


URBAN AND INDUSTRIAL WATER



Australian Government
Australian Trade Commission





Cover image: Desalination Plant, Adelaide, Australia
Image courtesy of SA Water and Aurecon 

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EXPERIENCE, INNOVATION AND PROVEN SOLUTIONS

> INTRODUCTION

INDUSTRY OVERVIEW

COMPANIES AND CAPABILITIES

FURTHER INFORMATION

Australia's variable climate has placed the nation's water industry in a unique position to capitalise on its significant capabilities and strengths in managing water resources.

As a result, the Australian water industry has leading-edge capabilities and expertise developed through a depth of experience in overcoming extensive periods of climatic variables.

Australia's urban and industrial water sectors continue to provide first-class technical and engineering solutions, while also offering world-leading expertise in strategic asset management, governance and pricing reform. This is underpinned by premier research, scientific and technical expertise.

Urban water is delivered through an integrated total water-cycle management philosophy and the industrial water sector has been able to design and deliver world's best practice solutions across notable hard cases such as food condiments and high-strength wastewaters such as in the meat and livestock industry.

Though Australia is a small, remote market on the international playing field with a very commercially sensitive client base, we have created an in-country framework for innovation and creative delivery of all aspects of the water-cycle program.

The earlier cooperative research programs assisted with nationally integrating academia, water utilities and authorities with the private sector; all to deliver novel, technically advanced solutions here and overseas.

Australia's water industry has a plethora of small to medium enterprises, all highly motivated in the delivery of innovative and cost-effective solutions. Many are established in international markets, have secured distributorships or are currently having validation trials of their technologies offshore including Singapore, China and the United States.

This initiative has continued through Australia's national centres of excellence such as the International Water Centre as well as Desalination and Water Recycling centres. These centres are supported by national research and development (R&D) facilities, such as national research agency the Commonwealth Scientific and Industrial Research Organisation (CSIRO) and the Australian Nuclear Science and Technology Organisation (ANSTO), as well as a number of Government-established cooperative research centres (CRC), including the CRC for Water Sensitive Cities.



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Australia's water sector capabilities are in demand internationally. The nation's water challenges are similar to those experienced by other countries around the world, including variable climate and water security issues, and more than 1000 Australian companies provide a range of technologies and other expertise.

A range of developments from Government and the industry itself have underpinned the evolution of Australia's water industry into a source of world-class capabilities available for export.

Reform

Australia's water industry reform has long been a national priority. All levels of government in Australia – federal, state and local – have been working together to implement a far-reaching program of reform. The initiatives undertaken have revolutionised water use, improved its management, and made the sector more profitable and fostered innovation.

Having responsibility for their own financial performance has led utilities to focus on improving the management of water assets. This has resulted in Australia being renowned globally for its leadership on strategic asset management, improving systems performance, and reducing costs. Many now have novel network systems using real-time demand management and flow or quality monitoring. Further, the increasing involvement of the private sector has meant improved operational and maintenance outsourcing programs.

Desalination

Australia is a world leader in desalination technologies with six coastal desalination plants in Sydney, Melbourne, Adelaide, Perth and on the Gold Coast.


The National Centre of Excellence in Desalination Australia (NCEDA) boasts a world-class desalination pilot-scale testing facility that allows researchers and industry to performance test novel and improved desalination technologies and processes at pilot scale and allows industry to validate commercial products, integrate currently deployed technology and evaluate potential technology options.

Through the resources and capabilities built into the pilot-scale testing and research facility, the NCEDA provides commercial testing and research services to water utilities, the desalination industry, government, engineering consultants and industrial desalination users.

Water recycling

Water recycling has become an important component of industrial and municipal water management in Australia.

In addition to research on the optimisation of recycling technologies and the development of novel technologies, Australian researchers have been focusing on demonstrating the benefits and opportunities of water recycling, building greater community acceptance and adoption of water recycling, and developing validation processes that ensure the quality of the product.



Maintaining a strong focus on urban water is important for realising our desire for a better future, not just coping with threats.

- Tony Wong, CEO of Australia's Cooperative Research Centre for Water Sensitive Cities

Aurecon Group: Desalinated water delivers secure solution

Growing concern over water security is driving demand for expertise in desalinated water.

In Adelaide, one of Australia's driest cities, Aurecon Group was involved at the earliest stages in a plan to introduce desalinated water into the South Australian city's water supply.

Aurecon led the technical studies supporting the environmental impact statement, which involved Aurecon's environmental, geotechnical and engineering specialists and some 50 sub-contractors, as well as input from the South Australian Water Corporation (SA Water).

For the pre-construction phase of the Adelaide Desalination Project, Aurecon worked within a wider integrated project team formed by SA Water.

Aurecon also assisted with the development of tender documents and participated in the bid evaluation process to appoint the construction

consortia and other contractors.

In addition, Aurecon provided performance-based technical specifications for the plant's design and construction contract, as well as its associated 20-year operations and maintenance contract, to best meet SA Water's long-term needs.

SA Water delivered commercial handover of the plant 19 days ahead of schedule, within the original approved budget of A\$1.824 billion.

The design of the reverse osmosis system at the heart of the plant allows a high level of plant flexibility and can achieve capacity turn-down ratios to as low as 10 per cent of total capacity with proportional decrease in energy consumption.

Today, the Adelaide Desalination Plant operates at full capacity, delivering 300 megalitres of drinking water daily and strengthening the water security of the city's 1.3 million residents.

The project has received several industry awards including the 2013 Project of the Year at the Project Management Institute awards in the US.

"The award especially recognises the project management approach and the 'one team' culture," said SA Water Project Director Milind Kumar.

Aurecon's Major Projects Leader Brett Nilsen added: "The relationship-style approach adopted for this project enhanced team collaboration, resulting in joint problem solving, high-quality design and plant performance, reduced variations and timely project delivery."

Aurecon is headquartered in Melbourne. It has nearly 130 offices outside Australia in Africa, Asia and the Middle East.

"The award especially recognises the project management approach and the 'one team' culture."

- Milind Kumar,
SA Water Project Director



Adelaide Desalination Plant

Clean TeQ bacteria help industries meet environmental obligations

No one wants to live in a world where the air is not fit to breathe and the water not fit to drink. The rapid growth in population, urbanisation and industrialisation is causing a crisis which is being seen in the world's deteriorating air and water resources.

Melbourne-based company Clean TeQ Limited is an Australian leader in the provision of next generation environmental solutions, helping industrial and municipal sectors clean up their act with innovative air and water processes based on naturally occurring bacteria, advanced separation and continuous ionic filtration technology.

Clean TeQ has invested in research and development to solve this problem and is now selling the solution globally including across South-East Asia, China and Canada.

Clean TeQ Chief Executive Cory Williams said the company's Continuous Ionic Filtration (CIF™) is the solution for water treatment and reuse applications.

'Our innovation allows us to provide economic solutions to problems that are now being encountered by major industrial and municipal players as they strive to meet their economic and environmental obligations,' Mr Williams said.

'Shareholders are now well versed in the risk associated with uncontrolled air and water emissions from their companies,' he said.

Wastewater from industries such as mining, coal, steel and iron, oil and gas, and processes like flue gas desulphurisation and cooling tower blowdown contain problematic amounts of suspended solids, calcium, magnesium, sulphate, carbonate and heavy metals and metalloids, all of which are notoriously difficult to treat for water recycling.

Clean TeQ's CIF™ filters and treats the water simply and effectively, delivering the highest water recovery at the lowest whole of life cost. Additionally, the by-products from the CIF™ process can be

further processed to extract value in many cases.

The CIF™ technology can be further extended to treat contaminated sludges and soils to extract heavy metals and make the materials suitable to be recycled back into the value chains.

Currently, CIF™ is being applied to treat produced water from coal seam gas production where it is desalinating the water, removing salt to a standard that allows the water to be used for irrigation for crops and stock. In another application, the technology is used to remove sulphate from mining water to a level that allows the treated water to be discharged to surface waters.

'Our innovation allows us to provide economic solutions to problems that are now being encountered by major industrial and municipal players as they strive to meet their economic and environmental obligations.'

- Cory Williams, CEO, Clean TeQ





Image courtesy of Clean TeQ

GHD introduces Water-Sensitive Urban Design to 17 cities in China

Faced with increasing resource constraints and deteriorating ecosystems, China's 18th National Congress announced recently that promoting ecological progress is critical to the country's future.

When the Ministry of Water Resources selected 45 cities across 28 provinces in which to pilot water ecological principles, it engaged GHD to provide concept planning for 17 of these cities.

The concept planning is based on analyses of existing water resources, river systems and ecological conditions. The proposed integrated solutions include structural and non-structural measures, such as improved regulations and management systems.

As part of the planning, GHD is introducing the principle of Water-Sensitive Urban Design, which has been widely adopted by urban areas in Australia but is new to many cities in China.

"Depending on the circumstances of each city, there are opportunities to utilise stormwater to reduce environmental degradation, improve the appearance of urban areas, and provide spaces for recreation," said Xiaoming Shi, GHD's Project Director and Water Business Group Manager in China.

"There are also opportunities to conserve both water and energy," Mr Shi said.

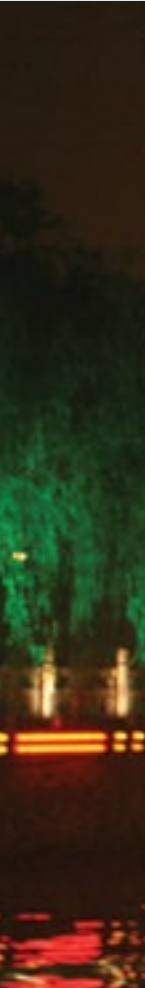
In the historic city of Yangzhou, GHD has designed a new water landscape along the Grand Canal, an important transport artery throughout Chinese history. The solution also includes a high efficiency water resources management system to control flooding and reuse stormwater.

The team also identified the priority areas for Yangzhou city government to take action: water quality, ecological deterioration, potable water safety and water landscapes.

GHD is one of the world's leading engineering, architecture and environmental consulting companies. Wholly owned by its people, GHD is dedicated to solving its clients' challenges in the global markets of water, energy and resources, environment, property and buildings, and transportation. Operating globally and delivering locally, GHD's 5500 professionals collaborate as One GHD to improve infrastructure, economies and communities.

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- Xiaoming Shi, Project Director and Water Business Group Manager in China, GHD





Grand Canal in Yangzhou, China

Optimatics delivers affordable, effective sewer overflow planning to US Midwest

The city of South Bend, Indiana lies on the banks of the St Joseph River, which runs 332 kilometres and drains US Midwest agricultural lands in the Lake Michigan watershed.

When the city's Department of Public Works began talks with the US Environmental Protection Agency in 2003, South Bend had discharged more than two billion gallons (7.6 billion litres) of combined sewer overflow (CSO) into the river.

More than 700 cities in the US have combined sewer systems, which collect rainwater runoff, domestic sewage and industrial wastewater in the same pipe. Combined sewer systems usually transport all wastewater to a sewage treatment plant, where it is treated and discharged to a nearby water body.

However, during periods of heavy rainfall or snowmelt, a system's wastewater volumes can exceed treatment plant capacity. As a result, excess untreated human and industrial waste, toxic

materials and debris overflow, creating major water pollution problems.

By 2010, South Bend had reduced the discharge by more than half to 750 million gallons but the city wanted to do more. It wanted to reduce the frequency and volume of CSOs into the St Joseph River by implementing a Long Term Control Plan (LTCP).

However, the estimated US\$510 million cost of the plan represented a heavy burden for ratepayers.

The City of South Bend engaged Optimatics, an Australian water-planning software and computer-modeling company, to conduct a study of the existing plan with a view to keeping utility costs as low as possible for residents, as well as maximising LTCP efficiency.

In undertaking the project, Optimatics' Optimizer WCS software was used to address a range of objectives, including optimising grey infrastructure and

determining the most cost-effective conveyance and storage strategy, looking at the potential benefit of investing in 'green infrastructure' which helps reduce stormwater flows into the system, and prioritising projects to reduce CSO volumes as much as possible within budget for each planning horizon.

As a result, the Optimizer analysis identified a plan which lowered costs by 27 per cent, signalling savings for South Bend and its residents of US\$112 million compared to the existing plan. In addition to reduced costs, the CSO facility's total overflow volume was reduced by more than 30 per cent and the number of overflow locations fell from eight to five.

"When you are about to invest half a billion dollars over the next 20 years on a CSO Long Term Control Plan, you want to know it is the right plan – the smartest investment," Gary Gilot, South Bend Board of Public Works President.

The optimisation generated better ideas than the department's existing ones by capitalising on synergies between infrastructure improvements, he said, adding cost savings as a result of the synergies would provide financial relief to residents, keeping their water bills as low as possible.

"Coming closer to the Clean Water Act guidance target of 2 per cent [of household income] is a huge benefit to ratepayers," Mr Gilot said.

Optimatics provides cutting-edge software which enables water utilities to meet their regulatory requirements in the most cost-effective way. The Optimizer suite of software programs is used by water utilities and consultants to optimise the planning, operation and management of water and wastewater infrastructure. The results provide decision makers and financial bodies with defensible infrastructure designs and operating plans, and are used in many scenarios from control rooms to

master plans looking 50 years into the future. Optimatics operates globally, with its product development headquarters in Adelaide, Australia.

Building on the work conducted in North America, the company recently took part in the Australian Water Solutions Mission to China, covering Beijing, Nanjing and Guangzhou. The mission, supported by Austrade, the Department of Industry and the Australian Water Association's waterAUSTRALIA, has laid the groundwork for securing future opportunities in China.

‘When you are about to invest half a billion dollars over the next 20 years on a CSO Long Term Control Plan, you want to know it is the right plan – the smartest investment.’

– Gary Gilot, President, South Bend Board of Public Works



Image courtesy of Optimatics

SMEC strengthens stormwater system in US\$112bn Kuwait 2030 Master Plan

SMEC, formerly the Snowy Mountains Engineering Corporation, has its origins in an iconic Australian project launched 65 years ago that stands today as one of the world's great engineering accomplishments.

The Snowy Mountains Scheme, involving hydropower, roads and other infrastructure, was undertaken between 1949 and 1974. Its Australian Government-funded price tag of A\$820 million translates to A\$6.13 billion in today's terms.

In 1997, the American Society of Civil Engineers recognised the project as an International Historical Civil Engineering Landmark, ranking it alongside the Panama Canal and the Eiffel Tower.

Since the 1960s, SMEC has operated in remote, and often harsh, environments around the world, giving rise to its current, expansive international operations.

SMEC recently undertook a project which laid the groundwork for improving the existing stormwater drainage systems in Kuwait. The project is part of the latest Kuwait Master Plan to navigate the city's development up to the year 2030. With a budget of US\$112 billion, the plan aims to integrate development of its housing, commercial, leisure space, utilities and transportation.

SMEC was the lead consultant and undertook a stormwater master planning study to assist the Kuwait Government in eliminating flooding problems and ensuring that appropriate drainage infrastructure was in place to service future development under the wide-reaching master plan.

The Australian company's services in the Middle Eastern project included assessment of existing data, detailed engineering surveys, development of a Geographic Information System

database of the stormwater system, impervious area and topographic survey, and the development of a range of master plan solutions to accommodate five-year Average Recurrence Interval (ARI) stormwater flows.

The project also included development of a remediation strategy for addressing rising groundwater levels throughout the city.

SMEC is headquartered in Melbourne. It has a workforce of more than 5000 people in more than 70 permanent offices throughout Australia, Asia, the Middle East, Africa and North and South America.

SMEC's project is part of the latest Kuwait Master Plan to navigate the city's development up to the year 2030.





Image courtesy of SMEC

STAR Water Solutions' innovation keeps famous Australian beach clean

When popular travel website TripAdvisor named Australia's Manly Beach one of the South Pacific's top 10 beaches, it generated headlines across the country. Meanwhile, a massive project was quietly carried out behind the scenes to keep the famous beach beautiful and its waters clean.

Australia's STAR Water Solutions designed and supplied the filtration system for the Manly Council Stormwater Treatment And Reuse (STAR) Project to remove high-volume toxic contaminants, litter, nutrient-rich and polluted stormwater, and stop the waste from being discharged directly into the coastal environment.

For all its attractions, the beachfront environment presents a unique set of factors that virtually attract pollution.

Intensive development combined with a highly transient population often results in higher numbers of cars, motorcycles and other vehicles, as well as more litter. This creates an increased pollution load and an adverse environmental impact.

The STAR Project uses an integrated catchment management approach, which combines control measures, community education and engagement programs that are designed to serve as innovative best-practice models for future implementation in Manly and elsewhere.

In addition, the Manly STAR Project includes the use of stormwater litter traps fitted onto drains to stop litter and sediment from roads flowing to the beach, while innovative porous paving installed on a nearby road catches particulate matter.

The highly polluted runoff from short-term parking bays along the beach is filtered through porous pavers that are built into the drain. A 500-metre section along the access road to the beach captures polluted stormwater from the corresponding road and carpark catchment.

After passing through a grate system, the polluted stormwater is treated using Reactive Filter Media, a specifically design-engineered infiltration medium

that uses a blend of organic and inorganic components. This specially selected blend physically, biologically and chemically treats contaminated water.

Treatment and purification is achieved by physically filtering sediment and contaminants, chemically binding contaminants to the organic matter and biologically degrading the contaminants.

For example, hydrocarbons, metals and other contaminants typically found in road and car park runoff in Manly are treated by the specially designed structural Enviro-media without compromising the structural integrity of the pavement. The microorganisms in Enviro-media eliminate the pollutants by degrading the toxic chemicals prior to water infiltrating into permeable channels.

From the channels, purified water passes into a 360,000-litre storage tank. A pump system then uses the water to irrigate the Norfolk Pines that are a major feature of the Manly seascape. Excess purified water overflows and percolates


through the existing sandy site soils to recharge groundwater.

The University of NSW's Water Research Laboratory, Sydney Water and the NSW Environment Protection Authority carried out monitoring programs to evaluate the effectiveness and efficiency of the project.

STAR Water Solutions provides stormwater, industrial, mining and agricultural waste water recovery, treatment and reuse systems. STAR holds an exclusive worldwide license for Reactive Filter Media™ technology that enables effective and energy efficient recovery, treatment and reuse. Common pollutants such as heavy metals, nutrients and toxic compounds are physically, chemically and biologically treated by the system.

The company is headquartered in Sydney, and has operations across Australia, Canada, Singapore and the United States.





For all its attractions, the beachfront environment presents a unique set of factors that virtually attract pollution.

Manly Beach in Sydney, Australia

CSIRO computer modelling measures water pipeline

When the Australian Government's national science agency wanted to create a tool to optimise water infrastructure assets, it tapped into a range of disciplines to develop the Pipeline Asset and Risk Management System, known as PARMs.

The Commonwealth Scientific and Industrial Research Organisation (CSIRO) fused engineering, statistical modelling, computing and information-management systems to create PARMs, a software solution designed to improve the asset-management process for water utilities worldwide.

The PARMs tool, developed and offered exclusively by CSIRO Urban Water, uses sophisticated statistical models to predict pipe failures based on soil type, water pressure, pipeline age, material, diameter and other factors.

By optimising a pipeline network's short-term and long-term repair and replacement, water utilities can ultimately assess the costs of various management and operational scenarios.

Other applications include identifying assets for replacement, assessing replacement based on the predicted number of failures in any one year, forecasting the expected annual number of failures, and calculating the cost implications of different management and operational strategies.

In addition to gauging costs and other economic consequences, PARMs also takes into consideration social costs associated with water interruptions and traffic disruption. This information is key to developing an overall cost-benefit assessment of infrastructure management.

Through collaboration with the Water Services Association of Australia, PARMs has been developed into an enterprise software tool that is now used by the majority of Australian state water utilities. To date, use of PARMs has justified and targeted multi-million dollar investments across Australia.

CSIRO is one of the world's largest and most diverse research organisations, with more than 50 sites throughout Australia and overseas.

The Australian Government established the organisation in 1926 largely for agricultural research purposes. Since 1949, CSIRO has been conducting research under a broader scientific and industrial remit, with its industrial research and development covering every aspect of tertiary, primary and secondary industry.

CSIRO Urban Water designed PARMs to:

- analyse customer preferences and their effects on long-term costs
- assess economic consequences
- assess social costs associated with water interruptions as part of an overarching cost-benefit framework
- identify and evaluate lifecycle costs of meeting standards for water supply continuity
- allow assessment of the effects of different operational and management strategies



Aquatec Maxcon helps brewery welcome new neighbours

Castlemaine Perkins Brewery has been producing beer in Milton, Queensland since 1878 and is a state landmark as the home of the iconic Australian beer brand XXXX.

Castlemaine Perkins' owner, Australasian food and beverage company Lion, has strict environmental standards. In line with these values, the company is focused on reducing water use wherever possible and continually looking at new ways to increase its water recycling capability.

In 2008, Lion contracted wastewater treatment provider Aquatec Maxcon to assist in meeting its stringent environmental standards with a new water-reuse plant for its Milton-based brewery.

Cooling water, wash-down water or process-cleaning water is typically recycled in a brewery. Meanwhile, rigorous product-safety protocols must be met to ensure recycled water remains separate from the product.

With these demands in mind, the Aquatec Maxcon Group designed, installed and commissioned the plant. The group's various divisions built the tanks, as well as its dissolved air flotation (DAF) and dissolved air flotation filtration (DAFF). Aquatec Maxcon also installed the system.

The plant is designed to treat 2800 kilolitres per day of wastewater at a chemical oxygen demand loading of 11 000 kilograms per day. The treatment process consists of fine screening, a buffer tank, pre-acidification tank, high-rate anaerobic reactor, aerobic granular-sludge reactor, DAF, DAFF, microfiltration and reverse osmosis, as well as sludge dewatering.

The plant has additional UV and residual chlorine dosing to ensure no bacterial regrowth occurs in the reticulation system around the brewery.

'The XXXX water recycling plant has been a highly successful project for our client, Lion,' Aquatec Maxcon Director Peter Ferrando said.

Mr Ferrando said the plant produces minimal waste solids and requires significantly less energy to operate than alternative treatment technologies. It also converts organic waste to biogas, producing a useful by-product.

The brewery is the second in Australia to recycle its wastewater to potable water quality, which is reused for cleaning water and in the cooling towers. As a result, the Castlemaine Perkins brewery has achieved a world's best practice with an average water-to-beer ratio of 2.3 to 1.

'The plant also reduces costs to their business, by decreasing potable water consumption, lower trade waste charges and lower natural gas consumption as biogas is used to supplement the boilers,' he added.

In addition, the plant successfully contains all odour by fully enclosing all reactor tanks and treating all off-gases in a two-stage biological and activated carbon treatment process.

Aquatec Maxcon provides water and wastewater technology and equipment. Its head office and factory are in Ipswich, Queensland, where it was founded in 1970. In Australia, it also has offices in Sydney, NSW; Melbourne, Victoria; Adelaide, South Australia; and Townsville and Chinchilla, both in Queensland. The company has offshore offices and factories in Thailand and Indonesia.

'The XXXX water recycling plant has been a highly successful project for our client, Lion.'

- Peter Ferrando, Director, Aquatec Maxcon





The brewery is the second in Australia to recycle its wastewater to potable water quality, which is reused for cleaning water and in the cooling towers. Image courtesy of Aquatec Maxcon

BioGill's microbes help water authority treat wastewater, save money

From a tropical resort in Fiji to a winery in Canada, BioGill exports its clean-water technology worldwide.

The Sydney-based company recently worked on a project in the Philippines where there are a large number of community septic plants treat sewage in and around the capital city, Manila.

The city's water authority wanted to reduce power consumption and treat sewage wastewater to a high standard for environmentally friendly discharge to nearby waterways.

To meet the brief, BioGill installed four bioreactors which basically provide five-star accommodation for microbes. By providing the perfect home – above ground and surrounded by oxygen – the microorganisms grow and flourish. These microorganisms basically eat waste out of the water and breathe the oxygen to grow and multiply.

'The BioGill system only requires 1 kilowatt hour (KWH) per kilolitre treated, compared to 6.5KWH/kilolitre treated

previously,' BioGill Chief Executive John West said.

'This is a massive energy saving for the water authority.'

In addition, the sewage was treated to better than required outcome, with minimal energy use and low operator knowledge.

BioGill was established in 2009 to commercialise award-winning wastewater treatment technology developed in the research laboratories of the Australian Government's Australian Nuclear Science and Technology Organisation.

BioGills use flexible ceramic substrate known as 'gills' which deliver a perfect oxygen/liquid interface for bacteria and fungi to flourish. Worldwide patents are now in place for both its gill technology and the wastewater treatment process.

The technology also has applications in aquaculture, improving water quality so fish and shrimp farmers have opportunities to produce larger,

healthier harvests and ultimately lift farm productivity. BioGill has aquaculture systems in place in Vietnam and is in talks with major companies in China and Malaysia.

'The BioGill system only requires 1 kilowatt hour (KWH) per kilolitre treated, compared to 6.5KWH/kilolitre treated previously. This is a massive energy saving for the client.'

- John West, Chief Executive Officer, BioGill



Worldwide patents are now in place for BioGill's technology and wastewater treatment process. Image courtesy of BioGill

eWater technology helps allocate water across borders

The eWater Source modelling platform is being adopted by key water management organisations in Australia and around the world to make critical decisions when it comes to quality, quantity and allocation.

These decisions are vital to water managers and planners in designing and implementing defensible policy to support the ecologically and economically sustainable use of water in rivers and catchments that often cross boundaries and jurisdictions.

One such example is eWater's work on the Lake Tai Water Pollution Treatment Project in China, where the Source modelling system was applied to model water quantity and quality for a pilot area on the Dongshan Peninsula in the Lake Tai Basin.

Source combines a leading Integrated Water Resource Management (IWRM) modelling system with the sophisticated water governance arrangements that reflect the Australian management

approach to sustainable water policy development and operation.

In 2012, Source was adopted as Australia's National Hydrological Modelling Platform under the Council of Australian Government's National Hydrological Modelling Strategy. It is a nationwide collaborative effort backed by the Australian government, with over 20 years of scientific research, development and applications.

In line with their mission to support better water management through a community of best practice, eWater has released a free version of Source. Source (public version) provides an entry point for trans-boundary studies and research based on the hydrological, ecological and water quality foundations of eWater Source. It is designed to allow sharing of models across governments, non-governmental organisations and the wide range of stakeholders necessary to engage in water resources management, and aims to promote transparency and

knowledge sharing by removing price as a barrier, particularly for developing and emerging countries.

Another eWater product is MUSIC, established as market leading stormwater management software with commercial licensees in 47 countries. It supports decisions related to stormwater quality management and Water Sensitive Urban Design (WSUD).

MUSIC is one of the few software products available to design WSUD systems for green infrastructure elements such as rain gardens, wetlands and other water-quality devices for cities that wish to modernise and reduce the impact of urban stormwater pollution. The latest version (v6) includes MUSIC-link, a time-saving feature which streamlines the process for assessing the compliance of stormwater designs against guidelines from a specific local or state government authority.

In addition to this suite of tools is the eWater Toolkit, which provides free

water and environmental management tools and resources, with over 20,000 users in more than 120 countries.

eWater is an Australian Government owned not-for profit organisation established to build, apply and support modern, integrated urban and water resources modelling. They provide water policy, management and scientific advisory services to government partners and the Australian and international water industry.

eWater's modelling technologies and expertise enhance the ability of governments and organisations to make policy and management decisions that are sustainable, cost-effective, transparent, and scientifically defensible. They are applicable in situations where there are competing demands for scarce water resources, a need to improve water quality, and to balance human and environmental water use.

Source combines a leading Integrated Water Resource Management (IWRM) modelling system with the sophisticated water governance arrangements that reflect the Australian management approach to sustainable water policy development and operation.



The Source modelling system was applied to model water quantity and quality for a pilot area on the Dongshan Peninsula in the Lake Tai Basin. Image courtesy of eWater

Environmental Water Services delivers safe sanitation to Nauru detention centre

The Australian Government's agreement with the Pacific island of Nauru to build and operate an asylum-seeker centre there led to a race to secure services and get the centre ready in record time.

Australian company Environmental Water Services (EWS) was awarded a contract to design, manufacture and supply a 1500-person wastewater treatment plant for the Nauru Regional Processing Centre through Canstruct, the Australian Government's managing contractor for the construction of the centre.

To meet Canstruct's brief, EWS needed to fully manufacture and deliver the plant within four weeks. The tight timeframe posed numerous challenges for the EWS project team, which was overseeing simultaneous production across several Australian states.

In early 2013, EWS developed the novel integration of a Moving Bed Biofilm Reactor (MBBR) process within its existing GO TREAT WWTP to achieve maximum performance within a

compact footprint and without the use of membranes.

With the new GO TREAT MBBR system, EWS has the ability to deliver safe and efficient sanitation in a faster, more affordable manner. It also allows for delivery to a considerably wider population than previously achieved.

Using this methodology, the 1500-person plant was manufactured and delivered in four weeks, as well as being successfully installed before the Christmas 2013 deadline. The WWTP is now treating wastewater efficiently to the required quality.

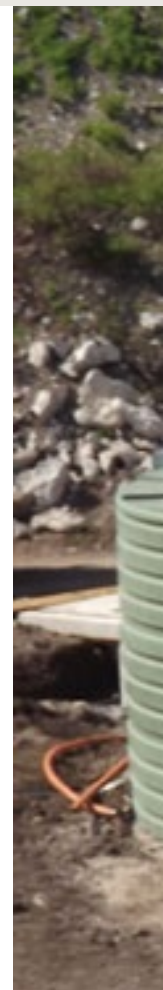
'The MBBR system they [EWS] provided was cost-effective and delivered successfully in very tight timeframes,' said Paul Hillman, Canstruct's cost control manager.

'The system is currently up and running and working well. We would recommend EWS and, particularly for remote projects, wouldn't hesitate to engage them again,' Mr Hillman said.

EWS is based in Adelaide and operates throughout Australia, New Zealand and South East Asia. In addition to WWTP capabilities, it also exports biological water treatment systems and supplies, potable water systems and energy-efficient water treatment systems.

'The system is currently up and running and working well. We would recommend EWS and, particularly for remote projects, wouldn't hesitate to engage them again.'

-Paul Hillman, Cost Control Manager, Canstruct





With the new GO TREAT MBBR system, EWS has the ability to deliver safe and efficient sanitation in a faster, more affordable manner. Image courtesy of Environmental Water Services

Osmoflo helps Australian coalmine keep it clean with purpose-built desalination plant

Preventing the mining-related contamination of clean water is part of the extensive water management plan of a coalmine in eastern Australia.

To assist the coalmine with its plan, Osmoflo has designed and built a system capable of treating 21 megalitres daily (MLD) of water generated through coal production. Following blending, the treatment process allows up to 30 MLD of desalinated water to be returned to local streams and rivers which surround the coalmine in the state of New South Wales.

The treatment system was designed and built at Osmoflo's facility in Burton, South Australia. Its components include racks of reverse osmosis membranes, pumps and piping. The components were hauled to the site and assembled there, creating a new water treatment facility at the mine.

Scheduled for commissioning in November 2014, the system includes an advanced oxidation process as part of a filter-based pre-treatment system.

Pre-treatment removes dissolved elements which could otherwise foul the reverse-osmosis desalination membranes, reducing their efficiency.

Osmoflo is a key supplier to the resources, oil and gas, power generation, food processing and general manufacturing sectors in Australia and overseas.

Osmoflo's international headquarters is in the Adelaide, South Australia suburb of Burton. Also in Burton, Osmoflo has one of the largest facilities in the Southern Hemisphere dedicated to the production of reverse osmosis desalination plants. The facility includes a control centre from which Osmoflo remotely conducts round-the-clock monitoring and control of plants anywhere in the world.

Osmoflo also has offices in Chile, Dubai and India to support its operations in Latin America, the Middle East and Asia.

The treatment process allows up to 30 megalitres of desalinated water to be returned daily to local streams and rivers which surround the coalmine.





All system components were hauled to the site and assembled there, creating a new water treatment facility at the mine. Image courtesy of Osmofo

SWA assists KL International Airport with environmental compliance

When Malaysia Airports Holdings planned a second terminal at its Kuala Lumpur International Airport, it needed to ensure compliance with Malaysia's environmental laws.

Stormwater flowing from the aircraft parking areas and taxiways are potentially contaminated with oil and aviation fuel. The Airport Authority requires all such stormwater to be treated for oil removal before discharging it to nearby waters, in line with Malaysia's Environmental Quality Act.

Malaysia Airport Holdings contracted SWA Water Malaysia, a subsidiary of SWA Water Australia, to design, manufacture, install, test and commission an oil separation plant.

SWA Water Australia undertook the design of the oil separators and manufactured the separators' proprietary equipment.

SWA Water Malaysia built and installed the plant, which includes 18 oil separators located in 10 locations

around the airport terminal. The separators range in size from 1 368 to 9 900 cubic metres per hour (m³/h). The total flow rate processed through the 18 oil separators is 62 000 m³/h, and SWA Water believes they are the world's largest.

The Sydney-based company successfully tested and commissioned the plant, and it began operating in early 2014, well ahead of the terminal's opening in May 2014.

SWA Water Australia is a multi-national environmental engineering company specialising in the design, manufacture, construction and operation of industrial wastewater treatment plants.

SWA has companies in Australia, Malaysia and Thailand, as well as representatives throughout Asia. SWA has particular expertise in wastewater treatment plants for the oil and petrochemical industries, power stations, textiles and food processors, as well as pre-treatment for desalination plants.

Recent projects include treatment plants for oil terminals in the United Arab Emirates, power stations in Singapore and oil refineries in Indonesia, as well as petrochemical plant and power stations in Thailand.

The Sydney-based company successfully tested and commissioned the plant, and it began operating in early 2014, well ahead of the terminal's opening in May 2014.





Malaysia Airport Holdings contracted SWA Water Malaysia, a subsidiary of SWA Water Australia, to design, manufacture, install, test and commission an oil separation plant. Image courtesy of SWA Water



INTRODUCTION

INDUSTRY OVERVIEW

› **COMPANIES AND
CAPABILITIES**

FURTHER
INFORMATION

| Company name | Water Management Solutions | Contractors & Operators | Consultants | Technology & Manufacturers | Biological industrial water treatment systems and supplies | Commercial industrial water treatment cooling tower systems | Commercial and large residential buildings – greywater treatment | Commercial and large residential buildings – processing and reuse systems | Construction sector – drinking water treatment systems | Desalination systems and supplies | Disinfection products and systems | Energy sector – water supply | Energy-efficient water treatment systems | Oil & gas industry – produced water treatment systems | Petroleum chemical manufacturing treatment technology / systems | Processed food and beverage manufacturing water treatment systems | Scientific water quality measurement manufacturing | Textiles and tanning industry wastewater treatment | Urban and industrial water – asset management | Urban and industrial water – wastewater treatment | Urban and industrial water – sewerage and education and training | Urban and industrial water – skills – vocational | Urban environment – systems design | Urban environment – stormwater capture and re-use systems | Urban environment – urban landscape design |
|---|----------------------------|-------------------------|-------------|----------------------------|--|---|--|---|--|-----------------------------------|-----------------------------------|------------------------------|--|---|---|---|--|--|---|---|--|--|------------------------------------|---|--|
| Aquatec Maxcon Pty Ltd | | • | | • | • | | • | • | | • | | • | • | • | • | | • | | • | | • | | | | |
| Aquation Pty Ltd | • | | | • | | | | | | | | | | | | • | | | | | | | | | |
| Arup | • | | • | | • | • | • | • | • | | • | • | • | • | • | | • | • | • | | • | • | • | | |
| Aurecon | | | • | | | | | | | | | | | | | | | | | | | | | | |
| BioGill | • | | | • | • | | • | • | • | | | • | • | | • | | | | • | | | | | | |
| Bio-Organics Group Pty Ltd | | | | • | • | | | | | | | • | | | | | • | | | | | | | | |
| Clean TeQ Limited | • | | | • | | | • | | • | | | • | • | • | | | | | • | | | | | | |
| Coffey International Development Pty Ltd | | • | • | | | | | | | | | | | | | | | | | | | | | | |
| CSIRO | • | | • | • | | | | | • | | | • | • | | • | | • | • | • | | • | • | | | |
| Environmental Engineers International Pty Ltd | | | • | | • | | • | | | | | | • | • | | | | | • | | | | | | |
| Environmental Water Services Pty Ltd | | | | | • | | • | | • | | | • | | | | | | | • | | | | | | |
| Envirostream Solutions | • | | | • | | | | • | | | | • | • | | | | | | | | • | • | | | |
| Flinders University - The National Centre for | • | | | | | | | | | | | | | | | | | | | • | | | | | |
| GHD Pty Ltd | • | | • | | | • | • | • | • | | • | • | • | • | • | • | | • | • | | • | • | • | | |
| Greenco Water Pty Ltd | | | | • | | | | | | | | | • | • | • | | | | | | | | • | | |
| Entura | • | | • | | | | | | | | | | | | | | | • | | | | | | | |
| ICEWaRM | | | • | | | | | | | | | | | | | | | | | • | | | | | |

| Company name | Water Management Solutions | Contractors & Operators | Consultants | Technology & Manufacturers | Biological industrial water treatment systems and supplies | Commercial industrial water treatment cooling tower systems | Commercial and large residential buildings – greywater treatment and reuse systems | Commercial and large residential buildings – processing and reuse systems | Construction site water management – drinking, Desalination systems and supplies | Disinfection products and supplies | Energy sector – water cooling systems | Energy-efficient water treatment systems | Oil & gas industry – produced water treatment systems | Petroleum chemical manufacturing water treatment systems | Processed food and beverage manufacturing water treatment systems | Scientific water quality measurement manufacturing | Textiles and tanning industry wastewater treatment | Urban and industrial water – asset management | Urban and industrial water – wastewater treatment | Urban and industrial water – sewerage and education and training | Urban and industrial water – skills – vocational | Urban environment – stormwater capture and re-use systems | Urban environment – urban landscape design |
|-----------------------------------|----------------------------|-------------------------|-------------|----------------------------|--|---|--|---|--|------------------------------------|---------------------------------------|--|---|--|---|--|--|---|---|--|--|---|--|
| International Watercentre Pty Ltd | ● | | ● | | | | | | | | | | | | | | | | ● | | | | |
| Iplex | ● | | | ● | | | | | | | | | | | | | | | | | | | |
| John Holland | | ● | ● | | | | | | | | | | | | | | | | | | | | |
| MicroHeat | ● | | ● | ● | | | | | | | ● | | | | | | | | | ● | | | |
| Norman Disney and Young | ● | | ● | | | | | | | | | | | | | | | | | | | | |
| One Water Naturally | ● | | | ● | ● | | ● | | ● | | | | | | | | | ● | | | ● | ● | |
| Optimatics | | | | ● | | | | | | | | | | | | | ● | | | ● | | | |
| Osmollo Pty Ltd | ● | ● | ● | ● | ● | | ● | ● | ● | ● | ● | ● | ● | ● | ● | | ● | | | ● | ● | | |
| Ribloc | | | | ● | | | | ● | | | | | | | | | | | | | | | |
| SKM | ● | | ● | ● | | | ● | ● | ● | ● | | ● | ● | ● | ● | ● | | ● | ● | | ● | ● | ● |
| SMEC International | | ● | ● | | | | ● | ● | ● | | | | ● | | | | ● | | ● | ● | ● | ● | |
| STAR Water Solutions | ● | | | ● | ● | | | | | | ● | | | | | | | | | | ● | | |
| SWA Water | | ● | ● | ● | ● | | | ● | ● | | | ● | ● | ● | | ● | | ● | | | | | |
| Thiess Services Pty Ltd | | ● | ● | | | | | | | | | | | | | | | | | | | | |
| Transfield Services | | ● | ● | | | | | | | | | | | | | | | | | | | | |
| Water Data Services Pty Ltd | ● | ● | ● | ● | | | | | | | | | | | ● | | | | | | ● | | |
| WorleyParsons | | ● | ● | | | | | | | | | | | | | | | | | | | | |
| World Poly | | | ● | ● | | | | | | | | | | | | | | | ● | | | | |



INTRODUCTION

INDUSTRY OVERVIEW

COMPANIES AND
CAPABILITIES

> FURTHER INFORMATION

GOVERNMENT BODIES

The **Department of the Environment** designs and implements the Australian Government's policies and programmes to protect and conserve the environment, water and heritage and promote climate action.

environment.gov.au

The **National Water Commission** is responsible for driving national water reform under the National Water Initiative. They provide independent and public advice to the Council of Australian Governments (COAG) and the Australian Government by assessing, auditing and monitoring water reform progress.

nwc.gov.au

The **Commonwealth Scientific and Industrial Research Organisation (CSIRO)** is Australia's national research body. CSIRO, through the Water for a Healthy Country Flagship,

is strategically positioned to provide research, information and technology to solve international water issues.

csiro.au/Outcomes/Water.aspx

The **Cooperative Research Centre for Water Sensitive Cities** brings together the interdisciplinary research expertise and thought leadership to undertake research that will revolutionise water management in Australia and overseas. In collaboration with over 70 research, industry and government partners, they deliver the socio-technical urban water management solutions, education and training programs, and industry engagement required to make towns and cities water sensitive.

watersensitivecities.org.au

INDUSTRY ASSOCIATIONS

The **Australian Water Association (AWA)** is Australia's leading membership association for water professionals and organisations. Established over 50 years with over 5,500 members, AWA is independent and not for profit. It plays an essential role in supporting the Australian water sector in the delivery of effective and sustainable water management practices.

awa.asn.au

waterAUSTRALIA was established in 2009 to promote and develop new business for the Australian water industry both domestically and in international markets.

wateraustralia.org

The **Water Services Association of Australia (WSAA)** is the peak industry body that brings together and supports the Australian urban water industry. Members provide water and sewage services to more than 16 million Australians. They also provide services to many of Australia's largest industries and commercial enterprises.

wsaa.asn.au

The **Water Industry Alliance**, formed in 1998, is a respected industry cluster of water-related organisations focused on growing its members' business and the industry. The combination of R&D, consultancy, engineering, technology, manufacturing, education, operations and commercial know-how provides members of the Water Industry Alliance a unique ability to offer proven, efficient and cost-effective solutions, processes and equipment required by global markets.

waterindustry.com.au

The **International Water Association (IWA)** is the largest international professional membership association dedicated to the improvement of water management worldwide in an environmentally sustainable way.

iwahq.org

The **International Water Association of Australia (IWAA)** represents IWA members in Australia.

awa.asn.au/IWAA.aspx

The **Australian Water Quality Centre (AWQC)** is at the forefront of water-quality science and is world renowned for its excellence in research, development and innovation. The AWQC provides a comprehensive range of water and wastewater services including sampling, analysis, advice and research. Additionally, the AWQC undertakes projects for a wide range of water quality and treatment technology issues and provides expert advice for national and international projects.

awqc.com.au

The **Industry Capability Network (ICN)** offers a single source, sophisticated searchable database for Australian water suppliers. With offices in every state and territory in Australia, ICN employ over 100 technical consultants in 30 offices, offering tailored procurement services with local expertise.

water.icn.org.au

INTRODUCTION

INDUSTRY OVERVIEW

COMPANIES AND
CAPABILITIES

› FURTHER INFORMATION

NATIONAL CENTRES OF EXCELLENCE

The **Australian Water Centre (AWC)**, to be established in 2015, will coordinate and connect Australian public and private-sector water expertise and technology to meet growing demand from overseas governments and multilateral agencies for technical experts and tools to support public and private partnerships. The AWC will accomplish this using Australia's water-sector expertise especially in the Indo-Pacific region. The AWC will also be able to fund small, innovative projects, technology transfer and training by Australian water experts with partner country institutions. The AWC when operational will enable access to the full range of Australian expertise. For initial enquiries, email water@austrade.gov.au

The **Australian Water Recycling Centre of Excellence** aims to enhance the management and use of water recycling nationally and internationally through industry and research partnerships. Through its nationally competitive research projects, the centre aims to produce and commercialise new water recycling technologies, processes and approaches. australianwaterrecycling.com.au

National Centre for Groundwater Research and Training is building Australia's research capacity in groundwater studies. The research and training undertaken by the Centre aims to improve the understanding of groundwater, including its interaction with other natural systems and its importance to all Australians. groundwater.com.au

The **International Centre of Excellence in Water Resources Management (ICE WaRM)** provides a national focus and international gateway to Australia's education, training and research expertise in water, building international recognition as Australia's centre for leadership and innovation in collaborative approaches to water resources management, through its growing partnerships both in Australia and internationally. icewarm.com.au

National Centre of Excellence in Desalination Australia conducts internationally significant research to help Australia and the world face the future challenges of water security. Through government and industry partnerships, the centre supports a range of research activities to provide innovation to the desalination industry. desalination.edu.au

RESEARCH, EDUCATION AND TRAINING

University of Western Australia's Centre for Water Research works in close collaboration with local and international industry partners, governments and organisations. A team of scientists, engineers and technicians ensure that the solutions offered by the centre are always innovative and of the highest quality. Technology developed at the centre is used to supply half of Australia's water. Internationally, research and innovation developed at the centre supply more than 50 million people with fresh water. cwr.uwa.edu.au

Monash University takes a multidisciplinary approach to water research. Researchers work with colleagues across the globe – at campuses in Australia, South Africa and Malaysia and a learning centre in Italy – to confront worldwide water and water scarcity challenges. monash.edu.au

UniWater, a joint partnership between the University of Melbourne and Monash University,

builds on expertise at both institutions to form a hub for water research, with an emphasis on inter-disciplinary activities. UniWater is focused on four key water challenges: developing effective water policies and institutions for the 21st century, maximising the environmental return on investment in repair of rivers, groundwater and catchments, and providing reliable, sustainable water supplies to Australia's growing cities.

sustainable.unimelb.edu.au/content/uniwater

University of Technology Sydney's

Institute for Sustainable Futures is a research and consulting organisation working with industry, government and the community to help create sustainable futures through research, consultancy and training. The Institute is known nationally and internationally for its research that supports cost-effective, sustainable and adaptive water-cycle management solutions to the challenges presented by drought, rising urban populations, and environmental flow demands. The Institute is at the forefront of thinking in water and sanitation futures where resources are used efficiently, valued fully and managed responsibly.

uts.edu.au/research-and-teaching

Charles Darwin University's Water Engineering Research Group

is creating and applying new technologies in Australia's Northern Territory to better plan and manage a sustainable water environment. The group uses the latest methods in hydroinformatics, ecohydraulics, modelling and measurement for water engineering research. This research extends from traditional water supply and wastewater hydraulics through to surface water, coastal and estuarine hydrodynamics. By training civil engineers who integrate all disciplines that have an interest in the water environment the group is providing the best and most sustainable water solutions. The university also offers a range of water sector vocational training including for the aquaculture, drainage, sewage, stormwater and plumbing trades.

cdu.edu.au/engit/water-engineering





The Australian Trade Commission – Austrade – contributes to Australia’s economic prosperity by helping Australian businesses, education institutions, tourism operators, governments and citizens as they:

- develop international markets
- win productive foreign direct investment
- promote international education
- strengthen Australia’s tourism industry
- seek consular and passport services.

Austrade helps companies around the world to identify and take up investment opportunities in Australia as well as to source Australian goods and services.

Our assistance includes:

- providing insight on Australian capabilities
- identifying potential investment projects and strategic alliance partners
- helping you to identify and contact Australian suppliers.

W austrade.gov.au
E info@austrade.gov.au



austrade.gov.au



Australian Government
Australian Trade Commission

