SOURCE

7th August 2020
Jane Doolan
Commissioner
National Water Reform
Via email: water.reform.2020@pc.gov.au

Dear Ms Doolan,

We thank the Productivity Commission for the opportunity to present a submission to the Inquiry into the National Water Initiative. Our submission focuses on the provision of reliable water services to regional, rural and remote communities, the impact of climate change and environmental policy on water supply, and we offer recommendations for consideration by the Commission.

About Zero Mass Water

Zero Mass Water manufactures SOURCE Hydropanels (SOURCE), a technology which uses the power of the sun to extract clean, safe drinking water from the air. SOURCE is well established - the technology currently supplies clean drinking water to tens of thousands of people in more than forty-five countries through partnerships with governments, corporations and development organisations.

SOURCE has been deployed in a number of successful projects in Australia, including:

- The Australian Renewable Energy Agency (ARENA) supported the demonstration of SOURCE installations at 28 sites around Australia including schools, councils, homes and businesses;
- The New South Wales Government has deployed SOURCE as a drinking water solution several times, with the Aboriginal Housing Office installing SOURCE on more than 850 homes in regional towns such as Walgett, Broken Hill, Wilcannia and Menindee;
- The New South Wales Department of Education has deployed SOURCE on more than 10 schools in drought-impacted regional towns including Walgett, Goodoga and Narromine;
- The Northern Territory Government has funded a community-scale SOURCE array for the remote town of Yuelamu as an alternative supply source to a contaminated well;
- A SOURCE field installed in Scenic Rim, Queensland, producing more than 1 million litres annually and supplying to local water distributors as a non-extractive alternative to spring water; and
- SOURCE arrays in six water-stressed remote communities that were funded by the National Basketball Association (USA) and an Australian basketballer player, Patty Mills.

We thank the Productivity Commission for the consideration of our submission and welcome the opportunity to participate in any additional consultation.

Best regards,

Kristen Roy
Country Director
Zero Mass Water (Australia) Pty Ltd

Turn to the Sky: Renewable Drinking Water Solutions for Australian Communities

Reliable access to clean drinking water is a fundamental human right yet today many are still being deprived of this essential resource. While major Australian cities all enjoy clean and trusted supplies of drinking water, many rural and remote communities have faced multi-generational challenges to accessing clean water. Australia is the driest inhabited continent on earth and is no stranger to the effects of drought, climate change and water scarcity. The water strategies, technologies, and policies of the 20th century have yielded remarkable success in providing reliable service to high density urban areas, but they are failing rural homes and small communities across Australia who are without access to clean drinking water. The adoption of innovative, decentralised drinking water solutions can empower individuals, families and communities to enjoy long term drinking water security at a fraction of the cost and environmental impact of alternate solutions.

Hot, Dry and Low-Density: Australia's Drinking Water Challenges

Australia is one of the lowest density countries in the world, averaging just three people per square kilometer of land mass. It is also one of the world's most urbanised coastal dwelling populations, with more than 90% of Australians living within 100 kilometres of the coast and the vast majority located in major cities[1]. Local Governments in non-urban areas face challenges providing water service to lower density rural homes and small communities which often lack the requisite scale to fund, build, and service centralised water infrastructure. Examples of the types of challenges that are presented include:

- Remote communities that rely on bore water with ongoing challenges of water quality, taste and aesthetics (e.g. Meekatharra, Western Australia, and Oodnadatta, South Australia);
- Rural homes that do not have access to utility service and instead rely on local bores, rainwater tanks and bottled water delivery (e.g. homes Gundy, New South Wales, and Stanthorpe, Queensland); and
- Communities in rural and remote Australia that are far more likely to consume bottled water and high-sugar drinks than those in urban areas as a direct consequence of the availability, taste and the level of community trust in drinking water supplies[2].

Policy and investment gaps remain because existing solutions have a limited capacity to address the challenges listed above. This is evidenced through the ongoing use of interim supplies of safe drinking water (bottled water, trucked water and water delivery services), which provide near-term relief but fall short of stated policy goals as they relate to the accessibility, resilience and sustainability of water supply.

[1] Australian Bureau of Statistics "Interesting Facts About Australia's Population" (2018)

[2] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6988377/

The Adequacy of the NWI to Meet Current and Emerging Challenges

Zero Mass Water supports the Commission's call for practical advice on improving the NWI to better support social, economic and environmental outcomes. We believe the NWI has a critical role in identifying opportunities for improvement across the national framework and looking to maximise community benefit as it relates to both cost and impact.

We have identified five primary areas for future reform that are essential to optimising outcomes for Australian communities: (i) water policy considerations for remote households; (ii) recognition of fitness-for-purpose methodologies and project affordability for water stressed areas; (iii) the trial and adoption of innovative, non-traditional technologies to serve Australian homes; (iv) consumer expectations for household drinking water quality and availability; and (v) climate change and planning for extreme events. We deal with each in turn below.

1. *Water Policy Considerations for Remote Households*

The vast majority of Australians are supplied by urban water utilities, with seventy-six (76) urban water suppliers providing water to approximately 23 million people[3]. The existing policy and regulatory frameworks have been largely successful at providing water to this group of the population, but have failed to apply the same level of service to those Australians who fall outside of urban areas. In particular:

- Those who live on farms without access to utility water service and are reliant on self-sustaining supply from rainwater tanks and/or groundwater. For example, Walgett Shire in NSW has 6,107 residents[4] across an area of 22,336 square kilometers, which includes 882 rural properties,[5] leaving approximately 30% of Shire residents outside of the town water service area; and
- Those who live in smaller communities/villages outside of urban centres who are not served by the local government infrastructure – for example Gundy in the Upper Hunter Shire, NSW, and the Buttah Windee community in the Shire of Meekatharra, WA.

Applying the same set of technical solutions and regulatory frameworks is not an effective way of ensuring drinking water outcomes for an estimated one million Australians that live in households in rural and remote parts of the country.

Water service providers in remote parts of Australia typically operate as government owned corporations that are largely focused on improving supply to existing customers/ratepayers and are not sufficiently incentivised to extend services to the isolated households and communities highlighted above. In fact, most water service providers work towards established key performance indicators ("KPIs") that are based on financial performance (return on capital),

3 National Performance Report – Urban Water Utilities 2018-19

4 Australian Census, 2016

5 Walgett Shire Council Website

operational performance (earnings, cost efficiency, system performance), compliance and customer satisfaction[6]. The extension of service and/or solutions to isolated households and communities is therefore not only unattractive to water service providers, it is often misaligned with stated KPIs and looks comparatively expensive on a household level given the long-term depreciation of existing assets. As such, many Australian households that are not served by water service providers are "hidden" not only from the service providers, but to the funding programs and other water-focused policy initiatives that are typically implemented through service providers.

Regional service providers with low budgets, limited technical capabilities, poor quality source water and low-density service areas are mandated to provide the same quality and quantity of water to households as the sophisticated, well-resourced providers in urban centers. Importantly, this approach is not only unfair, but it actively restricts the pursuit of outcomes in several key areas:

- *Service Outcomes*: regional and remote service providers should be working to extend water service solutions to all Australian households, whereas the current framework is focused on maintaining compliance to those with existing connections, and effectively rules out the extension of service if full compliance is not achievable;
- *Water Quality Outcomes*: the current compliance frameworks actively prioritise "safety" while failing to meet community expectations about water that relate to taste, colour, hardness and other "aesthetic" considerations. Increased transparency about the (understandable) challenges to maintaining drinking water quality in remote parts of Australia will unlock future innovation and improved consumer satisfaction.

Recommendation 1: **Policy frameworks should incorporate distinctions between urban, regional and remote service areas. Water policy mechanisms should be encouraged to allocate a portion of funding towards non-urban recipients that is directly accessible by households, businesses, community groups and non-profit organisations representing those Australians not served by water service providers.**

2. *Fitness-for-Purpose Methodologies and Affordability in Project Pricing*

The NWI, and the water sector more broadly, consider water as a single commodity that is created equal, with the typical distinction of "treated" versus "untreated". Within the broader category of "treated" water, the current compliance frameworks actively prioritise safety and potability above taste, colour, hardness and other 'aesthetic' considerations.

This binary categorisation of water fails to consider that in fact the expectations and preferences of the Australian public go far beyond minimum standards of safety and potability where drinking

6 Power and Water Annual Report (2019), p10-13

water is concerned. As evidence, less than one percent (1%) of household water use in Australia is consumed directly for drinking[7], and yet Australians elect to spend over $1 billion dollars annually[8] on bottled water that meets consumer expectations for taste, quality and health. Conversely, the vast majority of agricultural, industrial and non-drinking household water is considered far less valuable and impactful by consumers.

Even where treated water is concerned, departments within Government regularly make fitness-for-purpose distinctions between water that is consumed for drinking and water that is used for non-drinking purposes. For example, in 2019 the Northern Territory Department of Health issued precautionary advice to multiple remote communities recommending that water for drinking, making food and cleaning teeth be obtained from either packaged water or boiled before use[9].

This advice, and bottled water market trends, highlight the dramatically different risk and value considerations between drinking and non-drinking water at the domestic level. The same considerations should also guide assessment of project affordability, noting the following:

- Calculating the *actual* costs of drinking water to impacted households, including externalities such as bottled water, rainwater tanks, filters, waste, resilience of supply and commuting time/distance from a reliable drinking water source; and
- Calculating relative value attributed to uses of water as it relates to different types of household uses, i.e. What is the relative value to households of 10 litres of bottled water, compared to 100 litres of treated water or 1,000 litres of untreated water? This calculation should include recognition of related factors like health impacts, cost of living, carbon footprint and morale.

There are opportunities here for suppliers to assess water needs on a segregated basis and balance project costs with the economic and environmental implications of drinking water alternatives. Suppliers should look for opportunities to apply a fitness-for-purpose approach to select appropriate water sources, delivery methods, reuse/recycling methods and efficiency measures that optimise the project from a cost, value and outcomes standpoint.

***Recommendation 2*: Water service providers should be encouraged to assess water needs on a segregated basis, incorporating a fitness-for-purpose approach that optimises use-specific solutions. Drinking water consumed directly by Australians is the most valuable, impactful and essential for health and should be regarded as a separate class of water within the broader category of treated water.**

7 Australian Government Website: www.yourhome.com.au

8 Statista Non Alcoholic Drinks Report – Bottled Water (2020)

9 Northern Territory Department of Health Website Alter (March 22, 2019)

3. *Identification and Adoption of Innovative, Non-Traditional Technologies and Alternative Water Sources*

Remote communities in Australia are overly reliant on a single water source, groundwater, entrenching a sub-optimal level of supply and water quality. For example, all 72 remote communities in the Northern Territory that are supplied with drinking water rely on groundwater as the water source[10], even though there are known contaminants such as arsenic (Katherine region), barium (Bulla), chromium (Wallace Rockhole), fluoride (Alpurrurulam and Nyirripi), nitrates (Pmara Jutunta, Yuelamu) and uranium (Willowra, Wilora and Laramba)[11]. In addition to contamination, the appearance, taste and odour of drinking water in these areas fall short of community expectations because of the presence of aluminum (Warruwi, Acacia Larrakia), chloride (Ngukurr, Wilora, Imanpa) and widespread hardness concerns driven by elevated levels of iodine, iron, manganese, silica, TDS and turbidity[12].

Vast numbers of rural farming households in Australia are limited to rainwater tanks as the primary source of water, with long distances from existing infrastructure effectively isolating many households from drought-proof supplies of drinking water. The record-breaking drought in recent years has shown the vulnerability of rural households in this area, with residents of towns like Murrurundi, NSW, and Stanthorpe, QLD, faced with driving long distances and/or paying premiums to access drinking water.

The dependence on rainwater and low-quality groundwater as the sole sources of drinking water in rural and remote Australia is suboptimal from a cost, quality, public health and community expectations perspective.

In other industries, evolving policy frameworks and a focus on outcomes have improved livelihoods and eased existing infrastructure pressures. The electricity industry has embraced innovation and used decentralised, renewable technologies to support the development of alternate service models such as micro-grids and residential rebates for solar PV. These models have not only increased access for consumers but have also lowered the cost of supply, enhanced standards of living, and increased the resilience of the electricity grid. Decades of policy support for decentralised and innovative solutions in the Northern Territory, including more than 30 solar PV hybrid projects in remote communities, have resulted in Power and Water Corporation having 94,000 electricity customers and only 51,000 water customers. Furthermore, innovative technologies like large-scale battery energy storage systems are being used as a mechanism to solve electricity grid congestion issues (curtailment) on transmission and distribution networks, thereby reducing the need to upgrade the infrastructure already in place. There is huge potential for water policy to replicate these concepts and improve livelihoods with alternate supply models.

[10] Power and Water Drinking Water Quality Report (2017), p12

[11] Power and Water Drinking Water Quality Report (2017), p52

[12] Power and Water Drinking Water Quality Report (2017), p52-58

It's worth noting the critical role played by the establishment of the federal Australian Renewable Energy Agency (ARENA) to allow the identification, demonstration and application of renewable energy technologies in this way – a dedicated and well-funded entity to improve policy outcomes and drive innovation in the energy sector.

Incremental solutions in telecommunications have also been transformative in regional Australia – limited telephone reception might not be enough to stream movies like urban colleagues with broadband networks, but the cumulative improvements are transformative from an amenity and liveability standpoint.

***Recommendation 3*: The NWI should consider pathways for non-traditional technologies, including alternate sources of water (i.e. atmospheric harvesting) and alternate delivery models (i.e. direct to tap, behind the meter), to better achieve policy outcomes for rural and remote communities. Consider also the development of a cross-agency climate change strategy in Australia by involving an initiative that is at the nexus of Renewable Energy, Water, Housing, Indigenous, Regional Development and Health agencies and focused on empowering communities and households to access high-quality drinking water in a resilient and sustainable way.**

4. Consumer Expectations for Household Drinking Water Quality and Availability

The recommendations outlined in this submission are consistent with the Australian community's drinking water preferences and expectations, which are underpinned by the commitment to United Nations Sustainable Development Goal 6 ("SDG6") and the recognition of access to clean drinking water as a basic human right[13]. Specifically, the modern community is largely supportive of several related viewpoints:

- Australians that live on farms, in regional towns, villages and remote communities are no less entitled to access clean drinking water than those who live in major cities;
- Indigenous Australians are no less entitled to access clean drinking water than non-indigenous Australians;
- Clean drinking water does not consist of discoloured water containing nitrates and/or other contaminants that are not found in urban water supply; and
- A reliance on bottled water, trucked water or untreated water supply from bores and rainwater tanks does not meet the objectives of SDG6.

[13] https://www.un.org/sustainabledevelopment/water-and-sanitation/

The example of Toowoomba demonstrates how these expectations can impact policy shifts. Perhaps the most viable, practical and readily available bulk water innovation is the recycling (or re-use) of wastewater, which is a proven component of water systems around the world. And yet the town of Toowoomba, QLD rejected the proposal for recycled wastewater in a 2006 referendum on the basis of concerns over public health, image and economic impact to the community[14]. In the case of Toowoomba, the less than 1% of water consumed for direct consumption purposes was not only the most valuable and impactful to the community, it was the very reason that prevented the shift to a more resilient, affordable and sustainable water service framework for other uses. In the future, a fitness-for-purpose approach would enable an independent, premium drinking water solution to complement the proposed bulk water system and deliver a "fit for purpose" outcome that is in line with consumer expectations, not in spite of them.

***Recommendation 4*: Consumer expectations should inform the innovation, demonstration and application of complementary solutions that can advance the concept of "smart water" through a segregated and fitness-for-purpose approach to supply for remote and water-stressed communities.**

5. *Climate Change and Planning for Extreme Events*

The challenges presented by climate change are illustrated by numerous recent examples such as drought, bushfires and the vulnerability of remote communities in the context of COVID-19. The lack of drinking water resilience in each of these examples is also demonstrated: convoys of bottled water donations being driven to Walgett during the 2019 drought, distributions of bottled water to Cobargo residents following contaminated supply from fire-fighting efforts in January 2020, or empty supermarket shelves of bottled water as consumers stocked up on essential items ahead of the COVID-19 lockdown in March of 2020. These highlight several key issues:

- The supply and distribution of drinking water is heavily dependent on climate (i.e. rainfall), particularly to rural households who rely solely on rainwater collection. Technology that can supply these households with high-quality water independent of rainfall will have a significant improvement on household resilience, health and cost of living;
- Climate related weather patterns and disaster events like fires, floods and cyclones disproportionately impact our rural and remote communities, who are left seeking alternate drinking water sources in times of crisis. Independent, distributed drinking

[14] Hurlimann, A. & Dolnicar, S. (2010). When Public Opposition Defeats Alternative Water Projects - the Case of Toowoomba Australia. Water Research, 44 (1), 287-297.

water systems located at the household level provide additional resilience to households; and

- Vulnerable populations are repeatedly dependent on bottled water in times of crisis, often for prolonged periods, which comes at a significant cost from an economic, environmental and emissions standpoint while providing no resilience to future threats.

***Recommendation 5*: Alternative water sources should be incorporated into climate change planning. There is currently a need for innovative, climate-proof solutions that can access reliable quantities of drinking water close to the point of demand (i.e. without reliance on rainfall or infrastructure to deliver water)**

Opportunities for Hydropanel Technology in Australia: Borroloola Community Case Study

Hydropanel technology can provide an independent source of resilient, sustainable, high-quality drinking water that operates independent of infrastructure. It can address "high value, high impact" drinking water needs while existing bulk water supplies can be used for more appropriate purposes like toilets, showers and irrigation. Hydropanel technology is well adapted to meet and exceed consumer expectations as it relates to trust (visibility into water source), transparency (real time monitoring of quality, storage, consumption), taste (made clean, mineralised) and sustainability (100% off-grid, renewable).

Consider the water-stressed town of Borroloola in the Northern Territory. Borroloola has 871 residents which include nearby populations in Garawa Camp One, Garawa Camp Two, Yanyula Camp and Mara Camp[15]. In recent years, the existing water supply system in Borroloola, assumed to have a depreciated value of $5 million, was enhanced with a new $6.4 million water treatment plant[16] in 2018 and a new $4.7 million pipeline connecting it to Garawa[17] in 2020. Over a 15-year period, the project requires an estimated $25 million of capital and operating costs while still facing challenges regarding quality of water, ageing distribution systems and community trust rebuilding after a long period of challenges.

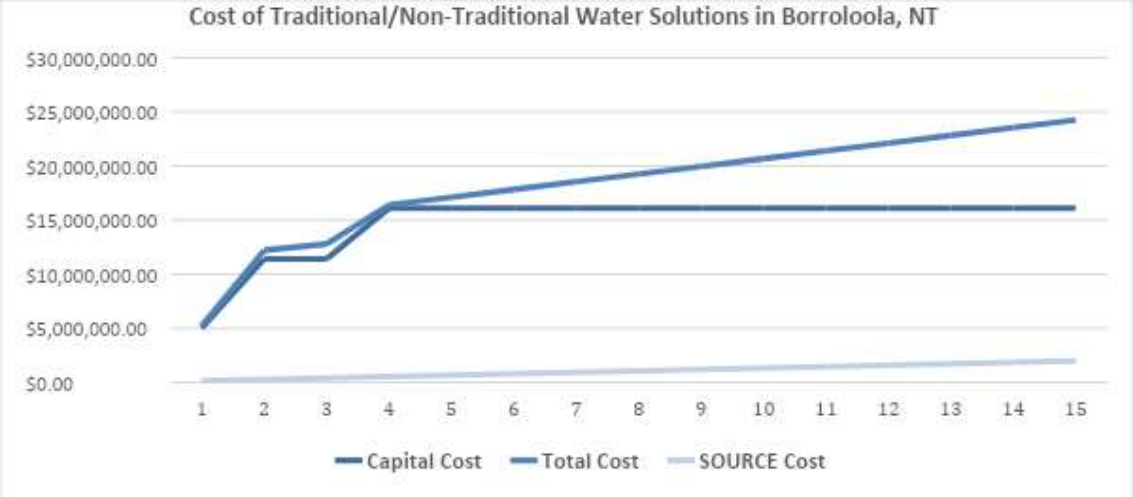
A community-wide SOURCE Hydropanel solution can complement a traditional system with an independent, household supply of high-quality drinking water for less than 10% of the 15-year cost. While not solving bulk water needs, the use of Hydropanels presents several opportunities:

15 https://ropergulf.nt.gov.au/our-communities/borroloola/

16 https://www.powerwater.com.au/about/projects/past-projects/improving-borroloola-water

17 https://www.powerwater.com.au/about/projects/current-projects/borroloola-to-garawa-water-main

- Immediate impact: project installation/commissioning within 2-3 months of order provides near-term relief for the residents of Borroloola and the four surrounding communities, 4 years faster than a traditional alternative and more complete coverage with a tap connection to all households in the surrounding camps;
- Scalable, Low Total Cost: independent supply at the household level comes at a dramatically lower total cost and can be scaled across much larger regions. i.e. the $25 million of capital and operating costs could be re-allocated to providing clean drinking water supply to more than 10,000 remote customers in the Northern Territory in 20-50 locations, extending the PWC service area by 20%;
- Resourceful: intervention to improve drinking water availability and quality with Hydropanel technology may sufficiently address consumer expectations to extend the lifetime of existing bulk water infrastructure that may be fit for the purposes of toilets, washing and agriculture; and
- The 'fit for purpose' model will reduce the quality requirements of non-drinking water, therefore decreasing the amount of investment required to build and operate those systems. This will enable expanded service for water providers and improved outcomes for households, while relieving financial burdens of an already accepted dual supply (e.g. bottled water and piped water) and better aligning with the KPIs of water suppliers.



Note: Indicative cost analysis assumes a household supply of 2-5 litres/day for each of the 900 Borroloola residents based on a service-agreement with no upfront capital investment or performance risk taken by service provider or household. Capital cost of traditional solution is $16.1m plus 5% annual operating cost assumption.