes and more business models leveraging synergies across water, waste, energy, agriculture, manufacturing and construction. WSAA's recent report WATER: Fuelling the path to a hydrogen future: The role of the urban water industry in Australia and New Zealand's renewable energy future, outlines the pivotal role our industry can play in the green hydrogen revolution.

For water, circular economy offers great scope – the water cycle itself is intrinsically circular, and our core operations can help to regenerate natural capital. Adopting circular economy approaches will boost the climate resilience of our water supplies, through greater use of recycled water, including to supplement drinking water storages, and all beneficial uses where there is surplus water available.

Greater harnessing of the full water cycle will also improve catchment management outcomes, by improving the quality of water flowing into rivers and dams, which is beneficial for public and environmental health.

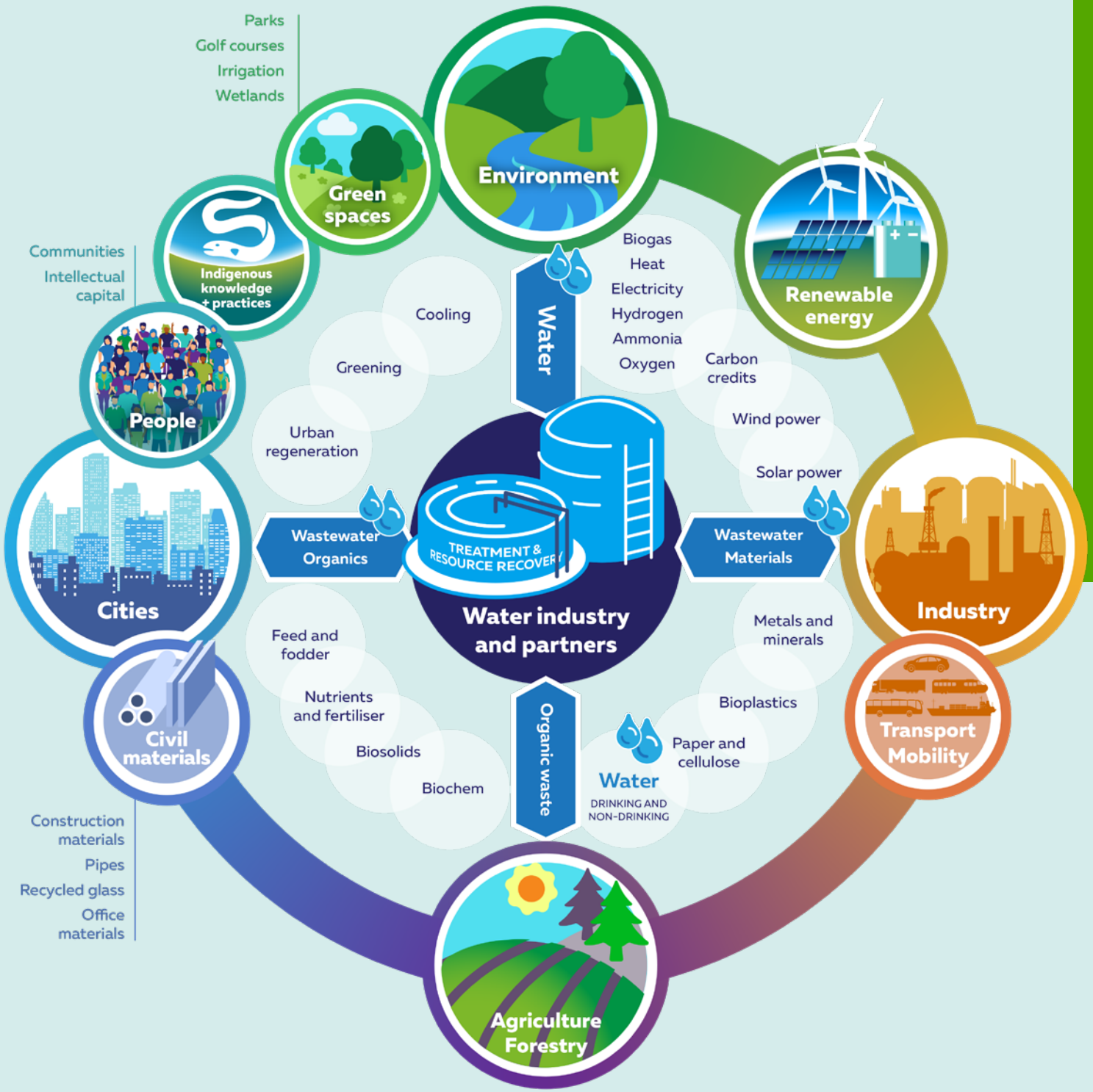
This will also deliver urban regeneration gains – allocating greater environmental flows will help to restore streamflows that have been modified by European settlement. In fact, greater recognition of cultural flows and Indigenous water management practices will make for more circular ways of managing our water cycle.

This also aligns closely with the Sustainable Development Goals (SDGs), which set out ambitious outcomes that encapsulate the circular economy. Many urban water businesses have committed to the SDGs and envisage the future as very different to the past. The nature of our operations means the water industry's potential contribution to the SDGs is sizeable.

Circular economy is not 'recycling on steroids', nor 'a new word for sustainability'. The transition can be characterised by how far we have moved from business-as-usual practices - sustainable solutions that can be implemented by utilities within their sphere of operation and knowledge; towards restorative solutions, that consider a broader material systems view; and regenerative solutions that seek a net-positive outcome for our environment and society.

2 Key circular economy opportunities for the water industry

Water utilities are at the heart of regions and communities, and can play a central role in embedding circular economy approaches throughout their regions



Diversity of water industry opportunities in the circular economy

Given the role of water in the environment, cities, industry and agriculture/forestry, we can explore linkages across each of these domains, and the interplay between them for returning value to these domains

3 Vision

WSAA's vision is for the water and resource recovery industry to maximise efforts to regenerate our natural, urban and social environments, with circular approaches embedded through the length of our supply chain. The water and resource recovery sector of the future will be a leading model of circularity within its ecosystem: for designing out waste, and an active driver of the marketplace for circular goods and resources.

We will help connect demand and supply over different geographic scales. We will consciously avoid the linear approaches of the past. Taking a **no opportunity wasted**[3] approach to becoming more circular will simply be business as usual.

We will work with governments and strategic partners across various sectors, to find and seed innovative approaches that can scale to be commercially sustainable.

We will work with governments, regulators and communities to recognise and value externalities, and the broader costs and benefits of circular economy approaches.

Achieving total circularity is difficult, and there may not be a clear 'finish line', but the industry will always seek continuous improvement and efficiency gains. We will have accessible measurement frameworks in place including baseline assessments, targets and simple metrics for reporting progress. These will be integrated into existing industry benchmarking and reporting frameworks.

3 Icon Water 'No Opportunity Wasted' Ozwater presentation and Banksia Award winner

REGENERATIVE DESIGN FRAMEWORK

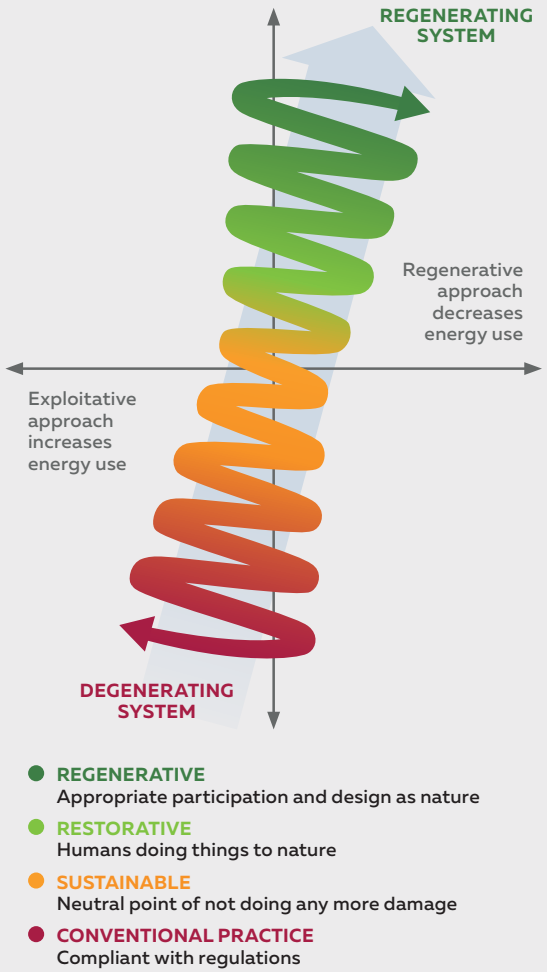


Image adapted from Reed, B. (2007) *Shifting from Sustainability to Regeneration*, Building Research and Information, 35(6), 61-76.

CIRCULAR ECONOMY PRINCIPLES	CIRCULAR ECONOMY EXAMPLES IN INTEGRATED WATER SERVICING
DESIGN OUT WASTE EXTERNALITIES	Designing for the most efficient amounts of energy, minerals and chemicals to be used in the delivery of water services
	Optimising the amount of water used to deliver efficient customer services and benefits
	Designing best value use of water whenever possible
KEEP RESOURCES IN USE	Maximising the reuse and recycling of water and input resources
	Optimising the use and extraction of energy, nutrients, minerals and chemicals
REGENERATE NATURAL CAPITAL	Maximising environmental flows by reducing consumptive and non-consumptive uses of water
	Returning treated wastewater to waterways where viable and best value
	Preserving and enhancing the natural and urban environment by maintaining water in the landscape for greening and cooling
	Minimising disruption to natural waterways through preventing pollution and improving the quality of discharge effluents

Circular economy principles: Ellen MacArthur

4 Building blocks for a circular economy transition

"In our current economy, we take materials from the Earth, make products from them, and eventually throw them away as waste – the process is linear. In a circular economy, by contrast, we stop waste being produced in the first place." ELLEN MACARTHUR FOUNDATION

Create knowledge, capacity and cultural awareness through tools, training, artefacts and resources. This includes why the circular economy is imperative, plus practices, learnings, research, best practices, successes and failures with different levels of governance, sectors and communities.

Leadership, stakeholder engagement and communication to promote the benefits of circular economy approaches, raise awareness of activity and outcomes, and invite others to join the journey.

Highlight the markets, end uses and opportunities available to the water and resource recovery industry, as a producer and consumer of goods and services, and potential partner with others industries, to design out waste, keep resources in use, and regenerate natural capital.

Create partnerships and forums for people to network, learn, co-create and help build the circular economy ecosystem. Forge strategic relationships within the industry and beyond – local, regional, global – to seed further learning and collaboration. Water businesses are well placed to lead and coordinate joint efforts in a region.

Scope frameworks and strategies to embed circular approaches into business-as-usual operations, overcome regulatory and other barriers, and secure investment.

Identify/devise systems and frameworks to measure circularity in our operations, individually and in the sector overall, to drive learning and continuous improvement, and celebrate gains.

5 Strategic action plan

STRATEGIC DIRECTION	BUILDING BLOCK	STRATEGIC ACTION	BRINGING IT TO LIFE	TIMELINE
1 Building circular economy knowledge	Knowledge	1 Enhance knowledge, capacity and training with tools, resources and case studies	Circular Economy Water hub to listen, learn and share, with education tools and resources. Map the circular economy ecosystem. The hub will be on WSAA's new Water360 website, which is open to utilities, adjacent industries and stakeholders	START NOW
			Practitioner forums, webinars will share ground-breaking examples for inspiration, learnings, good practice and contacts. Local and global case studies will cover new and existing assets, financial and risk aspects	ONGOING
			Updates on evolving policy and regulation where these relate to common national themes, that WSAA can support through national advocacy (noting many circular economy settings are state-based)	

STRATEGIC DIRECTION	BUILDING BLOCK	STRATEGIC ACTION	BRINGING IT TO LIFE	TIMELINE
2 Establishing new business models	Opportunities	2 Explore circular economy opportunities for the water industry, promoting end markets and product uses	Explore key existing and new markets, and opportunities in supply chains, and for blue/green infrastructure in urban cooling and greening, to highlight their potential contributions to circularity	START NOW 1-2 YEARS ONGOING
			Prepare thought-leadership papers on key opportunities, alone or in partnership with other sectors, covering scope, benefits, value, constraints, risk, governance models, and pathways to commercialisation. For example, WSAA's 2021 report WATER: Fuelling the path to a hydrogen future: The role of the urban water industry in Australia and New Zealand's renewable energy future highlighted the role our industry can play in supporting the hydrogen revolution	
			Future opportunities could include biogas; recycled embedments; water recycling; food/garden waste; biosolids/biochar, and urban greening and cooling through blue/green infrastructure; quick wins for smaller/regional utilities	
			This would guide WSAA's activities, help our members and stakeholders pursue key initiatives; plus capture knowledge gaps and identify areas for national action	
		3 Drive technology awareness and demonstration	WSAA's W-Lab platform spearheads raising awareness of the availability and readiness of technologies that can meet emerging needs and challenges captured through the W-Lab Technology Roadmap	START NOW 1-2 YEARS ONGOING
			WSAA can facilitate identification of technology needs and gaps, and work with research bodies such as Water Research Australia to support validation, quality control, standards and certification. There are many other bodies pursuing technical advancement programs such as Cooperative Research Centres	

STRATEGIC DIRECTION	BUILDING BLOCK	STRATEGIC ACTION	BRINGING IT TO LIFE	TIMELINE
2 Establishing new business models	Pathways	4 Overcoming policy, commercial and regulatory barriers	Scoping workshops to identify regulatory, economic or technical barriers, such as regulations on by-product use, manufacturer responsibility for contaminants, policy bans on recycling, or constraints on cross-market participation eg water utilities supplying energy directly to customers	START NOW
			Consider strategies to address them, such as financial incentives, changes in regulatory settings and policy, or creation of a mandate for implementation	
			WSAA can highlight common themes through our national advocacy, and liaison with peak bodies. Many barriers will be state-specific, which utilities may be best placed to address	
		5 Build investment and funding capability	Share knowledge on investment and funding strategies for case studies including public-private partnerships, investment details, regulatory arrangements, and available government/other grants	1-2 YEARS
			Lead dialogue with national stakeholders around investment challenges, referencing state-based examples. Continue WSAA work on methods for valuing external benefits	ONGOING
3 Measurement of the circular economy	Measurement	6 Evaluate tools and frameworks to measure circular economy at various scales	Explore measurement tools and frameworks in use globally to track levels of circularity and participation, and consider their applicability locally. This could extend to development of standardised metrics or frameworks for reporting progress (voluntary initially). Consider their scope for inclusion in existing reporting frameworks and WSAA's national benchmarking program	1-2 YEARS ONGOING

STRATEGIC DIRECTION	BUILDING BLOCK	STRATEGIC ACTION	BRINGING IT TO LIFE	TIMELINE
4 Institutional transitioning	Collaboration	7 Explore collaborative forums for existing and new markets, along the whole supply chain	Lead and foster cross-industry liaison. Where potential projects or market confluences at various scales are identified, WSAA will support partner organisations to enable further scoping. Lead liaison with peak circular economy bodies, amplify their work seeking to connect producers and consumers, advocate for our needs and contribution.	START NOW 1-2 YEARS ONGOING
			Share guidance on suppliers, vendors and purchasers and explore place-based local circular economy opportunities	
	Advocacy	8 Position the water industry as a resource recovery sector	Underpinning all actions is a redefining of the sector from 'water and waste', to an expanded value proposition including production, consumption and resource recovery, a practice which is gathering momentum globally	START NOW 1-2 YEARS ONGOING
			WSAA has nominated fostering the circular economy as a core Industry Priority	
			Showcase the sector's activity and advocate for the benefits of circular economy spreading from local, to regional, to cross-sectoral, to global	
			WSAA papers on the economic contribution of the water sector, and resource recovery naming convention	
		9 Promote all options on the table concepts	Ongoing leadership of national water reform – the Productivity Commission echoed our calls for all options on the table for water supply. We hope others will echo us in their own spheres of influence	START NOW 1-2 YEARS ONGOING
			Continued advocacy for efficient recycling including purified recycled water for drinking and integrated water management; national coordination on water literacy, terminology and research	

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