Water & Carbon Group

Submission to the Productivity Commission Inquiry into Australia's Urban Water Sector

November 2010

Executive Summary

Water & Carbon Group (WCG) welcomes the opportunity to respond to the Productivity Commission's Inquiry into Australia's Urban Water Sector.

At WCG we specialise in urban reforestation, biofiltration wetlands and other low-emissions technology for sewage and stormwater treatment. We intimately understand the need to process wastewater in an efficient, cost-effective and environmentally conscious manner.

With our head office in Brisbane, WCG is an Australian company with a vision to provide the water market with world-class carbon sequestration and water treatment systems that deliver significant and sustainable economic, biodiversity and community benefits.

Our 12 employees design, build and operate low cost, emissions, high performance water treatment systems that produce safe, reliable, high quality water with applications for sewage, stormwater, industrial wastewater, and mining wastewater.

For a number of years we have been working in partnership with government and private industry to deliver customised wastewater solutions and we understand the priorities and constraints within which government objectives are framed and decisions are made.

WCG appreciate the opportunity to address some of the important issues for wastewater regulation, which is one of the priority elements of the overall urban water sector in Australia.

In recent years, the water debate in Australia has been centred on drought and supply of environmental flows and water for communities and industry. Understandable as a short-term focus, it has tended to ignore the market for wastewater services, even though fully 50% of consumers' costs are in the wastewater retail, transport, treatment and disposal. In fact, the Commission's Issues Paper makes this point in its supply chain diagram at page 10.

As a further illustration, the NSW's Government's 2009 *"Independent Report into Secure and Sustainable Urban Water Supply and Sewerage Services for Non-Metropolitan NSW"* (the 'Armstrong-Gellatly' Report)[1] estimated that the capital value of water supply and treatment infrastructure in regional NSW alone is $17billion – we estimate about half of this relates to sewage treatment infrastructure is about half of this figure. Extrapolating nationally, this regional sewage infrastructure would likely be well over $20billion in capital cost.

For WCG the core issues for the wastewater industry fit into the framework set out in the *Issues Paper,* more specifically:

- the supply of water and wastewater services;
- consumption and pricing;

[1] Armstrong, Ian, & Gellatly, Colin. & New South Wales. Dept. of Water and Energy. 2009, *Report of the Independent Inquiry into Secure and Sustainable Urban Water Supply and Sewerage Services for Non-Metropolitan NSW / Ian Armstrong, Colin Gellatly* NSW Dept. of Water and Energy, [Sydney] : http://www.dwe.nsw.gov.au/water_urban/utilities_local.shtml

- improved scope for Competition and contestability; and
- identifying the tools and options for achieving reform.

Without losing sight of the overall needs of the water industry WCG wish to emphasise the economic, social and environmental benefits of adopting more natural ecosystem-based technologies.

We have appended our presentation entitled *High performance, low energy, wastewater management with biodiversity benefits* to support our submission and elaborate on our responses to specific sections of the *Issues Paper* (see Attachment A).

About Water & Carbon Group

The Water and Carbon Group aims to provide an integrated ecological, low cost approach to high performance wastewater treatment and reuse solutions. Our mixed-species forest systems provide compliant high-quality biodiverse carbon offsets.

WCG is achieving world's best treatment performance for key parameters through site specific solutions that harness and optimise natural processes.

WCG's tailored solutions include new generation wetlands, which:

- integrate into existing facilities or built as new;
- provide substantial cost savings to build and operate;
- require minimal energy and chemical inputs;
- can be readily up-scaled as the community grows;
- boast high reliability and safety especially with variable flows; and
- create new high quality wetland habitats.

WCG outcomes from sewage treatment:

- globally unprecedented treatment performance using natural systems;
- potential savings of over 70% on upfront capital expenditure;
- performance exceeding EPA requirements over the long-term; and
- reduction in greenhouse gas intensive energy and chemical use.

WCG's systems can reduce the cost, increase the treatment performance and reliability, and reduce the use of greenhouse gas intensive resources such as electricity, concrete, steel and chemicals.

Response to the Issues Paper

5 - Supply of water and wastewater services

Wastewater services

Is there scope to increase the efficiency of wastewater services? If so, how significant are these opportunities? What is preventing them from being realised?

WCG strongly believes that there is considerable scope for efficiency improvements in the wastewater management sector. Essentially this would occur via achieving the same output (compliance) with substantially lower input (and, hence, cost).

Significant improvements can be achieved both in treatment methodologies and in the larger issue of re-entry of treated wastewater to the natural water cycle.

In the last 10 years sewage treatment has undergone substantial change with increasing adoption of high-energy-use technologies such as Biological Nutrient Removal (BNR) and Membrane Bioreactors (MBR). These technologies aim to reduce the nutrient loads in effluent but improvements in treatment performance have been reflected in substantially rising costs of treatment to state government, local councils and their ratepayer funding base.

A large number of Sewage Treatment Plants (STPs) still require upgrades for both capacity and environmental reasons, but as large expenditures are required for fully engineered plants, upgrades have not been undertaken. WCG offers an alternative, but is encountering barriers to wetland-type technology take-up, despite the evident cost benefits.

Performance and cost-reduction results from a number of Council-operated systems on the Northern Rivers of NSW demonstrate that more effective and much less expensive technologies and methods can be transferred to the many wastewater management systems around Australia that are in need of improvement.

Without access to relevant Australia-wide data it is difficult to quantify how many treatment systems to which this model may apply but for example of the approximately 23 STPs in the RAMROC Council region some 20 feature older technology such as trickling filters with only limited reuse and without constructed wetlands. These older systems are relatively inexpensive but often ageing and their discharges commonly cause environmental degradation.

Where the can be introduced, the benefits include:

- cost reductions of 50-70%
- substantial water quality improvements
- avoidance of significant indirect carbon emissions
- diverse water re-use applications
- creation of regional green jobs, and less demand for skills subject to existing shortage, especially in regional Australia

Are there particular challenges and opportunities in providing wastewater services in regional urban areas?

Regional urban areas are expanding in many parts of Australia. If we consider the Gellatly - Armstrong Report in NSW, the framework of that report provides a blueprint for more efficient institutional arrangements. For example the report proposes amalgamations based on rational analysis of benefits, geographical logic, and willingness of participants. We can work very well within this framework to address issues such as skills shortages and scalability.

It has often been the case that very high cost, engineered results for small communities do not take into account land buffer zone assets which are not fully utilised or understood by the engineering culture and approach.

Are wastewater systems performing well from an environmental perspective?

Recent life cycle analysis research on the Gold Coast has shown that wastewater management has the biggest contribution to environmental impact of all sectors of the water cycle. Environmental impacts associated with wastewater systems include eutrophication of aquatic environments, greenhouse gas emissions, alteration to natural hydrological cycles and in some cases contamination of land due to land application of water and solids.

Recently in Darwin there has been significant impact on the coast adjacent to discharge areas with beaches being closed due to dangerous levels of bacteria that are not only indicative of impacts to the environment but also represent a significant threat to human health.

- Significant environmental impacts are associated with both treatment and disposal or discharge to the environment. Recent upgrades to wastewater treatment facilities have resulted in some improvement in discharge water quality. However, these improvements are largely offset by increased power and energy requirements and increased pollutant loads entering the environment due to increasing capacities of the treatment plants.

- Few STP's are achieving the highest possible treatment performance so substantial environmental impacts are often associated with the discharge of treated water. Constructed wetland and similar systems allow for the best possible treatment performance and are low cost, have minimal energy requirements and integrate ecosystems into the treatment system. The adoption and use of wetland technology will minimise the environmental impacts associated with both treatment and discharge.

See slides 4, 5 and 6 in the attached presentation to see a time-series comparison of compliance results for WCG wetlands against a more highly-engineered BNR-type plant. The comparison at slides 5 and 6 show better and more consistent compliance outcomes for the ecological system versus the more expensive, engineered version.

6 - Consumption and pricing

What impact might growth in population, and trends in technology, consumer behaviour and climate have on the demand for water and wastewater services in the future?

As regions grow, demand will change to correlate with population and ecotechnology such as waste stabilisation ponds and constructed wetlands, which are fully scalable, will help manage risk of population shifts

When climate costs are internalised, ecological solutions will become more preferred, but Government support is needed via demonstration of sustainable performance across a range of locations and climates.

To what extent are efficiency gains in the supply of water and wastewater services dependent on pricing reform (that is, on obtaining better price signals to guide supply augmentation investment)?

WCG believes that there needs to be a full user-pays regime established to drive decision-makers to make value-for-money resource allocations.

To date this is not happening in NSW due to the State Government being the supplier of last resort and part taxpayer subsidy for infrastructure upgrades. This means that full accountability via cost management is lost, and the case for cheaper technology that delivers compliant outcomes at much cheaper cost is not being captured in procurement decision-making.

As slide 7 in the attachment illustrates, the marginal cost of later stages of treatment via heavy-engineered plants increases at an increasing rate. It is in these later stages that wetlands can provide final treatment and a substantially lower marginal cost. Overall this makes a strong difference in the relative economics of both alternatives.

Slide 12 shows the comparative NPVs of four options that are separately outlined in slides 8-11.

7 – Scope for Competition and contestability

What lessons can be learned about the costs, benefits and scope for introducing competition-based reforms from developments in the Australian urban water sector to date?

At present most regional wastewater infrastructure is managed by local government or related entities.

There is a concern that real contestability between in-house and outsourced services is not a priority, despite merits of considering this in many circumstances

This is available to utilities as they are not accountable to users for the full costs of their decisions

To what extent is there scope for competition and/or contestability in the different elements of the urban water supply chain?

WCG is of the view that there is plenty of scope for more competition as most services are provided in-house by the public sector.

The Lismore/Byron outsourced model is a good example.

What are the main impediments to competitive pressure developing (that is, why might it be difficult for new firms to enter the urban water market and provide goods and services)?

• What is the nature of these impediments (that is, are they technical, regulatory, policy-related, or of some other nature)?

Based on our extensive experience in attempting to introduce these improvements to other areas we conclude that the reasons why the efficiency improvement opportunities are not presently being realised include barriers such as:

- Lack of integrated view of the water cycle and the place of wastewater within it. The most popular wastewater treatment methodology of the moment is often adopted in spite of high capital and operational costs.
- Sustainable wastewater management is often viewed as simply an exercise in meeting licence levels, and strategies are developed in isolation and without serious regard for the health of downstream waterways or for larger community issues such as greenhouse gas emissions.
- Accountability in utility governance could be improved to support greater efficiency.
- Existing guidelines do not appear to contain adequate performance targets, appropriate incentives or realistic penalties for non-compliance.
- The project procurement process. For example the tender system although in our view effective in maintaining public service integrity does not in many cases produce the best outcomes. Comprehensive assessment of alternatives using best practice life cycle analysis is unusual.
- Solutions are often mandated upfront in design stage rather than allowing solutions to tender to meet set water treatment objectives (quality, reuse etc).
- Decision makers have few incentives to alter the status quo.
- Perceived risk of making non-conventional decision.
- Insufficient benefits for individuals who make such decisions even if they deliver better outcomes and save resources.
- Insufficient transparency exists about performance of market and the process as a whole.
- Market would be improved if a national register of cost-effectiveness of systems were published.

- EPA data on system performance alongside cost information (e.g. Life Cycle Analysis) likely to reveal to the market which systems perform the best for their ratepayers.

Moreover, the environmental impacts of wastewater management are not fully valued. Conventional Activated Sludge technology for example emits large quantities of greenhouse gases, particularly carbon dioxide, during the mechanically-mediated oxidative breakdown of organic matter, in the treatment process.

Power usage and associated carbon emissions in many treatment plants is very high compared with technologies such as biogas reactors, wastewater stabilisation ponds (installed widely for example in the Northern Territory) or constructed wetlands. Our experience indicates that the investment of large funds in mechanical treatment systems usually leaves few resources for effluent reuse or for the downstream effluent management systems now regarded as essential for a sustainable solution.

Past perceptions of performance of more natural treatment methodologies such as biogas reactors, ponds and constructed wetlands were based on problems encountered in the early development stages of all technologies. Revised design and management approaches are now proving to be highly effective in achieving much higher efficiencies in wastewater management.

8 - Tools and options for achieving reform

Case for reform

Can you provide any quantitative or qualitative evidence or analysis of the efficiency gains from reform that might be achieved in the Australian urban water sector?

- WCG anticipate possible $500m - $1bn in estimated savings on water infrastructure in NSW alone over next 10 to 15 years with at least the same or a better quality outcome for groundwater. However, it is difficult to obtain real data on the number and status of STPs.

Building regulation and planning approvals

What type of regulatory arrangements are efficient for the urban water sector?

• At what point in the urban water supply chain should these regulations apply?

• What are the benefits and costs of these arrangements?

• Should the same regulatory arrangements apply in both metropolitan and regional urban areas?

What is the appropriate role for government with respect to regulation of the urban water sector?

- Regulation via proper governance and accountability mechanisms.

- Operation better undertaken in many instances via private sector involvement, which could take a range of forms.

Urban water reforms options

What option(s) (that is, package of institutional, governance, regulatory and structural arrangements) would facilitate the urban water sector best meeting its objectives? What makes this option(s) superior to other possible options?

What costs and risks would be involved with this option? How would the costs be met and the risks managed?

What role would competition and/or contestability play in this option?

If the preferred option varies by jurisdiction or region, what are the key factors (for example, number of connections or number of bulk water supply sources) that are important in matching the option to the location

- Competition and contestability should drive better outcomes with better regulatory settings.

- There is a strong case for Government support to demonstrate the benefits to engineers of ecological outcomes.

- Greater role for environment officers in local government procurement plans than just engineers.

Concluding Remarks

WCG wishes to emphasise the need for more accountability on triple bottom line issues.

Our experience is that the current wastewater management approach is an inefficient use of resources and limited by piecemeal assessment of treatment methodologies and downstream re-entry to the water cycle, and a failure to carry out comprehensive life cycle analysis and consider triple bottom line results.

Our considered position is that existing and proposed management and funding frameworks are adequate and broadly amenable to the improvements we are suggesting.

Government recognition of the wastewater efficiency potential would be an encouraging initial step towards realising the benefits that could be leveraged in this sector. Government support in terms of demonstration project funding or “seed funding” would be a welcome sign of confidence in the industry.