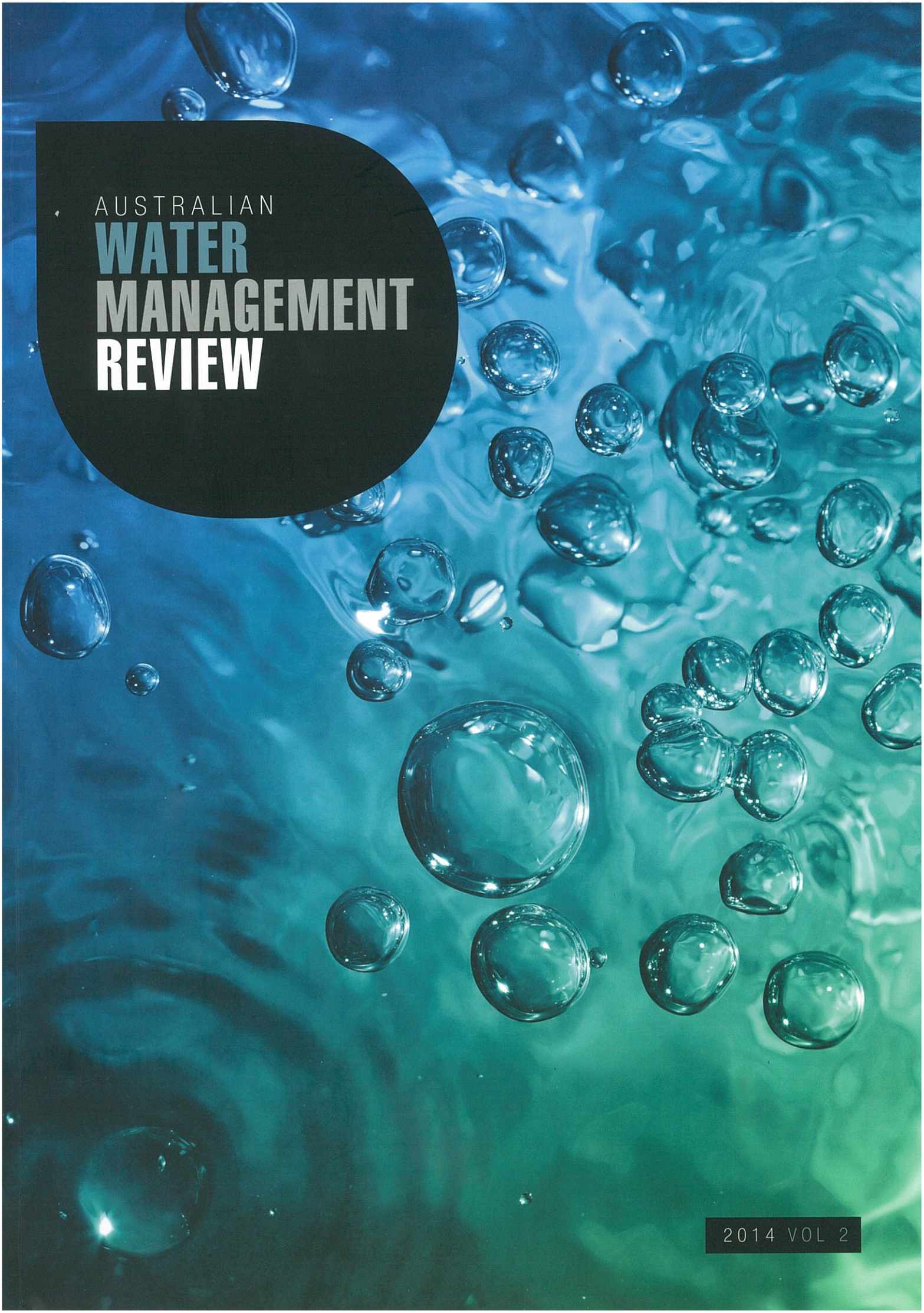
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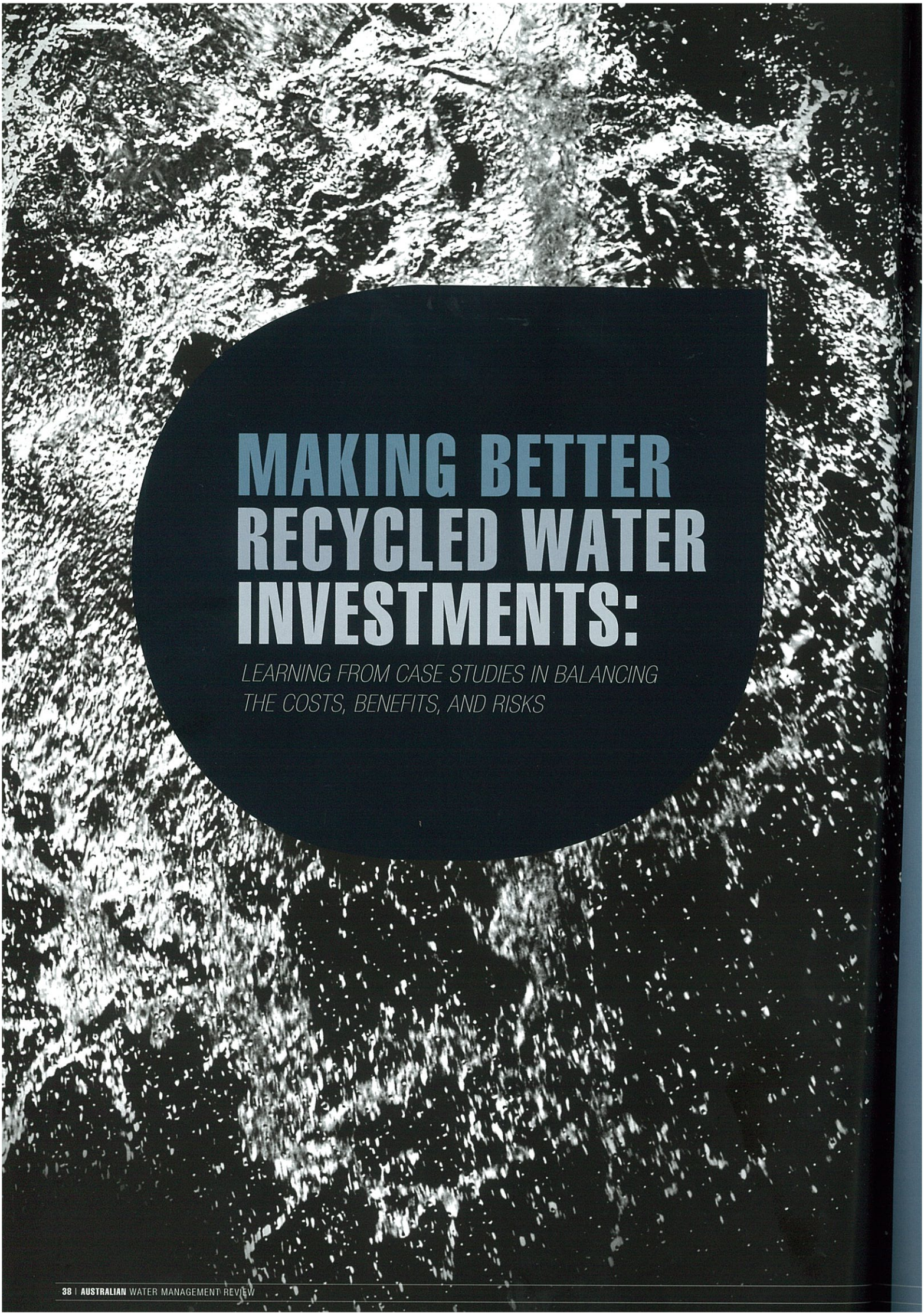


MAKING BETTER RECYCLED WATER INVESTMENTS:

LEARNING FROM CASE STUDIES IN BALANCING THE COSTS, BENEFITS, AND RISKS

Over the past decade, driven by a confluence of interrelated factors such as drought, subsidies, and sustainability interests, Australia has seen significant developments in water recycling. However, we have seldom looked back at these investments to see how differently things panned out from what had been initially planned or anticipated, and how the real costs, benefits and risks were balanced and distributed across different stakeholders. Learning from these experiences is essential if effective recycled water investments are to be made in the future.

The Institute for Sustainable Futures (ISF), at the University of Technology Sydney has recently completed a two-year national collaborative research project for the Australian Water Recycling Centre of Excellence aimed at filling this knowledge gap, and enabling the sector to build better business cases.

The project investigated eight diverse case studies of water recycling schemes from across Australia.

Key reflections

The 'stories' revealed by the project case study investigations illustrate why context matters in every situation, and how the practical assessment of success or otherwise goes beyond economics.

Often recycled water investments do not 'stack up' by themselves financially. These get over the line either through scheme investors having access to government subsidies or the means to accept the financial gap in return for the less tangible outcomes. For example, one utility was able to spread the costs across its entire customer base and the scheme provided significant organisational learning and development outcomes. In another example, investment in water recycling by a private developer to ensure the highest sustainability rating of a new building secured a premium tenant on a long-term lease, at the height of the Global Financial Crisis.

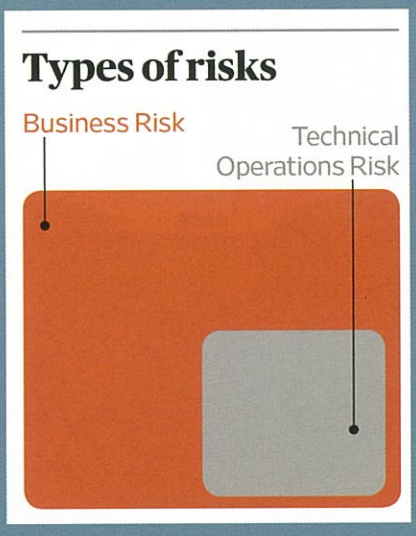
Demand for recycled water is likely to increase in the future, not least from the drive to improve urban livability and the benefits of retaining greater amounts of water in the landscape. However, subsidies are less likely in the future, so to enable public investments in water recycling other approaches may be necessary. These include for example, accepting the additional costs in return for the less tangible or direct benefits, facilitating shifts in the distribution of costs and benefits across the different stakeholders, and allowing recycled water to operate on a same basis as other sources, i.e. though postage stamp pricing.

Clear articulation of the benefits, including the ones that are hard to monetize, is important in that it can help proponents of recycling schemes determine whether pursuing these schemes justifies accepting the financial gap.

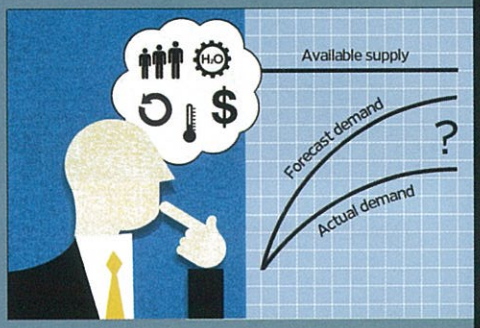
In such considerations, careful thought about the location and scale of recycled water provision is also important as it can facilitate access to certain benefits such as avoided infrastructure upgrade costs.

Moves toward cost reflective pricing of water and sewage services, alongside improving the capacity to access both of these revenue streams and streamlined regulations will improve the opportunity for private providers to enter the market.

Figure 1: Different categories of risk



Another key reflection emerging from the project is that the treatment of risk in recycling needs to expand dramatically. This needs to incorporate a broader range of business risks associated with the decision to invest in recycling, extending well beyond the historical focus around technical issues to ensure the product meets public and environmental health standards (Figure 1). For example, case study investigations highlighted that demand risk is significant in recycled water planning and investment. Deviations from demand forecasts are common across quite different recycled water schemes, often leading to unanticipated financial and operational consequences.



The reason why overestimating demand is widespread is because it is rooted in human cognitive and behavioural biases. Avoiding these pitfalls is possible and requires both explicit attention to these psychological traps and a corporate culture that values failure and learning from experience. The project's theme paper '*Demand forecasting: a risky business*' expands on this and the project's guidance materials - *'Making better recycled water investment decisions: Shifts Happen'* – show how to approach the whole subject differently.

It requires a structured practical process to uncover and assess all the relevant sources of risks and uncertainty, from political shifts to changes in the market. The project identified six areas where significant shifts can happen in practice. Each of these areas requires attention from the earliest stages of a proposed scheme, so that the risks can either be managed or planned for.

The project

The project case studies were selected via a participatory process with the project partners, who represent a diversity of stakeholder groups in the water sector including utilities, regulators, technology providers, developers, and councils *(Figure 2)*.

These were selected to reflect the diversity of reuse schemes nationally, as well as the complex web of cost benefit interactions between stakeholders illustrated in *Figure 3*.

A broad spectrum of situations across wide-ranging dimensions were covered. These include scale, jurisdiction, source, end-use, location and operational duration *(see Table 1)*.

The depth of the case studies is expanded in six documents exploring cross-cutting themes, that emerged from the detailed investigation of the case studies and insights from beyond the water sector as well. These include:

- 'Navigating the institutional maze' – draws on the experience of a NSW metropolitan Council to illustrate the messy process of establishing council schemes, when water recycling regulations are unclear.
- 'Saving water and spending energy?' – explores energy consumption issues and trade-offs faced by recycled water schemes.
- 'Demand forecasting: a risky business' – demonstrates that deviations from demand forecasts are common across the recycled water industry and provides guidance on how to notice and mitigate this risk.
- 'Matching treatment to risk' – demonstrates how the perception of water recycling health and environmental risks is inextricably intertwined with other business and organisational risks, and how this can often lead to choices of "best quality" instead of "fit-for-purpose" water, which add unnecessary additional costs and impacts.
- 'Public-private matters: how who is involved influences outcomes' – illustrates the strong relationship between the drivers and outcomes of water recycling schemes and the public or private nature of the proponents.
- 'Looking to the future' – taking the case studies as a starting point, it explores a broader canvas of plausible futures for recycled water and the forces that determine these scenarios.

Project outputs

The project outputs are documented in a suite of 16 concise, engaging, and interwoven deliverables. In addition to the case studies and the cross-cutting theme papers, an investment guide and a policy paper were also developed. The investment guide collates all the learnings from the project and help potential help potential investors apply these learnings in their own projects. More specifically, it assists with making the questions that matter to identify and assess risks and uncertainties involved, when planning a water recycling scheme.

The policy paper in turn, discusses how policy and regulatory settings around environmental protection, water security, infrastructure charges, and approvals and licensing impacted on the case studies.

This bold approach has been well received with enthusiastic feedback from industry leaders such as Dave Gough, the Chair of WateReuse Australia, who said '*I am really excited about the potential of this tool to help policy makers, practitioners and service providers better understand what makes a good recycled water project, and how to overcome barriers to their implementation.*'

Concluding remarks

This project began with the tittle 'Building better business cases for recycled water' and an intent to explore and learn from on-the-ground experience. The future value to the sector of this research project lies in improving the investment landscape for water recycling by helping to reveal the risks that matter and how to identify them, enabling the development of better cost-sharing arrangements and influencing policy design and institutional settings.

Find out more about the project here: http://waterrecyclinginvestment.com.

Figure 2: Stakeholder groups represented by the project partners

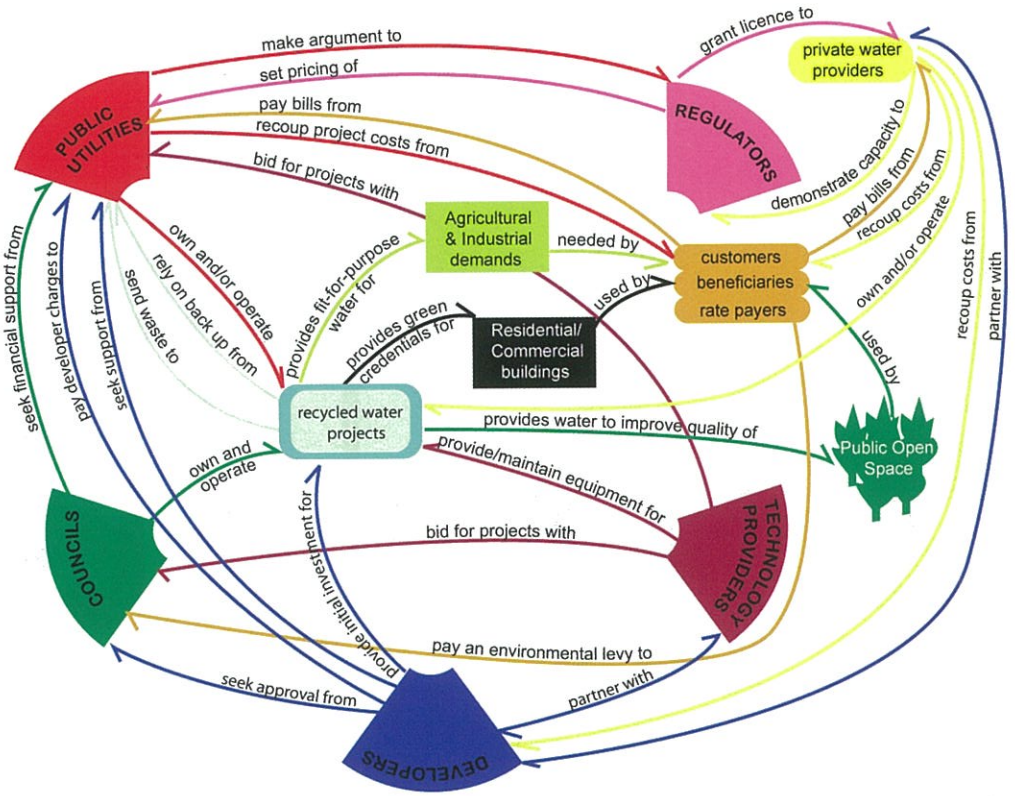


Figure 3: Interpretation of the complex web of cost and benefit interactions between key players in recycled water projects loosely based on the NSW context

Table 1: Characteristics of the water recycling schemes investigated

Case study	Jurisdiction	Scale	Water source	End-use	Delivery model	Year operation started
Darling Quarter	NSW	0.17 ML/d	Sewage (sewer mining)	Commercial building reuse for toilet flushing, irrigation, and cooling towers	Privately owned and operated	2011
Roseville	NSW	26 ML (Dam capacity)	Stormwater	Urban golf course and oval irrigation, and toilet flushing	Private-public collaboration between a golf club and a council	2009/10
Wide Bay Water	QLD	14.3 ML/d (3 plants)	Sewage	Cane farms, hardwood plantations, council open spaces, golf course, Hervey Bay airport and dust suppression	Owned and operated by a public utility/ local government authority	1992
Rosehill	NSW	20 ML/d	Sewage	Industrial processes and irrigation	Private-public partnership between a private consortium and a public utility	2011
Aurora	VIC	3.5 ML/d	Sewage	Greenfield residential reuse for toilet flushing, garden watering, car washing and irrigation of public open space	Owned and managed by public utility	2009
Wagga Wagga	NSW	23.26 ML/d (3 plants)	Sewage	Sports ground; lawn cemetery; Agricultural – non-food crop	Owned and managed by a council	mid-1980s
Yatala	QLD	1.5 -2 ML/d	Industrial effluent (brewery)	Industrial reuse (cooling towers, cleaning processes, toilet flushing, and irrigation)	Privately owned and operated	2005
Willunga	SA	5.8 GL/yr	Sewage	Irrigation	Private-public partnership between a private joint venture and a public utility	mid-1990s

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Institute for Sustainable Futures

The Institute for Sustainable Futures (ISF) is a flagship research institute at the University of Technology, Sydney. ISF's mission is to create change toward sustainable futures through independent, project-based research with government, industry and community. For further information visit www.isf.uts.edu.au

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