WATER SERVICES
ASSOCIATION OF AUSTRALIA

HELP US HELP YOU

AUSTRALIAN WATER SECTOR OPPORTUNITIES AND BARRIERS TO CIRCULAR ECONOMY

Submission to the Circular Economy Ministerial Advisory Group

HELP US HELP YOU

Australian water sector opportunities and barriers to circular economy

December 2023

Water Services Association of Australia (WSAA) is the peak industry body representing the urban water industry. Our members provide water and sewerage services to over 24 million customers in Australia and New Zealand and many of Australia's largest industrial and commercial enterprises.

Traditional Custodians acknowledgement

WSAA acknowledges and pays respect to the past, present and future Traditional Custodians and Elders of this nation. We recognise their continuing connection to land and waters and thank them for protecting our waterways and environment since time immemorial.

Acknowledgements

Thank you to the WSAA member utilities that provided input to this paper.

More information

Please contact info@wsaa.asn.au

Attention Circular Economy Ministerial Advisory Group, established by the Hon. Tania Plibersek, Minister for Environment and Water
Secretariat: CircularEconomy@dcceew.gov.au

Dear Council members,

The urban water industry of Australia is keen to work with the Ministerial Advisory Group on Circular Economy (CE MAG), to help accelerate the journey we are already on towards circularity, and contribute to national decarbonisation, environmental restoration and liveable cities objectives.

Water does not currently appear on the CE MAG's timeline and workplan of sectors with the biggest opportunities for driving Australia towards a circular economy[1] . Since water underpins every other area and product that is identified, we believe it warrants a place. Australian water utilities can contribute to the circular economy transition by 2030 and beyond, by:

- Optimising the value of water resources – natural, treated and recycled
- Harvesting and returning nutrients, metals and other resources from wastewater streams and organic materials, to optimise their value to the economy
- Embracing the 9 'Rs' to reduce and optimise resource use to enhance the economic benefit of water, nutrients and other elements
- Contribute to national goals including renewable energy, carbon capture and storage, regenerating natural systems, designing out waste, climate adaptation, and providing affordable essential services
- Keeping resources in the economy, at their highest value, for as long as possible
- Building new revenue streams and jobs, with domestic and export markets, as both a seller and purchaser of circular materials and services
- Keeping water locally for urban greening, cooling and water-based amenity such as swimmable water bodies, parks, playing grounds and other recreation areas
- Enhancing the natural environment by minimising and avoiding environmental impacts from all sources; and through water industry participation in the Commonwealth Government's proposed nature repair market, and capacity to deliver environmental offsets and regenerate natural systems to achieve net positive environmental outcomes.
- Bringing a variety of stakeholders together by virtue of largely being government-owned geographic monopolies.

The circular economy is a key part of the water industry's operations and mindset, with their approach clearly articulated through the WSAA-led Circular Economy Action Plan for the water sector. The sector is already progressing several strong initiatives. National support from the CE MAG will better enable us to overcome key policy barriers and accelerate our progress including engagement with other sectors.

[1] https://www.dcceew.gov.au/environment/protection/circular-economy/ministerial-advisory-group

Based on our extensive engagement across the Australian water sector the following initial opportunities would benefit significantly from CE MAG support:

1. Biochar: Carbon sequestration from wastewater treatment
2. Reducing environmental impacts from plastics and sewage entering the environment, through improved management of wet wipes in wastewater systems
3. Nutrient offsetting opportunities for waterway system regeneration and habitat restoration
4. Optimising fit-for-purpose water reuse: for the environment, cooling and greening, industry, hydrogen, and drinking

There are many other opportunities as well – we propose this initial tranche as we believe the CE MAG can assist with the pathways for progress.

A key, ongoing challenge that hinders the water industry's efforts to contribute to national goals, is that most institutions, laws and policies governing water are at state/territory government level. The federal government can seek outcomes, but the levers are often held by state/territory governments which hinders progress and cohesion. Creating targeted national levers to may help accelerate progress within state-based frameworks – such as enhancing national guidelines on water recycling.

The renewed National Water Initiative (NWI) is currently being developed by the Commonwealth government, seeking all state and territory governments to sign on. It should be a useful vehicle for galvanising consistency, momentum and shared commitment between the Federal and state/territory governments. It may provide a pathway to address some of the challenges in this paper. We would like to see the CE MAG engage with the renewal of the NWI, and advocate for circular economy objectives, outcomes, actions and timelines to be included in the NWI – as a means of trying to harness policy-makers across the country to work together. The NWI should also ensure circularity is built into enabling aspects such as skills, training, recruitment and retention.

We would like to work with the CE MAG to progress the matters identified in this paper. If desired, we could outline our proposed water measures to the CE MAG's February or May 2024 meeting, and explore the opportunity to work collaboratively with the CE MAG on addressing them. A number of these activities are likely to deliver clear outcomes within the next 1-2 years.

The time to act is now, as many of our assets are high-cost, long-life investments and there is a significant investment opportunity in the near term with the expected replacement of assets that were installed during the post-war boom.

Focussing on urban water circular economy opportunities is also a strong national investment as we are the last remaining essential service that is primarily publicly owned. Any constructive government interventions to our operations will deliver benefits that go to communities and accelerate public amenity. We are a long-standing, well-trusted, efficient operator of public assets, and most water utilities have good standing within the regions and communities they serve.

We also note that the Goulburn Murray Resilience Taskforce are developing a separate paper to submit to the CE MAG, outlining the role water utilities and other trusted players can play in promoting circularity within a regional context. We support their approach as a positive case study which could complement our initiatives.

Yours sincerely,

Adam Lovell
Executive Director

Attachments:

- Opportunity summaries
- Water industry circular economy background
- Technical papers on each opportunity

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1 HELP US HELP YOU TARGET WATER OPPORTUNITIES

We propose four initial target opportunities for CE MAG collaboration below, based on:

- **Scale of potential benefit** – these activities do or could happen all across Australia, offering high potential compared to activities that are very location-specific
- **Specific improvement actions identified** – based on strong water utility engagement, WSAA has identified a plan of actions for the sector to progress this opportunity
- **Government support will help accelerate implementation** – we need support from governments in the form of policy and/or legislative change or support to accelerate progress.

We support the CE MAG's purpose to guide Australia's transition to a more circular economy by 2030, and advising the Minister for the Environment and Water on CE opportunities within specific sectors; regulatory, commercial and other barriers; best practice initiatives that show promise for adoption and/or expansion in Australia; plus research, development and innovation needs.[2]

We believe the water sector has promising initiatives and opportunities which could be greatly enhanced through assistance addressing certain key barriers. We are asking the CE MAG to help in various ways (details provided in attachments):

- Addressing policy barriers in relation to identified regulatory challenges
- Education of communities and consumers by raising awareness on specific challenges and opportunities through government networks and advocacy programs
- Actively engage in the National Water Initiative renewal process over the next 12+ months by urging support for circular economy Objectives, Outcomes, Actions and Timeframes in the National Water Initiative, to channel Federal, State and Territory governments to work together on shared pathways
- In some specific cases, we are requesting direct funding; such as $500k for an education campaign on flushable wipes, or in other cases, for the next stage of detailed research
- Create a mandate – sometimes we don't need grants, just the creation of an obligation to achieve a particular outcome or undertake an activity.

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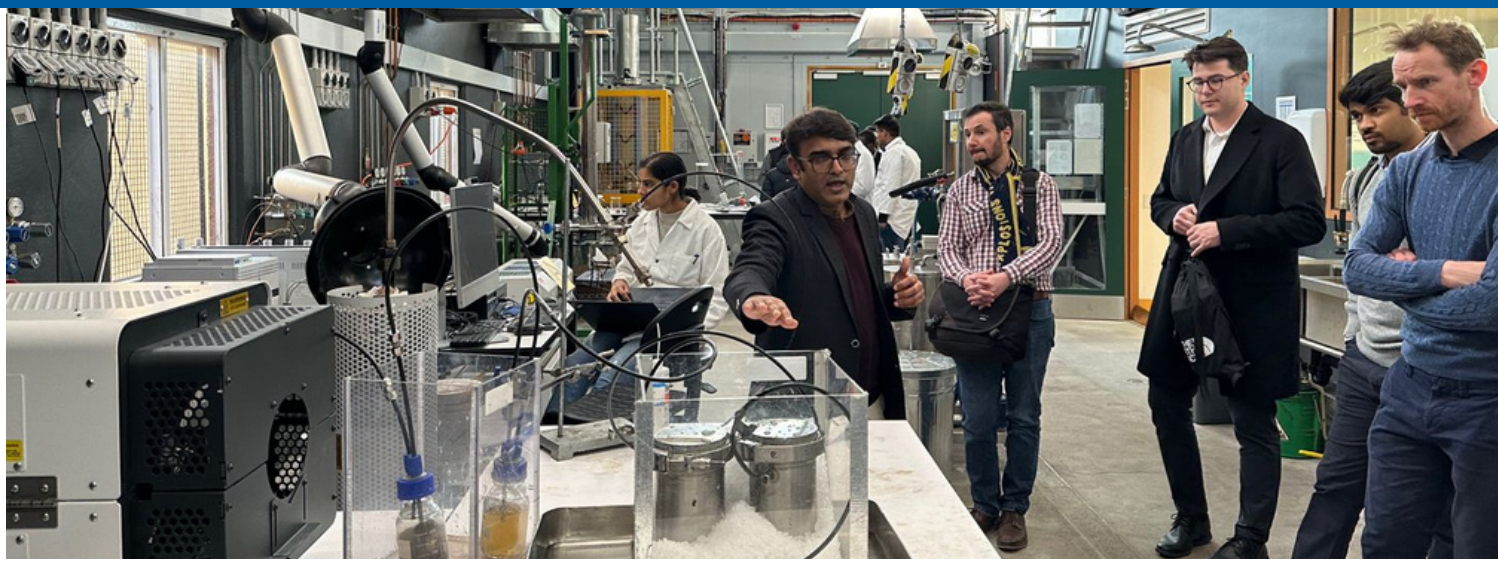
[2] https://www.dcceew.gov.au/environment/protection/circular-economy/ministerial-advisory-group



1. Biochar: Carbon sequestration from wastewater treatment

This is an innovative way to use the biosolids which are extracted at wastewater treatment plants all around the country. These biosolids can be thermally treated to produce a product (Biochar) that can capture and store carbon, destroy potential contaminants, and is a valuable soil improver.

Biochar is not the only option for how our industry could beneficially recycle organics – a range of options are available. However, as it is an opportunity that offers multiple benefits, and for which there is a well-documented roadmap, it is a good candidate to try and accelerate progress through CE MAG collaboration.

Biochar could add up to $700 million [3] to the Australian economy and make a substantial contribution to national decarbonisation goals. There are clear, concrete steps for different governments to help optimise the use of biosolids for biochar:

- Commonwealth – support creation of an ACCU method for biochar. The IPCC already lists it as an emissions reduction and CO2 removal pathway. This would open up valuable offset markets.
- Commonwealth – provide funding support for initial adoption of technologies to convert biosolids to biochar, and support market development for end users of biochar products.
- State/territory – address a regulatory barrier by decoupling the heat treatment methods for biochar (pyrolysis and gasification) from incineration, in the waste hierarchy. Pyrolysis and gasification, also known as carbonisation, provide uplift by turning biomass into stable carbon, rather than releasing it to the atmosphere, and produce renewable energy as a co-product. Incineration is also a mature technology with its own pros and cons, but the three are different and should not be grouped together.
- State/territory – change the classification of biosolids, and biochar derived from biosolids, as a waste, which typically attracts a waste levy and is challenging to move across borders. Instead classify them as a product or resource, to remove constraints and improve their marketability.
- The industry is working on understanding the geographic scales at which biochar from biosolids is commercially feasible, versus where funding support might be needed initially – we would welcome working with the CE MAG and other relevant organisations on this.

[3] Industry estimate based on potential market value of biosolids to higher value biochar

2. Reducing harm from wet wipes in wastewater systems

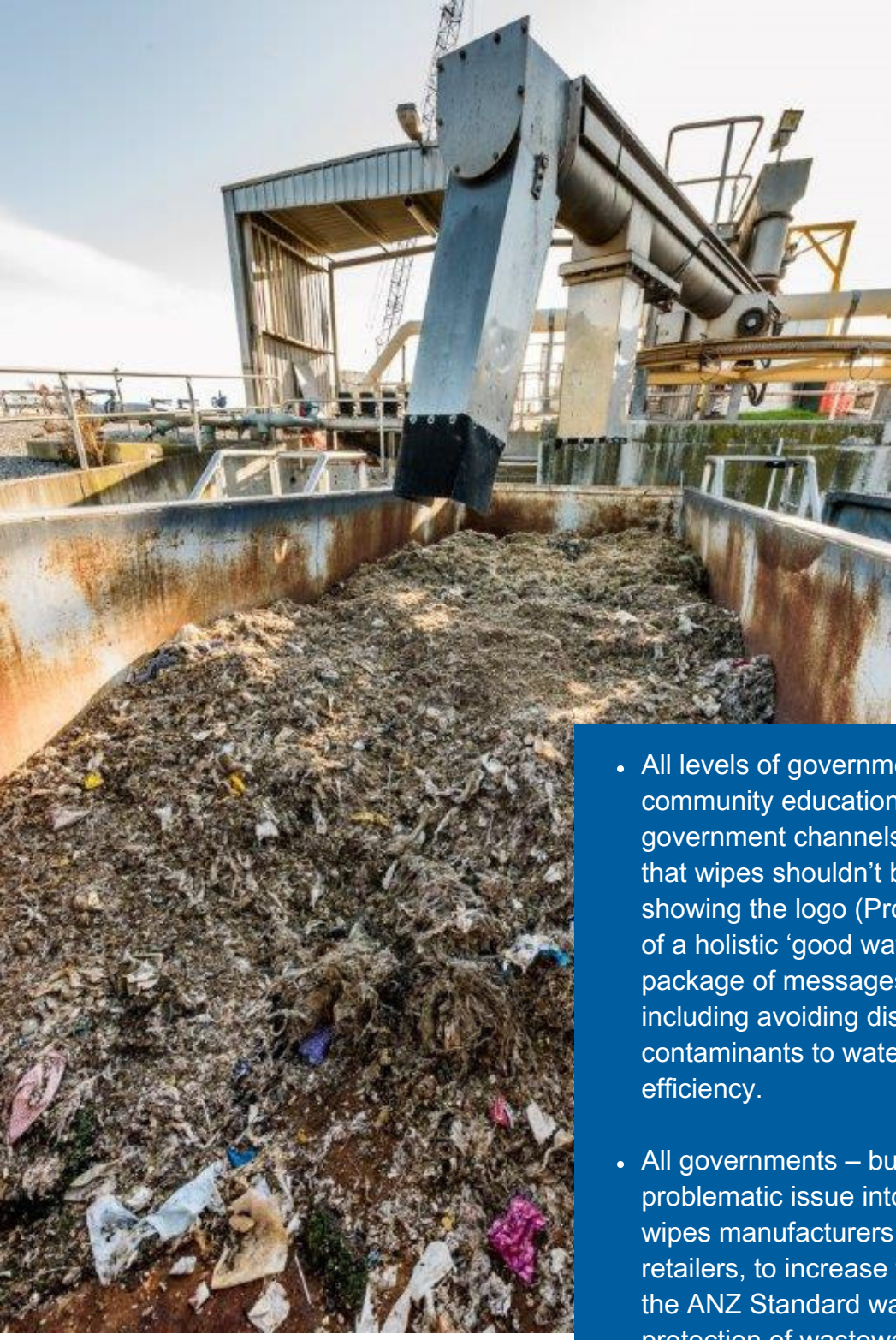
Wet wipes have been a growing international issue for water utilities since the early 2000s. The sales of these products have been steadily increasing since that time, as have the number of sewer blockages. Anecdotal information from water utilities in the last few years indicates that inappropriately designed wet wipes can cause significant sewer pipe blockages, costing in excess of $15M [4] per year to remove within Australia alone. While that may not seem a huge sum, this issue could be prevented with effective customer education. There are also additional costs at treatment plants, which are hard to quantify but widespread.

These blockages often lead to sewage spilling to the environment, which undermines the principle of regenerating nature. They also contribute to ‘fatbergs’ in sewers and wastewater treatment plants, which are complex and expensive for water utilities to remove, and add to customer water bills. They also undermine the principle of eliminating waste and pollution.

In addition, wet wipes may also contain single use plastics. The release of such materials to the environment has been banned in the European Union. There has been no clear standard to define material that is suitable for toilet flushing in Australia until 2022. The new Australian and New Zealand Standard [5] provides clear testing and labelling requirements. Prior to that time there have been products claiming to be suitable for toilet disposal which were not. For example: the White King flushable wipes, which received a $700k fine from the Australian Competition and Consumer Commission (ACCC) in 2018.

With the publication of the ANZ Standard there is now a clear opportunity to reduce sewage spilling to the environment along with the potential release of single use plastics from wet wipes. The standard has a grace period for manufacturers until May 2024. However, in the lead up to that deadline it is important to educate consumers through promotion of the ‘4 ps’ that can be flushed – pee, poo, paper and PROOF – the logo indicating that a wipe is flushable. The CE MAG and governments can support this important initiative by:

[4] Cross-industry estimate - noting there is very limited data available
[5] Flushable Products Standard (DR AS/NZS 5328:2022)



- All levels of government – leading some community education activities through government channels, to raise awareness that wipes shouldn't be flushed, unless showing the logo (Proof). This could be part of a holistic 'good water behaviours' package of messages for consumers including avoiding disposal of a range of contaminants to waterways, plus water efficiency.

- All governments – build awareness of this problematic issue into all engagement with wipes manufacturers and major food retailers, to increase their awareness that the ANZ Standard was developed to ensure protection of wastewater infrastructure and minimise customer bills. If manufacturers wish their products to be used in a bathroom setting and to be considered safe to flush down the toilet, then they should have an Australian Standard compliant logo.

- Governments should seek to limit the use of PFAS and other forever chemicals in supply chains for household products, as the water industry often inherits these as a problem we need to clean up.

3.Nutrient offsetting opportunities for waterway system regeneration and habitat restoration

‘Offsetting’ is most often associated with trading credits for decarbonisation activities. An evolving field is applying ‘offsetting’ principles to nutrient discharges within waterways and catchments. This is being demonstrated through various initiatives both internationally and within Australia. As with other offset schemes, these initiatives require careful consideration on the way in which offsets are delivered and evaluated. WSAA’s report, How A Nutrient Trading Regime Can Deliver Environmental Outcomes, presents case studies from Queensland, NSW and Victoria, and proposes governance framework approaches based on market mechanism experiences from Australia and overseas.

Protecting water quality, in the interest of public and environmental health, is at the heart of water utilities' operations. Effective wastewater treatment systems remove considerable amounts of solids, nutrients, and pathogens from sewage effluent before it is discharged into waterways. However, as licensed point source pollution activities, water utilities often face higher regulatory and community expectations compared to diffuse source pollution from stormwater or agricultural runoff, which typically have a more significant overall impact.

In certain circumstances, a combination of more stringent discharge standards and significant treatment upgrade costs reach a point of diminishing returns. Under such circumstances, it may be more effective to focus on measures related to restoring degraded riparian areas, improving stormwater treatment and enhancing land management practices, as more cost-effective measures for improving water quality and environmental conditions. These efforts can range from soft engineering and tree planting on riverbanks to prevent streambank erosion to creating fencing and riparian buffer strips to restrict livestock movements into and the pollution of riparian zones and waterways. In this context, nutrient offsets offer a market-based instrument for this, creating a holistic, catchment-based, pollution management approach across both point and diffuse sources.

Water businesses are well placed to play a far more holistic, beneficial role in catchment management, by facilitating and implementing strategies across multiple sources of pollution that go into waterways and catchments. This can support affordable essential services by reducing the need for high cost upgrades of wastewater treatment facilities, in circumstances where equivalent benefit can be gained at lower cost for the protection of waterways and catchments.

Overall, the state and trend of the environment of Australia is poor and deteriorating as a result of increasing pressures from climate change, habitat loss, invasive species, pollution and resource extraction (DCCEEW State of the Environment Report 2021). This is doubly concerning as community wellbeing and a stable economy are underpinned by healthy land, water and marine environments.

As such, the approach to offsetting is one of many ways that water utilities are able to deliver on the regenerative principle within the circular economy. When considered holistically, with actions for nature repair and climate change mitigation, this approach has the potential to build ecosystem and urban resilience for the future. CE MAG support could include:

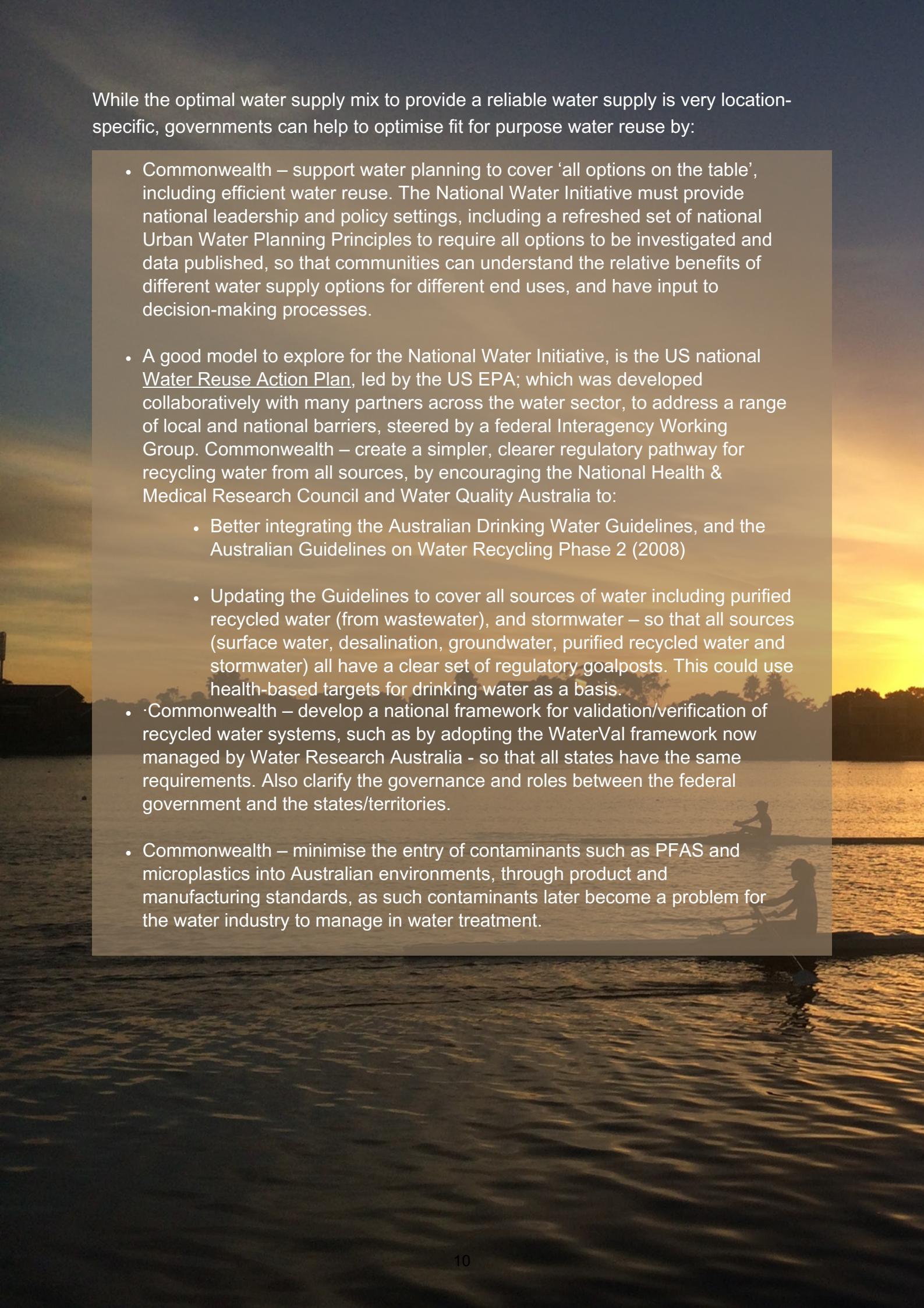
Commonwealth government –

- Strengthen broader markets: Conduct review to align waterway nutrient trading with existing carbon and nature repair markets, guided by ACCU review, and incorporate valued co-benefits such as biodiversity and First Nations participation.
- Reporting standards: Host workshops for alignment with Taskforce for Climate-Related Financial Disclosures and International Sustainability Standards Board frameworks, develop metrics and templates, and establish third-party verification for nutrient credits.
- National Health and Medical Research Council + Water Quality Australia – Clarify the policy and regulatory framework for stormwater harvesting and reuse – which also reduces runoff and nutrients to waterways but suffers from a complex governance framework.
- Engage buyers & social licence: Implement outreach and market sounding program focused on operational risks and investor confidence, using WSAA study methods for social license identification.
- Urban water industry role: Co-develop white paper to align urban water industry with federal environmental objectives, including pilot projects and funding sources.
- National Water Initiative:
- National methodology: Develop standardised methodologies for non-point source actions in nutrient offsetting, based on successful international models, including how to achieve ‘nutrient impact equivalence’.
- Establish guidelines for state and local water businesses, supported by principles for nutrient trading and market integration, within carbon and biodiversity offsets.
- All levels of government – Support measures to build Traditional Owner capacity in caring for Country, in waterway and land management, and for First Nations participation in emerging markets such as carbon, nutrient and biodiversity offsets.

4.Optimising fit-for-purpose water reuse

Traditional linear approaches involve collecting and using water once, then treating and disposing of it. While some water in Australia is recycled, there remains scope to harvest more water at various stages of the water cycle (including surface water sources, stormwater and treated water). The water can be treated and reused in fit-for-purpose ways, for everything from irrigation, industry, environmental discharge, urban cooling and greening, hydrogen production, and supplementing drinking water supplies. We would like to see ongoing regulatory support to maximise efficient water reuse.

Maximising water reuse enhances water security through less reliance on rainfall-dependent and linear system supplies. It can also reduce the impact of drought, floods and bushfires, which all put pressure on water storages and filtration systems. However securing investment for water recycling schemes can be difficult – non-drinking recycling schemes can be higher cost than other options. It has typically been difficult to quantify the benefits created by such schemes, especially when beneficiaries are broad, including the environment itself.



While the optimal water supply mix to provide a reliable water supply is very location-specific, governments can help to optimise fit for purpose water reuse by:

- Commonwealth – support water planning to cover 'all options on the table', including efficient water reuse. The National Water Initiative must provide national leadership and policy settings, including a refreshed set of national Urban Water Planning Principles to require all options to be investigated and data published, so that communities can understand the relative benefits of different water supply options for different end uses, and have input to decision-making processes.

- A good model to explore for the National Water Initiative, is the US national Water Reuse Action Plan, led by the US EPA; which was developed collaboratively with many partners across the water sector, to address a range of local and national barriers, steered by a federal Interagency Working Group. Commonwealth – create a simpler, clearer regulatory pathway for recycling water from all sources, by encouraging the National Health & Medical Research Council and Water Quality Australia to:
    - Better integrating the Australian Drinking Water Guidelines, and the Australian Guidelines on Water Recycling Phase 2 (2008)

    - Updating the Guidelines to cover all sources of water including purified recycled water (from wastewater), and stormwater – so that all sources (surface water, desalination, groundwater, purified recycled water and stormwater) all have a clear set of regulatory goalposts. This could use health-based targets for drinking water as a basis.
- ·Commonwealth – develop a national framework for validation/verification of recycled water systems, such as by adopting the WaterVal framework now managed by Water Research Australia - so that all states have the same requirements. Also clarify the governance and roles between the federal government and the states/territories.

- Commonwealth – minimise the entry of contaminants such as PFAS and microplastics into Australian environments, through product and manufacturing standards, as such contaminants later become a problem for the water industry to manage in water treatment.

State/territory –

- Adapt water planning and pricing frameworks, and policy settings, to make it easier to place a financial value on the indirect benefits of recycling schemes, and allocate these benefits within pricing frameworks, and prioritise local use of recycled water (which creates smaller loops for circular economy). This could include tools like the NSW Interim Framework for Valuing Green Infrastructure and Public Spaces.

- Better integrate land and water use planning. Where land planning occurs first and water planning follows separately, opportunities are missed for sympathetic co-locations – such as paths and cycleways that provide infrastructure corridors, biodiversity habitats and green spaces.

- Consider creating incentives for efficient recycling. It should also include integrating land and water planning; and investigate experience in places like the United States, where extensive government investment incentives (Title XVI) are available for water reuse programs.

- All levels of government - educate and work with elected officials, communities and stakeholders, and encourage bi-partisan support for recycling of water (including recycled wastewater and stormwater). A key element is education – build greater awareness that recycling is part of the natural water cycle. This should include explainers that used water is already extensively recycled to the environment, and that unacknowledged reuse of water used by upstream communities has always been a part of the urban water cycle.

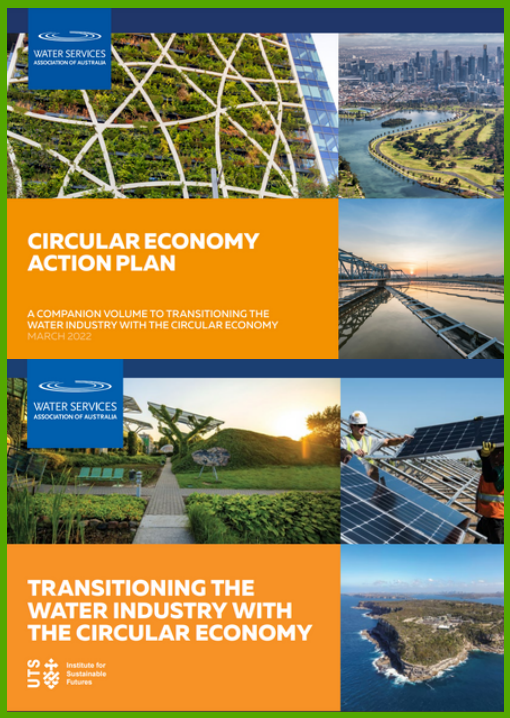
2

HELP US HELP YOU
WATER INDUSTRY CIRCULAR ECONOMY BACKGROUND

The urban water industry is already on the path to circularity

We practice circularity when we take water from the environment, treat it for use by communities, clean and return it to the environment. We have a long history of managing and restoring natural capital, through our management of riparian (river) zones.

Apart from the water itself, the wastewater that comes through our hands is a goldmine for circularity. Water utilities around Australia have been trialling or implementing resource recovery applications such as water recycling, waste to energy (collecting biogas from wastewater treatment and converting it to renewable energy and heat), producing green hydrogen with water and electricity, and beneficial reuse of dried wastewater treatment biosolids, in forestry and land restoration.



In 2020 we published Transitioning the Water Industry with the Circular Economy, and in 2022 we followed this up with the industry's Circular Economy Action Plan.

What are our opportunities?

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

We sit at the core of an ecosystem: we take materials from the environment, treat and give them to communities, then receive materials again in the form of waste. Our treatment and resource recovery facilities are hubs that can transform these materials into useful resources.

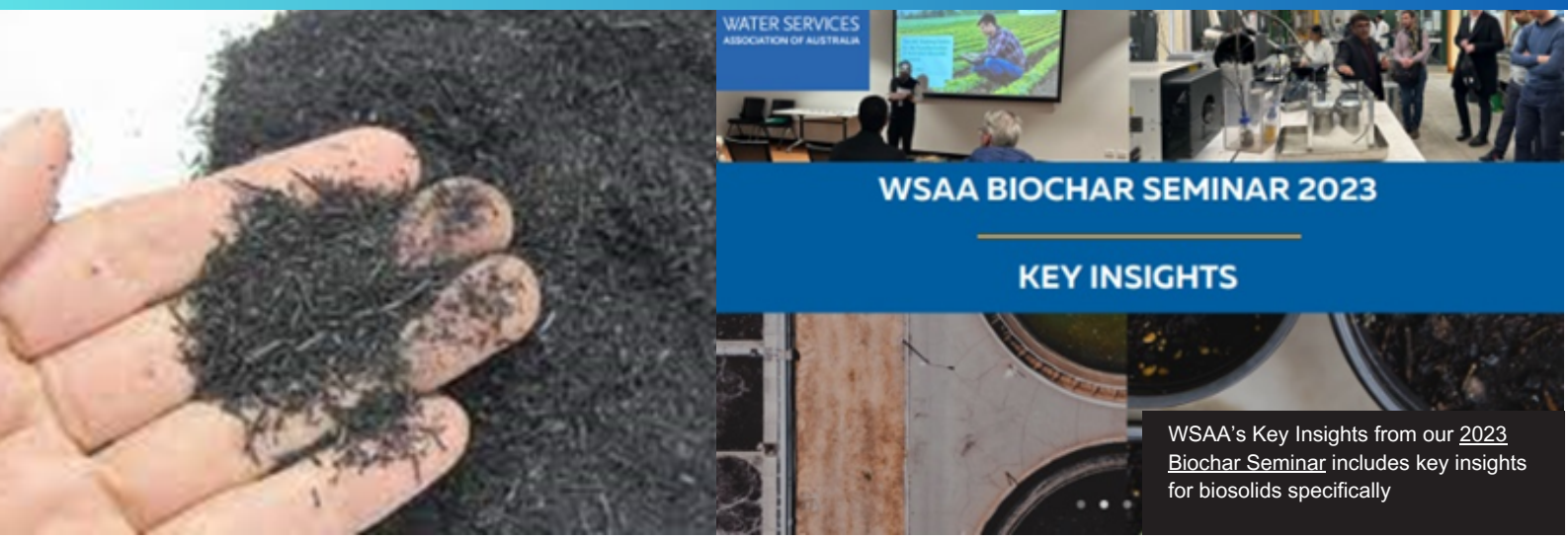
WHAT STRATEGIC STEPS DO WE NEED?

WSAA's Circular Economy Action Plan identifies nine steps to accelerate circularity in the urban water industry:

STRATEGIC DIRECTION	BUILDING BLOCK	STRATEGIC ACTION	BRINGING IT TO LIFE
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 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 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)
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 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 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
	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 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 Lead dialogue with national stakeholders around investment challenges, referencing state-based examples. Continue WSAA work on methods for valuing external benefits
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
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. 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 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 Continued advocacy for efficient recycling including purified recycled water for drinking and integrated water management; national coordination on water literacy, terminology and research

3 HELP US HELP YOU OPPORTUNITY TECHNICAL PAPERS

OPPORTUNITY 1: BIOCHAR - TECHNICAL PAPER



WSAA's Key Insights from our 2023 Biochar Seminar includes key insights for biosolids specifically

We can transform biosolids from wastewater treatment around Australia, into a reliable carbon-capture and storage product – one that can also provide valuable soil benefits, and solve water industry waste management challenges.

What is it?

Biochar is a stable, carbon-rich material produced by heating sustainably obtained biomass under controlled low oxygen conditions using a clean technology, which is specifically used to store carbon in a durable form (in both soil and non-soil/industrial applications). Biochar can be made from many biomass feedstocks, such as forestry residues, crop straw, manure, urban green-waste and biosolids from wastewater treatment. Biochar can be used as a soil improver and has a range of other non-soil potential applications (water management, road construction, cement, building materials, and more) that provide multiple benefits.

Biochar is not the only option for how our industry could beneficially reuse organics. Other avenues including incineration are also relevant. However, it is an opportunity that offers multiple benefits, and for which there is a well-documented roadmap, so it is a good candidate to try and accelerate progress.

Biochar is recognised by the IPCC as an effective method for climate change mitigation, providing a double benefit from emissions reduction and CO2 removal, with a potential abatement of up to 6.6 Gt CO2e per year globally [6]. This is estimated to be roughly equivalent [7] to all US CO2e emissions.

Disposal/reuse of biosolids from wastewater treatment is a growing challenge for water utilities globally. There are increasing operational costs such as transport costs, and increasing regulatory attention to contaminants of emerging concern, such as PFAS and microplastics. The water industry does not create these contaminants – they arise in industrial effluents, firefighting, and the manufacture and use of domestic, household and clothing items. However they become 'our problem' as they can be found in the effluents that make their way from communities to our wastewater treatment plants.

Water utilities have a major opportunity to turn this problem into a benefit for emissions reduction, soil and waterway health. This could also boost our revenue base through the production of biochar offsets.

[6] IPCC, 2022. Sixth Assessment Report, Climate Change 2022: Mitigation of Climate Change. https://www.ipcc.ch/report/ar6/wg3/
[7] ANZBIG Biochar Roadmap 2022, p7

Alignment with circular economy

Biochar helps deliver on all three pillars of a circular economy:

- It eliminates biosolids waste, by destroying pollutants of emerging concern such as microplastics and PFAS, thus enabling beneficial reuse.

- It harnesses otherwise wasted resources, and returns them to the economy as high-value products, building new revenue streams for water utilities. This includes domestic sales as an agricultural amendment, industrial agent in concrete, asphalt, inks, and resins[8], and potentially export (for example, Pacific nations are an emerging market for biochar products).

- When used in soil amelioration it helps add carbon to soils, which is beneficial for soil structure; reduces air emissions [9] (compared to biosolids which biodegrade); improves soil fertility and productivity through reduced nitrogen leaching and stabilising of new organic matter; increases water holding capacity, and immobilises contaminants. It can promote regeneration of degraded land and improve productivity on production land – by supporting the resilience of natural systems.

Technology required

Pyrolysis or gasification plants are two ways to provide thermal conversion of biosolids. These are relatively high cost assets. Water utilities looking at investing may need to consider factors including the volumes of wastewater/biosolids needed, potential savings in other areas such as transportation costs/emissions, and potential product sales. The industry is doing some national work currently to understand the scale, which may include regional agglomeration, that would create a feasible business case for water utilities to undertake this.

[8] https://anzbig.org/biochar-industry-2030-roadmap/

[9] Non-carbon greenhouse gas emissions - especially N2O, but also NH4, indirect GHG

Scope of benefits (across Australia)

The water industry is scoping a piece of work to develop realistic estimates of the potential scale of biochar production from biosolids, and model associated revenues and job impacts, across Australia. We would like to work with the CE MAG and other relevant organisationson this, and request consideration of CE MAG funding. The work will cover aspects including:

- the scale of biosolids capacity required to make biochar production cost effective – which in some regions, could only be achieved through regional agglomeration;
- identify key drivers, including opex, and emissions from truck movements of biosolids
- exploration of improvements gained from other feedstock inputs eg food/organic garden wastes to add volume and quality to the biochar produced, noting that pyroysis facilities can be beneficial in addressing other waste management challenges for other sectors
- producing a high-quality biochar requires considerable cross sector collaboration to ensure high quality inputs including plant and animal wastes – insights and learnings
- This work focusses on the supply side – we would be keen to engage with the CE MAG on the demand side as well, as consumer markets for biochar products also need to be supported for biosolids-biochar solutions to be effective.
- We are deliberately engaging with the CE MAG now, to explore how we could work on this collaboratively. There may be greater potential benefits gained when government policy-makers and industry scope and deliver the work together.

The Australia New Zealand Biochar Industry Group (ANZBIG) has previously assessed the scope of the overall biochar industry (including a range of feedstocks) and estimates that modern biochar systems could reduce Australia's national carbon footprint by 10-15%, provide up to 20,000 permanent jobs, improve soil health and the productivity of millions of hectares of farmland each year and provide high quality environmental, social and governance (ESG) investment opportunities in the order of billions of dollars (ANZBIG, 2022 Roadmaphttps://anzbig.org/biochar-industry-2030-roadmap/). These estimates are not water-specific, and water industry estimates are not available yet. Achieving high quality inputs through cross-sector collaboration could add millions to the economy.

Biochar also supports State/Territory and Commonwealth Circular Economy and waste reduction targets as indicated in the National Waste Policy Action Plan 2019. If used in agricultural and urban soils, it helps promote climate change adaptation through improved farm productivity, water efficiency, and street tree growth, helping to deliver on the National Climate Resilience and Adaptation Strategy.

In Australia the water industry produces about 350,000 dry tonnes of biosolids annually (1.4 million wet tonnes) of which on average 75% is reused in agriculture, 12% stockpiled around 3% sent to landfill[10].

[10] ANZ Biosolids Partnership, 2021. Australian Biosolids Statistics: Biosolids production in Australia 2010-2021. https://www.biosolids.com.au/guidelines/australian-biosolids-statistics/

Project Value: $240,000
Cash: $150,000
In-Kind: $90,000

- Partners:
- DEECA
- Barwon Water
- South East Water
- Intelligent Water Networks (IWN)
- The City of Greater Geelong

Value: A world-first project that uses biochar from biosolids to power Na-ion batteries. Unlocking economic potential for the water-sector and expanding an advanced Circular Economy.

However, the amount of biosolids reused in agriculture has been declining year on year since 2017[11], with stockpiles increasing due to regulatory uncertainty around contaminants of emerging concern within biosolids and the perceived or real risk to agricultural soils, products and markets.

Advanced thermal treatment processes producing biosolid-derived biochar have demonstrated the destruction of PFAS, pathogens, pharmaceuticals and a significant reduction of microplastics. This reduces the risk of human health and environmental impacts from land spreading of biosolids, in an environment of increasing regulatory attention on biosolids management. This means water utilities can be leaders in risk reduction for these problematic substances whilst advancing circular economy policies.

Biochar can also be substituted for carbon black in any manufacturing product that uses fossil fuel-derived carbon black, which effectively gives a double mitigation benefit. The carbon within the biochar is sequestered in the product, and the product substitutes carbon black produced from fossil fuels with biochar. There is already research underway in the water industry itself looking at biochar for superconductor batteries (see Barwon Water case study).

Energy efficient biochar production therefore presents the industry with an opportunity to advance the wastewater circular economy, provide a high value resource to other industries and ensure that carbon and nutrient-rich biosolids are beneficially reused while managing any contamination present in biosolids and/or other feedstocks.

[9] As above

Regulatory context

The potential production of biochar has touch points in policy and legislation at both federal and state/territory government levels. Enabling change can be a complex process that needs to consider:

- The appropriate instrument (ie. regulation, policy or legislative change)
- Scale and regulatory impact
- Alignment with other jurisdictions
- Impact on markets

A key next step would be to pinpoint the exact changes to regulatory instruments that would help. While we have outlined some areas of change below that have been researched to a degree through the Australia New Zealand Biochar Roadmap 2030, to fully scope all legal changes required across federal, state and territory regimes as regards water utilities, is a substantial body of work. We are requesting funding from the CE MAG to conduct this additional work collaboratively.

Federal government responsibilities

- National waste policy including:
  - Determining whether biochar and associated feedstocks are classified as waste under state legislation (as sewage is exempt from the nationally-agreed National Environment Protection Measure for Movement of Controlled Waste)
  - Developing changes to the waste hierarchy
  - Meeting National Waste Policy Action Plan targets
- Commonwealth policy supporting Australia's Nationally Determined Contributions towards the Paris Climate Agreement goals
- Delivering the National Climate Resilience and Adaptation Strategy (2021-2025)
- Funding and policy settings of agencies involved in managing the ACCU Scheme, ARENA and the Clean Energy Finance Corporation
- Grant federal funding support and incentive schemes
- Communication with the public on the circular economy, including the benefits of biochar

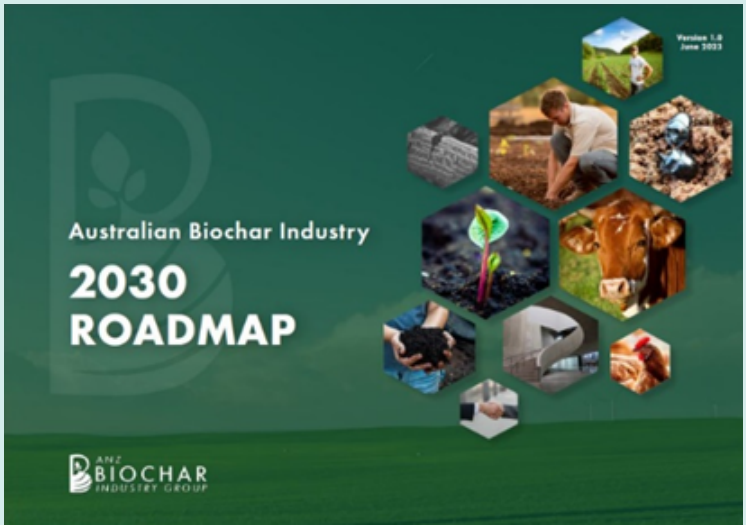
State/territory government responsibilities

- Responsible for regulating waste management, state government owned water utilities, and the economic, health and environmental regulatory frameworks governing what can be achieved in the circular economy (including management of biomass residues, and regulation of soil amendments)
- Grant funding support and incentive schemes
- Enabling and promotion of alternative public sector governance models for the circular economy (eg. local government & water utility co-ownership of limited liability entities consolidating multiple lines of feedstock)
- Communication with the public on the circular economy, including the benefits of biochar

Cost recovery framework & government investment support sought

- Urban water is a full cost recovery business, with prices for water and wastewater services independently regulated to varying degrees across Australia. However, cost recovery applies to the core business purpose set out for each utility, which traditionally means wastewater treatment and disposal (as under historic linear thinking, wastewater has been considered a waste product).
- The state-based cost recovery frameworks do not extend as easily to extensions of that paradigm – such as treating the biosolids to a higher level than the minimum required under EPA licensing obligations, converting it to a marketable product, and then trading that product. The existing environmental obligations create less of a regulatory mandate to do this where it is not the least cost way of meeting the environmental obligations. It is not impossible, but it is challenging – unless the water sector can make a very strong case to justify the investment (which may include demonstrating a very high proportion of customers are willing to pay the additional costs), it is harder for economic regulators to consider such investment as prudent and efficient.
- Put simply, if biochar represents the least cost way to dispose of wastewater solids, it will be relatively easy to invest in the technology necessary.
- However, if it is not the least cost way of disposing of wastewater solids, additional funding support may be needed. This can happen if:
  - a government or other entity provides actual funding, eg a grant
  - governments provide a mandate (ie a formal direction, either generally for circular economy, or specifically for solids reuse such as biosolids upcycling) to a water utility to undertake the activity and recover the costs through its normal cost recovery channels, ie its customer base.
- Significant grant funding has been needed to get some projects off the ground, eg Logan Water received a $6m ARENA grant to establish their flagship water industry biochar project.

Barriers – What's holding us back?



Biochar is a good initiative for the CE MAG to focus on, as resources like the ANZBIG Biochar Roadmap to 2030 have already set out a detailed pathway for accelerating circularity. The Roadmap seeks to progress biochar from various feedstocks, of which biosolids is just one.

Biochar is a proven method of carbon capture and storage, which the IPCC lists as an emissions reduction and CO2 removal pathway (AR6 WGIII Chapter 12 section 12.3 and also Technical Summary Table TS.7). However biochar is not included in Australia's Nationally Determined Contributions toward Paris climate goals or in its national greenhouse gas inventory – this means there is no driver for the Clean Energy Regulator to develop a method to generate ACCUs from biochar. Having an ACCU Scheme method would likely improve investment opportunities. A method could be considered under the 'proponent-led' pathway to be implemented based on recommendations of the Chubb review.

- Water industry regulatory environment:
  - Strong environmental & health regulation and wastewater/biosolids discharge licenses can be an indirect driver for biochar production, if pyrolysis were to be the lowest cost means of means of meeting the environmental obligations. across states and territories
  - Regulation of biochar use in soil applications currently varies substantially across different state jurisdictions[12] (harmonisation would be valuable to facilitate market access); and is further supported via established industry codes of practice and standards, both nationally and internationally, such as the ANZBIG Biochar Industry Code of Practice 2021).
  - No specific regulation or policy for biosolids to biochar in Australia, and the existing regulations for biosolids and biochar vary across states and territories.

- Biochar's classification as waste is severely limiting in the market - significantly devalues the material, prevents innovation/circular economy opportunities and creates an unnecessary burden on water corps in terms of attracting a waste levy

- Market development – We have an opportunity to create a successful biochar market if we invest in market development from the outset – which could include:
  - in order to improve biochar project viability as well to scale up projects, we need development and support for the end-use markets (ie markets for both soil and non-soil products).
  - investment into R&D (such as commercial demonstrations) to prove/establish products and emerging markets
  - it may also include government policy incentives. This can include subsidies, tariffs or other measures to make the cost for consumers of choosing the circular option, to be less than the linear option – once this occurs, investment is more likely to follow. In the US, tax incentives (eg 45V, 45Q tax credits) have been effective.

[12] In New South Wales, biosolids are regulated by the Environment Protection Authority under the Protection of the Environment Operations (Waste) Regulation 2014, while biochar is considered a soil conditioner that must conform to relevant Australian and international standards. In contrast, in Victoria, biosolids are regulated by the Environment Protection Authority under the Environment Protection (Industrial Waste Resource) Regulations 2009, while biochar is not explicitly mentioned in any legislation.

What does success look like?

01

ERF method for biochar that enables scale up of biochar projects

02

Clearer utility understanding of their biosolids resource and local market dynamics before settling on a technology

03

Fit for purpose regulation of biosolids that supports biochar's classification as a resource and allow its movement across state borders

04

Exploring co-location of feedstocks and innovative governance models that support economies of scale across aligned sectors, eg, water, local government and waste

05

Business cases focusing on market potential not just solutions to emerging contaminants in biosolids

06

Work towards source control of PFAS

07

Revision to the waste management hierarchy that separates out pyrolysis and gasification from incineration

Excerpt from WSAA Biochar Seminar Highlights (2023)

Policy reforms - What are we asking for?

Federal actions (WSAA can prepare letters of support or slide packs for advocacy on these issues, allowing the CE MAG to support these issues with other government departments and stakeholders):

1. Support the water industry's strong advocacy for the National Water Initiative to include an objective for all governments to work towards optimising the use of biosolids for biochar. This objective could encompass regulatory, market, collaboration and research and education actions. WSAA can draft a letter of support on behalf of the CE MAG if desired.
2. Commonwealth government to update Australia's emissions inventory methods to account for biochar, as per IPCC guidelines and progress an ACCU method for biochar including a biosolids feedstock pathway, which could be considered under the 'proponent-led' pathway to be implemented based on recommendations of the Chubb review. This would facilitate quicker ROI and scaling of investment through ACCU generation. WSAA made a submission to the ACCU scheme, which can be provided on request.
3. Request IPCC include biochar emissions reduction in future climate scenario projection modelling.
4. Encourage the Federal government to explicitly call out biochar's role in both mitigation and adaptation in the National Climate Resilience and Adaptation Strategy, and in the sectoral decarbonisation plans under the Net Zero 2050 Plan - for soil carbon, farm productivity and water efficiency benefits as well as decarbonisation
5. Support and resourcing for the biochar industry, particularly for ANZBIG and the Australian Biochar Industry 2030 Roadmap which is facilitating and expediting implementation, with broad benefits for circular economy, climate action and other co-benefits for many sectors.
6. Work with State/territory governments to develop a supportive policy framework and a harmonised and consistent regulatory framework that can be adopted by the States & Territories that recognises and supports biosolids to biochar as a beneficial use option that can achieve multiple environmental, social and economic outcomes.
    a. One step in this could be to fund development of risk-based guidelines for metals concentration in biosolids-derived biochar, which would help unlock end uses and markets
    b. Ensure that the existing state/territory-based biosolids guidelines are adapted for application to biochar (eg. for heavy metals bioavailability and co-feedstocks)
    c. Develop application-rate-based guidelines that reflect the metal-binding capacity of biochar and optimal application rates
    d. Build the evidence base and documentation of the results.

7. Development, support and incentives for the end use markets (both soil and non-soil), including investment into R&D to prove/establish emerging markets.
8. The CE MAG to consider granting funding to WSAA to develop industry estimates, as outlined above, about the treatment plant capacity thresholds where biochar is viable, the opportunities across Australia for regional agglomeration, and the likely yield of biochar and ACCUs, and address other opportunities for biosolids-derived biochar to support government circular economy, decarbonisation and climate adaptation policies/strategies.

State/territory actions:

- Re-designate biochar and its feedstocks as a product or 'non-waste' rather than a waste – for example, encourage establishment of End of Waste codes for biochar, charcoals and bio-carbons, that also redesignate feedstocks/co-feedstocks as 'resources' for making biochar. This will better enable biochar's role in the circular economy and unlock value streams (eg. through environmental regulation schedules [13]), in accordance with outcomes-based regulation.
- Revise existing state/territory-based biosolids guidelines to be applicable to biochar (eg. for heavy metals bioavailability and co-feedstocks) – see link for each state/territory guideline
- Partner with interested water utilities to promote regional scale governance models between local governments, private sector, and water utilities (eg. Colac RON) to enhance economies of scale in feedstock, multiple value streams, and capex/opex on production. Interest could be identified through a market sounding.
- Funding support and incentives, including through policy changes, for pilot projects, commercial demonstrations and large scale investment; testing systems for new innovations, such as a previous EPA mobile testing van. This should also include promoting outcomes-based regulatory frameworks over prescriptive ones wherever practicable, to minimise red tape delays.
- Supporting the development of consistent messaging across government, water and waste sectors to facilitate market confidence.
- Enhance and facilitate collaboration and knowledge sharing, especially between sectors & industries adjacent to the water industry: The collaboration and knowledge sharing among water utilities, research institutions, technology providers, biochar users, and other stakeholders should be enhanced to foster innovation, address technical challenges, demonstrate best practices and increase market awareness and acceptance of biochar products. The National Water Initiative would be a good vehicle to drive this.
- Where valuable potential schemes are identified, but are outside the core mandate of the water utility or not cost effective in their own right, identify and make use of levers in the regulatory framework to enable non-standard practices. For example, in NSW the government can require utilities such as Sydney Water to undertake an activity that is non-commercial or in the public interest, via a process defined in the State Owned Corporations Act.

[13] The Victorian Environment Protection Regulations, Schedule 5, lists residues such as digestate, bottom ash and biochar as reportable priority waste

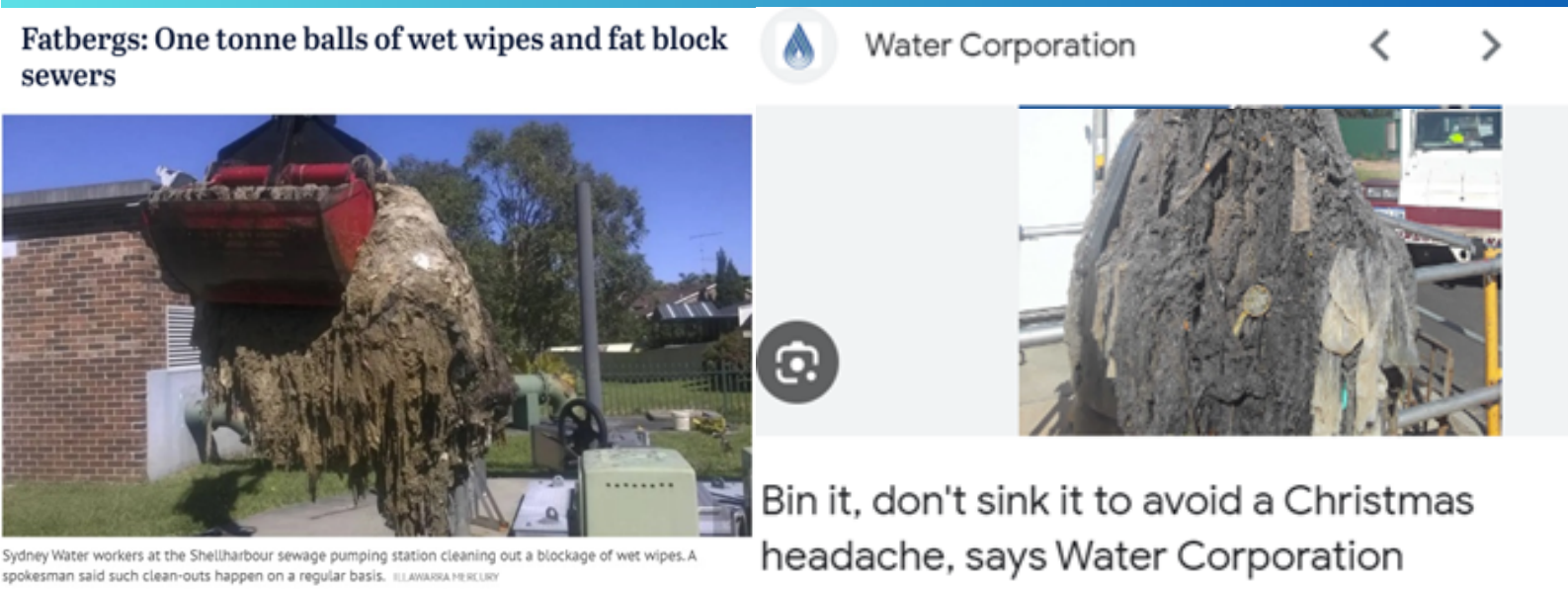
Downsides/risks/criticisms

- Environmental & health regulation re contaminants of emerging concern – unclear regulation threatens the scale up of biochar projects.
- Balance of nutrients and PFAS/contaminants – biosolids contain important soil nutrients in phosphorus and nitrogen. Biosolids-derived biochar can be enhanced by co-pyrolysis with other non-contaminated biomass such as crop and forestry residue. If biosolids-derived biochar is not used in agricultural applications because of perceived/real risks of contaminants, then these nutrients are lost from soils. Government resourcing to develop rate-based biochar application guidelines could assist this current constraint nationally.
- Potential commercial impacts from adjacent or competitive industries. For example the solid waste management industry includes many private players. Biochar can sometimes be improved in quality through combining food and garden solid organic waste with biosolids; there are competitive landscapes that need to be managed appropriately whilst exploring longer term circularity gains.

Media opportunities

- Combine announcement of a regulatory impact statement into the impacts of reviewing the classification of biosolids and/or biochar as ‘waste’
- Multiple initiatives (eg 2. 4 and 9) and milestones of the Australian Biochar Industry 2030 Roadmap – particularly commercial scale demonstrations across the nation (Initiative 4).
- Market sounding in a regional area for opportunities to trial a combined waste to biochar scheme
- ·ABC have recently profiled the Logan Water gasification plant. Could be further opportunities to profile/launch other biochar projects eg Pyroco (Vic); and the Bega Group, which the biochar industry is currently engaging with, along with the NSW Decarbonisation Innovation Hub.
- Govt has given money to Bega Valley to establish national circular economy centre (of excellence?), headed by Bega Cheese Group, that wants to have a whole of community approach with a range of industries

OPPORTUNITY 2: REDUCING HARM FROM WET WIPES IN WASTEWATER SYSTEMS - TECHNICAL PAPER



Various wipes, when flushed down toilets, cause 'fatbergs' which are complex and costly to remove, wasting resources and damaging assets. A new voluntary standard has been developed to identify which wipes can be flushed. Governments can help build consumer awareness of how to dispose of wipes safely

What is it?

Wet wipes have been a growing international issue for water utilities since the early 2000s. The sales of these products have been steadily increasing since that time, as have the number of sewer blockages. Anecdotal information from water utilities in the last few years indicates that inappropriately designed wet wipes can cause significant sewer blockages, costing in excess of $15M per year within Australia alone to remove. (This is an estimate across the industry – noting there is very limited isolated data available).

Wet wipes also cause additional costs at treatment plants for screening, dredging and disposal, and create related system problems (pump ragging, floating in wet wells, mechanical failures). It is hard to quantify a specific cost for this.

There has been no clear standard to define material that is suitable for toilet flushing in Australia until 2022. The new Australian and New Zealand Standard provides clear testing and labelling requirements. Prior to that time there have been products claiming to be suitable for toilet disposal which were not. For example: the White King flushable wipes, which received a $700k fine from the ACCC in 2018.

With the publication of the Australian and New Zealand Standard there is now a clear opportunity to reduce sewage spilling to the environment along with the potential release of single use plastics from wet wipes. The standard has a grace period for manufacturers until May 2024. However, in the lead up to that deadline it is important to educate consumers through a campaign to promote the '4 ps' that can be flushed – pee, poo, paper and PROOF – the logo indicating that a wipe is flushable.

Alignment with circular economy

Sewer blockages often lead to sewage spilling to the environment, which directly impedes and undermines Pillar 3 of circular economy (regenerate natural environments). They also create 'fatbergs' in sewers and wastewater treatment plants globally, which are complex and expensive for water utilities to remove, and undermine Pillar 3 (eliminate waste and pollution). The wipes contribute unnecessarily to landfill. This also decreases asset life and increases costs, and therefore customer water bills.

In addition, wet wipes may also contain single use plastics. The release of such materials to the environment has been banned in the European Union.

Technology required

Nil

Scope of benefits (across Australia)

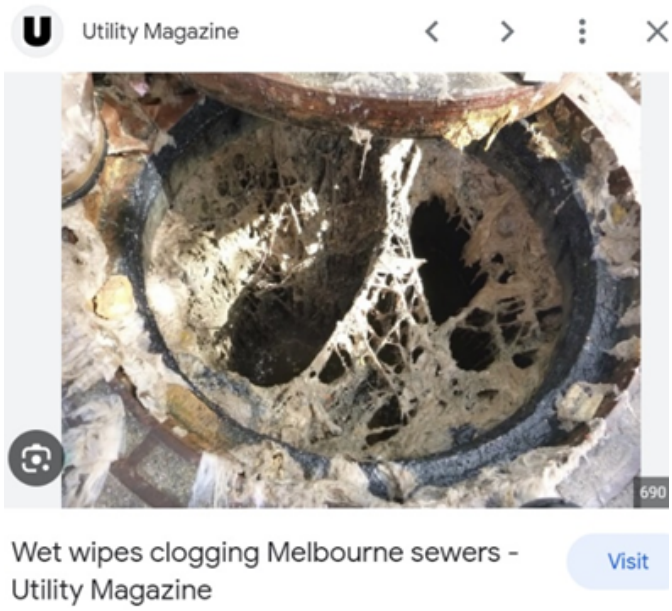
Reduced waste of money and time spent repairing assets that are being damaged by consumer behaviour (inappropriate disposal) which is itself largely a product of low awareness and misleading product packaging.

While the financial benefits of this issue are not as sizeable as for some resource recovery initiatives, this cost could be avoided with effective education. Greater consumer water literacy (ie understanding what can and cannot be flushed) correlates with better water stewardship on this and a whole range of water matters.

Education activities about flushable wipes could be part of an overall package on 'good water behaviours' including avoiding disposal of other contaminants to waterways (PFAS, microplastics and unsuitable items), along with positive water efficiency behaviours, and helping people understand water's role in making liveable cities.

Regulatory context

The water sector in Australia and New Zealand has been engaging with the wipes manufacturing industry since 2015 with a view to developing a national standard for materials suitable for flushing down the toilet. The standard was published in May 2022 as AS/NZS 5328:2022. The Australian and New Zealand Flushable Products Standard is a voluntary document that sets out a framework, test methods and criteria for determining if products are suitable for flushing down a toilet. It also provides guidance and requirements for the labelling of products that are likely to be flushed down the toilet. It excludes toilet paper, liquids and soluble products.



What is a flushable product?

A flushable product is a product considered suitable for disposal through wastewater networks and treatment systems, including onsite treatment systems. It is flushable if it does not materially adversely impact those systems, or remain recognisable in effluent leaving them after being through the wastewater treatment process.

What does the symbol for packaging look like?

The ANZ Standard provided example logos for packaging. However, these logos are trademarked by Standards and cannot be used by others. To ensure consistency in the logos used by manufacturers, WSAA has developed and trademarked the symbols below in consultant with manufacturing peak bodies – Accord (the national peak body for hygiene and personal care products) and the Australian Food and Grocery Council.

The Standard states that packaging for products that have a high potential to be flushed should clearly inform customers whether or not they are appropriate for disposal via the toilet. For example, if the product cannot be flushed it should clearly display a do not flush symbol.

There is a two-year grace period for products to comply with the standard, which expires in May 2024. There are currently at least two products on the market that meet the standard, with more in the pipeline. However, there remain numerous products (number unknown) that do not meet the standard.

What does this mean for customers?

If a product meets the Standard and is therefore suitable for flushing, the packaging should display the “flushable” symbol. Packaging for non-flushable products that have a potential to be flushed, should clearly indicate that the product should NOT be disposed of down the toilet. The packaging should display a tidy person symbol as a minimum, and also a ‘do not flush’ symbol.

Cost recovery framework & government investment support sought

Repairs to wastewater systems that need to be carried out to remove fatbergs and other blockages, are part of water utility operating and maintenance costs. These are funded by consumer water bills – so reduced need for removal of sewer network and treatment plant blockages, translates to avoided costs that benefit consumers.

Barriers – What's holding us back?

The Standard will have limited impact without consumer awareness. Now that the Standard has come into effect there needs to be clear messages to customers to make them aware of the Standard and to look for the flushable logo if they want to buy products suitable for toilet flushing. Historically water utilities have used the 3P's messaging - Only flush pee, poo and (toilet) paper. This could be adjusted to the 4 Ps – poo, pee, (toilet) paper and PROOF, with the logo being proof that the product is flushable.

The current compliant products have undergone soft launches. So the public has very limited knowledge that anything has changed.

In addition, because the Standard is voluntary, manufacturers may choose not to participate and continue to produce damaging products.

Downsides/risks/criticisms

- Need to ensure the messaging is about providing clarity to consumers - communications need to clearly distinguish products suitable for toilet disposal – which should be called 'flushable' vs products that are not suitable for toilet flushing. There is potential for manufacturer criticism and consumer confusion if there is misuse of these terms.
- There is a slight complexity in that the Australian and New Zealand Standard only applies to solid products. Liquid toilet cleaners and solid, dissolvable toilet cleaners are not covered by the Standard.

Policy reforms - What are we asking for?

- We request government investment to fund a national media awareness campaign about the 4 Ps. The anticipated investment for this campaign is $500k. The intent of the campaign is to create consumer awareness, which will reduce the amount of unsuitable product being disposed down the toilet. The net benefit is a reduction in sewer blockages, customer costs and discharges to the environment.
- We would like to understand if the CE MAG can assist with provision of funding directly or through other government channels.
- Governments should seek to limit the use of PFAS and other forever chemicals in Australian supply chains for all kinds of household products. The use of these chemicals in manufacturing creates a problem that the water industry inherits further down the value chain, a problem that is not of our making yet we then need to clean up. Proactive action from governments to reduce the presence of these substances in the first place would have great value across the value chain.

Media opportunities

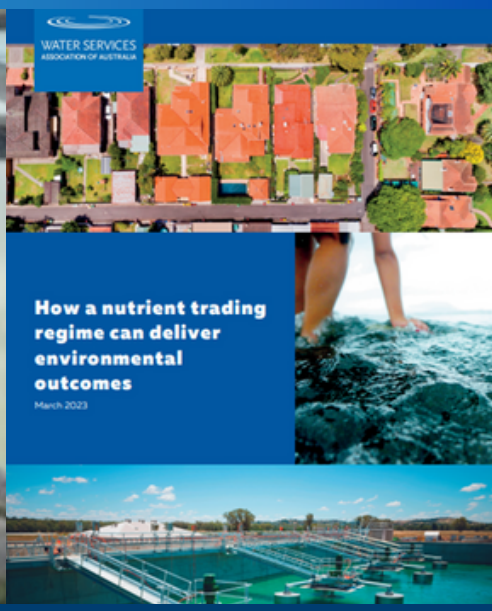
- Announcing the creation of the Australian Standard and in the lead up to its grace period expiring in May 2024.
- Attend a sewer blockage repair job – highlight the challenge, cost and futility of these preventable repair works.
- Providing information and education to consumers that as we approach this date they should look for the flushability logo on their products before the decide to flush something down the toilet. The messaging should be consistent with the 4 Ps.

Example of wipes showing the new logo:

This example was copied from Woolworths online shopping platform as at September 2023. While the logo on these products is similar to the official logo, it is not quite the correct version. This highlights the challenges:

OPPORTUNITY 3: NUTRIENT OFFSETTING OPPORTUNITIES FOR WATERWAY AND CATCHMENT SYSTEM REGENERATION, THROUGH REDUCED SEDIMENT AND NUTRIENT INPUTS - TECHNICAL PAPER

Kilmore is a successful example of nutrient offsetting principles



WSAA's 2023 report on nutrient trading outlined various Australian projects and potential governance pathways

An all-options approach to pollution management, provides a new and more holistic way for improving waterway and catchment health in suitable circumstances.

What is it?

'Offsetting' is most often associated with trading credits for decarbonisation activities. An evolving field is applying 'offsetting' principles to nutrient discharges within waterways and catchments. This is being demonstrated through various initiatives both internationally and within Australia. As with other offset schemes, these initiatives require careful consideration on the way in which offsets are delivered and evaluated. WSAA's report, How A Nutrient Trading Regime Can Deliver Environmental Outcomes, presents case studies from Queensland, NSW and Victoria, and proposes governance framework approaches based on market mechanism experiences from Australia and overseas.

Water businesses are well placed to play a far more holistic, beneficial role in catchment management, by facilitating and implementing strategies across multiple sources of pollution that go into waterways and catchments. This can support affordable essential services by reducing the need for high cost upgrades of wastewater treatment facilities, in circumstances where equivalent benefit can be gained at lower cost for the protection of waterways and catchments.

Protecting water quality, in the interest of public and environmental health, is at the heart of water utilities' operations – effective wastewater treatment systems remove considerable amounts of solids, nutrients, and pathogens from sewage effluent before it re-enters

waterways. However, as licensed point source pollution activities, water utilities often face higher regulatory and community expectations compared to diffuse source pollution from stormwater or agricultural runoff, which typically have a more significant overall impact.

As effluent standards and treatment upgrade costs reach a point of diminishing returns, in certain circumstances it may be more effective to focus on restoring degraded riparian areas, improving stormwater treatment and enhancing land management practices, as more cost-effective measures for improving water quality and environmental conditions – so long as equivalent overall benefit and environmental protection can be achieved. These efforts can range from soft engineering and tree planting on riverbanks to prevent streambank erosion to creating fencing and riparian buffer strips to restrict livestock movements into and the pollution of riparian zones and waterways. In this context, nutrient offsets offer a market-based instrument for this, creating a holistic, catchment-based, pollution management approach across both point and diffuse sources.

Globally, nutrient offsetting is an innovative environmental strategy being applied with greater effect, in addition to more conventional measures. Such a strategy combines the work of managing point-source pollution (i.e. wastewater effluent discharges by water utilities), with further investment in catchment rehabilitation works. The aim is to address the total load of nutrients collectively across the catchment rather than at a single point. These efforts can range from soft engineering and tree planting on riverbanks to prevent streambank erosion to creating fencing and riparian buffer strips to restrict livestock movements into and pollution of riparian zones and waterways.

For water utilities, the primary objective of offsetting involves initiating catchment rehabilitation efforts aimed at significantly reducing nutrient loads introduced into waterways. The context of this approach is only viable when it presents a more cost-effective solution compared to marginal benefits gained from the extensive upgrading of existing wastewater treatment technologies and infrastructure. Often, addressing the surge in nutrient loads accompanying urban expansion necessitates the enhancement of wastewater treatment systems. However, there are scenarios where alternative initiatives could realize comparable, if not more comprehensive, advantages. Thus, the objective of nutrient offsetting is to ensure the availability and feasibility of such diverse options, beyond conventional treatment upgrades, for optimised nutrient load management.

This is particularly important in the context of Australia, where many freshwater catchments are in very poor condition due to extensive historical land-clearing for agriculture and urbanisation. More intense rainfall events due to climate change will increase the rate of catchment degradation posing a significant threat to both surface-water and groundwater dependent ecosystems. By adopting nutrient offsetting, water utilities can play a more holistic role in waterway and catchment management, addressing high risk sources of diffuse catchment pollution by rehabilitating riverbanks and creating many co-benefits such as enhancing aquatic and terrestrial biodiversity. This could help to resolve current environmental issues and also build an ecosystem and urban resilience for the future.

Unity Water Oyster Reef Restoration Project

Alignment with circular economy

Nutrient offsetting using Nature Based Solutions (NBS) aligns well with one of the key principles of a circular economy - regenerating natural systems. Nutrient offsetting using NBS promotes sustainable integrated land and water management practices. By including co-benefits, such as land protection, sediment export reduction and biodiversity improvements, this more holistic approach to catchment rehabilitation, potentially offers stacking of multiple offset credits for a single project, thereby attracting more investors and making such projects more economically viable from an offsetting perspective.

Technology required (for offsetting specifically, in addition to technology required for wastewater treatment and recycling)

An uplift in catchment rehabilitation digital technologies is required to drive nutrient offsetting. The industry needs advanced catchment/flood modelling platforms, monitoring systems for erosion sources and water quality, GIS mapping for identifying poor condition and habitat loss areas, employing drone technology, and remote sensing/data analytics tools for measuring the nutrient equivalence and ongoing effectiveness of nutrient offsetting projects.

These technologies are crucial for selecting the most cost-effective project and achieving the required number of nutrient offset credits. Advanced monitoring systems, such as drone-based LiDAR, can provide cost effective routine data on project area erosion rates, enabling timely interventions after flood events to manage any natural asset damage. GIS mapping can help in the spatial analysis of water bodies, riverbanks and tree cover to identify areas that are most in need of rehabilitation. Satellite remote sensing data linked to data analytics tools can process large sets of data to measure the effectiveness of nutrient offset projects, thereby informing design of future projects.

Scope of benefits (across Australia)

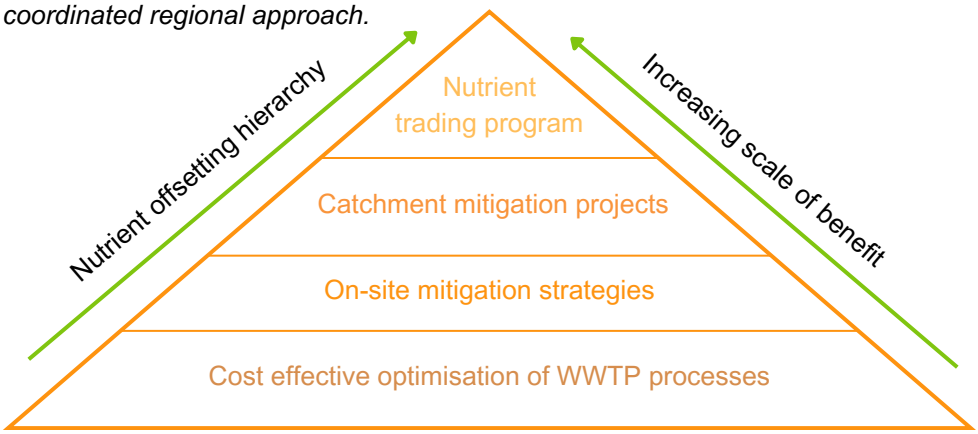
Australia faces challenges related to the degradation of its waterways, although the extent of degraded waterways is not currently known. The effective management of wastewater treatment facilities will always be one of the most important measures for managing nutrients. However, nutrient offsetting has the potential to further assist in the reduction of total catchment nutrient loads, aiding improvements to water quality and restore at risk or endangered habitats, but the exact impact would depend on a variety of factors including the type of interventions, scale of the project, and local conditions.

For illustrative purposes, a suite of targeted streambank rehabilitation nutrient offset projects in a waterway suffering very high streambank erosion rates could significantly reduce sediment and nutrient loads to the Great Barrier Reef. Rehabilitating a relatively small proportion (~10%) of high erosion risk streambanks could reduce end of catchment sediment and nutrient loads by more than 50%. These catchment management actions would likely improve water quality in estuarine and coastal waters (near the mouth of thewaterway). This could also create cost savings, benefiting customer bills.

Again, the exact cost savings would depend on the specifics of the project and local conditions.

Beyond the environmental and economic benefits, improved catchment condition and water quality will have a positive impact on biodiversity, from aquatic (fish populations and aquatic plants), to riverbanks and the connectivity across the catchment. Moreover, these co-benefits provide enhanced social benefits, including improved amenity, public health, opportunities for recreation and sustaining cultural heritage.

coordinated regional approach.



Pyramid of approaches to nutrient reduction into waterways

Beneficial works are not limited to waterways, as offsetting can support whole of catchment land restoration projects, and working with the agriculture sector to reduce nutrient inputs into ecosystems. Additional benefits may include flood mitigation from improved river management and tree planting; reduced erosion and hence sediment loss; improved recreation opportunities; improved asset protection and reduced insurance costs; job creation and investment opportunities; and social capital for utilities, governments and local councils.

Water customers want to see improvements such as this - WSAA surveyed over 8,000 water customers across Australia and Auckland in late 2023 and asked what they value more than keeping water bills as low as possibly - healthy waterways was the highest response.

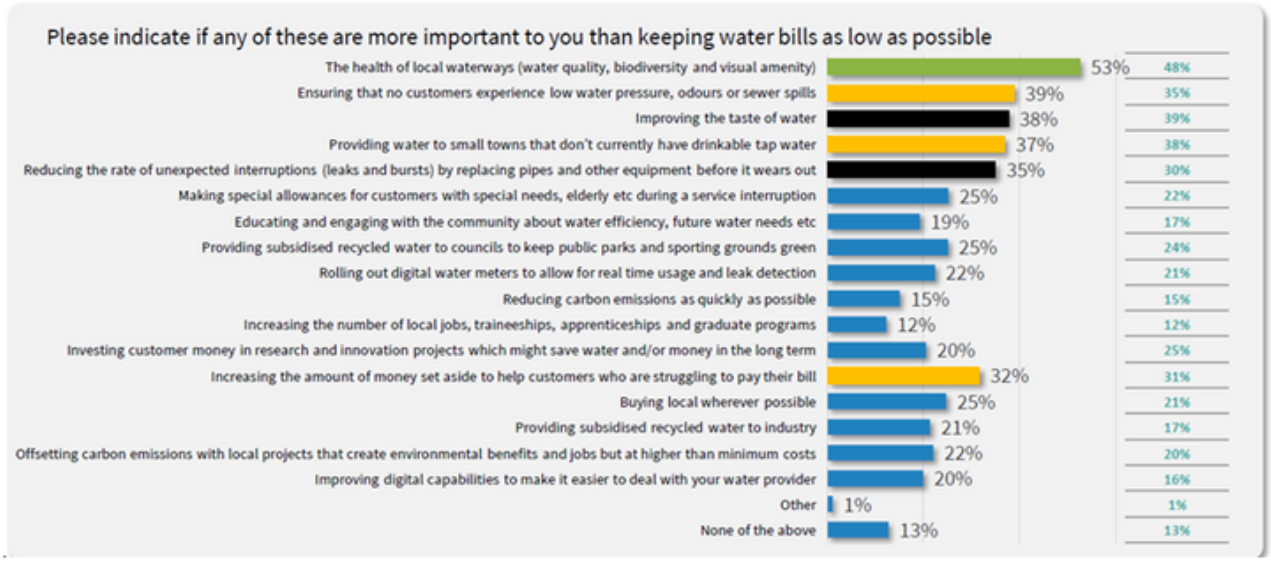


Image: Riparian plantings that show the setback from the creek to the fence line and the number of plants that will eventually provide the dense riparian zone. Source: GVW Water.

Image: Kimore Treatment Plant offsets scheme, Victoria

There are many successful case studies, where nutrient offsetting loads from catchment restoration have equalled or exceeded nutrient loads from wastewater treatment plants. Logan Water estimated offsetting benefit of 2.89 tonnes total nitrogen per year, and 2.89 tonnes of Total Phosphorous (compared to 700kg of total nitrogen allowable wastewater treatment plant discharge. Another study demonstrated that revegetating 30 metres of a riparian buffer not only removed 50-70% of total nitrogen in the runoff, but also removed approximately 80% of sediment and total phosphorous loads.

WSAA's report How a Nutrient Trading Regime can Deliver Environmental Outcomes, notes that "There are a range of projects throughout Australia using nutrient offsetting to offset WWTP nutrient discharge. This includes projects initiated by Urban Utilities (Beaudesert, Laidley Creek), Logan Water (Logan River), Unitywater (Caboolture River), Goulburn Valley Water (Kilmore) and Hunter Water (Paxton). These projects undertook restoration work in rural or semi-rural catchments which focussed on bank stabilisation, riparian tree planting and fencing.

There were several urban projects as well, e.g., Melbourne Water. Other projects are still in the scoping or early construction phase, e.g., Sydney Water. The sections below integrate the findings of all these studies to provide information on the range of approaches taken, and their effectiveness. A range of studies in various phases of implementation throughout Australia, focussed primarily on those undertaken by utilities."

Regulatory context

The regulatory landscape for point source nutrient offsetting in Australia is still evolving. Some states have policies and agreements that provide a pathway for utilising nutrient offsetting solutions. In New South Wales (NSW), the EPA produced a concept paper on green offsets for sustainable development. A significant focus for nutrient offsetting has been the greater Sydney region, including the Hawkesbury/Nepean River system, resulting in the development of a nutrient management strategy for this system by the NSW EPA to guide further action. However, it can be challenging if state governments take only a regulatory role rather than seeing this as a potential partnership. If governments and regulators are highly risk-averse and operate under precautionary principles, this can stifle interest from buyers/sellers.

There is a need for more coordinated and consistent policies across states. The introduction of agile, risk-based approaches and national waterway rehabilitation guidelines could streamline the regulatory process, making it easier for projects to get approved and implemented.

Existing frameworks like the National Water Initiative, Water Act 2007, and the Murray–Darling Basin Plan provide a starting point but need to be adapted to include nutrient offsetting specifically. Regulatory support is crucial for the success of nutrient offsetting projects, as it provides the legal and administrative framework within which these projects operate.

As a related issue, stormwater harvesting is a valuable activity that can reduce runoff and nutrients to waterways – yet its regulatory context is not ideal. The governance arrangements and regulatory guidelines are unclear around the country. This is discussed in Opportunity 4.

Cost recovery framework & government investment support sought

Through innovation, the water industry is hopeful that nutrient offsetting projects may present a viable cost-effective solution for utilities compared to equivalent treatment upgrades, for appropriate and demonstrated scenarios. This does not mean sacrificing one environmental segment to benefit another, it means keeping all options that can achieve a pre-defined environmental outcome on the table. This affordability can be a key driver for utilities to undertake these projects, as it has the potential to keep consumer bills down while achieving enhanced environmental outcomes.

However, a multi-pronged approach to funding, combined with the potential for cost-effectiveness compared to traditional treatment methods, can ensure the long-term viability and affordability of nutrient offsetting projects.

The cost recovery for nutrient offsetting projects can be facilitated through various mechanisms, including government grants, public-private partnerships, and market-based nutrient trading schemes. Government grants can provide the initial capital required to kickstart projects, while public-private partnerships can bring in additional expertise and resources. Market-based nutrient trading schemes can create a self-sustaining financial model, where the credits generated from successful projects can be sold to fund future initiatives.

Barriers – What's holding us back?

Key barriers include significant costs in coordinating projects, lack of good quality data on return on investment, and risks of not meeting government compliance requirements.

The initial costs of setting up nutrient offsetting projects can be high, ***especially when done on an ad-hoc basis with limited Federal/state coordination*** – requiring significant investment in technology, manpower, and other resources. The lack of quality data can make it difficult to measure the effectiveness of projects, thereby affecting future funding and support.

Finally, the evolving regulatory landscape can create uncertainties, making it challenging for projects to design for and meet compliance requirements. Furthermore, differentiating regulatory environments can unintentionally create competing markets from state to state.

One of the world's best known projects is the Chesapeake Bay Nutrient Management Initiative

Policy reforms - What are we asking for?

The National Water Initiative to include measures on nutrient offsetting within the broader framework of offsetting markets for carbon and biodiversity, for example an Outcome:

- The states and territories agree to develop policy settings and regulatory frameworks that enable off-setting and trading where cost-effective environmental benefit can be achieved for nutrients, carbon and biodiversity.

With concrete Action/s:

- Develop a national Roadmap on nutrient trading
- Establish evidence-based national guidelines (state implementation) to support state, territory and council-based water businesses striving for consistency and fairness for market access. eg market protocols, equivalence regimes, monitoring & reporting, results assessment, benefit sharing with customers.
- This would include the ability to manage nutrient credits and associated offset project areas within catchments and for cross-state and territory borders. The guideline is to be supported by an agreed set of principles on the objective and outcomes to be achieved through nutrient offsetting and integration with broader markets.

Commonwealth government:

- **A systematic approach to working with and strengthening broader markets:** Conduct a comprehensive review of existing carbon, biodiversity and emerging nature repair markets to identify synergies and gaps with a nutrient offsetting regime. This should include a legal analysis of regulatory compatibility and a market study to identify potential buyers and sellers. Such a report can be prepared following the ACCU review to guide and inform policy adjustments.
- **Adherence and enabling compliance to reporting standards:** Host industry-led cross-sector workshops to promote alignment with mandatory reporting standards, such as Taskforce for Climate Related Financial Disclosure and ISSB recommendations for inclusion and use of nutrient offset credits in trading schemes. This can include development of key metrics and reporting templates that businesses can use to meet corporate reporting requirements. Such a process can also aid the establishment a third-party verification and certification process. This would ensure the integrity, transparency, and accountability of nutrient credits generated by the urban water industry. The publication of an annual nutrient offset credit report detailing the generation, sale, and retirement of all nutrient offset credits can further support alignment to reporting standards.
- **Facilitate engagement with willing buyers and strengthening social licence:** Design and initiate a comprehensive program that combines targeted outreach and market soundings to engage businesses actively seeking to mitigate operational risks and enhance investor confidence through participation in and delivery of nutrient offset schemes. This can be followed by a process to utilise data analytics methods similar to those employed in the WSAA's "Willingness to pay for carbon abatement and co-benefits" study to identify groups and demographics in determining the social licence across industry sectors to actively participate in these schemes.
- **Establishment of a national methodology framework:** To align with successful international models, Australia needs to examine and develop consistent and standardised estimation methodologies specifically for nonpoint source actions in nutrient offsetting programs. This is crucial for ensuring the credibility, transparency, and effectiveness of these credit schemes.
- **DCCEEW (NHMRC and Water Quality Australia):** Clarify the policy and regulatory framework for stormwater harvesting and reuse – which also reduces runoff and nutrients to waterways, but suffers from a complex governance framework.
- **Urban water industry – Leverage the urban water industry to support federal and state initiatives:** The opportunity exists for the co-development of a white paper outlining how the urban water industry can contribute to federal objectives in carbon, nutrient, and biodiversity markets. This can include a list of potential pilot projects, range of funding sources, benefits realisation guides and key stakeholders.
- **All governments** - Support measures to build Traditional Owner capacity in caring for Country, in waterway and land management, and for First Nations participation in emerging markets such as carbon, nutrient and biodiversity offsets.

Downsides/risks/criticisms

While nutrient offsetting has its benefits, there are also risks such as the potential for 'greenwashing,' the lack of standardised methodologies, and the uncertainty in demonstrating the long-term effectiveness of offsetting projects. These risks need to be carefully managed to ensure the integrity and success of nutrient offsetting initiatives.

To counter 'greenwashing', there needs to be a robust system of verification and certification for nutrient offsetting projects.

The time for delivery on these types of projects is either medium or longer term, depending on the nature of the initiative being taken – i.e. restoration versus improved land management. This lag needs to be accounted for, with a strong baseline of data and well sustained monitoring program to measure and report on benefits and possible improvements needed.

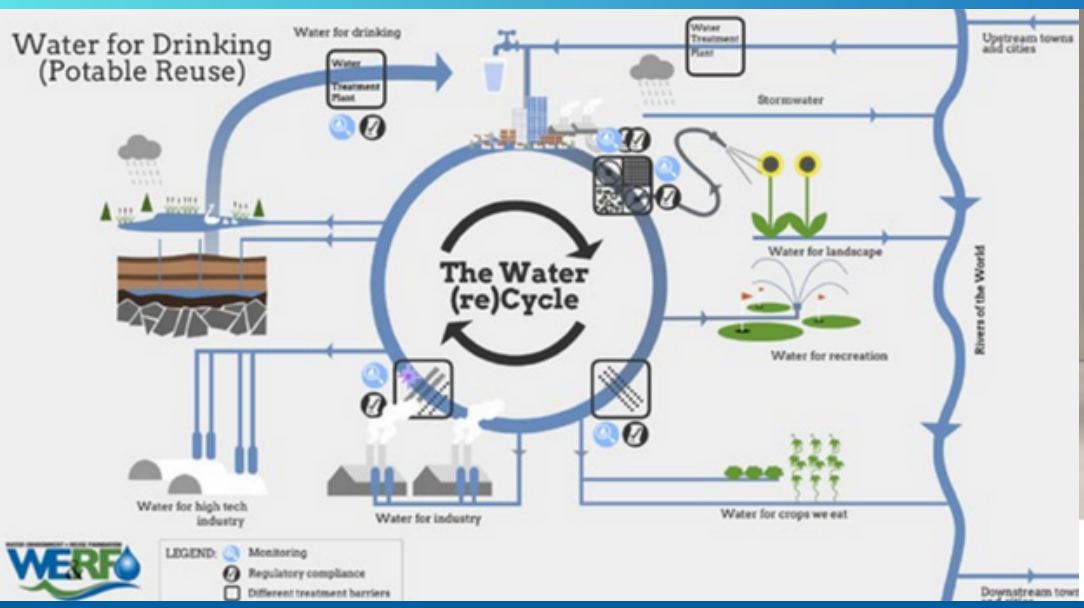
Media opportunities

- The case studies across Australia identified in WSAA's report How a Nutrient Trading Regime can Deliver Environmental Outcomes could all present potential media opportunities.

- Kilmore Treatment Plant Offset Scheme (Victoria): an innovative partnership between Goulburn Valley Water (GVW) and Goulburn Broken Catchment Management Authority (GBCMA) and the first of its kind in Victoria, has seen the implementation of an offset scheme where the medium term results and impact can be assessed.

- Demonstrating the multiple benefits of the Urban Rivers and Catchments Program: by considering the inclusion of nutrient offsets within the program, the opportunity is to highlight the multiple benefits being delivered in addition to the initial set out objectives.

OPPORTUNITY 4: OPTIMISING FIT-FOR-PURPOSE WATER REUSE -TECHNICAL PAPER



Purified recycled water from Hampton Roads (Virginia), Singapore, Orange County (California)

Figure taken from WSAA All Options on the Table: Lessons from the Journeys of Others (2019)
Image source: WSAA
WSAA library to provide a generic image of water recycling and/or recycled water used for food production eg watering crops, vegetables

While some water is recycled in Australia, there remains scope to capture and treat more water for fit-for-purpose reuse in irrigation, industry, agriculture, urban greening and cooling, hydrogen production, and for purified recycled water to supplement drinking water supplies.

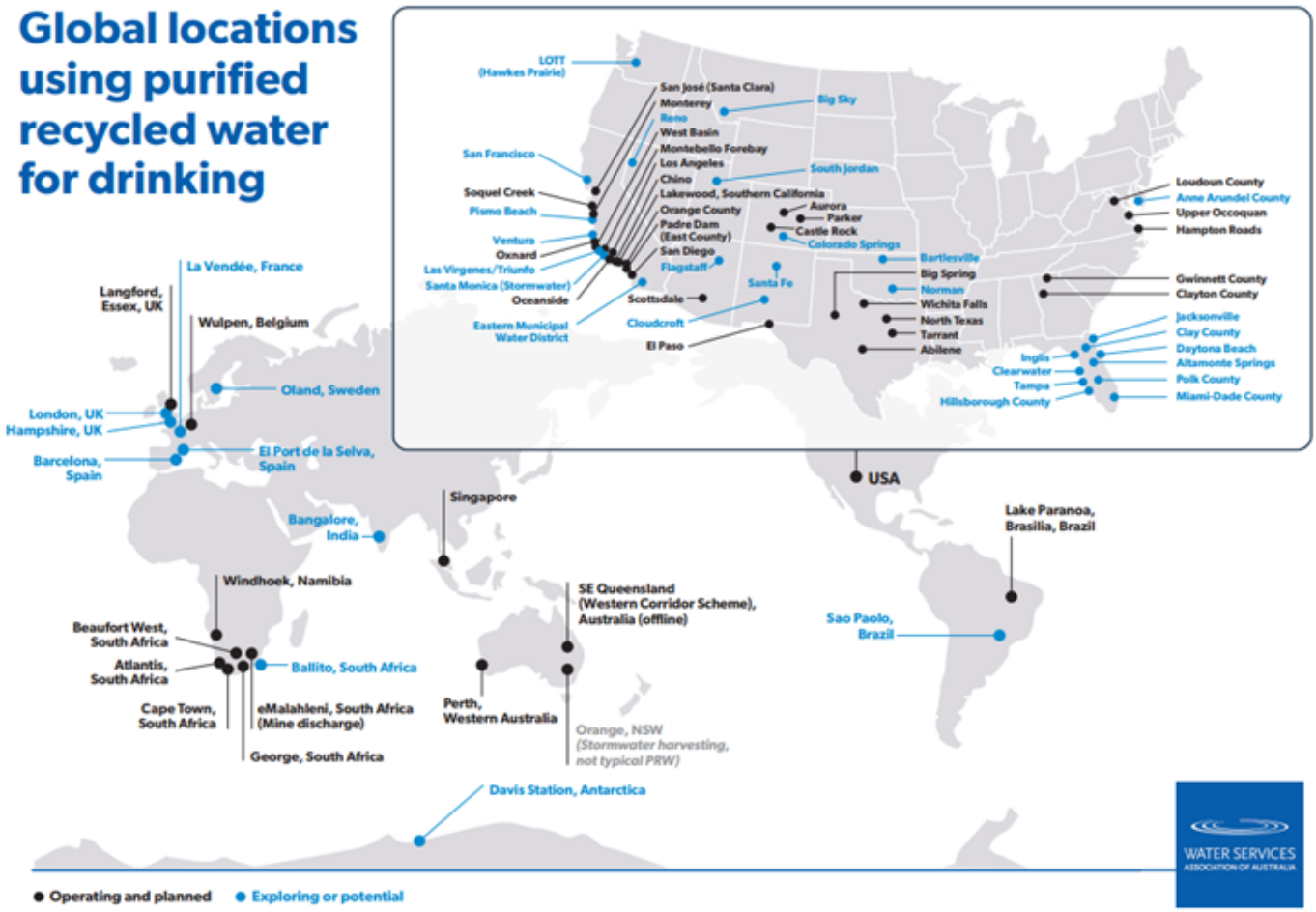
What is it?

Water reuse involves taking used water from various sources (grey water from showers and laundries; and/or black water from toilets, sinks and drains; also stormwater), treating it to a quality that is suitable for a specific end use, and then supplying it to customers for that end use. The end uses can be non-drinking purposes including irrigation, agriculture, urban greening and cooling (which may be able to use recycled water of a lower quality), industry, hydrogen production (which needs high quality recycled water), and for purified recycled water to supplement drinking water supplies (which needs recycled water of the highest quality).

An important part of water recycling is how the recycled water is conveyed to customers:

- Where the recycled water is to be used for non-drinking purposes, it is typically conveyed from the treatment location to the customer/s via a separate distribution network, so that it is not mixed with the higher quality drinking water supply. These schemes are sometimes called ‘third pipe’ schemes as the customer/s have a separate recycled water pipe (usually purple in colour) going into the property, alongside the usual drinking water pipe going in and the wastewater pipe going out.

- Purified recycled water typically involves taking used water that’s been recycled from wastewater, treating it through advanced treatment processes, to further filter and purify it so that it is meets required health and safety standards to safe to become part of the drinking water supply. It is often mixed with water from other raw water from a reservoir, lake or aquifer. Because the purified recycled water is part of the drinking water supply, it is conveyed from the treatment location to the customer/s via the drinking water distribution network, and does not require a separate network to be built.



Source: WSAA purified recycled water toolkit

Purified recycled water for drinking is used in Australia (Perth), and 35 cities around the world, particularly in the US. Traditionally, the purified recycled water has been added to an environmental buffer such as a lake, reservoir or aquifer, and then the combined water is treated together before being supplied to customers. This is often called indirect potable reuse. However, direct potable reuse is becoming more common, which does not require the environmental buffer. Four states in America are developing guidelines for direct potable reuse. It is already practised in Texas and several cities in Africa including Windhoek, Namibia, where it has been safely used for 50 years.

Alignment with circular economy

Water is nature's original cycle. Optimising the use of recycled water, purified recycled water and harvested stormwater:

Reduces waste – as it means we re-use the water that we already have, reducing how much we need to take from other sources like rivers and the ocean.

Can reduce how much nutrients we discharge into waterways (depending on the quality level of the recycled water). This protects and enhances the natural environment by minimising environmental impacts, which can support the circular economy pillar of regenerating natural systems.

Means keeping resources in use for as long as possible. Depending on how much we treat the water, we can keep it at its highest value use. In financial terms, the highest overall value use is usually as part of drinking water supplies. However the highest value use for each region will be location-specific, based on the local context, and could include different options like environmental discharges, urban greening, supporting biodiversity and cultural values for First Nations peoples.

Also enables us to extract other resources through the recycling process – nutrients that can be used in fertiliser applications, cellulose can all be extracted through the recycling process as well as the water itself.

Technology required

Water recycling treatment systems are mature and well understood around the world, yet always evolving due to ongoing innovation. The treatment technology required depends on the end use for the water, the level of likely human contact with the water, and the quality level the water needs to be for that end use. The over-arching principle is appropriate risk management to protect human health and the environment (see Regulatory Context). Recycling can happen at utility scale, where the water utility supplies recycled water to customer/s in a precinct or region, for example:

- single customers – such as a golf course
- a suburb/s whose homes receive recycled water for outdoor uses via a 'third pipe' network
- multiple customers eg an industrial precinct and/or irrigation customers that receive water via a dedicated pipe
- or at a system scale where purified recycled water is supplied to part or all of the customer base mixed with other water sources.

It can also happen at individual property scale, for example:

- grey water diversion devices which do not treat the water, but distribute it to the garden
- commercial in-home systems with inbuilt technology which treat and reuse water for garden, toilet flushing and laundry, such as Hydraloop, WOTA Box

These are typically managed between builders, plumbers and home-owners with limited water utility involvement.

At utility level, standard recycling treatment steps include screening and grit removal processes, sedimentation, biological nutrient removal (aerobic or anaerobic digestion).

Advanced recycling systems, such as those purifying recycled water to supplement drinking water supplies, might use different types of filtration, reverse osmosis, oxidation and UV disinfection.

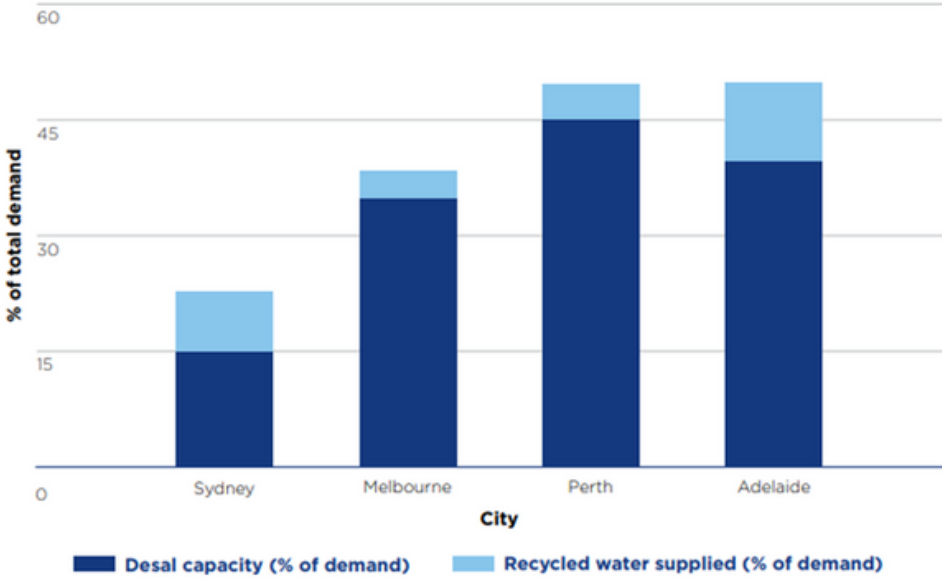
Geographic location is also a factor for utility level recycling. For example, coastal areas can more readily use membrane trains such as reverse osmosis treatment trains that discharge a brine stream, which is generally discharged to the ocean. Some cities in the US and elsewhere are adopting carbon/ozone based treatment systems, which produce less brine. Investment in Australia in such treatment systems, even at demonstration scale, would be valuable to help open up more options for inland areas.

Scope of benefits (across Australia)

Changing rainfall patterns have led to reductions in inflows to streams and waterways in different parts of Australia, and IPCC predictions are that rainfall could become more variable in future. Re-using the water we already have makes our system less reliant on taking water from the environment.

Rates of water recycling vary across the country, with hundreds of schemes, of different types. Some states reuse a substantial portion of their water but in most places a large amount is still discharged to the environment. Some statistics include the below chart showing the extent of recycled water (and desalination) as part of the overall water supply in various capital cities, from the Greater Sydney Water Strategy (2022, p37):

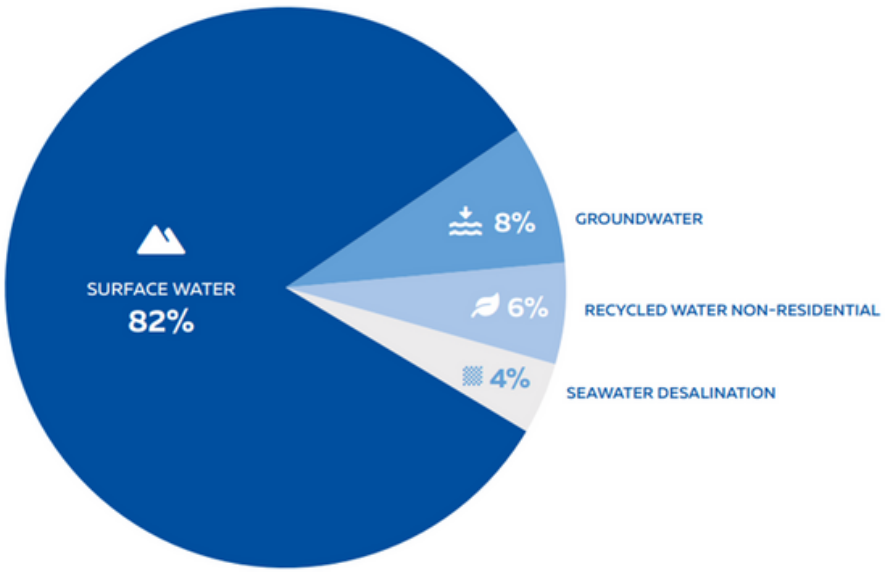
Rainfall-independent water supply: Sydney versus other cities



Sources: Australian Water Association, Desalination Fact Sheet, Bureau of Meteorology 2021, National performance report 2019/20, urban water utilities, part A.

And the estimate below that recycled water provided a small portion of the national water supply mix in 2019 (source, WSAA All Options on the Table – Urban Water Supply Options):

Rainfall-independent water supply: Sydney versus other cities



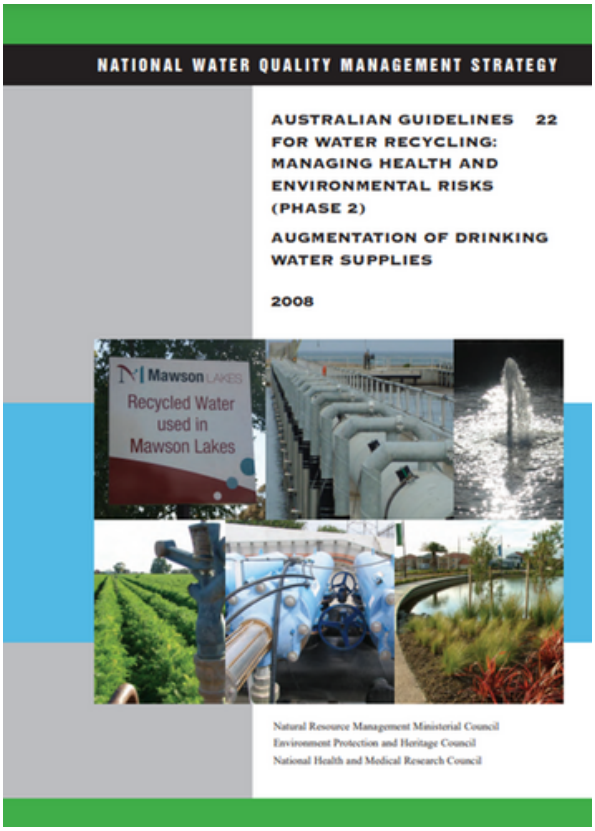
At a planning level, most cities and towns consider water recycling and stormwater harvesting options for different end uses as part of planning for their region. However there remain some barriers to the effective use of recycled water, including regulatory hurdles, plus some historic unwillingness to engage with communities on using purified recycled water for drinking, despite this happening in Perth and many places across the world.

Policy platforms like the National Water Initiative need to set a clear requirement for water utilities to investigate all options including non-traditional options that offer more rainfall independence such as recycled water for non-drinking, stormwater harvesting, and purified recycled water for drinking, to reduce the likelihood of implicit policy bans and maximise the likelihood of these options being implemented where feasible on cost, environmental and other aspects. Discharging recycled water to waterways is an important and climate-independent stepping stone towards purified recycled water.

It may also be valuable to explore other policy interventions to help enable non-traditional options including licence obligations, funding frameworks and incentives. In the US, for example, there is a federally funded Title XVI program that provides funding specifically for water reuse projects. Participants can use the funds for planning, design and construction, in partnership with local government entities. This will be particularly important for inland communities adapting to climate change, as they do not have coastal options such as seawater desalination readily available or at feasible cost. New technologies are likely to be of assistance to inland areas, for example carbon/ozone based recycled water treatment technologies. These technologies create less brine than membrane treatment systems such as reverse osmosis – there are significant challenges disposing of brine streams in non-coastal locations as it is usually too salty to discharge to inland waterways. Brine management is an important area for research investment for the future.

A good model to explore for the National Water Initiative, is the US national Water Reuse Action Plan, led by the US EPA:

Regulatory context



AGWR phase 2

The Australian Guidelines on Water Recycling (Phase 1, Managing Health and Environmental Risks, 2006) were developed over 15 years ago and provide the national guidance on water quality standards and management systems. They include a Phase 2 (Augmentation of Drinking Water Supplies, 2008). States and territories then have their own subsidiary frameworks, but these are not always consistent, and there is no national, standard approach to validating treatment process units. There are a range of standards and codes, including plumbing codes, that govern specific products and services.

Cost-wise, recycled water is addressed in economic regulatory frameworks in most jurisdictions. It is often treated as a non-core, or unregulated product – in some cases with the ability for recycled water costs to be offset by savings created in water/wastewater systems. Today, there is broad support for integrated water cycle management approaches to urban planning and design that incorporate all sources of water holistically, including recycled water and stormwater (for example Productivity Commission reviews, Water Sensitive City frameworks). However, if IWCM is not the least cost approach, it can be difficult to obtain funding approvals. It has been challenging to quantify the non-monetary benefits, plus the beneficiaries are often broader than water customers, and can include the environment itself. Without clear, strong obligations in regulatory frameworks, IWCM approaches can be regarded as discretionary or 'nice to do'.

In some places, developers can be required to contribute [14] to the upfront costs of recycled water schemes. In NSW and South Australia, competition frameworks exist that enable utilities to compete alongside public water utilities and offer such services [15]. Developments with recycled water are sometimes seen as offering a 'green premium' which can attract home buyers. However, recycled water schemes are an additional service for water utilities to operate and maintain; they can also be seen as creating additional red tape and regulatory burden.

Recycled water cost and planning frameworks are primarily a state issue. But there would be enormous value in taking a leadership stance at national level - by encouraging or mandating investigation of water recycling among all other options as part of urban planning in the National Water Initiative, and requiring full transparency on costs and bill impacts. Community engagement often shows high support for reusing water – for example the Lower Hunter Water Security Plan and the Greater Sydney Water Strategy both outlined strong support within their communities for water reuse of both recycled water from wastewater and stormwater, for non-drinking and drinking end uses. This support needs to be nurtured.

[14] Developer charges typically cover the shortfall between capital costs to service an area, and the net revenue from charges over time
[15] The Water Industry Competition Act regime in NSW, the Third Party Access regime in South Australia

Cost recovery framework & government investment support sought

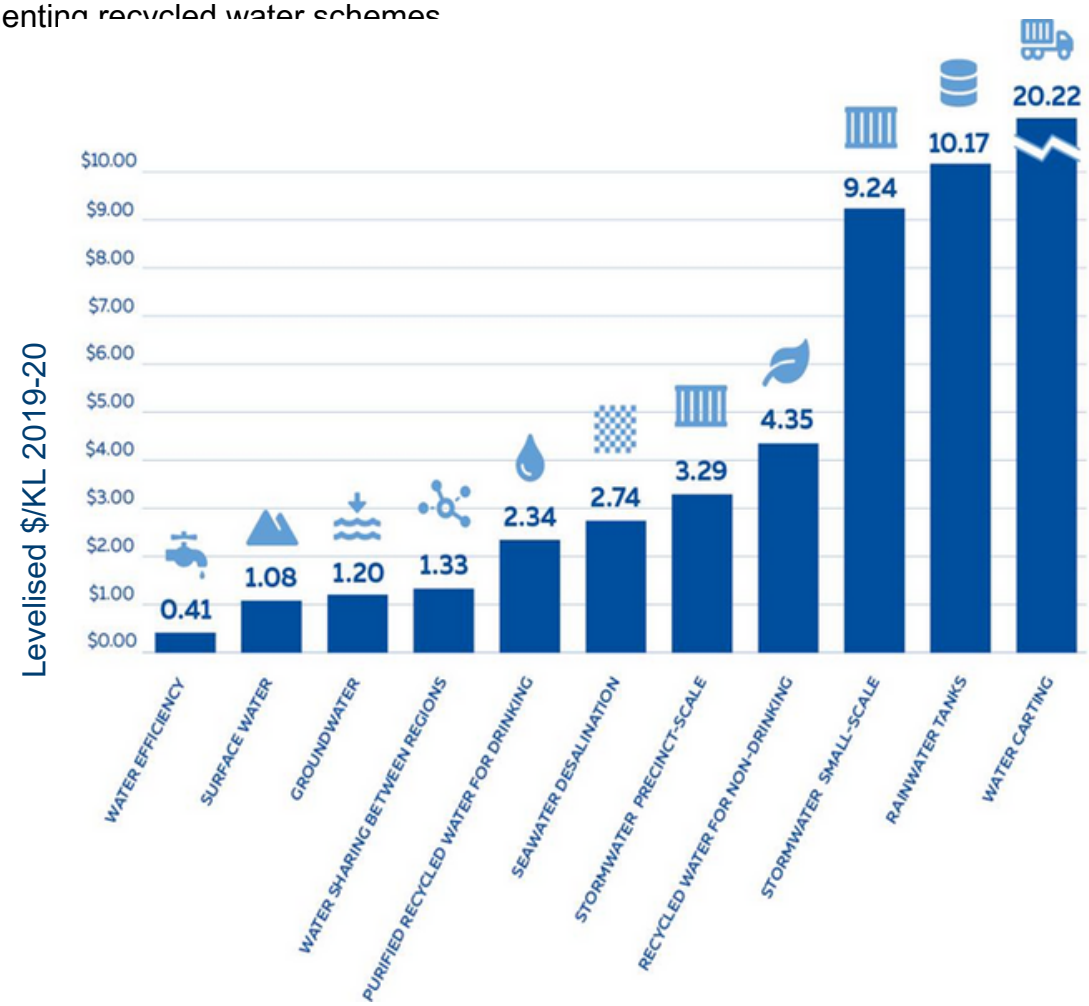
Utility-scale recycled water is typically funded on a user pays basis, but there is a wide range in the pricing and governance around this. In some instances it is highly regulated, in others less so. In some instances it is sold at a lower price than drinking water to encourage uptake – this can create challenges in trying to help communities understand that it is a valuable product.

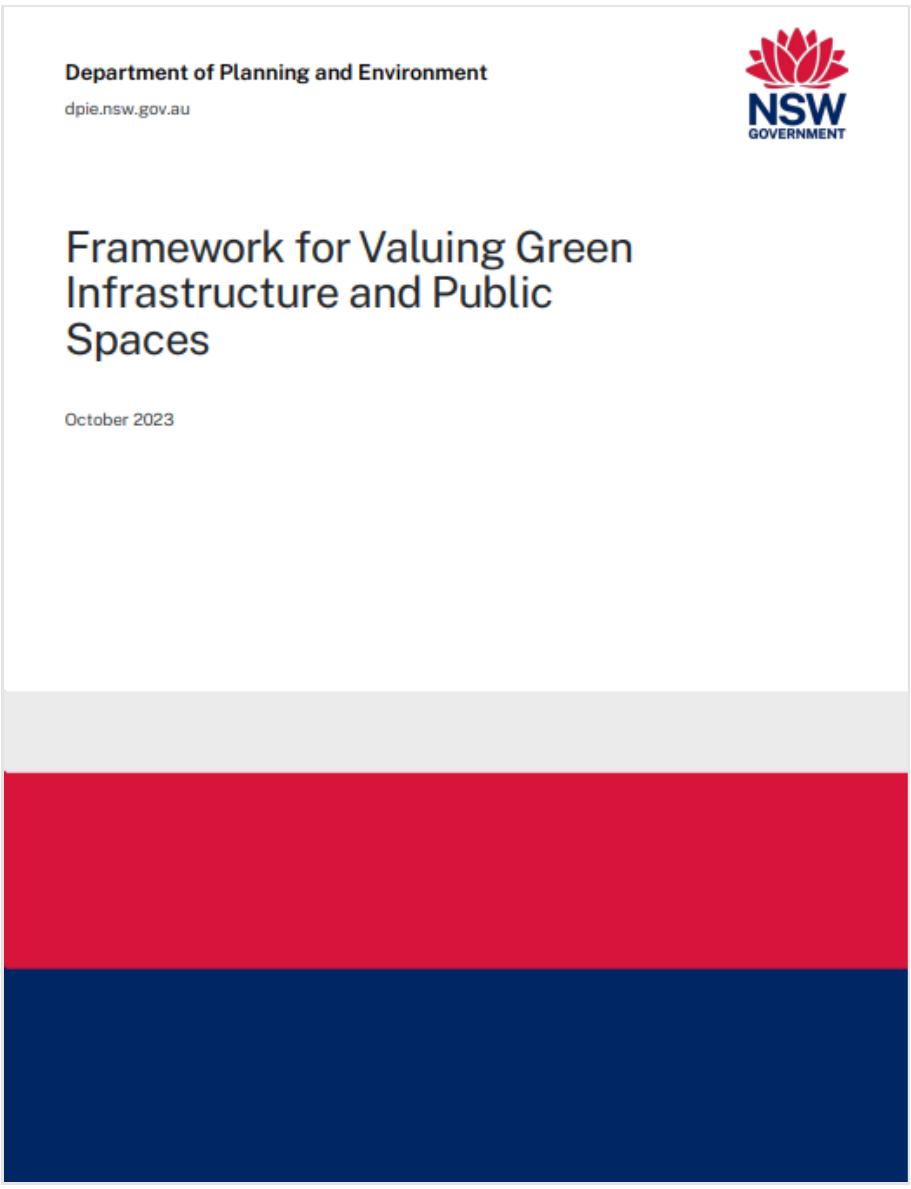
Governments can support effective water recycling by creating consistent, practical regulatory settings that appropriately value the co-benefits created by recycled water. This may include ensuring that there are strong obligations within the regulatory frameworks, that create an effective mandate for undertaking the work. And, reducing red tape and barriers around implementing recycled water schemes.

Governments can also support this by providing funding through grants or fund-matching arrangements. This could be particularly important for some beneficiary groups such as Traditional Owners and the environment.

There is also a need for better training and skills – operators need to have appropriate training. There is a current gap in the availability of suitable training organisations and resources, and a lack of clearly defined competencies and benchmarks. This will be a limiting aspect in future if not addressed.

WSAA's 2020 report All options on the Table – Urban Water Supply Options developed a database of over 330 Australian water supply projects:





From the information available, recycled water projects for agricultural or industrial end uses had lower costs, generally less than $5 per kilolitre, with many projects below $2 per kilolitre. The cost of recycled water for non-drinking is relatively high cost, because it also includes higher cost projects including where pipework is duplicated to provide recycled water to households. The median levelised cost was $4.35 per kilolitre.

In other words, due to the need for a separate transport network, non-potable recycled water schemes can be quite high cost relative to other options. However, these solutions also create value by enabling growth, urban greening and cooling, agricultural food production, waterway health and biodiversity benefits. The NSW Interim Framework for Valuing Green Infrastructure and Public Spaces has provided a positive landmark for valuing some of these benefits, so that economic regulators can better value the benefits they provide.

Barriers – What's holding us back?

There are a mix of social, regulatory and technical barriers preventing greater uptake of recycled water:

- There are national guidelines on water quality, along with national health-based targets, but there is not a standardised national approach to validating treatment process units across the country. This makes it more costly for recycled water technology providers in Australia as there is not a consistent set of goalposts.
- There are also different recycled water quality standards in different states. There are slightly different approaches for demonstrating that various sources of water (ie recycled water, stormwater, surface water) are fit for their intended end use – it would be helpful to standardise these.
- Land planning and water planning are conducted separately within urban planning authorities, missing many opportunities for better water servicing and integrated water cycle management (IWCM).

Roadblocks to Integrated Water Cycle Management

The Productivity Commission found that IWCM.. 'should lead to better decisions and lower cost solutions. However, IWCM cannot be delivered by the water sector alone. Implementing IWCM will require significant, ongoing collaboration between the land-use planning and local government sectors and the water sector, in both policy and planning at a range of different scales.'

Ten key impediments to IWCM being implemented include a lack of clear objectives or responsibilities: poor linkage between statutory land and water planning, and local-scale and systemwide water planning: policy bans on all options being on the table;
environmental regulators being focussed on actions not outcomes. [B5]

- Treating recycled water as a secondary, separate or unregulated product in regulatory frameworks, can make it challenging to pursue.
- Isolated instances of community backlash, such as the 2006 Toowoomba referendum on purified recycled water for drinking, have created unwillingness to begin the journey of community engagement, despite far more widespread successes. Measurements of community support for using purified recycled water as part of drinking water schemes are promising – governments need to help familiarise communities with these practices as they will likely be increasingly part of the mix in future.
- Training programs and competency benchmarks have not kept pace with employment markets and technology change – there is an urgent need to develop more reliable training platforms.
- There are regulatory hurdles for specific products and schemes across the country. For example, Hydraloop is in a protracted effort to find a regulatory pathway as it does not fit neatly into the existing Standards. Similarly, an industrial recycling scheme in northern NSW has spent years trying to identify a clear regulatory pathway as it does not fall neatly within Section 60 of the Local Government Act.

Policy reforms - What are we asking for?

There are a range of ways in which governments can support optimisation of fit-for-purpose water reuse. Many of these actions need to be done collectively, not in a piecemeal way, to achieve maximum impact.

This may include creating incentives for efficient recycling. It should also include integrating land and water planning; making it easier to place a financial value on the indirect benefits of recycling schemes, and allocate these benefits within pricing frameworks; and investigate experience in places like the United States, where extensive government investment incentives (WaterSMART Title XVI) are available for water reuse programs.

Commonwealth government

- National Water Initiative to provide national leadership and policy settings, including requiring all options to be investigated and data published, so that communities can understand the relative benefits of different water source options and provide input to decision-making.
    - A good model to explore for the National Water Initiative, is the US national *Water Reuse Action Plan*, led by the US EPA; which was developed collaboratively with many partners across the water sector, to address a range of local and national barriers, steered by a federal Interagency Working Group.
- Via the NWI, standardise criteria and benefits to assess all options including recycled water, purified recycled water, stormwater (for irrigation and/or drinking), desalination. Show how they contribute to overall water security in an apples-with-apples way.
- Encourage the NWI to lead a process of standardisation of state-based guidelines and water quality requirements under a consistent national framework. Also clarify the governance and roles between the federal government and the states/territories.
- Create a simpler, clearer regulatory pathway for recycling water from all sources, by encouraging the National Health & Medical Research Council and Water Quality Australia to:
    - Better integrate the Australian Drinking Water Guidelines, and the Australian Guidelines on Water Recycling Phase 2 (2008)
    - Update the integrated Guidelines to cover all sources of water including purified recycled water (from wastewater), and stormwater (noting there is an existing scheme in Orange, NSW) – so that all sources (surface water, desalination, groundwater, purified recycled water and stormwater) all have a clear set of regulatory goalposts. This could use health-based targets for drinking water as a basis.
    - Use the opportunity to finalise the update of the Australian Guidelines on Water Recycling which have not been updated for nearly 20 years – technology and practice has evolved a lot in this time. It would be helpful for the ownership of these guidelines to be made clearer to the industry.
    - The industry is able to provide assistance and qualified people to assist with drafting guideline updates (with appropriate governance controls built in, naturally.) This would also invigorate bodies such as en-Health and the Water Quality Advisory Committee to the NHMRC, through greater exposure to industry representatives, who can highlight practical implementation issues.
    - The requirement for regular (say, 5-year) reviews of the Guidelines should be built in, along with helpful information about implementation pathways for utilities wanting to pursue these options.
- Develop a national framework for validation/verification of recycled water systems, , such as by adopting the WaterVal framework now managed by Water Research Australia - so that all states have the same requirements.
- Minimise the entry of contaminants such as PFAS and microplastics into Australian environments, through product and manufacturing standards, as such contaminants later become a problem for the water industry to manage in water treatment.
- Develop a national framework for validation/verification of recycled water systems, so that all states have the same requirements.
- Support hydrogen settings in both the National Water Initiative and National Hydrogen Strategy, that recycled water should receive first consideration as source water for green hydrogen schemes.
- Invest in research on brine management, which is shaping as a major hurdle for inland recycling. This could include research into micro-algae, and metallurgical extraction of valuable compounds from brine salts from water treatment.

State/territory governments

- Better integrate land and water use planning. Where land planning occurs first and water planning follows separately, opportunities are missed for sympathetic co-locations – such as paths and cycleways that provide infrastructure corridors, biodiversity habitats and green spaces. Actively pursue integration of land and water planning, as recommended by multiple studies including the Productivity Commission's detailed report 'Integrated Urban Water Management - Why A Good Idea Seems Hard To Implement'
- Adapt water planning and pricing frameworks, and policy settings, to make it easier to place a financial value on the indirect benefits of recycling schemes, and allocate these benefits within pricing frameworks, and prioritise local use of recycled water (which creates smaller loops for circular economy). This could include tools like the NSW Interim Framework for Valuing Green Infrastructure and Public Spaces.
- Consider creating incentives for efficient recycling. It should also include integrating land and water planning; and investigate experience in places like the United States, where extensive government investment incentives (Title XVI) are available for water reuse programs.
- All governments - educate and work with elected officials, communities and stakeholders, and encourage bi-partisan support for recycling of water (including recycled wastewater and stormwater). A key element is education – build greater awareness that recycling is part of the natural water cycle. This should include explainers that used water is already extensively recycled to the environment, and that unacknowledged reuse of water used by upstream communities has always been a part of the urban water cycle.
- Ensure regulatory frameworks recognise the increasing role recycling could play in future as part of integrated water systems, by integrating recycled water into pricing frameworks rather than treating it as a separate, unregulated isolated product. There are good frameworks now available to value the benefits of water-enabled infrastructure such as the NSW Interim Framework for Valuing Green Infrastructure and Public Spaces.

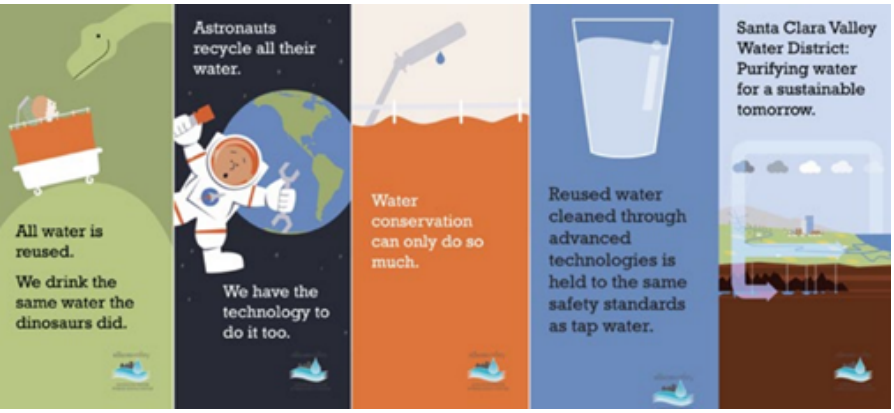
All governments

- Support more demonstration plants and projects to showcase how water recycling can work and demonstrate different treatment processes, working with communities and stakeholders. Globally, demonstration plants are a key step on the journey to implementing schemes. Given funding limitations, ensure that demonstration projects are prioritised based on knowledge benefits and information-sharing.
- Support WSAA's recommendations to the review of the National Hydrogen Strategy – many of these relate to enabling greater uptake of recycled water.
- Show leadership by spearheading community education and engagement activities that increase water literacy and understanding of the valuable role water reuse can play in ensuring a sustainable future. Take all opportunities to explain that ensuring secure water supplies and protecting water's vital functions in maintaining urban ecosystems, involves billions of dollars in capital expenditure, so we need to be open to the most effective, sustainable, reliable, climate-resilient options. Educate elected officials, communities and stakeholders, and encourage bi-partisan support for water in political arenas. WSAA and the urban water industry can work with governments on engagement strategies. Build greater awareness of the natural water cycle, and that recycling water just speeds up what happens in nature, into education curriculums.
- Create a dedicated Australia/New Zealand water recycling conference, to bring policy-makers, industry and regulators together and fast-track coordinated progress.
- Work to overcome regulatory hurdles for practical in-home solutions for grey-water diversion and recycling.
- Support regimes such as BASIX (NSW) that mandate water savings in homes, and include eligible grey water systems such as Hydraloop to qualify.

Downsides/risks/criticisms

- There has historically been some political reluctance to explore different forms of recycled water due to fear of community perception. However, other parts of the world and cases like Perth Australia, have shown that it is quite possible to bring the community to understand the value of recycling options. For example, in San Diego, community support for purified recycled water in San Diego was only 26% in 2004, but this has since risen to 79% through well planned education activities. The levels of community support for reuse pin Australia now are encouraging. Education is the key.
- The time to engage communities about these issues is during non-drought times. Once drought comes, while communities have high interest in the issues, it is also too late to develop and implement new approaches. It is critical to bring communities on the journey before the drought conditions arise.

1
Harvested stormwater
entering Suma Park dam for
the first time in 2009



From WSAA All Options on the Table – Lessons from the Journeys of Others, Think and Drink banners from the Santa Clara County visitor space

Media opportunities

- Visits to existing recycled water schemes can be easily organised on achievement of key milestones eg new construction, [x] years in operation, a milestone of water recycling reached. There are recycled water schemes in almost all parts of Australia.
- This could include visits to nature based solutions such as wetlands adopted as part of a treatment process instead of traditional 'grey asset' solutions.
- A ministerial visit to Orange Council (NSW) Blackmans Swamp Scheme (photo credit).
- It could also include demonstration plants for new approached being trialled or considered.
- Each successive release of IPCC documents is a good hook to announce initiatives on fit for purpose water reuse.
- The Murray-Darling Basin challenges also provide potential opportunities to highlight the value of reducing reliance on rainfall-dependent water supplies, through water reuse.