



# **Review of water policy and research in Australia**



**Analysis of policy reform and input to Productivity Commission consultation questions**

Water Research Australia

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→ **The Power of Commitment**



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# Executive summary

GHD has been engaged by Water Research Australia (WaterRA) to provide insight into the role of science and research in the Australian water sector and their treatment under the proposed national reform agenda. The paper has been prepared to support Water Research Australia's broader submission to the Productivity Commission's National Water Reform Inquiry. The purpose of this white paper is to articulate why science and research must be foundational to the next phase of national water reform, informing policy design, regulatory decision-making and system adaptation, rather than remaining a peripheral or supporting consideration

This report is subject to, and must be read in conjunction with, the limitations set out in section 1 and the assumptions and qualifications contained throughout the Report.

## **The policy and institutional foundations of Australia's water sector**

Australia's water sector is entering a new phase of reform shaped by climate variability, infrastructure renewal pressures, affordability concerns and rising expectations for transparency and meaningful engagement (including First Nations interests). In this context, science, research and innovation are not ancillary inputs; they are foundational to credible policy design, adaptive management and durable regulatory decision-making.

A targeted gap analysis across 20 key legislative, regulatory and policy instruments found that science and research are unevenly recognised and rarely embedded as a core governance requirement across the system. Only five instruments demonstrated strong support for water research, science and innovation, based on explicit references and the extent to which science is positioned as integral to objectives and decision processes. While water resource legislation in several jurisdictions and national technical guidelines provide clearer recognition of the need for evidence-based decision-making, there is no clear roles or responsibilities for development of this 'evidence' to support water agencies.

Overall, the gap analysis points to a systemic absence of clear, durable arrangements that allocate responsibility for coordinating and stewarding the national water science base, and translate research and innovation into consistent policy, planning and regulatory practice.

## **Informing the Productivity Commission's reform conversation**

This report also provides targeted input to support WaterRA's engagement in the Productivity Commission's National Water Reform Inquiry. In particular, it is intended to help position WaterRA as a constructive, evidence-based contributor by identifying where the Commission's focus on productivity, affordability, long-term sustainability and regulatory design depends on strong science and research capability, and where current policy and regulatory settings do not adequately enable that capability to be developed, coordinated and applied.

Key issues identified relevant to the Commission's consultation questions include:

- Progress towards the NWI objectives has been limited due to a lack of a formal role for science, research and innovation
- Several delivery, investment and system performance risks are introduced across by not embedding science, research and innovation into the Australian water framework
- Economic regulation frameworks do not actively incentivise innovation or sustained investment in research and development
- Economic regulatory frameworks do not adequately account for long term benefits and cost reductions arising from R&D investment
- Current assessment frameworks struggle to capture the risks and costs of deferring or avoiding investment
- Environmental and climate investment face disproportionate evidentiary hurdles in economic regulatory processes
- Affordability constraints contribute to lower levels of investment in innovation and long-term capability

To address these issues and challenges, this report proposes a number of potential reforms, including:

- Science and research considerations should be explicitly incorporated into the Water Act and Basin Plan reviews
- Pilot a national Water Science & Research Stewardship Function
- Adopt Water Science & Research Principles as a national assurance standard
- Create a National Water Research “Capability Map” and Investment Register
- Standing Independent Peer Review & Rapid Advice Panel for contested questions
- Require “Evidence Statements” in key water decisions (planning, SDLs, approvals, major infrastructure)
- Human capital development driving innovation through R&D training and capability
- Alignment to global ISO innovation standards
- Establish a reliable, equitable and recurring funding base for water science, research and innovation
- Shift towards outcomes-based regulatory frameworks
- Provide ring-fenced innovation and capability allowances

### **Summary and conclusion**

This paper finds that science, research and innovation are not consistently embedded as core governance requirements across Australia’s water regulatory and legislative framework, creating risks to productivity, affordability, long-term sustainability and the legitimacy of key trade-offs. Submissions to upcoming reforms from research organisations like WaterRA should advocate for practical changes to treat research as essential system infrastructure, strengthening stewardship and coordination, setting clear assurance expectations (including evidence statements), and aligning economic regulation to enable innovation and long-term research and development. Together, these steps would support more credible, adaptive decision-making and more resilient outcomes for communities, the environment and the economy.

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# 1. A turning point for national water reform

Australia's water sector has been shaped by more than two decades of sustained national reform, driven by the need to balance economic productivity, environmental sustainability and community wellbeing in a highly variable climate. These reforms have delivered material gains in water planning, entitlement and market frameworks, environmental water management, and the provision of urban and regional water services.

However, the challenges now confronting the sector are fundamentally different in scale, complexity and urgency from those that informed earlier reform agendas. Climate change is amplifying hydrological variability and extremes; population growth and urban expansion are increasing demand pressures; emerging contaminants are testing existing treatment and regulatory frameworks; infrastructure systems are ageing; and expectations around meaningful First Nations participation in water governance are rising. Collectively, these pressures are reshaping both the risk profile of the water sector, and the policy questions governments must now confront.

In response, governments have initiated a new wave of national reviews and reform processes that together signal a potential reset of Australia's water policy architecture. At this critical juncture are three concurrent and interrelated processes: the Productivity Commission's National Water Reform Inquiry, the statutory review of the Water Act 2007 (Cth), and the once-in-a-decade review of the Murray–Darling Basin Plan. While distinct in scope, these processes are tightly interconnected and will together shape the next generation of water policy, regulatory frameworks and investment settings across Australia.

## 1.1 The National Water Initiative as the foundation of reform

The 2004 National Water Initiative (NWI) provides the foundation for Australia's contemporary water reform framework. Agreed by all Australian governments, the NWI established nationally consistent principles for water access entitlements, water planning, environmental water management, water markets and pricing. Central to the NWI is a clear commitment to decision-making based on the best available science, transparency, and adaptive management.

While the policy landscape has evolved since 2004, the NWI continues to function as the primary reference point against which reform progress is assessed. The Productivity Commission has a statutory role in periodically reviewing governments' implementation of the NWI, and successive reviews have informed national debate on reform effectiveness, institutional performance and priority areas for further action.

Governments are now in the process of transitioning from the NWI to a refreshed National Water Agreement. This transition seeks to retain the core strengths of the NWI while responding to contemporary challenges; particularly climate variability, First Nations water rights and interests, and the long-term sustainability and resilience of water systems.

## 1.2 A converging reform agenda

### 1.2.1 Productivity Commission National Water Reform Inquiry

In March 2026, the Australian Government commissioned a new Productivity Commission inquiry to assess progress under the NWI and advise on pathways to a more sustainable, affordable and productive water services sector. The inquiry has an expanded remit compared to previous reviews, with explicit attention to long-term financial sustainability, affordability, and regulatory design in the face of climate and demographic pressures.

Critically, the inquiry will inform refreshed national guidance on water pricing and independent economic regulation; areas where robust scientific evidence on system behaviour, risk and long-term impacts is indispensable.

## 1.2.2 Independent review of the Water Act 2007 Cth

Running in parallel is the Independent Review of the Water Act 2007, the first since 2014. The review is examining whether the Act remains fit for purpose and whether its objects (ecological sustainability, economic efficiency and community resilience) are being achieved in practice. It also places explicit emphasis on improving governance arrangements, elevating First Nations water rights and interests, and aligning Commonwealth legislation with the evolving National Water Agreement.

The Act mandates national water information and Basin-scale planning, embedding science as a legal cornerstone of decision-making. The review therefore represents a critical juncture for clarifying how scientific evidence is generated, weighted and applied within statutory frameworks.

## 1.2.3 Murray-Darling Basin Plan Review

Finally, the Murray–Darling Basin Plan is undergoing its first statutory review since commencement in 2012. The review is intended to assess whether the Plan remains effective in achieving its objectives under a changing climate and whether adjustments are required for the next decade of Basin management. The MDBA has explicitly identified the need to draw on the latest evidence and scientific understanding, particularly in relation to climate change, ecological outcomes and water recovery effectiveness. [mdba.gov.au]

Debate around the Basin Plan review has clearly exposed the consequences of uncertainty, contested science and gaps in long-term monitoring, underscoring the importance of credible, trusted research to support reform legitimacy.

## 1.3 Why science and research matter now

Taken together, these reform processes signal not incremental policy adjustment, but a fundamental reassessment of how Australia manages water in the national interest. Decisions emerging from this reform window will shape infrastructure investment, regulatory settings, environmental outcomes and community impacts for decades to come.

In this context, science and research is intended broadly to encompass water science and applied research across the full water cycle and all aspects of service delivery including hydrology and climate science, water quality and ecosystem science, demand and usage analysis, asset performance and resilience, system modelling, data and monitoring frameworks, and the translation of this evidence into operational, regulatory and policy decisions.

At this juncture, science and research cannot be treated as ancillary inputs. They are essential infrastructure for reform, enabling adaptive management in the face of uncertainty, reducing policy and investment risk, informing difficult trade-offs, and sustaining public trust in decision-making. Without deliberate and coordinated investment in scientific capability, data systems and the translation of research into policy and practice, the ambitions of national water reform will be difficult to realise.

## 1.4 This report

Water Research Australia engaged GHD Australia to assist in preparing this white paper on the role of science and research in the Australian water sector and their treatment under the proposed national reform agenda. The paper has been prepared to support Water Research Australia's broader submission to the Productivity Commission's National Water Reform Inquiry.

The purpose of this white paper is to articulate why science and research must be foundational to the next phase of national water reform, informing policy design, regulatory decision-making and system adaptation, rather than remaining a peripheral or supporting consideration.

We have done this by:

- Undertaking a targeted gap analysis of key Commonwealth, state and territory water legislation and policy instruments to assess whether, and how, research, innovation and science-based decision-making are explicitly recognised and embedded.
- Assessing how gaps, omissions or weak references to science and research may have influenced reform progress and outcomes, including implications for the delivery of safe, secure and reliable water services.
- Mapping identified gaps against National Water Initiative (NWI) outcomes and broader reform objectives to highlight where insufficient emphasis on science-based policy and research represents a material barrier to progress, and to identify emerging short-term risks to achieving NWI objectives where reform ambition is not supported by evidence-based policy settings.
- Identifying practical and targeted reform options to address the gaps, with a focus on the most effective mechanisms for strengthening the role of research, innovation and science-based policy in water governance frameworks.
- Undertaking a targeted review of key economic regulatory frameworks in Australia to assess how science, research and innovation are incorporated, and how these are incentivised or constrained for regulated utilities.

This report is intended to support the development of Water Research Australia's submission to the Productivity Commission.

This report is structured as follows:

- Section 1 introduces the report, outlining its purpose, scope and limitations, and the key assumptions that inform the analysis.
- Section 2 provides background and context to the water reform white paper and the Productivity Commission consultation, including relevant policy and reform settings.
- Section 3 responds to the Productivity Commission's consultation questions, including progress since the 2024 National Water Initiative assessment, barriers and emerging risks, and priorities for future reform.

The appendices contain additional data, analysis and reports that have been prepared as part of responding to the consultation questions published by the Productivity Commission.

## 2. The policy and institutional foundations of Australia’s water sector

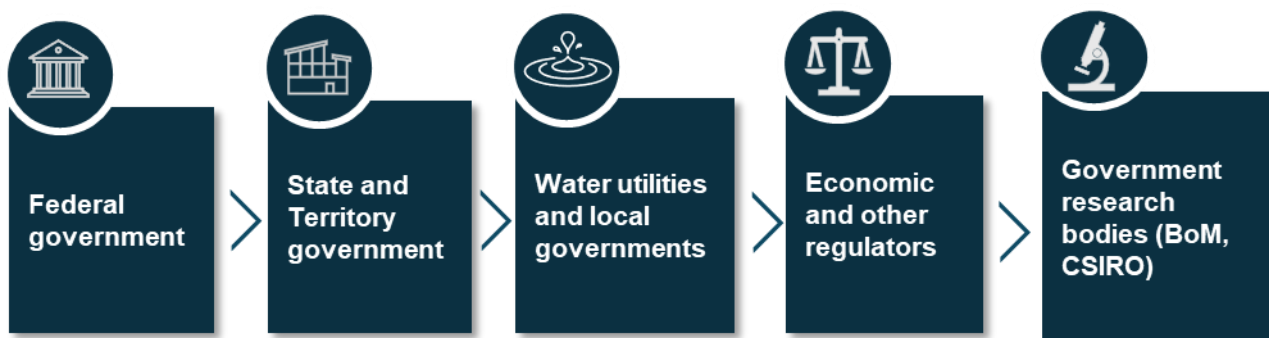
### 2.1 The Australian water sector: institutions and responsibilities

Australia’s water sector operates within a federated governance system in which responsibilities are shared across the Commonwealth, states and territories, and a diverse range of delivery and regulatory institutions. At the national level, the Commonwealth plays a stewardship role setting overarching policy frameworks, legislation and national agreements; collecting and disseminating water information; and leading reform in areas of national significance. This includes responsibility for administering the *Water Act 2007*, overseeing the Murray–Darling Basin Plan, and commissioning independent reviews through bodies such as the Productivity Commission.

States and territories retain primary responsibility for on-ground water management. This includes water resource planning, entitlement administration, service delivery regulation, and infrastructure investment. Urban and regional water services are largely provided by state-owned or locally governed utilities, while economic regulation is undertaken by a mix of jurisdictional regulators and national bodies depending on context.

Independent national institutions play a critical role in supporting this system. These include the Murray–Darling Basin Authority (MDBA), which coordinates Basin-wide planning and monitoring; the Bureau of Meteorology, which is responsible for national water data collection and dissemination; and the Productivity Commission, which provides independent, evidence-based advice on reform progress and future policy settings.

National bodies – BOM is responsible for national water data collection, analysis and reporting, supporting transparency and consistent information across jurisdictions including through the National Water Account. CSIRO provides independent scientific research including climate modelling, hydrology and surface/groundwater assessments which inform policy development, water planning and reform design.



This institutional complexity makes credible, nationally consistent science and research essential; both to inform policy design and to maintain trust across jurisdictions and stakeholders. Strengthening the role of science and research is not optional. It is a prerequisite for delivering resilient, equitable and future-ready water systems across Australia.

### 2.2 Gap analysis of legislation

A targeted gap analysis was undertaken across Australia’s water legislation, regulatory and policy instruments to assess the extent to which research, innovation, and science-based decision -making are explicitly recognised and embedded. In total, 20 instruments were reviewed, spanning institutional, economic, health and broader research and innovation settings.

Overall, the gap analysis found that water research and science are systemically under-valued, with many instruments treating them as implicit to core functions rather than key enablers of effective water management.

This has significant implications for the achievement of NWI objectives and the effectiveness and durability of water resource management reform.

Of the 20 instruments reviewed, only five demonstrated a strong level of support for water research, science and innovation. This assessment was based on the presence of explicit references to water research and scientific decision-making, as well as the extent to which these mechanisms are positioned as integral to the core objectives and functions of each instrument.

For example, the *Water Management Act 2000* (NSW) was assessed as providing strong support, as it explicitly embeds scientific knowledge and research as central to water resource planning, management and decision-making. Further detail on the gap analysis and the resulting classification of instruments is provided in Appendix A. Implications of the current policy gaps relating to science and research are examined in greater detail in the following sections. The findings from this analysis are summarised in Table 1 below.

**Table 1** Gap analysis summary

	Focused support – explicit and functionally embedded recognition of water science, research and innovation for water resource management or the Murray-Darling Basin only.
	Strong support – explicit and functionally embedded recognition of water science, research and innovation across whole of sector.
	Moderate support – indirect, limited or implied recognition of science that is not structurally embedded.
	No support – absence of meaningful reference to science, research and innovation.

Instrument	Explicit mention of science and research (Y/N)	Level of support
Water Act 2007 (Cth)	Y	
Water NSW Act 2014 (NSW)	N	
Water NSW Regulation 2020 (NSW)	N	
Water Management Act 2000 (NSW)	Y	
Water Act 1989 (Vic)	Y	
Water Act 2000 (Qld)	Y	
Water Services Act 2012 (WA)	Y	
Water Industry Act 2012 (SA)	Y	
Water Management Act 1999 (TAS)	N	
Water Resources Act 2007 (ACT)	N	
Science and Industry Research Act 1949 (Cth)	Y	
Water Charge Rules 2010 (Cth)	N	
PREMO water pricing framework 2016 (Vic)	N	
The 3Cs framework (IPART Water Regulation Handbook)	N	
Statement of Regulatory Pricing Principles for the Water Sector 2021 (QLD)	N	
Australian Drinking Water Guidelines (2011) – Updated June 2025 (Cth)	Y	
Water Supply (Safety and Reliability) Act 2008 (QLD)	N	
Environment Protection and Biodiversity Conservation Act 1999 (Cth)	Y	
Environmental Protection (Water and Wetland Biodiversity) Policy 2019 (Qld)	N	
Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000 (ANZG 2018 update)	Y	

## 2.2.1 Australia's core legislative and policy instruments do not explicitly integrate science, research and innovation in the water sector



### Issues:

Outside of water resources and the Murray–Darling Basin, there is no explicit reference to science, research or innovation in key legislative and policy instruments.

Our literature review finds that, outside water resource management and the Murray–Darling Basin, Australia's core water legislation and policy frameworks do not explicitly articulate the role of science, research and innovation in supporting effective water management. Where these concepts are referenced, they are typically framed at a high level and lack clarity or specificity.

While the *Water Act 2007 (Cth)* embeds requirements for the use of best available information in Basin-scale planning and establishes national water data functions, there is no comparable system-wide framework that defines how scientific capability, research investment or innovation should systematically inform broader water policy, planning and regulation. Consequently, the role of science and research is often implicit, fragmented or discretionary, rather than embedded as a core element of water governance.

For example, sections 21(4)(b) and 22(3)(k) of the *Water Act 2007 (Cth)* require Basin planning to be informed by the best available scientific knowledge and supported by specified scientific information and models. The *Water Act 1989 (Vic)* similarly recognises research as a function of water corporations under section 91(2)(a). Beyond these limited provisions, however, there are few explicit references to science or research in water legislation across other jurisdictions. There are also no explicit references to science or research in legislation for functions outside of Basin or water resource management in other jurisdictions.

This absence represents a material gap in Australia's water policy architecture and highlights the need for legislative and planning frameworks to more clearly and consistently embed science and research as foundational enablers of resilient and adaptive water management.

## 2.2.2 There is no clear legislative allocation of responsibility for coordinating or directing Australia's research



### Issues:

Roles are fragmented: BOM and CSIRO are established, but sectoral direction and responsibility for research capability are unclear.

Australia has strong scientific institutions that contribute extensively to water knowledge, most notably the Bureau of Meteorology (BoM) and the Commonwealth Scientific and Industrial Research Organisation (CSIRO). The BoM has clear statutory functions under the *Water Act 2007* to collect, standardise and publish national water data and accounts, while CSIRO undertakes substantial water-related research to inform planning, modelling and management decisions under the *Science and Industry Research Act 1949*. However, despite these well-defined organisational roles, there is no overarching legislative or policy framework that allocates responsibility for coordinating, prioritising or directing Australia's water research capability across jurisdictions and sectors. As a result, responsibility for research is fragmented across agencies, programs and funding cycles, with no single body accountable for ensuring that research effort aligns with national water reform priorities or emerging system risks.

This fragmentation is particularly evident outside the Murray–Darling Basin, where there is no statutory mechanism to link research priorities to water planning, regulation and long-term system resilience. In the absence of a clear allocation of responsibility, research coordination relies heavily on informal arrangements, time-limited initiatives and institutional goodwill rather than durable governance settings. This lack of legislative clarity weakens Australia's ability to strategically deploy its water research capability and limits the effectiveness of science as a system-wide enabler of water reform.

### 3. Informing the Productivity Commission’s reform conversation

The Productivity Commission has released 44 questions for individuals and organisations to respond to for the initial submissions in relation to its NWI 2026 inquiry. Due to the compressed consultation timeframes set by the Productivity Commission, we have prepared a response to a subset of targeted consultation questions:

#### Part A – NWI assessment

The PC is assessing progress against the 2004 NWI, including jurisdictions’ responses to findings and key priorities identified in the PC’s 2024 NWI assessment.

##### 1. Progress since the 2024 NWI assessment

- Where has progress been limited or slower than expected, or been reversed, and why?
- What policy, legislative, regulatory, funding or governance factors have influenced progress (positively and negatively) and how?

##### 2. Barriers and emerging risks

- What policy, legislative, regulatory, funding or governance barriers are affecting progress towards NWI outcomes in your jurisdiction or operating context (including how responsibilities, decision-making and oversight are organised)?
- What emerging risks are currently affecting, or over the next three years could affect, NWI water reform objectives and outcomes?

##### 3. Forward reform priorities (next three years)

- From your perspective, what 1 – 3 water reform priorities would most improve outcomes in your jurisdiction or operating context over the next three years.

#### Part B – Secure, resilient and sustainable services

##### 1. Overall questions

- Are there specific aspects of current water service arrangements, in particular regions or jurisdictions, that creates material risks, inefficiencies or misalignments?
  - What consequences have you observed and who is affected by them?
  - Do you anticipate any risks, inefficiencies or misalignments increasing in the future and if so, why?
- How do current arrangements affect how trade-offs are made between service reliability, long-term financial sustainability, affordability and any other objectives?
  - Are there objectives and goals that are not being achieved as successfully as others, and if so, which ones?
  - How might these trade-offs become more acute over the medium to long term (for example, due to climate change, population growth, new or expanding water-intensive industries, or emerging demand profiles), and how well are current arrangements positioned to manage these pressures sustainably?

### 3.1 Connection between science, innovation and the NWI objectives

**Issues:**  
 Science and research are referenced but narrowly framed around water resource management (and in some cases climate, catchment or health), and largely outside the scope of the PC inquiry.

**Response to Productivity Commission consultation Part A questions:**  
 Where has progress been limited or slower than expected, or been reversed, and why?  
 What policy, legislative, regulatory, funding or governance factors have influenced progress (positively and negatively) and how?

Progress towards the NWI objectives has been limited due to a lack of a formal role for science, research and innovation in key legislative instruments (see Figure 1). Across multiple NWI objectives, effective delivery is contingent on the availability of consistent, credible and transparent scientific evidence. This is especially evident for objectives related to entitlement security and statutory water planning, which rely on robust information about water availability, system behaviour, and future risk.



Figure 1 Mapping of gap analysis findings to NWI objectives

The analysis also reveals a tension between the long-term nature of objectives related to the environment and sustainability, and the limited embedding of ongoing research in monitoring and evaluation mechanisms. Objectives such as restoring over allocated systems to sustainable extraction levels, achieving public benefit outcomes, and managing surface–groundwater connectivity are inherently science intensive and dynamic, particularly in the context of climate change.

The implications extend beyond technical reform into areas of trust, adaptation and innovation. Where the science underpinning decisions is perceived as opaque, outdated or weakly connected to policy, community acceptance of reform diminishes. Similarly, policy settings intended to promote efficiency and innovation are unlikely to deliver in practice without deliberate mechanisms for research translation and adoption. Innovation in water management requires active institutional support to move from research to operational and economic outcomes.

Taken together, the mapping highlights that the effectiveness of the NWI is closely linked to how well science and research are governed, coordinated and embedded across the water sector’s institutional landscape. Addressing these structural weaknesses is therefore not ancillary to reform, but foundational to achieving the NWI’s objectives in a manner that is adaptive, credible and resilient over time.

## 3.2 Risks of not appropriately focusing on science



### Issues:

Science and research are referenced but narrowly framed around water resource management (and in some cases climate, catchment or health), and largely outside the scope of the PC inquiry.



### Response to Productivity Commission consultation questions:

What emerging risks are currently affecting, or over the next three years could affect, NWI water reform objectives and outcomes?

What policy, legislative, regulatory, funding or governance barriers are affecting progress towards NWI outcomes in your jurisdiction or operating context (including how responsibilities, decision-making and oversight are organised)?

Building on the NWI objective mapping, the gap analysis identified a set of interrelated risks that arise where science, research and innovation are not clearly governed or systematically embedded within Australia’s water framework. These risks reflect how structural weaknesses in the science base translate into constraints on reform delivery, investment confidence and system performance.

### 1. Ownership and stewardship of the water science base

Unclear ownership of the national water science and research base undermines accountability for evidence stewardship, prioritisation and translation into decision-making. While existing institutions (such as the BoM and CSIRO) perform important functions, no instrument establishes a whole-of-system mandate for coordinating water research across domains. As a result, responsibility for maintaining and updating the evidence base is dispersed across jurisdictions and agencies, increasing the likelihood of duplication, gaps, short-term research cycles and reliance on outdated or narrowly scoped information.

### 2. Climate adaptability and system learning

Current water science-to-policy pathways largely assume linear processes, which are ill-suited to the dynamic and non-stationary nature of water systems under climate change. Limited feedback loops between research, planning and operations constrain system learning and adaptive capacity, increasing the risk of maladaptive planning and investment decisions as conditions evolve. Competition for short-term funding further reinforces this fragmentation.

### 3. Jurisdictional consistency and reform velocity

Inconsistent scientific assumptions across jurisdictions slow reform processes for the water sector and increase the likelihood of disputes between governments, water users and communities. In the absence of a coordinated water research framework, jurisdictions apply different baselines, climate scenarios and modelling approaches, reducing the portability of science-based policies and regulatory settings. This increases transaction and dispute resolution costs and weakens national reform momentum.

#### **4. Regulatory and investment confidence**

Fragmented and short-term water science and research governance undermines confidence in the durability and credibility of regulatory and planning decisions. Where evidence changes abruptly or lacks transparent justification, decision-makers are incentivised to adopt reactive or risk-averse approaches rather than the long-term outlook required to achieve NWI objectives. This increases perceived regulatory and investment risk across the sector.

#### **5. Market efficiency and long-run costs**

Poor integration of science and innovation contributes to inefficient water markets, resulting in higher long-run marginal and average costs than would be achievable under a coordinated, innovation-enabled system. Slow uptake of efficiency-enhancing technologies and practices reflects the lack of mechanisms to validate, update and embed new knowledge at scale.

#### **6. Transparency, trust and public confidence**

Limited transparency and coordination of the evidence base reduce confidence across water planning, markets and environmental management, with flow-on effects to public and consumer trust. Where research priorities, assumptions and updates are opaque or inconsistently applied, stakeholders have limited confidence in decision rationales, particularly where there are material impacts associated with adjustments.

#### **7. Innovation diffusion and productivity gains**

Innovation fails to deliver operational or economic benefits without active translation, validation and adoption pathways. In the absence of sector-wide mechanisms to move innovations from pilots into business-as-usual practice, productivity gains remain fragmented and localised, resulting in foregone efficiency improvements across the system.

There is a clear need for systematic mechanisms to share evidence, research outputs and scientific insights across jurisdictions and utilities, enabling learning to be scaled and embedded consistently. Without coordinated approaches to knowledge transfer and adoption, the sector is unable to capture cumulative productivity improvements or realise the full value of publicly funded research and innovation.

#### **8. Funding continuity and priority risk**

The absence of a clear, durable funding pathway for water science creates a risk of systematic under-investment and under-prioritisation. Short-term and episodic funding limit the ability to sustain long-horizon research and infrastructure-aligned science. Unlike other sectors, water lacks a dedicated, enduring innovation funding mechanism.

#### **9. Misaligned incentives for utilities**

An implicit assumption that utilities will “take care of” water research, without an explicit mandate or cost-recovery mechanism, risks chronic under-investment in sector-wide science that would produce a public benefit. Investment tends to occur only where directly linked to immediate regulatory obligations or price determinations, leaving broader system, environmental and resilience research underprovided.

### 3.3 The effectiveness of current pricing, economic regulation and governance in delivering long-term outcomes

This section responds to a subset of questions published by the Productivity Commission under Part B – Secure, resilient and sustainable services. The Terms of Reference for the current Productivity Commission inquiry includes an examination of whether current pricing, economic regulation and governance arrangements are delivering secure and resilient services, financial and environmental sustainability over the long-term and affordable outcomes for customers.

#### 3.3.1 Incentives for innovation or sustained investment in R&D in current regulatory frameworks



**Issues:**

Economic regulation frameworks do not actively incentivise innovation or sustained investment in research and development.



**Response to Productivity Commission consultation questions:**

Are there specific aspects of current water service arrangements, in particular regions or jurisdictions, that creates material risks, inefficiencies or misalignments? What consequences have you observed and who is affected by them? Do you anticipate any risks, inefficiencies or misalignments increasing in the future and if so, why?

As identified through the gap analysis, regulatory frameworks across Australia currently provide limited incentives for innovation, experimentation and risk-taking. As a result, long-term system resilience is neither strongly supported nor consistently rewarded through existing regulatory mechanisms.

A step change in regulatory thinking is required to address the infrastructure renewal challenge, while simultaneously balancing service reliability, affordability and financial sustainability. Without stronger incentives, the regulatory framework continues to favour conservative, asset-led solutions, constraining the sector's ability to pursue innovative, adaptive responses to long-term uncertainty.

The PREMO framework, implemented by the Victorian Essential Services Commission, stands out as one of the few regulatory models in Australia that actively incentivises innovation through the potential for a higher rate of return. PREMO is designed to reward water businesses that deliver greater customer value by linking financial outcomes to the ambition of their proposals. It does this through five assessed elements: performance, risk, engagement, management and outcomes.

Under PREMO, innovation is incentivised by allowing Victorian water businesses to earn a higher return on equity where ambitious, customer-focused and efficient proposals, often underpinned by research and innovation, credibly deliver improved outcomes and accept greater risk on behalf of customers. This represents a deliberate shift away from uniform returns and risk-averse regulation, placing responsibility and opportunity at the board level.

By contrast, the Cunliffe Review highlights that where regulatory frameworks prioritise cost certainty and short-term efficiency, innovation and science become systematically disadvantaged. The review finds that inadequate incentives for research and development limit the sector's ability to respond to climate change, increase long-term system costs, undermine affordability, and erode industry capability. Together, these impacts reinforce a cycle of conservatism that constrains the effective application of research and scientific advancement across the water sector.

## 3.3.2 Valuation of economic benefits arising from R&D investment in current regulatory frameworks



### Issues:

Economic regulatory frameworks do not adequately account for long term benefits and cost reductions arising from R&D investment.



### Response to Productivity Commission consultation questions:

Are there specific aspects of current water service arrangements, in particular regions or jurisdictions, that creates material risks, inefficiencies or misalignments? What consequences have you observed and who is affected by them? Do you anticipate any risks, inefficiencies or misalignments increasing in the future and if so, why?

Science and research play a critical role in strengthening the evidence base underpinning prudency assessments of both capital and operating expenditure. Robust scientific analysis, spanning climate modelling, asset deterioration, water quality risk, system resilience and service reliability, provides the empirical foundation needed to demonstrate that proposed investments are not only technically sound, but necessary and reasonable in the face of evolving risk profiles. In the absence of this evidence, prudency assessments risk becoming backward-looking, anchored in historical norms rather than forward-facing assessments of system vulnerability and long-term service obligations.

Well-integrated research also materially improves optioneering and efficiency outcomes. By enabling comparative assessment of intervention pathways under different risk scenarios, science-based decision-making supports more transparent trade-offs between capital intensity, operating strategies and risk exposure. This allows regulators to distinguish between genuinely inefficient expenditure and prudent investment designed to avoid low-probability but high-impact service failures. In this context, research acts as an enabler of efficiency (not a cost) by reducing uncertainty, avoiding over- or under-investment, and supporting least-regret decision-making under deep uncertainty.

Prudency tests struggle to accommodate investments driven by emerging scientific understanding rather than historical evidence of asset failure or service non-compliance. Where risks are uncertain or probabilistic in nature, regulated businesses face significant evidentiary hurdles in demonstrating that expenditure is both prudent and efficient, despite signals from climate science, environmental monitoring or system modelling that service reliability is deteriorating. As a result, investment decisions are frequently deferred until risks crystallise, at which point costs, disruptions and affordability impacts are materially higher.

More fundamentally, existing frameworks tend to assess prudency at the project or cost-line level, rather than at the system or portfolio level where resilience benefits are realised. This narrows the scope for regulators to recognise the value of redundancy, modularity, or adaptive capacity: features that are central to managing high-impact risks but may appear inefficient when assessed in isolation. Without explicit mechanisms to value uncertainty reduction, optionality and avoided future costs, regulatory decisions can unintentionally discourage innovative or preventative solutions.

Strengthening the role of science and research within regulatory decision-making therefore requires a shift from viewing uncertainty as a justification for delay, to recognising it as a rationale for action. This includes greater acceptance of scenario-based evidence, probabilistic risk analysis and adaptive pathways planning within prudency frameworks. It also requires clearer regulatory signals that well-founded research and long-term risk mitigation constitute prudent behaviour, even where benefits extend beyond a single regulatory period.

Ultimately, embedding science more deeply into prudency and efficiency assessments would support more resilient, efficient and equitable outcomes for customers. By enabling regulators to better account for long-term system risks, high-consequence events and the value of foresight, regulatory frameworks can more effectively balance service reliability, affordability and financial sustainability under conditions of increasing uncertainty.

### 3.3.3 Valuing the risks and costs of deferring or avoiding investment in current regulatory frameworks



#### Issues:

Current assessment frameworks struggle to capture the risks and costs of deferring or avoiding investment that have been enabled by good science and research.



#### Response to Productivity Commission consultation questions:

How do current arrangements affect how trade-offs are made between service reliability, long-term financial sustainability, affordability and any other objectives? Are there objectives and goals that are not being achieved as successfully as others, and if so, which ones? How might these trade-offs become more acute over the medium to long term (for example, due to climate change, population growth, new or expanding water-intensive industries, or emerging demand profiles), and how well are current arrangements positioned to manage these pressures sustainably?

Current assessment frameworks are not well equipped to deal with the valuation of the counterfactual as it relates to emerging science. Prudency and efficiency tests are typically framed around observable costs, historic performance and relatively short regulatory periods, which makes it difficult to recognise the value of investments aimed at reducing uncertain but potentially catastrophic risks. Where the probability of an event is low or its timing uncertain, regulators often default to requiring a high standard of proof that the expenditure is immediately justified, even where the consequences of failure to act would be severe, irreversible or system-wide.

Science and research can narrow this evidentiary gap by improving understanding of emerging risks, clarifying causal pathways and strengthening confidence in long-term projections. Improved climate science, asset degradation modelling, water quality risk assessment and systems analysis all help to make previously latent risks more visible and defensible in regulatory decision-making. However, even with better science, existing frameworks struggle to translate this knowledge into an economic valuation that sits comfortably within conventional prudency tests. In particular, they provide limited mechanisms to recognise the value of reduced uncertainty, avoided future disruption, or the option value created by earlier, proactive investment.

This creates a structural bias towards deferral, with investment decisions often only supported once risks crystallise through service failures, compliance breaches or extreme events. At that point, the counterfactual becomes obvious with hindsight, but the costs to customers, communities and the environment are materially higher than if action had been taken earlier. The inability to adequately value avoided costs or non-events means that regulatory decisions can unintentionally favour short-term cost minimisation over long-term resilience and productivity.

As climate variability increases and systems are exposed to more frequent and severe shocks, the costs of under-investment or delayed investment are likely to rise non-linearly. Without reforms that better integrate scientific evidence into prudency assessment and explicitly recognise the risks and costs of inaction, current frameworks risk undermining service reliability, increasing long-run costs, and constraining the sector's ability to respond efficiently to growing uncertainty. Addressing this challenge is therefore central to improving productivity outcomes and ensuring that regulatory settings support timely, risk-informed investment decisions.

### 3.3.4 Prudent and efficient long-term capital planning with an uncertain climate future



#### Issues:

Environmental and climate investment face biases in economic regulatory processes.



#### Response to Productivity Commission consultation questions:

How do current arrangements affect how trade-offs are made between service reliability, long-term financial sustainability, affordability and any other objectives? Are there objectives and goals that are not being achieved as successfully as others, and if so, which ones? How might these trade-offs become more acute over the medium to long term (for example, due to climate change, population growth, new or expanding water-intensive industries, or emerging demand profiles), and how well are current arrangements positioned to manage these pressures sustainably?

Climate change is reshaping the risk environment for water systems, with extreme weather becoming both more frequent and less predictable. Of particular concern is the growing incidence of short, intense rainfall events that can overwhelm existing infrastructure. These risks are further heightened by the emergence of compound events, where multiple climate extremes occur in close succession or concurrently, magnifying their cumulative impact. Research by CSIRO and the Bureau of Meteorology highlights that eastern Australia faces the greatest uncertainty in projected rainfall outcomes nationally. Climate modelling points to a wide range of possible futures, with average annual rainfall projected to either decline significantly or increase materially, and similarly divergent patterns emerging across seasons.

At the same time, the water and environment sector is contending with mounting pressures on catchment and ecosystem health that further complicate water management outcomes. Degraded waterways, declining water quality and the accumulation of emerging contaminants such as PFAS, microplastics and other persistent pollutants are increasingly intersecting with core water service delivery challenges. These issues place additional demands on treatment processes, monitoring regimes and regulatory compliance, while also heightening community and environmental risk. Addressing climate uncertainty alongside catchment health and contamination concerns will require more integrated, adaptive and precaution-based approaches across the water sector.

Capital planning must strike a balance between responding to environmental realities and delivering efficient investment that maintains service standards and customer affordability. However, climate change and broader environmental pressures are increasing uncertainty and volatility, undermining the assumptions that traditionally underpin prudent capital planning. This makes it challenging to determine the appropriate scale and timing of investment where infrastructure needs are closely linked to unpredictable climate-driven events.

From our review of regulatory instruments, we were unable to identify a regulatory function or framework that enables climate-related expenditure to be considered apart from the Queensland Competition Authority's (QCA) 2023 Final Position Paper on Climate Change Expenditure Review.

A lack of clear guidance risks environmental and climate investment facing disproportionate evidentiary hurdles in economic regulatory processes, putting resilience, adaptation and mitigation outcomes at risk. This is supported by two recent regulatory processes for Sydney Water and TasWater where environmental or climate expenditure has not been considered prudent or efficient, set out in Box 1.

### Case study: Sydney Water 2025-30 price determination process<sup>1</sup>

In 2025, the Independent Pricing and Regulatory Tribunal (IPART) assessed Sydney Water's 2025–30 price proposal and, in its draft decision, reduced the proposed capital program by approximately 35 per cent. This outcome was heavily influenced by advice from IPART's independent consultant, AtkinsRéalis, and reflected IPART's views on the appropriate level of risk allocation, customer needs, environmental performance, growth servicing requirements, water security and emerging risks.

A significant contributor to the reduction was IPART's determination that the Prospect Pretreatment project was not prudent. Prospect Water Filtration Plant is one of Sydney's largest treatment facilities, supplying around 85 per cent of households and playing a critical role in maintaining water quality, particularly during extreme weather events. While the plant has a high design capacity under normal conditions, its throughput is materially constrained during poor raw water quality events due to elevated turbidity and organic matter, increasing treatment complexity and operational demands. In such circumstances, failure to adequately treat source water can trigger boil water notices to protect public health.

AtkinsRéalis concluded that the project could not be considered imperative in the near term, noting that Sydney Water has historically managed adverse water quality events without issuing boil water notices. However, submissions to IPART argued that this history represents a series of near-misses rather than a robust system outcome, particularly in the context of climate change and the increasing likelihood of extreme water quality events.

In response to IPART's draft decision, Sydney Water included a lower proposal for the Pretreatment Program, comprising of projects that are already contractually committed and in delivery. IPART accepted this revised expenditure for the Pretreatment Program.

Experience in the United Kingdom demonstrates long-standing recognition of the challenges water utilities face in responding to climate change. Ofwat identified these issues more than a decade ago, including through its 2009 review, and has since continued to strengthen its regulatory approach. Most recently, Ofwat released its Fourth Climate Change Adaptation Report,<sup>2</sup> reinforcing its objective of maintaining a regulatory framework that supports water companies to deliver services efficiently and effectively for customers and the environment, while adapting to climate-related risks and holding companies accountable for meeting their statutory obligations.

In parallel, the UK Environment Agency, working closely with UK Water Industry Research, has developed comprehensive guidance<sup>3</sup> to support the assessment and management of climate-related risk and uncertainty within water resource management planning. The consistent application of this framework across all Environment Agency-regulated water companies has driven the development of advanced and rigorous Monte Carlo modelling techniques. These approaches are now routinely used to assess headroom, uncertainty and risk within water supply systems.

Clear, consistent and evidence-based guidance of this nature strengthens the evaluation of risks to water security, including both supply quantity and quality, and would help mitigate behavioural biases such as the normalisation of deviance and outcome bias in decision-making. It would also create opportunities for science-based partnerships between regulators, utilities, researchers and industry to test, validate and scale innovative solutions, accelerating sector-wide learning and embedding evidence-led practice into business-as-usual decision-making.

Similar issues were identified in the UK's Independent Water Commission's 2025 review of the UK's water sector (the Cunliffe Review). The Cunliffe Review discusses how the UK's regulatory structures can actively shape innovation behaviour.<sup>4</sup> Short price review cycles favour proven, capital-intensive solutions that deliver visible outcomes within a single determination period, while longer-term, adaptive approaches such as nature-based solutions, digitalisation and demand-side innovation are disadvantaged. Without mechanisms to manage regulatory risk, allow controlled experimentation, and recognise long-run benefits, utilities rationally default to lowest-risk, short-term compliance strategies.

<sup>1</sup> See: IPART (2025) Prices for Sydney Water Corporation from 1 October 2025, available at: <https://www.ipart.nsw.gov.au/review/water-metro-pricing/prices-sydney-water-corporation-1-october-2025>

<sup>2</sup> See Ofwat, Climate change adaptation reporting: fourth round reports, available at: <https://www.gov.uk/government/collections/climate-change-adaptation-reporting-fourth-round-reports>

<sup>3</sup> See: UKWIR, Water Industry Research, available at: <https://ukwir.org/home-of-water-industry-research-projects-reports-tools>

<sup>4</sup> See: paragraphs 1020, 1392 and 1393 of Independent Water Commission (2025) *Final Report*, available at: [https://assets.publishing.service.gov.uk/media/687dfcc4312ee8a5f0806be6/Independent\\_Water\\_Commission\\_-\\_Final\\_Report\\_-\\_21\\_July.pdf](https://assets.publishing.service.gov.uk/media/687dfcc4312ee8a5f0806be6/Independent_Water_Commission_-_Final_Report_-_21_July.pdf)

### 3.3.5 Balancing short-term affordability against investment in long-term capability



#### Issues:

Affordability constraints contribute to lower levels of investment in innovation and long-term capability.



#### Response to Productivity Commission consultation questions:

How do current arrangements affect how trade-offs are made between service reliability, long-term financial sustainability, affordability and any other objectives? Are there objectives and goals that are not being achieved as successfully as others, and if so, which ones? How might these trade-offs become more acute over the medium to long term (for example, due to climate change, population growth, new or expanding water-intensive industries, or emerging demand profiles), and how well are current arrangements positioned to manage these pressures sustainably?

Affordability pressures within current regulatory and funding frameworks can unintentionally constrain investment in innovation and long-term capability, even where such investment would improve productivity and system resilience over time. In practice, the strong emphasis placed on near-term bill impacts and short-run cost containment limits the scope for regulated entities to pursue research, trials and capability-building activities whose benefits accrue gradually or materialise beyond a single regulatory period.

Where affordability is treated as a binding constraint rather than one objective to be balanced alongside long-term efficiency and service reliability, discretionary expenditure such as innovation, applied research and system transformation tends to be deferred. These investments are often perceived as higher risk or less immediately tangible than core asset replacement or compliance-driven upgrades, particularly when regulatory frameworks provide limited recognition of their future productivity benefits or risk-reduction value.

Over time, this dynamic can reinforce a cycle of under-investment in capability. Utilities focus on incremental, lowest-cost solutions to manage short-term pressures, while opportunities to improve operating efficiency, reduce long-run costs, or adapt to emerging challenges are foregone. As a result, affordability constraints may paradoxically lead to higher costs for customers in the long term, as systems become less flexible, less efficient and more exposed to shocks that require expensive reactive responses.

This tension is particularly acute in the water sector, where rising input costs, increasing climate variability and ageing infrastructure place growing demands on system performance. Innovation, whether through new treatment processes, data-driven asset management, demand management approaches or alternative service models, has the potential to moderate these pressures over time. However, in the absence of explicit regulatory signals or funding mechanisms to support investment in innovation under affordability constraints, these options are often deprioritised in favour of proven, short-term solutions.

From a productivity perspective, this suggests that current arrangements may not be optimally supporting dynamic efficiency. While affordability considerations are essential, reform settings that consistently favour short-run cost minimisation over long-term capability development risk locking in higher costs and lower performance over time. Addressing this imbalance would require a clearer framework for recognising the long-term value of innovation and system capability, and for enabling investment that improves affordability outcomes over the medium to long term rather than constraining it.

The Cunliffe Review<sup>5</sup> reinforces the conclusion that affordability-driven regulatory and funding frameworks, while essential for protecting customers in the short term, can unintentionally inhibit the very forms of innovation and capability-building required to deliver sustainable affordability over the long term. Where regulatory emphasis is placed predominantly on near-term bill impacts and short regulatory cycles, investment in research, innovation and system transformation is deprioritised, even where these investments would materially reduce future costs, improve resilience and enhance service outcomes.

<sup>5</sup> See: paragraphs 1390 to 1393 of Independent Water Commission (2025) Final Report, available at: [https://assets.publishing.service.gov.uk/media/687dfcc4312ee8a5f0806be6/Independent\\_Water\\_Commission\\_-\\_Final\\_Report\\_-\\_21\\_July.pdf](https://assets.publishing.service.gov.uk/media/687dfcc4312ee8a5f0806be6/Independent_Water_Commission_-_Final_Report_-_21_July.pdf)

The Cunliffe Review highlights that while competitive, project-based innovation funding is valuable, it has delivered uneven results, with implementation constrained by short-term funding horizons, concentration of awards among larger incumbents, and limited pathways for scaling successful trials into business-as-usual practice. These dynamics mirror broader challenges in water regulation, where innovation is supported at the margins, but not consistently embedded within core regulatory, pricing and governance arrangements. As a result, innovation remains episodic rather than systemic, and productivity gains are slow to diffuse across the sector.

Innovation and resilience are not competing objectives, but interdependent ones. Regulatory and governance frameworks that treat affordability as an overriding constraint risk locking the sector into higher long-term costs and reduced adaptability. Achieving secure, resilient and affordable water services will therefore require reform settings that explicitly enable innovation, support collaboration, and recognise the long-term productivity and risk-reduction value of science-based investment.

## 3.4 Summary of potential reform solutions



### **Response to Productivity Commission consultation questions:**

From your perspective, what 1 – 3 water reform priorities would most improve outcomes in your jurisdiction or operating context over the next three years.

### 3.4.1 Summary of potential reform solutions and mapping to issues

To support consideration of reform priorities, Figure 2 maps the key strategic and regulatory issues to a set of potential reform options. It illustrates how identified issues translate into specific intervention levers across policy, regulatory design and funding settings, highlighting where reforms are complementary, sequential or mutually reinforcing. This provides a clear line of sight from observed challenges to practical, implementable reform pathways.

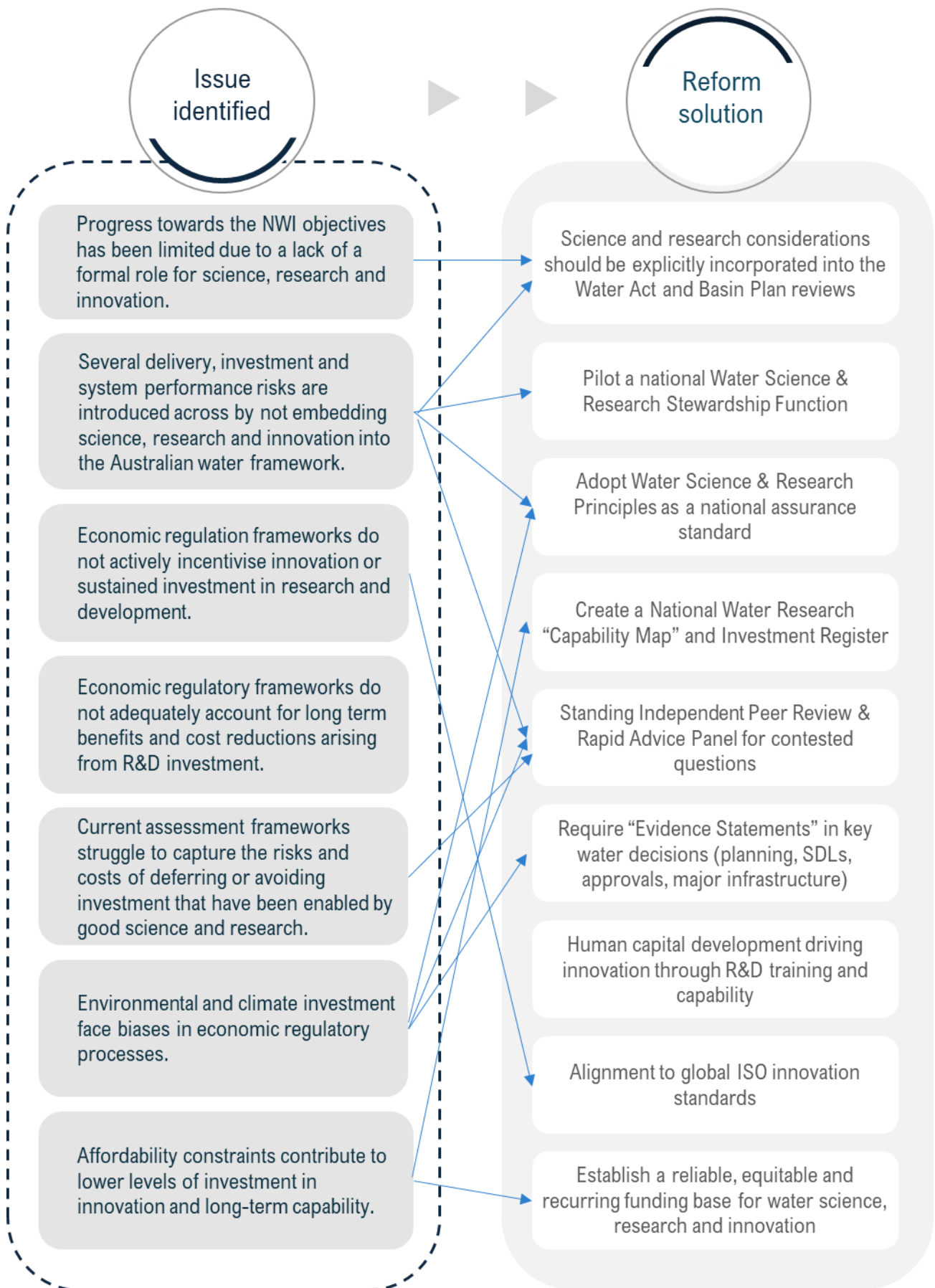


Figure 2 Mapping of issues to potential reform solutions

## 3.4.2 Potential reform solutions to be considered

### 3.4.2.1 Treat science and research as essential infrastructure

#### 3.4.2.1.1 Science and research considerations to be explicitly incorporated into the Water Act and Basin Plan reviews

A review of the current reform landscape indicates that the *Water Act 2007* (Cth) and *Basin Plan 2012* (Cth) reviews are the most appropriate statutory mechanisms to examine how science and research inform water resource management in Australia. While the Productivity Commission's National Water Reform Inquiry plays a critical role in assessing progress under the National Water Initiative and advising on water services regulation, its scope does not extend to water resource management or Murray–Darling Basin planning. As a result, the inquiry is not positioned to consider whether existing arrangements adequately support the generation, coordination and application of scientific knowledge in these domains.

In contrast, both the Water Act review and the Basin Plan review are explicitly concerned with decision-making frameworks, planning instruments and long-term system outcomes that depend directly on the availability, quality and use of scientific evidence. Accordingly, these reviews provide the appropriate and time-limited opportunity to explicitly assess whether science and research are being sufficiently recognised, supported and integrated to meet future water management challenges.

#### 3.4.2.1.2 Require “Evidence Statements” in key water decisions (planning, SDLs, approvals, major infrastructure)

Introduce a requirement for standardised “Evidence Statements” to accompany key water decisions, including system planning, Sustainable Diversion Limits, regulatory approvals and major infrastructure investments. Evidence Statements would set out the scientific evidence and research relied upon, describe key uncertainties and limitations, and explain how evidence has informed decision-making. This would strengthen transparency, improve decision assurance, and ensure that evolving scientific knowledge is consistently and explicitly considered alongside policy and value-based judgements.

### 3.4.2.2 Strengthen water science and research stewardship, transparency and coordination

#### 3.4.2.2.1 Pilot a national Water Science & Research Stewardship Function

A coherent national approach to water science and research would be strengthened by adopting the governance model recommended by O’Kane (2025).<sup>6</sup> This model proposes the appointment of a Chief or Principal Water Research Scientist/Advisor, supported by a User Stakeholder Panel comprising government agencies, and a broader stakeholder group representing environmental interests, industry, research institutions and First Nations peoples. Together, these bodies would be tasked with maintaining a national water research strategy, setting and regularly updating research priorities, and strengthening the translation of evidence into policy, regulatory and operational decision-making. Establishing this arrangement initially as a short-term interim pilot would allow roles, governance and value to be tested and refined, while providing an early signal of commitment to coordinated, science-led water reform.

#### 3.4.2.2.2 Create a National Water Research “Capability Map” and Investment Register

Sector-wide collaboration and knowledge-sharing mechanisms would support stronger integration of utility experience, academic research, regulatory insight and international best practice, reducing duplication and accelerating the diffusion of proven solutions. One practical mechanism, consistent with the recommendations of the O’Kane Review (Mary O’Kane Water Science and Research Review, 2025), is the establishment of a publicly accessible national capability map and metadata register covering water research projects, assets, models and monitoring programmes across jurisdictions. This would provide a single, authoritative view of existing scientific capability and activity, improving transparency, supporting collaboration and enabling more strategic investment decisions. Importantly, such an initiative would not require legislative reform and could be implemented as a

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<sup>6</sup> See: Mary O’Kane (2025) Water Science and research review, available at: <https://www.dcceew.gov.au/water/policy/publications/water-science-research-review>

standing dataset or catalogue, supported by minimal reporting requirements for publicly funded research and science activities.

#### **3.4.2.2.3 Standing Independent Peer Review & Rapid Advice Panel for contested questions**

Establish a standing, independent peer review and rapid advice panel comprising a small pool of accredited experts who can be convened quickly to assess contested or high-risk water policy, regulatory and investment questions. The panel would publish its findings transparently, including areas of uncertainty, and clearly distinguish scientific evidence and interpretation from policy and value-based choices. This mechanism would strengthen decision assurance, improve trust in science-informed outcomes, and support timely, robust decision-making where evidence is contested or evolving.

This could also reflect a centralised water R&D body funded by a utility-based levy but co-ordinated by a federal agency. Acting as a joint venture with states, territories, the Commonwealth and potentially third-party organisations like a CRC or incorporated RDC.

#### **3.4.2.3 Establish a reliable, equitable and recurring funding base for water science, research and innovation**

##### **3.4.2.3.1 Human capital development driving innovation through R&D training and capability**

Establish a targeted fellowship programme to build human capital and accelerate innovation by supporting structured staff exchanges between research organisations and water utilities, in both directions. This would strengthen applied research capability, improve translation of science into operational practice, and embed innovation skills and culture across the sector.

##### **3.4.2.3.2 Establish a reliable, equitable and recurring funding base for water science, research and innovation**

Funding mechanisms should move beyond short-term, competitive and ad-hoc arrangements to provide stable support for both the development and implementation of innovation, enabling longer-term capability-building, knowledge sharing and system transformation. A predictable funding base would reduce regulatory and investment risk, support sector-wide productivity improvements, and ensure that innovation contributes to improved affordability, resilience and service outcomes over the medium to long term. Consideration should also be given to aligning Commonwealth and state R&D funding with regulatory and pricing frameworks to ensure publicly funded research can be translated into regulated operations and investment decisions.

Recommendations from the Cunliffe Review regarding the establishment of establishing regulatory sandboxes for the water sector to allow utilities to trial innovative technologies, service models and nature-based solutions under controlled conditions, with regulatory flexibility and clear governance parameters should also be considered.

##### **3.4.2.3.3 Provide ring-fenced innovation and capability allowances**

Dedicated, ring-fenced innovation and capability allowances would provide a stable and predictable mechanism for utilities to invest in building the skills, systems and organisational capability required to deliver future outcomes. Unlike competitive or short-term pilot funding, these allowances would support the implementation, scaling and embedding of proven innovations into business-as-usual operations.

Such allowances would recognise that innovation is not a one-off activity, but an ongoing capability that underpins productivity improvements, customer outcomes and long-term cost containment. Ring-fencing funding within regulatory determinations would also provide transparency and assurance to customers that innovation expenditure is targeted, material and delivering measurable benefits, while reducing barriers that currently limit utilities' willingness to invest beyond pilot-scale initiatives.

### **3.4.2.4 Economic regulation for water that enables and incentivises research and innovation**

#### **3.4.2.4.1 Shift towards outcomes-based regulatory frameworks**

A clear shift towards outcomes-based regulation would better align regulatory frameworks with long-term service, environmental and affordability objectives, while recognising the increasing complexity and uncertainty utilities face. Moving away from highly prescriptive input controls and detailed cost assessment would give utilities greater flexibility to determine the most efficient and innovative ways to deliver required outcomes, rather than optimising to regulatory compliance.

Outcomes-focused frameworks also enable regulators to place greater emphasis on customer value, system resilience, emissions reduction, water security and service quality, supported by clear performance measures and accountability mechanisms. This approach supports innovation, encourages whole-of-system thinking, and reduces the risk that regulatory settings unintentionally discourage new delivery models, technologies or adaptive responses to climate and growth pressures.

As part of this shift, economic regulators should be required to assess and value long-term productivity, resilience and risk-reduction benefits of innovation, rather than treating such expenditure as discretionary or ancillary to core service delivery. To support this, mechanisms to recognise benefits that accrue beyond a single regulatory period, including through longer planning horizons, benefit carry-over provisions, or explicit innovation outcome incentives should be strengthened to help provide greater clarity on how these benefits can be assessed by economic regulators.

### **3.4.2.5 Assurance expectations supporting research and evidentiary requirements**

#### **3.4.2.5.1 Adopt Water Science & Research Principles as a national assurance standard**

The adoption of a consistent set of Water Science and Research Principles as a national assurance standard would strengthen transparency, rigour and trust in water sector decision-making. As highlighted by O’Kane (2025), the role of science and research is to inform policy in an open and transparent manner, but not to predetermine outcomes. Effective water science should be rigorous and focused on delivering the best available and reliable knowledge, while recognising that research is inherently uncertain, evolving and unlikely to produce single definitive answers, particularly in complex and highly variable systems. In this context, there is value in employing a diversity of scientific approaches, data sources and modelling methods to better understand risks, trade-offs and system behaviour. Embedding these principles would provide a clear assurance framework for how evidence is generated, interpreted and applied across policy, regulatory and operational decisions.

#### **3.4.2.5.2 Alignment to global ISO innovation standards**

Aligning innovation with the ISO 56000 series on innovation management, particularly ISO 56002, will help embed innovation as a disciplined, system-wide capability. Alignment with these globally recognised standards would provide a common framework for governing uncertainty, valuing learning and enabling evidence-based risk-taking across jurisdictions, strengthening productivity, resilience and long-term affordability.

## **3.4.3 Prioritisation of potential reform solutions**

The table below provides a summary of the reform solutions and prioritises them from a government perspective in terms of potential impact, and ease of implementation. The most impactful reforms are likely to be:

- Science and research considerations should be explicitly incorporated into the Water Act and Basin Plan reviews
- Human capital development driving innovation through R&D training and capability
- Establish a reliable, equitable and recurring funding base for water science, research and innovation

**Table 2** *Prioritisation of potential reform solutions*

<b>Reform solution</b>	<b>Potential impact</b>	<b>Ease of implementation</b>	<b>Priority</b>
Science and research considerations should be explicitly incorporated into the Water Act and Basin Plan reviews	High	Easy	High
Pilot a national Water Science & Research Stewardship Function	High	Difficult	Medium
Adopt Water Science & Research Principles as a national assurance standard	High	Difficult	Medium
Create a National Water Research “Capability Map” and Investment Register	High	Difficult	Medium
Standing Independent Peer Review & Rapid Advice Panel for contested questions	High	Difficult	Medium
Require “Evidence Statements” in key water decisions (planning, SDLs, approvals, major infrastructure)	High	Difficult	Medium
Human capital development driving innovation through R&D training and capability	High	Easy	High
Alignment to global ISO innovation standards	Medium	Easy	Low
Establish a reliable, equitable and recurring funding base for water science, research and innovation	High	Easy	High
Shift towards outcomes-based regulatory frameworks	Medium	Difficult	Medium
Provide ring-fenced innovation and capability allowances	Medium	Difficult	Medium

## 4. Next steps

This report has outlined the current state of Australia's national water regulation and the importance of embedding science, research and innovation as core enablers of resilient, trusted decision-making. The following next steps set out the proposed actions to further strengthen the role of science and research in upcoming reform processes.

### 1. WaterRA Board Presentation

Present to the WaterRA Board on the current water market reform with a focus on positioning WaterRA to influence water sector reforms by combining targeted policy analysis with strategic engagement. The presentation should cover a rapid review of the Productivity Commission's reform agenda, the Water Act review and related consultation materials to identify where research, innovation and science-based decision-making are critical but under-represented.

These insights will inform a clear strategic narrative for WaterRA, informing priority engagement opportunities, member positioning and submissions to the Productivity Commission's interim update and the Water Act review. It could also include consideration of positions of other Water agencies (WSAA, AWA) and opportunities for partnership on key issues.

### 2. Productivity Commission interim update submission

Once the Productivity Commission's interim update clarifies the scope and timing of future consultation, WaterRA should consider developing a targeted, evidence-based submission that positions WaterRA as a constructive and authoritative contributor to reform. This will involve reviewing the consultation requirements to identify where research, innovation and science-based policy are most relevant to the Commission's reform objectives and testing these themes with WaterRA members to ensure alignment with sector priorities.

Insights should be synthesised into a clear and persuasive submission, supported by practical examples and case studies, and designed to influence both the Productivity Commission's final recommendations and the forthcoming Water Act review.

### 3. Broader advocacy in relation to the Water Act review

This stage will involve the development of a detailed, policy-focused report to inform WaterRA's broader advocacy in the context of the Water Act review. The work will commence with a structured review of the Water Act and associated reform materials to provide a more detailed assessment of how research, science-based policy and innovation are currently recognised and operationalised.

Building on this analysis, the report should articulate a clear and prescriptive case for strengthening the role of research within legislation and policy, including practical options for embedding research value across economic regulatory frameworks and price control processes. The report should be designed to support proactive engagement with policymakers and regulators, positioning WaterRA as a credible and solutions-focused advocate for long-term, evidence-based water sector reform.

# Appendices

# Appendix A

Gap analysis

## 4.1 Institutional

Name of Policy / Legislative Instrument	Reference to Water Research and Innovation	Notes on Gaps, Scope, or Relevance to Research & Innovation
Water Act 2007 (Cth)	<p>Section 21 (4)(b): <i>act on the basis of the best available scientific knowledge and socio-economic analysis</i></p> <p>Section 22 (3)(k): <i>a water resource plan must include requirements in relation to: ... the scientific information or models on which the water resource plan is to be based</i></p> <p>Section 50 (4A)(c): <i>In reviewing the Basin Plan... the Authority must consider the following matters and report on them... the management of climate risks.</i></p> <p>The Climate Change Convention is noted as a relevant international agreement in Section 4.</p> <p>Section 120 states that the Bureau and Director of Meteorology has the following functions: (a) <i>Collecting, holding, managing, interpreting and disseminating Australia's water information.</i> (b) <i>providing regular reports on the status of Australia's Water resources</i> (d) <i>compiling and maintaining water accounts... including... the National Water Account</i> (g) <i>undertaking and commissioning investigations to enhance understanding of Australia's water resources</i></p> <p>Schedule 3A Part 1 Clause 48: <i>Water access entitlement holders are to bear the risks of any reduction or less reliable water allocation, under their water access entitlements, arising from reductions to the consumptive pool as a result of:</i> (i) <i>seasonal or long-term changes in climate</i></p>	<p>Rely on scientific processes but does not establish mechanisms to sustain or renew research capacity over time.</p> <p>Assumes that adequate research capability exists, with a strong reliance on the Bureau of Meteorology as the primary institutional research body in the MDB and more broadly across Australia's water resources.</p> <p>Does not legislatively recognise or support broader external research institutions.</p> <p>While structural recognition of climate impacts exists, especially regarding allocation risk, there is a lack of measures to promote sustained scientific adaptation.</p>
Water NSW Act 2014 (NSW)	<p>Section 7 (1)(j): <i>the listed functions of Water NSW are as follows: to undertake research on catchments generally, and in particular on the health of declared catchment areas</i></p> <p>Water NSW is empowered to undertake <i>catchment audits</i> (Section 42 (2)(a))</p> <p>Section 42 (3): <i>The catchment audit must assess the state of the declared catchment area having regard to the catchment health indicators approved under section 41 for the area, as in force at the time of the assessment.</i></p> <p>Section 41 (2): <i>The appointed person [appointed by the Minister under Section 41] must develop and approve</i></p>	<p>Acknowledges the role of research in assessing and monitoring catchment health.</p> <p>However, scientific knowledge, innovation and adaptive research are not explicitly embedded as ongoing strategic requirements.</p> <p>Does not align clearly with contemporary climate-adaptation and innovation policy settings.</p>

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Water NSW Regulation 2020 (NSW)	<p><i>catchment health indicators of the catchment health of the declared catchment area.</i></p> <p>Section 5 (a-d):  <i>The Regulatory Authority [Water NSW] may exercise the functions conferred on it by this Part only for the following purposes: protecting declared catchment areas, protecting and enhancing the quality of water..., protecting controlled areas</i></p>	<p>Acknowledges the role of research in assessing and monitoring catchment health.</p> <p>Scientific knowledge, innovation and adaptive research are not explicitly embedded as ongoing strategic requirements.</p> <p>Serves as an administrative and procedural instrument, not strategic.</p>
Water Management Act 2000 (NSW)	<p>Section 43 (3A) (a-b):  <i>If a report of the Natural Resources Commission under subsection (3) recommends changes to a management plan that will result in a reduction of water allocations in relation to which compensation might be payable ... the Commission is to state in the report whether the purpose of the proposed changes is—</i>  <i>(a) to restore water to the environment because of natural reductions in inflow to the relevant water source, including but not limited to changes resulting from climate change, drought or bushfires, or</i>  <i>(b) to provide additional water to the environment because of more accurate scientific knowledge that demonstrates that the amount previously allocated to the environment is inadequate.</i></p> <p>Section 87AA (6)  <i>Compensation is payable as follows for a reduction in water allocations that is specified under section 46 (1) (b) by the Minister as being for the purpose of providing additional water to the environment because of more accurate scientific knowledge that demonstrates that the amount previously allocated to the environment is inadequate.</i></p> <p>Section 292 (1)(b):  <i>A water supply authority [bodies established by this Act, statutory bodies established by other Acts and State owned corporations] has the following functions: to conduct research, collect information and develop technology in relation to water management.</i></p> <p>Section 380:  <i>The objects of the Trust [private water trusts] are to promote, organise, carry out and fund projects, in both the public and private sectors, for:</i>  <i>(a) the restoration and rehabilitation of water sources and their dependant ecosystems, and</i>  <i>(b) the construction of works for the more efficient delivery, use and recycling of water, and</i></p>	<p>Strongly grounded in science, research and climate-responsive decision-making.</p> <p>Purpose of the Act is to provide protection, conservation, and ecologically sustainable management processes for the water sources of the State, and for other purposes.</p> <p>Science, research, and technological development are identified as important elements in driving this objective.</p>

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Water Act 1989 (Vic)	<p><i>(c) the conduct of water industry adjustment, business restructuring and industry training, and (d) the conduct of research, and the development of technology, in relation to the matters referred to in paragraphs (a), (b) and (c)</i></p>	
	<p>Section 22C (1)(a)  <i>A Sustainable Water Strategy must provide for the strategic planning of the use of water resources in the region to which it applies— (a) to identify threats to the reliability of supply and quality of water for both environmental and consumptive uses in the region</i></p>	<p>Positions science as a critical input to planning and decision-making, supported by mandated review cycles and long-term assessments to maintain currency with best practice.</p>
	<p>Section 22K:  <i>The Minister must commence a long-term water resources assessment— (a) for northern water resources— (i) by the end of 31 January 2025; and (ii) after that, by the end of the twelfth year in each consecutive 15-year period, where the first such period commences on 1 February 2025*</i></p>	<p>Conducting research is regarded as a primary responsibility for water corporations, authorities, and ministers.</p>
	<p>Section 91 (2)(a):  <i>In addition to any other functions conferred on a water corporation by or under this or any other Act, a water corporation [as defined in Division 1 or Part 6] has the functions of— (a) investigating, promoting and conducting research into any matter relating to its other functions, its powers and its duties**</i></p>	<p>Although climate change is not explicitly mentioned, section 189(1) might be interpreted as referring to climatic conditions.</p>
	<p>Section 189 (1) (bb)(c):  <i>An Authority that has a waterway management district has the following functions in relation to designated waterways and designated land or works within that district– to improve the environmental values and health of water ecosystems, including their biodiversity, ecological functions, quality of water and other uses that depend on environmental condition; (c) to investigate, promote and research any matter related to its functions, powers and duties in relation to waterway management</i></p>	<p>Acknowledges the importance of ongoing monitoring and assessment through the long-term water resources assessments.</p>
<p>Section 157 ((3)(b)(i):  <i>in determining whether or not a flow of water occurred as a result of negligent conduct on the part of an Authority, account must be taken of all the circumstances including any omission or failure, in the planning, design, construction, maintenance or operation of the works, to provide reasonable standards of capacity or efficiency or exercise reasonable care or skill having regard to the following matters— (i) the state of scientific knowledge and knowledge of local conditions at any relevant time***</i></p>		
<p><i>*Periodic assessments for water resources other than northern water Resources are also included</i></p>		
<p><i>**A similar function related to research pertain to each Authority and Ministers</i></p>		

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Water Act 2000 (Qld)	<p>*** A similar clause is provided with respect to public works</p> <p>Section 984 (d):  <i>environmental update purpose [in a water management plan] means the purpose of providing additional water to the environment because of new scientific knowledge demonstrating the amount previously allocated to the environment is inadequate.</i></p> <p>Section 45 (2)(g):  <i>The Minister must consider all of the following in making a draft of a water plan— the water-related effects of climate change on water availability</i></p> <p>Section 60 (2)(c):  <i>The Minister must consider the following in making a draft of a water use plan— the water-related effects of climate change on—            (i) water use practices; and (ii) the risk to land or water resources arising from the use of water on land.</i></p> <p>Section 58:  <i>A water use plan is a plan that applies to a part of the State and advances the sustainable management of Queensland's water by regulating water use if there is a risk of land and water degradation</i></p>	<p>Purpose of Act is to empower sustainable management of water resources.</p> <p>Scientific knowledge is acknowledged as an important consideration.</p> <p>Doesn't strongly mention research and doesn't include innovation or technological advancements.</p> <p>Includes climate change as an important consideration in water planning.</p>
Water Services Act 2012 (WA)	<p>Section 46:  <i>If the Authority [the Economic Regulation Authority] is required under this Part to determine whether or not something would be contrary to the public interest, then, without limiting the things that the Authority may take into account, the following matters must be taken into account to the extent to which the Authority considers that they are relevant to the particular case — (a) environmental considerations, including the value of ecologically sustainable development</i></p>	<p>Limited to no strategic recognition of research, innovation science or climate change.</p> <p>Environmental considerations and sustainable water management are at the discretion of the Authority.</p>
Water Industry Act 2012 (SA)	<p>Section 87 (3) and (5) related to the Consumer Advocacy and Research Fund:  <i>The Fund consists of— (a) the amount of \$250 000 (indexed) paid into the Fund on an annual basis (at a time determined by the Treasurer) from the total amount of annual licence fees payable under section 24 attributable to designated prescribed costs in any particular financial year</i></p> <p><i>The Minister may apply the Fund— (a) to support research or advocacy that promotes the interests of consumers with a disability, low-income consumers, or consumers who are located within a regional area of the State; or (b)</i></p>	<p>Limited and operational recognition of science; minimal recognition of research, innovation, or climate change.</p> <p>Objective is to facilitate planning in connection with water demand and supply.</p> <p>The role of research is sequestered to consumer advocacy – although this may be framed in terms of sustainable water</p>

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	<p><i>to support projects that advance the interests of consumers from an advocacy perspective</i></p> <p>Section 6 (1) and (2)</p> <p><i>The Minister must prepare and maintain a document to be called the State Water Demand and Supply Statement. (2) The State Water Demand and Supply Statement must— (a) assess the state of South Australia's water resources and the extent of water supplies available within the State; and (b) assess current and future demand for water within the State; and (c) outline policies, plans and strategies relevant to ensuring that the State's water supplies are secure and reliable and are able to sustain economic growth within the State.</i></p>	<p>management and climate adaptation.</p> <p>Although not explicitly mentioned, the emphasis on water planning (Water Demand and Supply Statement) by necessity relies on scientific evidence whether in the form of demand forecasting, hydrological modelling and/or understanding of factors that may lead to future resources constraints.</p> <p>Climate change isn't explicitly acknowledged.</p>
<p>Water Management Act 1999 (TAS)</p>	<p>Section 6:</p> <p><i>The objectives of this Act are to further the objectives of the resource management and planning system of Tasmania as specified in Schedule 1 and in particular to provide for the use and management of the freshwater resources of Tasmania having regard to the need to – (a) promote sustainable use and facilitate economic development resources; and of water (b) recognise and foster the significant social and economic benefits resulting from the sustainable use and development of water resources for the generation of hydroelectricity and for the supply of water for human consumption and commercial activities dependent on water</i></p> <p>Section 3: best practice environmental management has the same meaning as in the EMPC Act</p> <p><i>Section 14 and 15 related to scope of water management plans: A water management plan is to include – (c) an assessment of the ability of that water regime to achieve the environmental objectives and other relevant objectives of the plan; Where a water management plan provides for the allocation and use of water under section 14(3)(a), the plan must – (a) include an assessment of the capacity of the relevant resource to meet the likely demands for water by existing and future users; and (b) take into account the needs of existing and future users and state the likely effect of the plan on those users, including any effect on businesses carried on by those users.</i></p>	<p>Research and innovation are implicit rather than explicit (acknowledges best practice environmental management), and climate change is not explicitly stated.</p> <p>Although not explicitly mentioned, the focus of the scope of water management plans on achieving environmental objectives, and meeting the demands of existing and future users, may rely on scientific evidence whether in the form of demand forecasting, hydrological modelling and/or understanding of factors that may lead to future resources constraints.</p>
<p>Water Resources Act 2007 (ACT)</p>	<p>Section 6:</p> <p><i>The objects of this Act are— (a) to ensure that management and use of the water resources of the Territory sustain the physical, economic and social wellbeing of the people of the ACT while</i></p>	<p>Science, research and innovation are implicit in the objectives of the act (sustainable water management practices and</p>

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	<p><i>protecting the ecosystems that depend on those resources; and (b) to protect aquatic ecosystems and aquifers from damage and, where practicable, to reverse damage that has already happened; and (c) to ensure that the water resources are able to meet the reasonably foreseeable needs of future generations.</i></p> <p>Section 68:  <i>director-general [City and Environment Directorate] (1) The director-general must, as far as possible, continuously monitor and assess the condition of the Territory's water resources. (2) For subsection (1), the director-general may do any of the following: (a) construct, repair, alter or remove gauging, recording and monitoring stations or drill bores; (b) systematically monitor— (i) stream flow; and (ii) weather and climate; and (iii) waterways and ground waters; (c) operate or maintain gauging, recording and monitoring stations; (d) carry out investigations to determine the existence, location and nature of bores and water structures; (e) monitor bores and water structures; (f) sample and analyse water.</i></p>	<p>ensuring supply for future generations).</p> <p>Explicit dual economic and social outcome which implies potential trade-offs in each lever to achieve water resource management.</p> <p>Consideration of intergenerational equity.</p> <p>Scientific processes are implicitly embedded in monitoring and assessment practices and may be part of the processes for ensuring sustainable environmental flows.</p>

Science and Industry Research Act 1949 (Cth)

**Part II—The Commonwealth Scientific and Industrial Research Organisation**

8 Commonwealth Scientific and Industrial Research Organisation

*(1) There shall be a Commonwealth Scientific and Industrial Research Organisation.*

*(2) The Organisation:*

*(a) is a body corporate with perpetual succession; and*

*(b) must have a seal; and*

*(c) may acquire, hold and dispose of real and personal property; and*

*(d) may sue and be sued.*

*Note: The Public Governance, Performance and Accountability Act 2013 applies to the Organisation. That Act deals with matters relating to corporate Commonwealth entities, including reporting and the use and management of public resources.*

*(3) All courts, judges and persons acting judicially must:*

*(a) take judicial notice of the imprint of the Organisation's seal appearing on a document; and*

*(b) presume that the document was duly sealed.*

*(4) The seal of the Organisation must be kept in such custody as the Board directs and must not be used except as authorised by the Board.*

9 Functions of the Organisation

Name of Policy / Legislative Instrument	Reference to Water Research and Innovation	Notes on Gaps, Scope, or Relevance to Research & Innovation
	<p><i>(1) The functions of the Organisation are:</i></p> <p><i>(a) to carry out scientific research for any of the following purposes:</i></p> <p><i>(i) assisting Australian industry;</i></p> <p><i>(ii) furthering the interests of the Australian community;</i></p> <p><i>(iii) contributing to the achievement of Australian national objectives or the performance of the national and international responsibilities of the Commonwealth;</i></p> <p><i>(iiia) contributing to giving effect to Australia's obligations under the Paris Agreement;</i></p> <p><i>(iv) any other purpose determined by the Minister;</i></p> <p><i>(b) to encourage or facilitate the application or utilization of the results of such research;</i></p> <p><i>(ba) to encourage or facilitate the application or utilisation of the results of any other scientific research;</i></p> <p><i>(bb) to carry out services, and make available facilities, in relation to science;</i></p> <p><i>(c) to act as a means of liaison between Australia and other countries in matters connected with scientific research;</i></p> <p><i>(d) to train, and to assist in the training of, research workers in the field of science and to co-operate with tertiary-education institutions in relation to education in that field;</i></p> <p><i>(e) to establish and award fellowships and studentships for research, and to make grants in aid of research, for a purpose referred to in paragraph (a);</i></p> <p><i>(f) to recognize associations of persons engaged in industry for the purpose of carrying out industrial scientific research and to co-operate with, and make grants to, such associations;</i></p> <p><i>(h) to collect, interpret and disseminate information relating to scientific and technical matters; and</i></p> <p><i>(j) to publish scientific and technical reports, periodicals and papers.</i></p> <p><i>(2) The Organisation shall:</i></p> <p><i>(a) treat the functions referred to in paragraphs (1)(a) and (b) as its primary functions; and</i></p> <p><i>(b) treat the other functions referred to in subsection (1) as its secondary functions.</i></p>	
9AA Powers of the Organisation	<p><i>(1) The Organisation has power to do all things necessary or convenient to be done for or in connection with the performance of its functions and, in particular, may:</i></p> <p><i>(a) arrange for scientific research or other work to be undertaken, on behalf of the Organisation, by any person or body;</i></p> <p><i>(b) form, or participate in the formation of, a partnership or company;</i></p>	

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	<p><i>(c) make available to a person, on such conditions and on payment of such fees or royalties, or otherwise, as the Chief Executive determines, a discovery, invention or improvement that is the property of the Organisation;</i></p> <p><i>(d) pay to officers, or to persons undertaking work on behalf of the Organisation, such bonuses as the Chief Executive, with the approval of the Board, determines in respect of discoveries or inventions made by them; and</i></p> <p><i>(e) charge such fees, and agree to such conditions, as the Chief Executive determines for research and other services carried out, or facilities made available, by the Organisation at the request of any person.</i></p>	

## 4.2 Economic

Name of Policy / Legislative Instrument	Reference to Water Research and Innovation	Notes on Gaps, Scope, or Relevance to Research & Innovation
Water Charge Rules 2010 (Cth)	<p>Schedule 3 - Information to be included in an application under Part 7:</p> <p><i>3 Costs recovered through Part 7 operator's infrastructure charges</i></p> <p><i>(1) Details, in relation to the Part 7 operator's infrastructure services for each of the preceding three financial years, of:</i></p> <p><i>(a) the actual total operating costs incurred in providing the infrastructure services;</i></p> <p><i>(b) the depreciation of capital assets used for provision of the infrastructure services;</i></p> <p><i>(c) the actual taxation in relation to the provision of the infrastructure services;</i></p> <p><i>(d) the rate of return on investment in relation to the provision of the infrastructure services.</i></p> <p><i>4 Demand or Consumption</i></p> <p><i>(1) Details, in relation to the Part 7 operator's infrastructure services for each of the preceding three financial years, of the actual demand for, or consumption of, the infrastructure services.</i></p> <p><i>(2) Details, for the period for which the infrastructure charges for which approval or determination is sought will apply, of the forecast of the demand for, or consumption of, the infrastructure services, including:</i></p> <p><i>(a) the methodology used to determine that forecast demand or consumption; and</i></p> <p><i>(b) the assumptions on which the forecast is based.</i></p> <p>Rule 28 Section 29:</p> <p><i>(4) In determining or approving infrastructure charges under this rule, the ACCC must have regard to whether the infrastructure charges would contribute to achieving the Basin water</i></p>	<p>Highly economic-regulatory in nature, with no material recognition of research, science, innovation or climate change.</p> <p>Research and innovation not included as a mandatory cost consideration. Could be embedded in terms of ROI.</p> <p>Promoting pricing transparency and consistency for water fees and infrastructure charges across the Murray Darling Basin</p> <p>The required inclusion of forecasting in the application suggests reliance on scientific techniques to determine future demand.</p> <p>May rely on science-driven outcomes such as sustainable water management and water resource plans that evaluate risk to water systems.</p> <p>Section 29 embeds productivity efficiency but does not consider long-run cost minimisation.</p>

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	<p><i>charging objectives and principles set out in Schedule 2 of the Act.*</i></p>	<p>Schedule 2 establishes a capital-based (RAB) framework. Long run marginal cost is not referenced, calculated, or required.</p>
	<p>Rule 13 Content of schedule of charges: <i>1 (b)(i) the water resource, catchment or district, and the water resource plan or other plan, to which the charge relates</i></p>	<p>Competitive neutrality is implicit but structural equivalence is relied upon so that charges don't materially exceed efficient costs.</p>
	<p>Rule 29 ACCC to determine or approve infrastructure charges: <i>(2) The ACCC must not approve the infrastructure charges set out in an application under this Division unless the ACCC is satisfied: (6) ...the forecast revenue from the charges is reasonably likely to meet, but not materially exceed, the prudent and efficient costs of providing the infrastructure services...  (3A) If the ACCC is satisfied that: (a) there is sufficient uncertainty about the cost, timing, necessity, likelihood or feasibility of a capital expenditure project proposed by the Part 6 operator in its application;  the infrastructure charges must be determined on the basis that funding the capital expenditure project would not be a prudent and efficient cost of providing the infrastructure services.</i></p>	<p>Assumes costs are exogenous, verified after the fact as "prudent and efficient," rather than endogenous to R&amp;D and innovation.  There is no mechanism for recognising or rewarding R&amp;D that extends asset lives or reduces long-term costs.  Disincentivises capital projects geared toward R&amp;D due to level of uncertainty.</p>
	<p>Schedule 2: Determination of regulatory asset base</p>	
	<p>Section 10 Restriction of differing infrastructure charges for same infrastructure service  <i>if the difference between the amount of the charge referred to in paragraph (b) and the amount of the charge referred to in paragraph (a) is more than the difference between the actual costs necessarily incurred in providing each of those infrastructure services.</i></p> <p><i>*Schedule 2 of the Water Act 2007 claims that the objectives of water charging are to promote the economically efficient and sustainable use of water resources.</i></p>	
<p>PREMO water pricing framework 2016 (Vic)</p>	<p>Acknowledges the position of the ESC that pricing should involve: <i>"establishing strong incentives for the water businesses to operate efficiently and innovatively, while providing for their long term viability."</i></p> <p><i>"In applying the WIRO [Water Industry Regulatory Order] principles above, under PREMO, the Commission will</i></p>	<p>PREMO is highly customer outcome-focused, but strategically agnostic about the scientific foundations required to deliver those outcomes and regarding risks such as climate change.  Research and innovation not included as a mandatory</p>

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	<p><i>take into account how a business's proposed form of price control:</i></p> <ul style="list-style-type: none"> <li>- <i>allocates demand and supply risks to the party best able to control or manage the risk, and</i></li> <li>- <i>incentivises the party to reduce the risk or manage it effectively."</i></li> </ul> <p><i>"the framework will reward businesses that: focus on delivering outcomes sought by their customers; accept risks on behalf of their communities; and deliver services as efficiently as possible."</i></p> <p><i>"Prudent and efficient capital expenditure will be reflected in the revenue requirement as a return on the RAB (return on equity) and a return of capital invested through regulatory depreciation."</i></p> <p>Four high level objectives of the revision of the ESC's pricing review approach:</p> <ol style="list-style-type: none"> <li>1) Customers</li> <li>2) Autonomy</li> <li>3) Performance</li> <li>4) Simplicity</li> </ol> <p><i>"High quality price submissions are those that include significant, transparent and credible evidence to demonstrate prudent and efficient expenditure to deliver service outcomes for customers"</i></p> <p><i>"Instead, it considers that a price submission can be fast tracked to an early draft decision if it is satisfied with the proposals in the price submission, and considers that no further enquiry is required because of the significant, transparent and credible evidence put forward in the submission"</i></p> <p><i>"Price adjustments can occur during or at the end of the regulatory period, and be initiated by a business or by the Commission. The Commission will approve price adjustments when it is satisfied that:</i></p> <ul style="list-style-type: none"> <li>- <i>the event is clearly outside of the control of the business and not predictable with any confidence</i></li> <li>- <i>customers are not unduly exposed to risk or price fluctuations</i></li> <li>- <i>the impact of the event is material, clearly observable and verifiable</i></li> <li>- <i>the net impact on costs or revenue of all changes that have occurred during the period under consideration is significant</i></li> <li>- <i>the business has done everything within their control to mitigate against the circumstances in which they find themselves."</i></li> </ul> <p>Section 1.1</p> <p><i>services delivered at the lowest price while meeting all quality and reliability standards</i></p>	<p>cost consideration. It could be embedded in terms of return on capital.</p> <p>Does not explicitly mention research and science nor acknowledge its role in identifying risks and driving efficient outcomes.</p> <p>Compensation may exist via the rate of return for businesses that apply outcomes from research or technology investment as it relates to improving customer outcomes or efficient allocation of risk.</p> <p>Acknowledges the value of evidence-based findings.</p> <p>Does not mandate how risks are identified or mitigated.</p> <p>Demonstrates a reactionary approach to unforeseen events without a clear view on how to adapt and improve planning for such events.</p> <p>Customer preferences, autonomy of water business, and performance efficiency are the primary driving factor behind strategic outcomes.</p> <p>Means that long-term climate adaptation investments can be constrained if customers prioritise price stability; and scientific warning signals may be subordinated to short-term sentiment.</p> <p>Responsibility falls on businesses to shoulder the risk with no clear line of sight or incentive to prepare or forecast for long-term risks.</p> <p>Long run efficiency framing but not through long run marginal costs</p>

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	<p><i>Our approach to pricing will involve establishing strong incentives for the water businesses to operate efficiently and innovatively, while providing for their long term viability.</i></p> <p>Section 3.5 <i>Forecasts of each water businesses' expenditure over the regulatory pricing period are a key input into the forward looking revenue requirements that form the basis of proposed prices.</i></p> <p><i>The Commission will approve prices that reflect only prudent and efficient expenditure forecasts, including reasonable efficiency improvements.</i></p>	<p>Explicitly acknowledges innovation and implicitly allows room for R&amp;D driven efficiencies.</p>
<p>The 3Cs framework (IPART Water Regulation Handbook )</p>	<p><i>"The 3Cs [Customers, costs and credibility] framework is centred around pricing proposals that promote customer value. To apply the guiding principles, each business will actively involve and engage with its customers to develop a set of outcomes aligned to their preferences."</i></p> <p><i>"We expect water businesses to develop their pricing proposals to deliver safe, reliable services to customers now and into the future. Water businesses will communicate and consult with their customers and the community and reflect customer views in strategies, plans and the pricing proposal."</i></p> <p><i>"Businesses earn a strong reputational reward if they receive an Advanced or Leading assessment. This would be tangible evidence that management and decision-makers can use to show customers and shareholders that they are promoting customer value."</i></p> <p><i>"The water businesses need to take a long-term view of their operations, and our 3Cs framework is designed to give the businesses greater flexibility in meeting that challenge. Plans need to be continually updated with new information to ensure the business is sufficiently nimble, adaptable to new conditions and is managing risks. This includes information on evolving customer preferences, which requires a feedback loop between ongoing engagement with customers and the business's long-term plans."</i></p> <p><i>"We expect the long-term investment plans to outline the business's assessment of the need for water supply augmentation. We expect this to include an explanation of the method used for the assessment, and key information inputs and assumptions over the planning horizon around:</i></p> <ul style="list-style-type: none"> <li>- <i>population growth and changes in usage behaviour and demand</i></li> <li>- <i>changes in industrial and agricultural water demand</i></li> </ul>	<p>Explicitly place customers at the centre of pricing decisions.</p> <p>Consumer sentiment is considered a key factor but acknowledges that climate variability and other external factors are key risks that need to be included in long-term water planning.</p> <p>Although not explicitly mentioned, research, science and innovation may be implicit in long-term water planning (but not foundational).</p> <p>Innovation and cost-efficiency are valued but prioritises customer outcomes.</p> <p>Although long-run marginal cost is included, R&amp;D is not considered and customer preferences are prioritised, reflecting a short-term outlook.</p> <p>Does not define what can be classified as genuine innovation.</p> <p>There is no requirement to assess whether innovation options reduce long-run average costs relative to business-as-usual capital solutions.</p>

Name of Policy / Legislative Instrument	Reference to Water Research and Innovation	Notes on Gaps, Scope, or Relevance to Research & Innovation
Statement of Regulatory Pricing Principles for the Water Sector 2021 (QLD)	<ul style="list-style-type: none"> <li>- <i>changing environmental and cultural water needs</i></li> <li>- <i>system yield and water security risk, including assumptions around climate variability and rainfall, drought and contamination risk.</i></li> </ul> <p><i>“Each business must self-assess the extent to which its proposal promotes customer value, encourages cost efficiency and is able to be credibly delivered. The 3 grades are: [1] Leading – for businesses that are industry leaders in understanding their customers, innovating to deliver services customers want and driving costs efficiencies. The business also demonstrates how it delivers significant improvement in customer value through a combination of quantitative and qualitative evidence.”</i></p> <p><i>Section 4.7.4 Prices and tariff structures</i>  <i>For urban water retail businesses, we expect water usage prices to be set with reference to the long-run marginal cost (LRMC). The LRMC for water calculates the per unit cost of serving additional (permanent) demand for water services. It estimates the short-term production costs of serving demand, plus the long run ‘opportunity cost’ of current consumption in bringing forward investment in additional infrastructure</i></p> <p>Appendix C – Long-Run Marginal Cost</p> <p>Section 6.7 Innovation funding  Our 3Cs framework balances the need to promote genuine innovation that leads to better customer outcomes, against the fact that water is an essential service that must be delivered reliably, sustainably, and cost effectively.</p>	
	<p><i>“Where there are environmental costs to water use that are borne by third parties rather than the water user, a potentially effective solution is to reflect these costs in water prices so that water users take them into account in their water use decisions – that is, prices should reflect the marginal cost to the community at large.”</i></p> <p>Acknowledges that:</p> <p><i>“externality pricing is only feasible where:</i></p> <ul style="list-style-type: none"> <li>- <i>there are material externalities in the water cycle</i></li> <li>- <i>there are significant differences in the costs of addressing the externality across different parties and existing mechanisms cannot be tailored accordingly</i></li> <li>- <i>changes in price are likely to change behaviour or encourage innovation”</i></li> </ul> <p><i>“We are required to consider certain matters when conducting pricing investigations under Part 3 of the QCA Act.30 These may be broadly grouped under economic efficiency factors or social equity factors. Economic efficiency factors include:</i></p> <ul style="list-style-type: none"> <li>- <i>efficient resource allocation</i></li> </ul>	<p>Provides a clear, orthodox and durable set of economic pricing principles for monopoly water services in Queensland, centered on economic efficiency, cost reflectivity, revenue adequacy, and transparency.</p> <p>Acknowledges the value of innovation as an outcome of pricing but is not a requirement for businesses in their planning and pricing processes.</p> <p>Innovation is a consideration as part of an efficiency test when applied to capex/opex.</p> <p>Acknowledges the value of factors such as climate</p>

Name of Policy / Legislative Instrument	Reference to Water Research and Innovation	Notes on Gaps, Scope, or Relevance to Research & Innovation
	<ul style="list-style-type: none"> <li>- standards of good or services include-ing quality, reliability and safety</li> <li>- socially desirable investment or innovation”</li> </ul> <p><i>“In theory, economic modelling approaches can be a robust way to estimate scarcity prices, as they consider the interaction between pricing, future climate uncertainty, storage levels and planned investments”</i></p> <p><i>“We have distilled these pricing principles from our regulatory objectives. The principles focus primarily on economic efficiency criteria but are to be balanced against other public interest considerations. They may be refined in future if changes in technology and institutional structure alter regulatory objectives over time.”</i></p>	<p>uncertainty in economic modelling and pricing but is not mandated and can be dismissed as being too complex.</p> <p>Does not explicitly mention research or science, meaning that pricing is assessed as an economic outcome, without regard to the robustness or longevity of the research base that supports it.</p> <p>Research and scientific decision-making are largely implicitly embedded in economic efficiency factors.</p> <p>Technological change framed as a future consideration with no clear timeframe for this outlook.</p>

### 4.3 Health

Name of Policy / Legislative Instrument	Reference to Water Research and Innovation	Notes on Gaps, Scope, or Relevance to Research & Innovation
Australian Drinking Water Guidelines (2011) – Updated June 2025 (Cth)	<p>Intended to provide a framework for the good management of drinking water supplies to consumers in all parts of Australia.</p> <p>Not mandatory legally enforceable standards and the implementation of the guidelines is at the discretion of each state and territory.</p> <p>The framework addresses four general areas including: <i>“Supporting requirements. These requirements include basic elements of good practice such as employee training, community involvement, research and development, validation of process efficacy, and systems for documentation and reporting”</i></p>	<p>R&amp;D is explicitly mentioned and embedded in the structure of the framework.</p> <p>Strongly acknowledges the role of a tailored research approach in identifying risks and hazards to drinking water quality.</p> <p>Claims that R&amp;D should be structurally embedded in the business model of water organisations e.g. through employee training.</p>

Name of Policy / Legislative Instrument	Reference to Water Research and Innovation	Notes on Gaps, Scope, or Relevance to Research & Innovation
	<p>Management of drinking water quality through a comprehensive preventive strategy benefits the water industry by providing an overall framework that: <i>“identifies future research needs for individual systems and throughout the water industry, and assists the development of improved risk assessment for specific hazards.”</i></p> <p>Identifies that other quality frameworks such as the HACCP framework for food processing quality and ISO 9001 are limited in key areas including research and development (p.20, 22)</p> <p>Recognises the role of research and development is reducing uncertainty: <i>“uncertainty due to lack of knowledge can be reduced through better measurement and research.”</i></p> <p>Recognises research as an important component of employee training: <i>“Employees should also be trained in other aspects of drinking water quality management, including incident and emergency response, documentation, record keeping, reporting, and research and development.”</i></p> <p>Contains an entire chapter of research and development (element 9 of the framework) (p. 55): <i>“A corporate commitment to conduct and participate in research and development activities on drinking water quality issues is important. Such a commitment helps to ensure continual improvement and the ongoing capability to meet drinking water quality requirements. Applied research and development may be directed towards:</i></p> <ul style="list-style-type: none"> <li>- <i>increasing the understanding of a water supply system and potential hazards;</i></li> <li>- <i>investigating improvements, new processes, emerging water quality issues and new analytical methods;</i></li> <li>- <i>validation of operational effectiveness of new products and processes;</i></li> <li>- <i>increasing the understanding of the relationship between public health outcomes and water quality”</i></li> </ul>	<p>References scientific findings and papers throughout.</p> <p>Demonstrates a best-practice science governance model, involving evidence-based decision making.</p> <p>Guidelines are continuously updated to reflect best practice and the most up to date scientific findings.</p> <p>While the ADWG articulates the scientific requirements for safe drinking water, the translation of guideline values into mandatory investment obligations occurs through State and Territory regulatory frameworks and economic regulators. It is at this interface that affordability considerations are formally weighed against scientific risk.</p> <p>Unlike most economic or legislative frameworks, the ADWG explicitly acknowledge uncertainty and evidence evolution; integrate ongoing research as a core function; and treat guideline values as scientifically provisional, not fixed.</p>
	Directly reference papers published by Water Research Australia	
	Directly references scientific findings and papers throughout	
	<p>Advocates for evidence-based decision-making and processes: <i>“An evaluation of groundwater security must be based on credible scientific evidence to validate performance and inform the appropriate treatment requirements. This evidence should be discussed with the relevant health authority or drinking water regulator”</i></p>	

Name of Policy / Legislative Instrument	Reference to Water Research and Innovation	Notes on Gaps, Scope, or Relevance to Research & Innovation
Water Supply (Safety and Reliability) Act 2008 (QLD)	The Guidelines undergo a rolling revision to ensure they represent the latest scientific evidence on good quality drinking water.	Operationally strong but strategically narrow as it treats science and climate risk as technical inputs rather than evolving system drivers.
	Section 3: <i>(1) The purpose of this Act is to provide for the safety and reliability of water supply.</i> <i>(2) The purpose is achieved primarily by—</i> <i>(a) providing for—</i> <i>(i) a regulatory framework for providing water and sewerage services in the State, including functions and powers of service providers; and</i> <i>(ii) a regulatory framework for providing recycled water and drinking water quality, primarily for protecting public health...</i> <i>(b) protecting the interests of customers of service providers.</i>	The Act's purpose is framed narrowly around safety and reliability, without explicit reference to climate risk, adaptation, or evolving scientific evidence.
	Section 95: <i>(3) The drinking water quality management plan must—</i> <i>(a) be prepared in accordance with the guidelines, if any,</i> <i>made by the regulator about preparing the plan</i> <i>(d) identify the hazards and hazardous events the drinking water service provider considers may affect the quality of water to which the services relate; and</i> <i>(e) include an assessment of the risks posed by the hazards and hazardous events; and</i>	Relies heavily on “guidelines” but does not require them to be updated in response to new science or climate impacts.
	Section 106: <i>(1) A service provider must regularly review the service provider's drinking water quality management plan, in accordance with the notice given by the regulator</i>	Risk identification focuses on hazards within existing systems, not long-term climate uncertainty.  Reviews are time-based, not science-based.
	Section 42 Regulator may direct restriction: <i>(1A) To remove any doubt, it is declared that the regulator may direct a service provider for an area not under an immediate significant threat to sustainable and secure water supply to impose a restriction if the regulator considers the restriction is necessary or desirable because of a significant threat to sustainable and secure water supply in another area.</i>	Emergency powers respond to immediate threats, not long-term climate stress.  Does not necessitate a long-term outlook or research processes to identify long-term risks – more of a reactionary framework.
	Section 142A Performance Reports: <i>(4) The report may include a commentary on the performance,</i> <i>including any of the following—</i> <i>a matter that impacted on, improved or deteriorated performance;</i> <i>(b) an issue of future concern identified through the report;</i> <i>(c) any strategies to deal with issues of concern</i>	Does not mandate the identification of future concerns.  Although it relies heavily on guidelines to give effect to risk-based water, those guidelines are discretionary instruments made by the regulator or chief executive and are not subject to statutory requirements for scientific updating, climate adaptation, or periodic review.

Name of Policy / Legislative Instrument	Reference to Water Research and Innovation	Notes on Gaps, Scope, or Relevance to Research & Innovation
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Section 95 Preparing drinking water quality management plan:

*(3) The drinking water quality management plan must—  
(a) be prepared in accordance with the guidelines, if any,  
made by the regulator about preparing the plan;*

## 4.4 Environmental

Name of Policy / Legislative Instrument	Reference to Water Research and Innovation	Notes on Gaps, Scope, or Relevance to Research & Innovation
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Environment Protection and Biodiversity Conservation Act 1999 (Cth) (Volumes 1 and 3)

–Section 131AB Obtaining advice from the Independent Expert

*Scientific Committee on Unconventional Gas Development and Large Coal Mining Development*

Science is acknowledged as a technical input in decision-making however the scope of expertise is confined to being project specific

Research is acknowledged as a technical input in

Section 189 Minister must consider advice from Scientific Committee:

*(1) In deciding whether to make an amendment covered by paragraph 184(1)(aa), (b) or (d), the Minister must, in accordance with the regulations (if any), obtain and consider advice from the Scientific Committee on the proposed amendment.*

*(1A) Subsection (1) has effect subject to section 192.*

*(1B) If advice from the Scientific Committee for the purposes of subsection (1) is to the effect that a particular native species, or a particular ecological community, is eligible to be included in the relevant list in a particular category, the advice must also contain: (a) a statement that sets out: (i) the grounds on which the species or community is eligible to be included in the category; and (ii) the main factors that are the cause of it being so eligible*

decision-making however the scope of expertise is confined to being project specific (function of the Committee and Director)

Scientific committees have specific scopes such as the Threatened Species Scientific Committee, and the Independent Expert Scientific Committee on Unconventional Gas Development and Large Coal Mining Development.

Section 189A:

*(b) the only matters the Scientific Committee may consider are matters relating to:*

*(c) the survival of the native species or ecological community concerned; or*

The Act relies on scientific committees (Volume 2 p. 142 and 145) but does not require regular updating of standards or integration of new water science, such as emerging contaminants or climate-driven risks.

Although it mentions long-term considerations such as in the content of recovery plans (Volume 3), there is

Name of Policy / Legislative Instrument	Reference to Water Research and Innovation	Notes on Gaps, Scope, or Relevance to Research & Innovation
	<p><i>(d) the effect that the inclusion in the list of the native species or ecological community concerned is having, or could have, on the survival of that native species or ecological community.</i></p>	<p>no requirement to assess climate change impacts on water resources or to adapt management as climate science evolves.</p>
	<p>Volume 2</p>	<p>MNES is confined to Ramsar Wetlands and protection of water resources from unconventional gas development and large coal mining development (Volume 1). It does not adopt an expansive view of MNES related to water resources.</p>
	<p>Meaning of interested person—organisations  <i>(7) For the purposes of an application for an injunction relating to conduct or proposed conduct, an organisation (whether incorporated or not) is an interested person if it is incorporated (or was otherwise established) in Australia or an external Territory and one or more of the following conditions are met:</i>  <i>(b) if the application relates to conduct—at any time during the 2 years immediately before the conduct:</i>  <i>(i) the organisation’s objects or purposes included the protection or conservation of, or research into, the environment</i></p>	
	<p>505D Function of the Committee:  <i>(d) at the request of the Environment Minister—to provide advice to the Environment Minister about:</i>  <i>(i) priorities for research projects to improve scientific understanding of the impacts of unconventional gas developments and large coal mining developments on water resources, including any impacts of associated salt production and/or salinity; and</i>  <i>(ii) research projects commissioned by the Minister in relation to the impacts of unconventional gas developments and large coal mining developments on water resources, including any impacts of associated salt production and/or salinity;*</i></p>	
	<p>Volume 3</p>	
	<p>270 Content of recovery plans:  <i>(1) A recovery plan must provide for the research and management actions necessary to stop the decline of, and support the recovery of, the listed threatened species or listed threatened ecological community concerned so that its</i></p>	

Name of Policy / Legislative Instrument	Reference to Water Research and Innovation	Notes on Gaps, Scope, or Relevance to Research & Innovation
	<i>chances of long-term survival in nature are maximised.**</i>	
	Matters of National Environmental Significance (MNES) related to water are largely confined to Ramsar Wetlands, marine conservations and protection of water resources from unconventional gas development and large coal mining development	
	<i>*A similar function is given to the Director (Vol 2, p. 157)</i>	
	<i>** A similar clause is applied to threat abatement and wildlife conservation plans</i>	
Environmental Protection (Water and Wetland Biodiversity) Policy 2019 (Qld)	<p>18 Ambient monitoring</p> <p><i>(1) If the chief executive carries out a program of ambient monitoring of waters to assess the state of waters, the chief executive must—</i></p> <p><i>(a) carry out the monitoring under—</i></p> <p><i>(i) the document called ‘Monitoring and Sampling Manual 2018’, published on the department’s website; and</i></p> <p><i>(ii) the ‘Australian and New Zealand guidelines for fresh and marine water quality’, published in 2018;</i></p>	<p>Strong reliance on up-to-date scientific frameworks (ANZG, 2018).</p> <p>Empower the role of research and science in planning and monitoring processes however this is not mandated.</p>
	<p>Schedule 2 Recognition of research entities:</p> <p><i>(e) the Commonwealth Scientific and Industrial Research Organisation; or</i></p> <p><i>(f) a research centre completely or partly funded by the Queensland or the Commonwealth</i></p>	<p>Doesn’t require active revisions of processes informed by scientific best-practice, the continuous identification of long-term risks through research, or adaptation through fostering innovation.</p> <p>Technically static; lacks provisions to foster or fund innovation-driven water management improvements.</p>
	<p>8 Indicators and water quality guidelines for environmental values for waters:</p> <p><i>(6) In this section—</i></p> <p><i>load, of a contaminant of water, means the mass of the contaminant in the water measured over a period of time.</i></p> <p><i>site-specific document, for water, means a document that—</i></p> <p><i>(b) is recognised by the chief executive as having appropriate scientific authority</i></p>	<p>Although biological integrity is valued in water management, the mechanism to achieve this are not clearly defined – role of research, innovation and science not empowered.</p>
	<p>Section 16 Healthy Water Management Plans:</p> <p><i>(2) Also, a recognised entity, in cooperation with the chief executive, may develop and implement a healthy waters management plan.</i></p> <p><i>(3) A healthy waters management plan for water must—</i></p>	

Name of Policy / Legislative Instrument	Reference to Water Research and Innovation	Notes on Gaps, Scope, or Relevance to Research & Innovation
<p>Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000 (ANZG 2018 update)</p>	<p>(a) describe the water to which the plan applies; and  (b) include an assessment of the following for the water—  (i) any threats to water-dependent ecosystems;  (ii) any matters that may adversely affect the use of the water as a supply of drinking water;  (iii) any matters that may adversely affect the natural flows of the water;</p> <p>Biological integrity defined as: “for water or a wetland, means the ability of the water or wetland to support and maintain a balanced, integrative, adaptive community of organisms having a species composition, diversity and functional organisation comparable to that of the natural habitat of the locality in which the water or wetland is situated.”</p> <p>1.2 Guiding principles  “Ongoing research into the inter-relationships between ecological processes, water quality and the biota, and the dissemination of these findings in a readily usable form, are essential for effective management of water resources.”</p> <p>“As is recognised in the Guidelines, more research is needed to develop methods to describe degrees of acceptable ecological change relative to reference conditions”</p> <p>3.3.2.7 Measuring acceptable ecological change  “To define this level of change (a) water quality indicator distributions must be correlated with grades or levels of ecosystem health or integrity indicators/indices, and (b) substantiating potential cause and effect relationships must be identified through these correlations, using laboratory and field-based biological and ecological effects research.”</p> <p>“The current Guidelines, including this working volume, arise from a revision of the NWQMS Guidelines published in 1992 (ANZECC 1992). The revision was necessary to...incorporate current scientific, national and international information in a clear and understandable format;”</p> <p>The 2018 revision of the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZ Guidelines) improves processes by strengthening the reliance of the guidelines on evidence:  “improve confidence in our assessments by:</p> <ul style="list-style-type: none"> <li>• introducing a systematic approach to assessing a number of lines of evidence along the pressure–stressor–ecosystem receptors pathway</li> <li>• promoting decisions on the basis of the integrated weight of evidence.”</li> </ul>	<p>Explicitly acknowledges the role of research and science in measuring ecological outcomes and water quality.</p> <p>Operates on a rolling two to three-year program of activities. These are reviewed annually.</p> <p>Guidelines are continuously updated to reflect best-practice and scientific findings.</p> <p>Scientific processes and evidence-based findings are embedded in the decision-making structure.</p>

**Name of Policy /  
Legislative Instrument**

**Reference to Water Research and Innovation**

**Notes on Gaps, Scope, or  
Relevance to Research &  
Innovation**

# **Appendix B**

**Potential statements for inclusion in  
WaterRA Productivity Commission  
submission**

Issue:	Science and research are referenced but narrowly framed around water resource management (and in some cases climate, catchment or health), and largely outside the scope of the PC inquiry.	Outside water resources and the Murray–Darling Basin, there is no explicit reference to science, research or innovation in key legislative and policy instruments.	Roles are fragmented: BOM and CSIRO are established, but sectoral direction and responsibility for research capability are unclear.	Innovation and R&D incentives in regulatory frameworks	Treatment of long-term benefits in expenditure reviews	Consideration of R&D benefits in prudence and efficiency assessments	Valuation challenge of non-investment risk	Compliance-driven investment versus best-practice outcomes	Affordability pressures and investment outcomes
Soft	Science and research considerations should be reflected in the Water Act and Basin Plan review processes.	Science, research and innovation are not explicitly articulated beyond water resource management frameworks.	Governance and accountability for Australia’s research base are dispersed across institutions.	Regulatory frameworks provide limited encouragement for innovation and investment in research and development.	Expenditure reviews place limited weight on long-term benefits and cost reductions from R&D.	The consideration of R&D benefits in expenditure reviews is applied inconsistently.	The risks associated with not proceeding with investment are difficult to quantify within existing frameworks.	Higher evidentiary thresholds apply to environmental investments outside mandatory compliance.	Affordability considerations influence the timing and scale of investment decisions.
Medium	Science and research considerations should be explicitly incorporated into the Water Act and Basin Plan reviews.	Australia’s core legislative and policy instruments do not explicitly integrate science, research and innovation outside the water sector.	There is no clear legislative allocation of responsibility for coordinating or directing Australia’s research capability.	Regulatory frameworks do not actively incentivise innovation or sustained investment in research and development.	Expenditure reviews do not adequately account for long-term benefits and cost reductions arising from R&D investment.	Expenditure review frameworks do not explicitly recognise R&D benefits, leaving consideration largely to regulatory discretion.	Current assessment frameworks struggle to capture the risks and costs of deferring or avoiding investment.	Environmental investments not mandated by regulation face disproportionate evidentiary hurdles in expenditure reviews.	Affordability constraints contribute to lower levels of investment in innovation and long-term capability.

Issue:	Science and research are referenced but narrowly framed around water resource management (and in some cases climate, catchment or health), and largely outside the scope of the PC inquiry.	Outside water resources and the Murray–Darling Basin, there is no explicit reference to science, research or innovation in key legislative and policy instruments.	Roles are fragmented: BOM and CSIRO are established, but sectoral direction and responsibility for research capability are unclear.	Innovation and R&D incentives in regulatory frameworks	Treatment of long-term benefits in expenditure reviews	Consideration of R&D benefits in prudence and efficiency assessments	Valuation challenge of non-investment risk	Compliance-driven investment versus best-practice outcomes	Affordability pressures and investment outcomes
Strong	The Water Act and Basin Plan reviews need to embed science and research considerations as a central component.	Key legislative and policy frameworks largely omit science, research and innovation outside water resource management.	Australia lacks clear legislative accountability for the governance, direction and implementation of its research base.	Current regulatory frameworks disincentivise innovation and investment in research and development.	Expenditure reviews systematically overlook long-term efficiency gains and cost reductions from R&D.	Prudence and efficiency assessments create structural barriers to recognising the benefits of R&D investment.	The inability to quantify non-investment risk materially biases decision-making against R&D and innovation.	A compliance-first regulatory paradigm discourages scientifically justified investment needed to manage complex ecosystems.	Affordability pressures result in systematic underinvestment in innovation and long-term system resilience.



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