Draft NSW Water Strategy

Submission

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Introduction

Thank you for the opportunity to make a submission.

The submission provides a short overview, a discussion about the material interest of water corporations in infrastructure solutions, water efficiency, BASIX and systems framework modelling.

Overview

The draft strategy recognises that things need to be done differently but does not analyse how we make our decisions now and have made them in the past. Why have we made the wrong decisions?

The answers, and many of the solutions we need to consider, lie outside the traditional water industry. Both the engineering model and the financial model for water management in Australia are predicated on augmenting supply with central infrastructure. The bias is deep seated and warps most water-based decision making.

Despite this bias, in order to maintain a social licence it is necessary for water corporations to meet community expectations about water efficiency, integrated water management and impact on household welfare which could deter investment in supply infrastructure. One strategy for addressing this conflict could be to address those social goals at a high level in strategic documents provided no targets or dollars are discussed. Key performance measures and hard targets are best avoided lest they have a significant impact on building more supply infrastructure and we find these are rarely presented in water policy, including in the Draft NSW Water Strategy.

We were interested to read the repeated references to the need to build confidence in the water industry from the general community. We consider that the community is aware of the rent seeking behaviour in the water industry and these issues need to be made explicit and transparently managed in order to build community confidence.

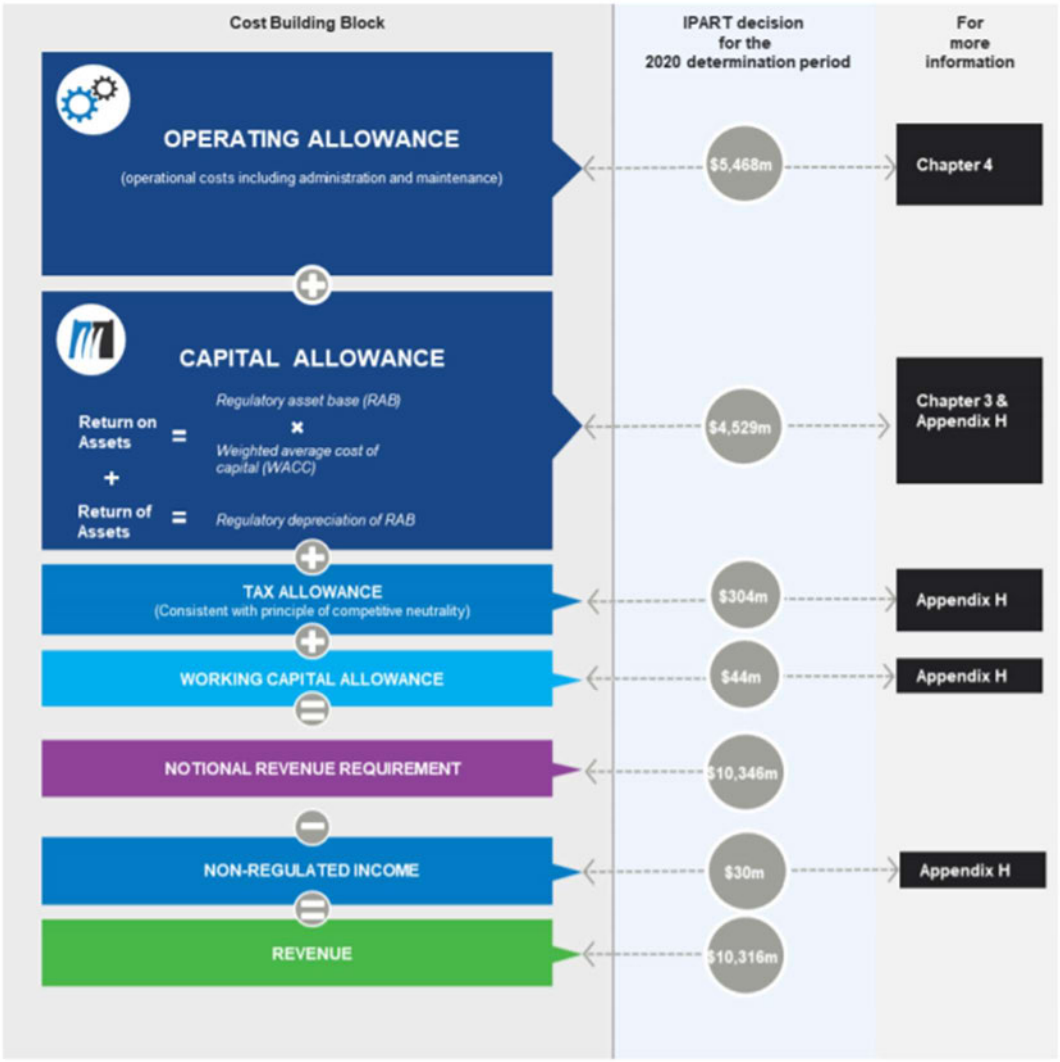
We are encouraged by the clear commitment to public good and wise strategic planning in the draft Water Strategy and would therefore like to propose amendments which may assist in realising that commitment.

Water Corporation Material interest in infrastructure solutions

Water Corporations were created on the principle that a business acting in its own interest provides services more efficiently than government seeking to balance the public interest. The legislated requirement to be a successful business is unequivocal and should not be confused with the desire of water corporations to protect their social licence. This does not mean that the water corporations should be disbanded, only that the rules for their operation and decisions about infrastructure and technologies should be set by government[1]

The material interest that Sydney Water enjoys under the current financial model is worth over $1B annually simply from owning infrastructure and the income allocated through IPART and the building block method (the capital allowance, below[2]). This income is payable annually for the life of the asset, and water assets last a very long time. The incentive to build more infrastructure has proved to be irresistible and has dominated all water investment decisions in NSW other than BASIX.

Figure 5.1 The building block model



[1] Alan Schwartz. (2020, September 13). Why Milton Friedman was right and wrong. *Financial Review*
[2] IPART. (2020). Review of Prices for Sydney Water from 1 July 2020 - Final Report. Independent Pricing and Regulatory Tribunal New South Wales

There are good reasons for requiring a service provider to apply business principles and the corporation is required to do so under government legislation. However public servants should acknowledge and transparently manage infrastructure recommendations from businesses with an irrefutable material interest in the investment decision.

Some examples of classic water strategy with the financial consequences for the water business

- Build a desalination plant to supply water to buildings, however let the rainwater that falls on the roof of the building flow into the street. Under the building block method a $5B desalination plant directly increases income to Water NSW by $170M annually based on a weighted average cost of capital of 3.4%. Rainwater harvesting contributes nothing to the regulatory asset base. That is a $170M annual loss associated with a policy decision to support rainwater harvesting.
- Build a recycling plant to recycle 50% of our wastewater, but in the analysis do not compare the cost with a water efficiency program that would reduce wastewater by 50%. A $5B recycling plant provides $170M in annual income to Sydney Water, a water efficiency policy provides little or no additional income.
- Rather than harvest rainwater from a roof which requires little or no treatment but does not contribute to the regulatory asset base; harvest significantly more contaminated stormwater from public spaces so that the stormwater infrastructure, the storage basin, the water treatment plant, the pumps and pipes to a sports field all contribute to the regulatory asset base and become a source of income for the 116 year life of the assets.

Can the NSW government and DPIE show that they understand this conflict and they have put in place measures to manage the financial interest of the water corporations in building their regulatory asset bases?

Water Efficiency

The recognition that water efficiency should always be considered in comparison to supply augmentation is strongly supported. This section is based on material developed by Michael Smit and Adam Jones in a recent submission to the National Productivity Commission Report on National Water Reform.

We consider that the water 'markets' do not operate as true markets, and therefore there is a need for intervention to balance incentives to get a desirable outcome. We also believe the current approach for determining the income of water corporations does not promote greater water productivity, even if this is in the best interests of the community.

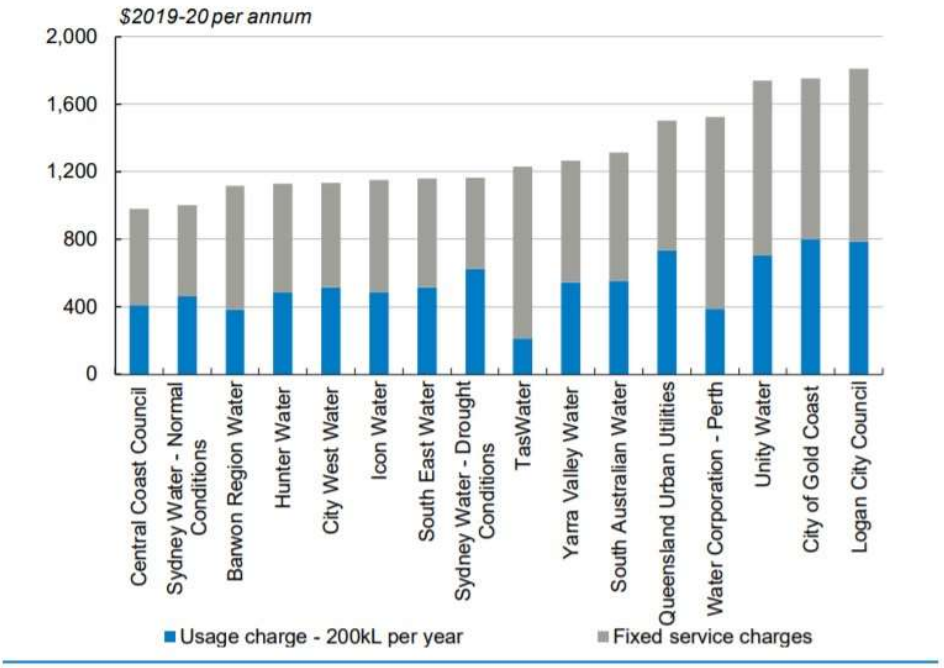
Most water utilities are monopolies, and so maximising their efficiency and productivity requires transparent and comprehensive oversight . Simple metrics including

- expenditure on water efficiency programs
- volume of water saved annually by water efficiency programs
- impact of water bills on household welfare as a proportion of disposable income
- size of the regulatory asset base
- combined water and wastewater bills for households with 100,200 and 300kl annual usage
- totex cost of water services/volume of water provided

are absent from the NSW Water Strategy assessment and should become part of the language of measuring water corporation performance.

As an example, we have included an assessment done by IPART [2] of the largest water corporations in Australia. Considering the combined charges for water and wastewater for households with 200kl of usage shows that Sydney is delivering water services for about $5/kl and Logan City Council at about $9/kl. This kind of assessment is rare in the water industry. It is notable that Sydney has a long history of water efficiency programs (including BASIX) but South East Queensland has invested in a desalination plant, recycled water, a water grid and removed water efficiency provisions from its Development Code and appears to have four of the five most expensive water corporations shown in the graph.

Figure 14.5 Combined water and wastewater bills for households with 200kL of usage



We consider this to be an early example of evidence to suggest that incentivising an unbalanced investment in water supply augmentation over demand management can have dramatic, long-term impacts on cost – and subsequently a constraining impact on household welfare and business efficiency. This is not simply due to covering large capital expenditure, but also the high costs associated with operating water systems where demand is left unconstrained and water wastage is unchecked.

Looking forwards, the cost to the broader economy of water system failure is expected to be extreme, and we believe the risk of this (from a drought failure or any other crisis) is maximised with systems being run to greater capacity.

Were these issues to be measured there may be a more balanced interest in more economically efficient solutions.

The issue of energy efficiency has been extensively discussed in Australia with a recognition in the energy industry that there is a need for a regulator to proactively balance incentives between network augmentation and demand management to avoid inefficient services. We believe that this consideration should also be applied to the water industry.

Figure 1 – Excerpt from an 'Australian Energy Market Commission' (AEMC) Fact Sheet[3]

In 2008 COAG[4] established national urban water principles. One of those principles was that the full portfolio of water supply and demand options should be considered for urban water management, and the first option was optimising the use of existing infrastructure through efficiency measures. COAG also considered that water should be managed on a whole of water cycle basis. This is important because water efficiency should be considered not only as the demand and supply of potable water but also take into account sewage, stormwater and irrigation efficiencies.

Likewise, a key finding of the Case for Water Efficiency published by the AWA in 2012[5] was that supply augmentation proposals should always be accompanied by an assessment of increased water efficiency using the same criteria.

The AWA Water Efficiency Specialist Network has prepared a short list of example demand management opportunities that could be considered by each water corporation and water utility at the same time as considering supply augmentation. Endorsing this simple list could result in a

[3] Australian Energy Market Commission. (2015). *Fact sheet: Distribution businesses and demand management.* AEMC
[4] Australian Government . (2020, March 12). *National Urban Water Planning Principles - COAG*
[5] AWA Water Efficiency Specialist Network. (2012). *The case for Water Efficiency - AWA Position Paper October 2012.* Sydney: Australian Water Association

significant reduction in water service costs, increased productivity and increased household welfare throughout the Australian economy.

We consider the under investment in water efficiency over the last decade means that a 20% reduction in household water corporation water consumption would have a net benefit for the community with little impact on household amenity but considerable benefits for network capital and operating costs. Note that this does not preclude the actual water use of the household, just how much of that water is supplied by the water corporation over distances of up to 100km. This figure is in practice a modest one compared to the BASIX program which required design modifications to achieve a 40% reduction in water use from a 2004 average and has been operating successfully since 2004.

Recommendations for water efficiency

1. Require transparent metrics to be reported that highlight water efficiency and economic productivity of water utilities including
    - expenditure on water efficiency programs
    - volume of water saved annually by water efficiency programs
    - impact of water bills on household welfare as a proportion of disposable income
    - size of the regulatory asset base
    - combined water and wastewater bills for households with 100,200 and 300kl annual usage
    - totex cost of water services/volume of water provided

2. Develop regulator engagement to ensure water utility incentives are effectively balanced between supply and demand solutions, and that options on both sides are compared effectively to determine the greatest efficiency.
3. Consider target setting to correct for under-representation of investment in demand management –a 20% reduction in per capita water consumption from water corporations is an appropriate starting point for setting water efficiency targets for water corporations.
4. Establish the following standard programs for large water corporation to carry out water efficiency[6]

[6] Beatty, Russell. (2019). *A Scale-appropriate Approach to Best Practice Water Efficiency and Demand Management – Australian Urban Water Utilities*. Unpublished

Utility Size	Overall Strategy	Water Pricing and metering	Retrofit and Rebate	Regulations and Codes	Education	Alternative Water Sources	System Water Loss
>500,000 customers	Should undertake a demand management strategy exercise every 5 – 10 years that considers how various demand management options, the water savings and the costs and benefits of options. Benefits to include the downsizing and/or deferral of capital expenditure, plus reductions on treatment and transfer costs. Should consider all options – including the wider use of recycled water, stormwater harvesting and rainwater harvesting systems modelling in a whole of system context.	Will have moved to smart water metering for all customers with water consumption in excess of 5,000 kL/a and a system for benchmarking and profiling water use and reporting on issues such as anomalous water use or high night flows. Should pilot a smart metering system for residential customers.	As determined by the demand management strategy. Options to be considered: • Residential retrofit program • Large water users audit program • Home tune up kits – toilet leak detection tablets, low flow showerheads and flow regulators for taps. • Should implement a program that provides free installation of water efficient showers. This program should only be terminated where there is clear evidence that it has reached market saturation. Follow up surveys of participating customers to verify medium and long-term retention	Permanent water saving rules should be in place. Other options as determined by the demand management strategy. Options to be considered include: • Water efficiency codes for new houses and buildings • Mandatory 5 yearly water efficiency benchmarking and reporting for large water users	At least one full time person dedicated to the coordination of water conservation-based education for customers and the community. Water efficiency benchmarking information should be widely available for customers.	The demand management strategy should consider: • High rainfall areas, may consider the use of building regulations to mandate the use of rainwater harvesting systems for new development. • Consider the use of recycled water for large water users. • The demand management strategy should also consider the costs and benefits of the use of recycled water systems beyond the largest users – especially in inland areas. • Stormwater and rainwater harvesting systems should also be considered.	Should have a system-wide automated water monitoring system that reports anomalous system events for investigation and action.

BASIX and Systems Framework Analysis

Context for BASIX

The benefits of distributed water management are supported by the real-world experience with BASIX in NSW that has been operating since 2004.

BASIX is designed to correct for the potential failure of the market to deliver socially optimal investment in energy and water efficiency, at the time that a residential dwelling is constructed. The market failure arises because[7]:

– often the party responsible for the design and construction of a dwelling differs from the ultimate dwelling resident and so sub-optimal trade-offs between upfront capital costs and ongoing operating costs are made – the so-called "split incentives" problem;

– there is a lack of information about the opportunities for cost-effective investment in water and energy efficiency measures as part of the construction of a dwelling;

– water and energy prices do not (currently) adequately include the cost of environmental (and other) external impacts; and

– of a lack of access to finance to fund cost-effective energy or water efficiency investments.

The Building Sustainability Index is a NSW State Environmental Planning Policy that applies to all buildings in NSW and requires developers to meet targets for water and energy savings based on carefully researched local climate data. BASIX is non-prescriptive which allows applicants a choice of technologies and design measures to achieve targets, and there is more than one pathway to achieve the target. BASIX mandates a performance outcome rather than a solution.

Houses must demonstrate up to a 40% water saving and 40% reduction in greenhouse gas emissions based on 2004 average household water and energy use for that area. Average water use in 2004 in NSW was 90,000 litres per person so this represents an annual saving of 86,000 litres for a household of 2.4 persons. Roof area, building materials, window areas and the number of bedrooms used by the tool to calculate water and energy use. Four key factors are used estimate rainwater tank efficiency and therefore calculate their 'score' in BASIX; local rainfall, connected catchment (roof area), the size of the tank, and number and type of connected water uses (demand).

BASIX integrates water and energy use with long-term land use planning. All residential planning and building must be accompanied by a BASIX certificate certifying the targets have been met. Targeting new houses and renovations incrementally upgrades all residential building infrastructure over time.

BASIX is a state environmental planning policy that operates independently of water utilities, cannot be overridden or traded away against other planning policy requirements. BASIX has clear, science based targets based on local data. Targets are mandatory and compliance is online without requiring professional assistance. Development cannot proceed without a BASIX certificate. It is a remarkably effective program with strongly demonstrated benefits discussed below.

[7] Nera Economic Consulting. (2010). *BASIX Post-Implementation Cost-Benefit Analysis An Economic Evaluation of the State Environmental Planning Policy- Building Sustainability Index (BASIX) A Report for the Department of Planning.* Nera Economic Consulting

The Sydney Alternative Water Strategy

Greater Sydney is the premier Australian city and it faces profound urban water challenges. Sydney must manage its infrastructure efficiently and sustainably to compete internationally as a Global city. Sydney has a strongly performing water services sector but has a traditional approach to water service management. Significant challenges include long transfer distances for water and sewage services and inadequate urban stormwater infrastructure management. These problems appear to be intractable using traditional water analysis approaches however a Systems Framework investigation can identify efficient solutions.

The Sydney Alternative Water Strategy[8] finds that Greater Sydney, despite significant challenges, currently has the most efficient and sustainable water services in Australia. This has been achieved through the strategic alignment of water demand management, rainwater harvesting and urban development. The BASIX state environmental planning policy has built-in demand management and stormwater management in most new buildings in the Greater Sydney region since 2004 and this 'bottom up' approach has a major legacy impact on the efficiency of water services. BASIX policies have already saved the Greater Sydney region about 79 billion litres of water annually by 2019, comparable to the 90 billion litre annual capacity of the Sydney desalination plant.
The Systems Framework is used to model and then compare four future scenarios based around the current BASIX policy. Business as Usual projects continuing the current Planning Policy compared to

- not having BASIX,
- an improved BASIX to include water sensitive urban design and
- a combined improved BASIX and variable price structure for water and sewage.

Up to 2050 an improved BASIX and variable price structure would deliver benefits of $7B in community benefits compared to Business as Usual and $11B compared to not having BASIX at all. The key insight is that a combination of supply and demand management is more efficient than relying entirely on supply solutions when considering whole of society benefits. These demand management solutions include behaviour change, water efficient appliances and rainwater harvesting. An example of these benefits is the 5 year deferral of the multi-billion dollar desalination augmentation provided by the BASIX policy. The inclusion of rainwater harvesting as a stormwater management solution has both infrastructure and demand management benefits and is an efficient decentralised infrastructure asset that improves the performance of the whole system.

The report identified water and sewage transfer distances of over 50 km across Greater Sydney. Transporting a heavy liquid over these distances and significant changes in ground elevations represents high capital and operational costs and potential economic inefficiencies. In some parts of Greater Sydney, the shadow cost (medium run marginal cost) of delivering water and sewage services is greater than $16/kL, which is nearly 800% more than the household usage tariff. As a result of the analysis the report recommends continuing the BASIX program, considering an improved version of BASIX and considering a more efficient pricing structure for water and sewage services.

[8] Coombes, P., & Smit, M. (2020). *Alternative Water Strategy for Sydney v1.* Newcastle: Urban Water Cycle Solutions

Systems Framework Model

One of the findings of the COAG principle for urban water reform was the need for better modes of analysis. We find that water planning in NSW has made little progress in key COAG recommendations including[9]

Urban water planning should be based on scenario planning, incorporating uncertainty in supply and demand, as well as integrated with future economic development and land use planning to ensure full knowledge of the availability of water supplies and water savings opportunities.

The management of potable water supplies should be integrated with other aspects of the urban water cycle, including stormwater management, wastewater treatment and re-use, groundwater management and the protection of public and waterway health.

Selection of options for the portfolio should be made through a robust and transparent comparison of all demand and supply options, examining the social, environmental and economic costs and benefits and taking into account the specific water system characteristics. The aim is to optimise the economic, social and environmental outcomes and reduce system reliability risks, recognising that in most cases there is no one option that will provide a total solution. Readiness options should also be identified as part of contingency planning.

Tariff structures for water supplies should be designed to signal the full value of finite water resources to end users to encourage efficient water use. The price charged for urban water services should be transparent and linked to the level of service provided.

The Coombes Systems Framework methodology was recognised in 2018 by Engineers Australia as leading water resource research.

Water cycle management is a system that includes human and environmental elements that can be analysed as a model to test different options. Water cycle management, environment and urban areas are complex dynamic systems and no model is perfect, however, the advantage of the digital age is that powerful computing can use billions of pieces of information, or big data, to model the real world1. Once a model is developed, the rules of the model, or scenarios, can be changed to achieve a better outcome. Understanding and modelling the system to test different outcomes is called a Systems Approach. A Systems Approach is a powerful tool for understanding complex dynamic systems.

The responsible and equitable social, fiscal and environmental management of water resources and ecosystem services is central to planning for a world challenged by population growth and increasingly variable climate. Development of a robust understanding of the nonlinear interactions of all water streams with our urban settings is vital to realising our visions and plans to build sustainable and resilient cities into the future. One way to come to this understanding is to construct and deploy numerical tools that consider the natural and anthropogenic water cycles and their interactions as a linked system. These human and linked earth systems generate trade-offs in response to proposed interventions that may only be revealed using systems thinking and models of system dynamics.

[9] Australian Government . (2020, March 12). *National Urban Water Planning Principles - COAG*

A description of the concept and modelling for the Systems Framework is available in Barry and Coombes (2018) ‘Planning for Resilient Communities’ which was the recipient of the Engineers Australia 2018 GN Alexander prize for Hydrology and Water Resources.

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