Submission No. 26

30 June 2010

Mr Rob Hansen
Research Director
Environment and Resources Committee
Parliament House
Corner Alice and George Streets
BRISBANE QLD 4000

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30 JUN 2010
Environment and Resources Committee

Dear Mr Hansen

I am writing in response to your request of 21 May 2010 for submissions to the **Inquiry into Growing Queensland's Renewable Energy Electricity Sector**. Thank you for the invitation. Please find attached my submission on behalf of Seqwater.

Seqwater was formed in July 2008 as part of the State Government's South East Queensland regional water grid, providing catchment-sourced water for urban, industrial and rural use. We have implemented a strategic plan that seeks to increase the sustainable value of the catchment assets required to source, store and supply water. Sustainable catchment assets will improve the reliability and efficiency of water supply as well as providing a range of other economic, environmental and social benefits for communities and businesses.

One of the additional benefits already being derived from our assets is renewable energy in the form of hydro electricity.

Internationally, there is growing realisation of the close relationship between water, energy and climate change. We know that our assets have further potential for productive alignment of energy and water in the form of opportunities for expanded hydro electricity generation, including for pump storage of renewable energy as well as for solar and wind energy generation. We are currently working in collaboration with the other water entities in the Water Grid to obtain the information we need to quantify the potential of the assets, including as sources of renewable energy.

In making this submission I want to emphasise the need to maintain an integrated approach to managing energy and water within water supply catchments. The water-energy-climate change (WECC) nexus is recognised as being very complex. We are confident that our business can play an important and broad role in creating vibrant, sustainable and optimistic urban and rural communities and businesses in South East Queensland, as long as the primary purpose of our catchments – water for life – is sustained.

Should you require additional information, please contact Bruce Mortimer, Seqwater's Manager - Strategy and Sustainability, on Tel. 3035 5514.

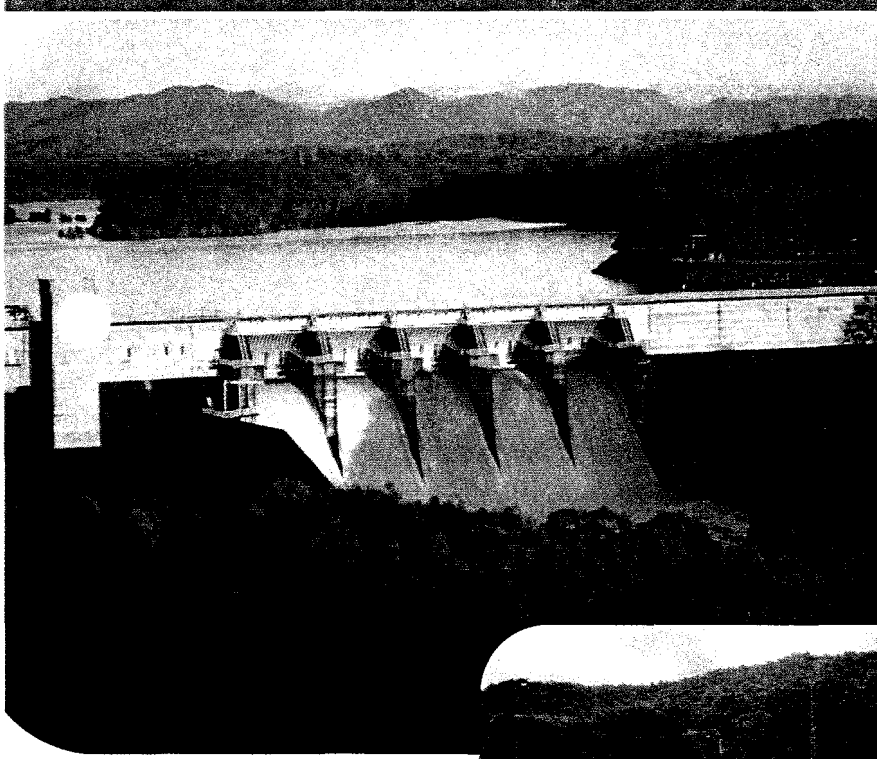
Yours faithfully

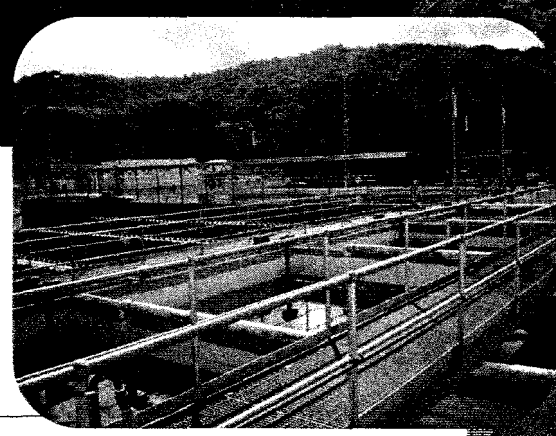
Phil Hennessy
Chairman

Attach.

seqwater
WATER FOR LIFE

Submission to the Inquiry into Growing Queensland's Renewable Energy Electricity Sector





SEQWATER'S SUBMISSION TO THE INQUIRY INTO GROWING QUEENSLAND'S RENEWABLE ENERGY ELECTRICITY SECTOR

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Executive summary

Seqwater's catchment-based assets already produce renewable energy in the form of hydro-electric generation – some 1,420,875 kWhrs of energy in 2008-9. There is potential to expand this capacity through integrating mini hydro schemes into new projects (eg Hinze Dam Stage 3) as well as existing infrastructure. There also is opportunity to consider the use of current and future catchment-based water supply infrastructure as pump-storage for renewable energy sources such as solar and wind energy.

Seqwater is implementing a strategic plan to grow the productive value of the region's water supply catchments. The strategic plan is based on the broad principles of sustainability, including the increasingly-important concept of the water, energy and climate change (WECC) nexus.

Seqwater is still developing the detailed knowledge about the complexity of its whole-of-catchment assets, primarily to secure the long-term future of the region's water supply, but also to propose compatible productive development, including in renewable energies. It will take some time to quantify the potential of Seqwater's assets as sources of sustainable renewable energy.

In the meantime, there is an opportunity for the State Government to explore the implications of the WECC nexus for its assets and other renewable energy options for the South East Queensland region and for the State.

Introduction

Seqwater supplies bulk water to South East Queensland (SEQ) working collaboratively with other water entities as part of the SEQ Water grid. The geographic size of the region makes Seqwater one of the largest water authorities in the country. Seqwater sources water from 1.2 million hectares of land, stores water in twenty-five dams and weirs and supplies water to the regional grid through fifty-one raw water treatment plants.

Seqwater is already a minor renewable energy player, producing almost 1.5 kWhrs of hydro-electricity in 2008-09. The strategic plan for the business seeks to maximise the sustainable productivity of our assets, including as expanded sources of renewable energy. This submission:

- outlines Seqwater's stake in the renewable energy
- examines what is happening elsewhere, nationally and internationally, regarding the relationship between renewable energy and water asset management
- addresses the specific questions of the Inquiry.

Seqwater's stake in the issue

1. Seqwater's strategic plan

Seqwater is statutory authority operating as part of the State Government's regional water grid, providing catchment-sourced water for South East Queensland (SEQ). Seqwater has a vision of:

Water for Life – vibrant, sustainable and optimistic urban and rural communities and businesses.

Catchments are vital regional resources. Seqwater defines catchments as the combined natural and built infrastructure needed to source, store and supply water to meet the quality and reliability needs of our customers.

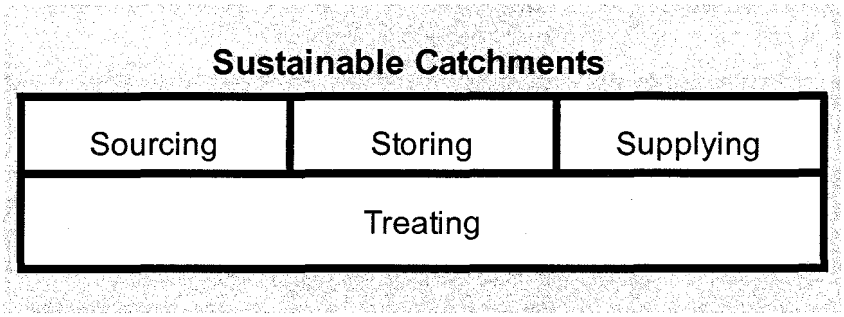

Figure 1: Seqwater's whole-of-catchment model

Catchments are complex systems subject to changes in weather, environmental impact, community values, regulation and economic demands. Seqwater's strategic plan sets a direction for the business to maximise the productivity of these systems for the benefit of communities and businesses. SEQ's catchments are distinctive amongst those of most capital cities in Australia in that the majority of land is subject to development, compared to Sydney and Melbourne where almost all drinking water catchments are protected.

Seqwater's situation creates both risks and opportunities. The risks include opening the way for developments that undermine water quality and security, threatening the reliability, cost and energy requirements for supply and treatment. The opportunity is to sustainably develop catchments to maximise their capacity for water security and quality while also deriving other economic, environmental and social benefits for communities and businesses.

The strategic planning for our business adopts contemporary principles of sustainability, including Life Cycle Analysis (LCA), to create an holistic understanding of our catchment systems – their inputs, processes and outputs – so that options for long-term productivity that enhance water security and quality while maximising their regional value can be assessed. The current priority is to improve the performance of water supply infrastructure to strengthen the resilience of the regional water grid. Progressively over the next five years increased attention will be focused on the productivity of storage and source assets.

There is growing international awareness about the strong relationship amongst water, energy and climate change. Options for integrating renewable energy and greenhouse gas sequestration with sound water management practices already are under consideration.

Seqwater has implemented a comprehensive suite of performance indicators with increasingly rigorous targets to demonstrate progress towards creating sustainable and productive catchments in South East Queensland.

2. Seqwater as an energy user

The water industry is one of the largest consumers of energy, and is expected to account for 4.25 per cent of energy utilised in SEQ by 2012 (QWC 2008). During 2008-09 Seqwater consumed almost 80 million kWh and produced over 73,000 tons of CO^2 emissions. As the largest water supplier in the state and supplying one of the fastest growing regions in the country, the South East Queensland water grid is one of the State's biggest electricity consumers. For the period from 1st July 2009 to 31st March 2010 Seqwater treated 187,400 ML of water, with chemical and energy cost amounting to over $14 million, of which 37 per cent was attributed to electricity.

The energy needs of water supply options are predicted to grow significantly over the next 50 years, even if some water savings and efficiencies are achieved (KBR 2008).

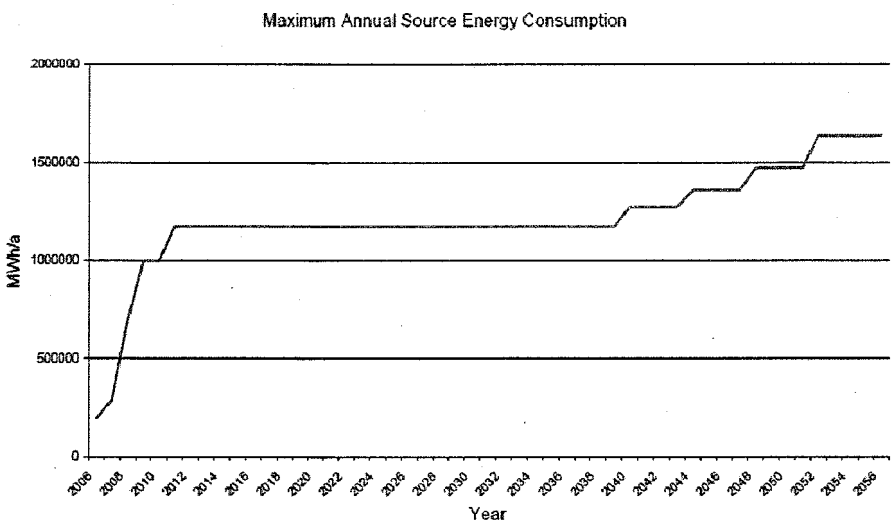

Figure 2: Forecast energy consumption for water supply in South East Queensland (KBR 2008)

Therefore, water suppliers across the state and SEQ in particular are significant and growing electricity consumers.

3. Savings from energy efficiency and water conservation

One method to achieve renewable energy targets and ensure the long-term energy security of the region is to maximise efficiency and minimise demand. In the same way that "the cheapest water is the water you save" the most renewable energy is the energy that is not used.

South East Queensland is recognised as being amongst world's best practice at reducing water consumption by achieving over 50 per cent reduction in demand per capita in response to the Government's regional drought strategy. This had an unintended benefit of also reducing energy consumption. SEQ residents are generally knowledgeable and supportive of the benefits of conserving water. This is a resource that may be leveraged to also achieve greater energy efficiency. An example of the sort of community information that may help to grow awareness and change behaviour is a study of Californian water demand found that leaving the tap on for five minutes consumed the equivalent electricity as leaving a 60 watt light bulb on for 14 hours (Cooley, 2007).

The establishment of the SEQ Water Grid in 2008 has created significant opportunities for water supply energy efficiency, particularly through optimising the size, location and type of water treatment plants. However, rationalising water treatment plants to maximise flexibility and efficiency is a long-term strategy requiring consideration of water quality, reliability, capacity, cost and energy efficiency. The Queensland Water Commission (QWC) is responsible for coordinating regional water infrastructure planning.

The regulation underpinning the SEQ water reform sets a very high standard of water quality. When infrastructure is the primary tool for treatment, meeting higher water quality standards generally requires higher energy consumption.

Alternate approaches, including improving natural catchment condition, require long-term investment to achieve long-term efficiency and energy benefits. There is increasing evidence that the overall efficiency of catchment-sourced water supply can be improved by restoring natural catchment condition to improve water quality, reduce infrastructure treatment costs and energy consumption. A recent comparative study of catchment-sourced water utilities in the USA found a significant positive relationship correlation between cost of water treatment and percentage of forest coverage (American Waterworks Association et al 2004).

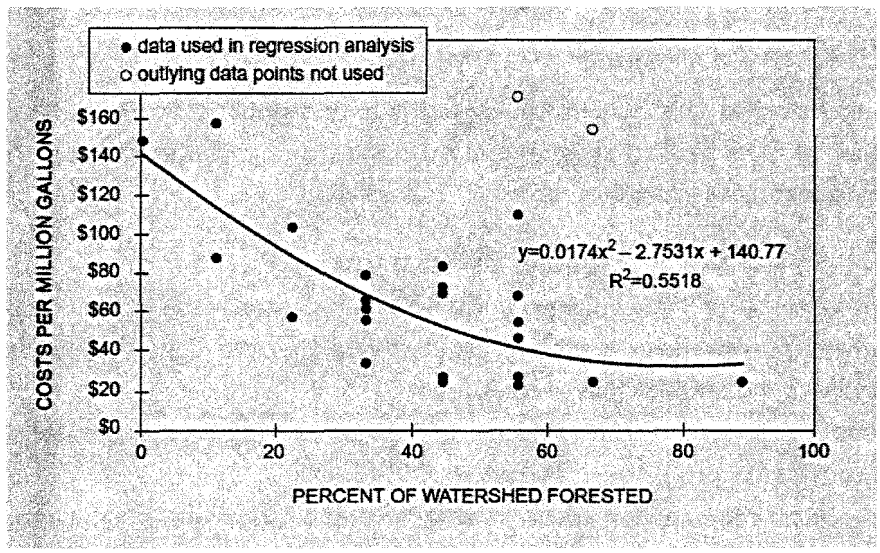

Figure 3: Comparative cost of drinking water supply by level of catchment forestation (AWA 2004)

Seqwater is working with government water planners to weigh up alternatives to achieve water quality standards by both investing in high-performance infrastructure and catchment improvements. The best options are to be assessed depending on a range of criteria including energy efficiency.

4. Catchments as energy sources

Seqwater manages significant resources that may be leveraged to produce renewable energy. Seqwater owns approximately 40,000 hectares of land plus an additional 22,000 hectares under water (full supply levels). This represents approximately two per cent of the land in SEQ. Seqwater has renewable energy opportunities available in hydro-electric, hydro-pump storage (including for the storage of renewable energy), bio-energy, solar and wind. In addition, there is the potential to use land to offset emissions – for example natural forests on Seqwater land.

Hydro-electric power

Hydro-power presents an opportunity to leverage current Seqwater assets to produce electricity within the short-term (less than 3 years). The British Hydropower Association (BHA 2005) describes a number of advantages for small-scale hydro over wind and solar power, including high efficiency of (70 to 90 per cent), high degree of predictability (subject to variations in annual rainfall) and ability to schedule output according to market demand. This makes hydro-electric renewable energy opportunities very attractive. Electricity produced by Seqwater can be contributed to the electricity grid or be used within the business.

Seqwater already has well-established capabilities in hydro-power. In 2008-09 Seqwater hydro-electric facilities produced 1,420,875 kWhrs of energy within the business, with an additional 59,364 kWhrs sold to the grid.

Seqwater has several sites that would be appropriate to establish small-scale hydro schemes including new sites (e.g. Hinze Dam Stage 3) and existing sites (e.g. Somerset Dam). These projects have a number of advantages including:

- hydro-electric projects leverage Seqwater's existing assets
- sites are often close to high voltage transmission lines and established assets, making it comparatively easy and cheap to deliver electricity to the grid (when compared with other renewable options, for example geothermal)
- extending the economic-life and capacity of current infrastructure, subject to yield and operational constraints
- hydro-electric generation applies robust, long-lasting technology with minimal requirement for repair and replacement when compared with solar and wind that require more intensive maintenance and have shorter project lives (Singh 1999)
- aligns with Seqwater's strategic direction and Sustainability Charter
- has a minimum impact on water production.

Bio-energy

Bio-energy offers an opportunity to utilise Seqwater's land assets for bio-fuel electricity generation and thermal energy. Aquatic plants are one potential bio-energy source as weeds are typically indigenous, plentiful and renewable or weeds, the removal of which provides a water quality benefit.

Bio-energy requires minimal infrastructure costs and can utilise diverse and scalable technology to provide initial and ongoing employment and economic benefits.

Seqwater, in conjunction with the University of Queensland, conducted an initial assessment of the economic viability of using a bio-digester to commercially extract methane from aquatic weeds. The preliminary findings were that this option may be economically viable but there were alternative uses of the resource, for example extracting pharmaceuticals, which were likely to provide a better return.

There are drawbacks from many sources of bio-energy that must be fully considered. In particular, water must be diverted from other priorities (i.e. rural and urban water supply) to produce energy. More feasibility studies are required to determine the efficacy of creating bio-fuel options using Seqwater assets.

Solar and wind

Seqwater land or water bodies may be utilised to establish solar facilities for feeding into the energy grid or for internal use. However, current commercial arrangements limit the economical feasibility of solar energy projects in Australia without substantial regulatory or financial support (Wyld Group and McLennan Magasanik Associates 2008).

Site selection is critical to generate energy through wind. Sites must be located in consistent, strong wind speed areas, typically coastal areas. South East Queensland is not ideally situated for wind power generation (Harries et al 2006). A recent study into opportunities on North Stradbroke Island found that wind generated energy was not cost-effective or sufficiently reliable (study done by Redland Council – need to confirm this).

One of the recognised limitations of solar and wind energy is that weather-dependence makes it unsuitable for base-load energy. The potential to store solar or wind energy through hydro pump-storage is recognised as a viable solution.

There is currently a 500 megawatt pumped storage hydro-electric facility, powered by existing energy sources owned and managed by Tarong Energy at Split-Yard Creek within the Wivenhoe catchment. An additional hydro-pump storage development site has been identified in the Somerset/Wivenhoe region with the potential to generate approximately 20 to 50 megawatts. While pump-storage does not necessarily generate a renewable benefit, if its source energy is renewable it is an important component within of an integrated renewable energy system, providing the opportunity to make renewable energy more integrated as base-load as well as enhancing water storage capacity.

Initial investigations have indicated that there may be viable solar and wind sites amongst Seqwater's assets. A full analysis is required to determine capacity and relative efficiency.

Carbon offsets

Carbon offsets are not renewable energy (within the scope of this Inquiry) however they are likely to be a component with an overall sustainable energy strategy. Seqwater land assets have been identified as including potential carbon offset sites with the additional benefit of supporting improved water quality.

International trends for water and energy

Increasingly water and energy sustainability are being recognised as being closely integrated. Globally policy-makers are addressing these concerns along with establishing demanding targets for using renewable energy for water supply.

Water, Energy and Climate Change (WECC) nexus

The WECC nexus describes the interconnectedness amongst water supply, energy supply and climate change. At its most simple it recognises that energy is essential to pump, treat and distribute water for urban, industrial and agricultural use, as well as to collect and treat the resulting wastewater and on the other hand water is a key input for generating electricity, whether it be hydro-electric power, cooling thermal energy plants or to extract oil. Energy consumption from traditional sources, such as coal, is a major contributor to greenhouse gas (GHG) emissions that are recognised as impacting climate, in turn impacting water availability and security.

Simplistically the WECC analysis exposes the ludicrous scenario of building greater water supply capacity (say a desalination plant) to provide water for energy production (say coal-fired) in order to meet the electricity demand for the new water supply. The full-range of interconnections amongst water, energy and climate are far more complex (DHI 2007). In the context of SEQ's growing population and its vulnerability to climate change (IPCC 2007) it becomes more critical that decision-makers consider energy security and water security as a single challenge.

It is estimated that 95 per cent of energy production in Australia is reliant upon water for processing (Cammerman 2009). At least one third of Seqwater's costs per ML of drinking water production are energy-related.

There is wide growing awareness of the WECC nexus and its importance for research and policy-making as evidenced by its national and international profile. The range of organisations advocating WECC nexus considerations including DHI (a water research and consulting organisation), the World Water Council, the International River Symposium, the Fenner Centre for Environment (Australian National University), the International Water Centre (Brisbane), and the Australian Water Association. The WECC nexus was on the agenda of the G8 environment ministers' conference in Gleneagles, March 2007 and the World Economic Forum, in Davos, January 2008 (COST 2009).

The DHI Group presented to the US Congress in 2006 about the WECC nexus, arguing for better integration of energy issues into water policy. They advocated that water conservation and efficiency should be given a higher priority by both water and energy planners and that the greenhouse gas implications of both water and energy policy may be significant, with opportunities for fast, cost-effective reductions through effective policy development.

A study of future US Water Consumption (Elock 2010) provides a good example about the interrelatedness of the WECC nexus. Total US domestic freshwater consumption is expected to increase by nearly 7 per cent between 2005 and 2030 while water consumed for energy production is expected to increase by nearly 70 per cent, and water consumed for bio-fuels (biodiesel and ethanol) production is expected to increase by almost 250 per cent over the same period. By 2030, water consumed in the production of bio-fuels is projected to account for nearly half of the total amount of water consumed in the production of all energy fuels.

Failing to considering the implications of increasing bio-fuel production will lead in the future to greater pressure on water resources. These findings identify an important potential future conflict between renewable energy production and water availability.

In South East Queensland, the energy intensity of water supply infrastructure varies, depending on type of treatment, location and size of facility. The following is a diagram that outlines the estimated energy intensity of different technologies across the region, demonstrating the significant and varying impact that water supply options may have on electricity supply (QWC 2008).

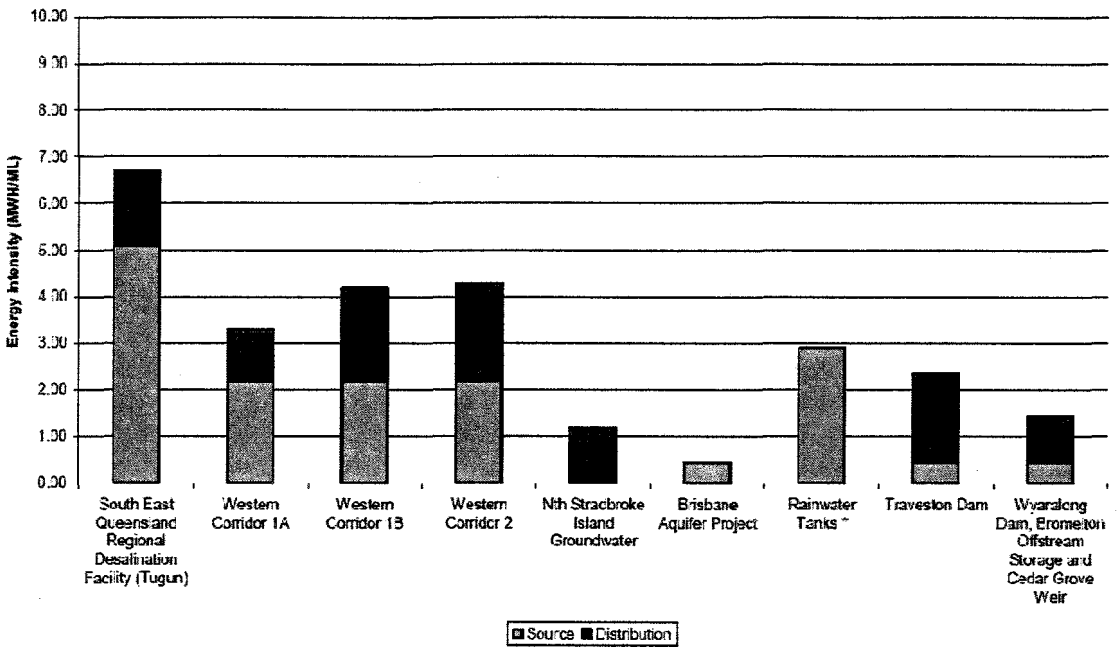

Figure 4: Energy requirements by type of water supply technology/system (QWC 2008)

National trends in renewable energy targets for water entities

Melbourne Water

Melbourne Water is the major bulk water supplier of water for the city of Melbourne and the surrounding region. It is responsible for bulk supply and waste water management.

Melbourne Water aims to meet all its energy needs from renewable sources by 2018. Currently, Melbourne Water is ahead of schedule, with more than 50 per cent of energy needs already met using renewable resources. Renewable energy is sourced from hydro electricity, bio-gas collection and waste heat from biogas electricity generation plant. For example, the Sugarloaf hydro electricity plant supplies the Sugarloaf treatment plant, enabling the treatment plant to be entirely powered by renewable energy.

Sydney Water

Sydney Water is the supplier of bulk water to Sydney. It has committed to being carbon neutral for energy and electricity use by 2020. Sydney Water will need to eliminate or offset over 400,000 tonnes of carbon dioxide each year to meet this target, the equivalent of taking 100,000 cars off the road.

Renewable energy methods used to offset carbon at Sydney water include:

- wind energy to fully offset power for the desalination plant (the wind farm has increased the supply of wind energy in NSW by over 700 per cent).
- turning gas into electricity – cogeneration incorporating generating methane gas (biogas) help power sewage treatment plants
- producing hydro-electricity to generate electricity for the North Head Sewage Treatment Plant, with excess energy from treated wastewater being captured by a hydro-electric generator
- other hydro-electric generators being planned or installed at Woronora Water Filtration Plant and on the Warragamba to Prospect Reservoir Pipeline.

Addressing the Inquiry's questions

1. **Should the Queensland Government aim to expand the use of renewable energy sources to generate electricity?**

- Seqwater can play a role in supporting the Queensland Government to expand renewable energy capacity in South East Queensland.

2. **What are the barriers to increased use of renewable energy for generating electricity and associated investment in Queensland?**

- The SEQ Water Grid is still in the early stages of reform with an initial focus on water supply security. Opportunities to more actively investigate investments that deliver both renewable energy and water security benefits are subject to the Water Grid achieving a level of stability and maturity.
- It is critical that water and energy be considered as integrated challenges – not as demarcated issues.

3. **What have the Queensland Government's own investments in renewable energy projects for the generation of electricity achieved to date, and at what cost?**

- Seqwater has expertise in hydro-electric generation and opportunities to expand renewable energy production in this area.

4. **What are the priority issues the Queensland Government should address to encourage investment in renewable energy for the generation of electricity?**

- The Queensland Government should consider a WECC policy that clearly defines the integrated challenges of water-energy security and climate change.

5. **Should the Queensland Government set a state target, or targets, for the proportion of electricity generated from renewable energy sources?**

- Seqwater currently is still acquiring the level of knowledge about catchment-based assets and the systems in which they operate to determine their capacity for renewable energy. Hence, it will take some time to be in a position to provide the Government with information that may inform the size and timeframe for renewable energy targets.
- Seqwater's strategic plan sets a direction for the business through which it will rapidly acquire the knowledge required to inform such decisions.

6. **If so, what should the target/s be, and what form should it/they take?**
7. **What actions should the Queensland Government take to encourage investment in the generation and co-generation of electricity from renewable energy sources?**

- The Queensland Government has the opportunity to leverage its success in achieving gains in water conservation to achieving similar gains in energy conservation, representing the 'cheapest form of renewable energy'.
- There also is an opportunity to create forums for innovation in the interfaces between energy, water and climate change responses.

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