

# SM

Apr/May 2016 Vol.9 No.5  
PP100007399

COUNCILS  
MANUFACTURING  
INDUSTRY  
UTILITIES  
INFRASTRUCTURE  
CONSTRUCTION  
RESOURCES

## sustainability matters



Innovative thinking  
for energy and  
water efficiency

Energy from Waste • Codigestion • Solar technology • Water for liveability





# Making a splash – naturally

As an abundant yet vital resource, water requires careful management, planning and design.

Working in harmony with natural water systems, water quality can be improved, and natural and built environments enhanced.

At AECOM, we see the opportunities across the entire water cycle. Working with clients, we create innovative water management solutions that help deliver liveable cities, resilient communities and sustainable natural environments.

## AECOM

Built to deliver a better world

[aecom.com](https://aecom.com)



# CONTENTS

12	Case Studies
22	R&D
39	Products & services
56	Resource centre



08

## 6 Making the most of wastewater – with biogas recovery

Optimising CAL systems.

## 8 Energy from Waste in Australia – is there a future?

State of EfW in Australia discussed.

## 14 Sydney Water committed to sustainable energy projects

Codigestion and solar.

## 20 Simpler solar cell design removes the need for doping

Research and development.

## 30 Sustainable wastewater treatment thanks to codigestion

Energy efficiency solutions.

## 38 Refrigerant trends for food retail in 2016

Quest for green refrigerant.

## 44 Corporate Renewable PPAs on the rise

Unlocking renewable energy.

## 48 Fluid solutions for liveable cities

Water's contribution to liveability.

## 58 Sustainable buildings – the tipping point for change

Opinion on IoT.



14



38

Cover image: © yahyaikiz/Dollar Photo Club

Westwick-Farrow Media is committed to using environmentally responsible print services to produce our publications.

**PAPER** This edition is printed on recycled paper (FSC Mixed Sources Certified) from an elemental chlorine free process.

**PRINT** It is printed by SOS Print+Media Group (ISO12647-2, FSC COC and PEFC certified), using soy-based inks and CTP plate processing.

**WRAPPER** It is delivered in a totally degradable plastic wrapper.



## READ ONLINE!

This issue is available to read and download



[www.sustainabilitymatters.net.au/magazine](http://www.sustainabilitymatters.net.au/magazine)

# WORDS FROM THE EDITOR

In the age of the internet, disruptive thinking is challenging most of our traditional business models. I'm sure you've all heard about uberTAXI and Airbnb, which have lately been challenging the traditional taxi and hotel industries. What this highlights is the need for any industry to continue to evolve and innovate, otherwise there is a risk of becoming less relevant or even irrelevant.

Technology and science are evolving at a fast pace, and consumers are becoming more educated, via the internet, in their decision-making. Information on climate variability and environmental concerns is more available, therefore innovations to reduce waste and pollution and optimise energy and water productivity are becoming ever more important to consumers.

Food waste is a massive issue globally, with most reports suggesting that over a third of all food produced is wasted. This level of waste not only hurts our hip pockets, it also impacts heavily on the environment and greenhouse gas emissions. Wasting food also means wasting resources that were used in the overproduction and distribution of that food. According to CSIRO data, throwing out a kilogram of beef wastes 50,000 L of water alone.

Technology is available to convert this food waste into energy. Community campaigns are also being implemented to try to prevent the waste in the first place. What other disruptive thinking could help?

In this, our water and solar feature, we take a look at innovations being implemented across the country. We talk to Wiley about the latest in optimising industrial wastewater treatment and Sydney Water talks about its latest sustainable energy projects.

**Carolyn Jackson**

sm@westwick-farrow.com.au



Westwick-Farrow Publishing  
A.B.N. 22 152 305 336

**Head Office**  
Cnr. Fox Valley Road & Kiogle Street,  
(Locked Bag 1289)  
Wahroonga NSW 2076  
AUSTRALIA

Ph: +61 2 9487 2700 Fax: +61 2 9489 1265

**If you have any queries regarding  
our privacy policy please email  
privacy@westwick-farrow.com.au**

**Editor**  
Carolyn Jackson  
sm@westwick-farrow.com.au

**Chief Editor**  
Janette Woodhouse

**Editorial Assistant**  
Lauren Davis

**Publisher**  
Geoff Hird

**Art Director/Production Manager**  
Julie Wright

**Art/Production**  
Tanya Barac, Colleen Sam

**Circulation Manager**  
Sue Lavery  
circulation@westwick-farrow.com.au

**Copy Control**  
Mitchie Mullins  
copy@westwick-farrow.com.au

**Group Brand Manager**  
Nicola Fender-Fox

**Advertising Sales**

**NSW**  
Courtney Van Den Berg  
Ph: 0424 417 329  
cvandenber@westwick-farrow.com.au

**VIC/SA/WA**  
Lachlan Rainey  
Ph: 0402 157 167  
lrainey@westwick-farrow.com.au

**QLD**  
Nicola Fender-Fox  
Ph: 0414 703 780  
nfender-fox@westwick-farrow.com.au

**ASIA - Lachlan Rainey**  
Ph: +61 (0) 402 157 167  
lrainey@westwick-farrow.com.au

**Subscriptions**  
For unregistered readers price on application.

Printed and bound by SOS Print+Media

Print Post Approved PP 10007399  
ISSN No. 1834-917X



September 2015

total CAB Audited Circulation  
**5301 readers** (69% personally requested)

*All material published in this magazine is published in good faith and every care is taken to accurately relay information provided to us. Readers are advised by the publishers to ensure that all necessary safety devices and precautions are installed and safe working procedures adopted before the use of any equipment found or purchased through the information we provide. Further, all performance criteria was provided by the representative company concerned and any dispute should be referred to them. Information indicating that products are made in Australia or New Zealand is supplied by the source company. Westwick-Farrow Pty Ltd does not quantify the amount of local content or the accuracy of the statement made by the source.*



**The Future of Energy Management  
Building Blocks has arrived.**

**BFM II**



SATEC's next generation of Branch Feeder Monitor, "BFM II" provides a modular design approach. The BFM II provides energy, demand, data logging, tariff metering for up to 54 circuits along with 72 pulse inputs for water and gas. This makes the BFM II perfect for residential, commercial and industrial projects.

**SATEC**  
Powerful Solutions

[www.satec-global.com.au](http://www.satec-global.com.au) | (02) 4774-2959



---

# Making the most of wastewater with biogas recovery

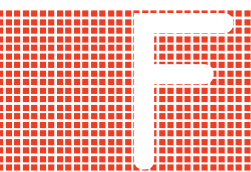
"If you're not processing your wastewater and getting all the energy you can out of it, it's a waste and you're losing out," says Wiley Process Engineer Heath Barker. In this article, Barker talks about the latest trends in covered anaerobic lagoon (CAL) systems and how they need to be nurtured to achieve maximum benefits.

*CAL solution at AJ Bush by Wiley*





It can be tricky dealing with all the rules and regulations for handling the biogas, and it can vary from state to state. But, if you have the right people it can be easy.



Following recent government policy shifts such as the Carbon Pricing Scheme and the Clean Technology Investment Program, many industrial sites

that use biological wastewater treatment lagoons have installed covered anaerobic lagoon (CAL) systems. These CAL systems are targeting more efficient effluent treatment methods that both reduce emissions and capture biogas as an on-site renewable energy source.

Barker points out that some systems can be quite basic with a simple cover applied to an existing pond to capture the biogas which is then flared off. "While this will reduce carbon emissions, companies [with these basic systems] are missing out on opportunities to harness that energy."

### How can the CAL system harness energy?

"Any company with an organic waste stream, such as abattoirs, dairies, breweries, pig farms and chicken farms, may benefit from the implementation of a CAL system for biogas recovery from wastewater," said Barker.

Existing anaerobic lagoons can be easily covered with high-density polyethylene (HDPE) to capture the biogas released from the lagoon. This gas can be burned through the boiler to provide energy for the processing plant.

"It can be tricky dealing with all the rules and regulations for handling the biogas, and it can vary from state to state," said Barker. "But, if you have the right people it can be easy."

Figure 1 shows how a typical covered anaerobic lagoon system works at a meat processing plant.

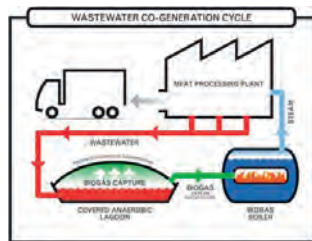


Figure 1

### How can the system be optimised?

Barker points out that it's important to remember that anaerobic systems are 'living' biological systems, and to get the most out of them, you need to nurture them just like you would nurture your pet.

"By improving your biogas yield, your anaerobic treatment will also be improved. This occurs because more organics are being converted to biogas and means there will be fewer organics in the waste stream.

"These days it is not uncommon to achieve 90% chemical oxygen demand (COD) reduction with these anaerobic digestion systems."

Wastewater quality monitoring and pre-treatment equipment combined with CAL technology can be used to optimise the generation of biogas.

Barker explained that, just as you wouldn't feed 100 hamburgers to your cat, you shouldn't overload your anaerobic digester.

"Inline wastewater quality monitoring systems are available that allow users to identify high peak loads and buffer them from the system by gradually reintroducing them into the flow. By using this technology, you can identify high peaks and bypass them to a tank, drip feeding it back into the digester to avoid that high peak.

"By capturing valuable organics before they enter the anaerobic digester, a steady state

condition of the digester can be maintained, which can increase gas generation.

"Installing a secondary anaerobic digestion (with a different type of methanogenic bug) downstream can improve biogas yield and wastewater treatment."

Operating temperatures are also an important aspect to these systems. When it comes to controlling temperature, Australia has an advantage over Europe and the US. Ambient temperatures are warmer, so less energy is required to heat up wastewater streams and keep the bugs healthy and warm.

"But, if you accidentally dump hot water into the system, this could be damaging," said Barker. "So managing your system with temperature control and redirecting anything that is potentially damaging is a good way to protect your anaerobic digester."

### Future

Although these systems are unlikely to provide enough power to make food processing sites self-sustaining, the energy the CAL system can produce is enormous. For example, one of Barker's recent projects at a rendering plant is currently generating half a megawatt of power each day, which is all used back in the processing plant.

In the future, Barker said, this technology could be used for more factories located close to cities, such as breweries. "So, we need to fine-tune the systems to operate on a smaller footprint."

Barker concluded by stating: "If there are organics in your wastewater, it is imperative that you do something with them."

Wiley & Co Pty Ltd  
[www.wiley.com.au](http://www.wiley.com.au)



With a decade of food and process engineering experience, Heath Barker is an Electrical Engineer by trade, a 'gen-y' technical explorer and Wiley's frontier technology specialist. Heath has strong experience in emerging technologies such as: Augmented Reality — exploring virtual solutions in the real world; Virtual Reality — experiencing solutions before they physically exist; 3D printing — rapid prototyping of design concepts; and 3D scanning — ensuring new designs integrate seamlessly with existing processes. He has been instrumental in delivering world-class solutions to companies such as Nippon, JBS Australia, Heinz Golden Circle, Beak & Johnston and OSI. More recently, he has worked with AJ Bush on its biogas recovery and carbon reduction project and with Western Downs Regional Council on its site wastewater handling.



Energy from Waste (EfW) is very well established overseas, but in Australia it has yet to get off the ground. The reasons for this are to be found in a complex combination of different historical factors: adequate landfill capacity, poor financial incentives, unfavourable public perceptions and lack of government policy support. While these are changing, they have combined in the past to prevent any meaningful EfW projects from gaining traction. But the position is changing.



Over 10 years ago, the federal government provided financial support to the Waste Management Association of Australia to develop an 'EfW Sustainability Guide',

which was finalised in 2005. The document was the result of extensive nationwide consultation and represented a starting point to put EfW back on the agenda by outlining some basic principles and a process for assessing EfW proposals, such as:

- Does recovering energy from the proposed fuel represent the best use of that material at that place and time?
- Is the process efficient?
- Will environmental outcomes be controlled?
- What will be the social outcomes?
- Are controls in place to ensure the stated outcomes will be achieved?
- Will the project work financially?

These questions are largely common sense, but they needed to be clearly stated because at the time EfW was a no-go zone in Australia. Given the slow progress since then, it is easy to conclude that these efforts may have been forgotten.

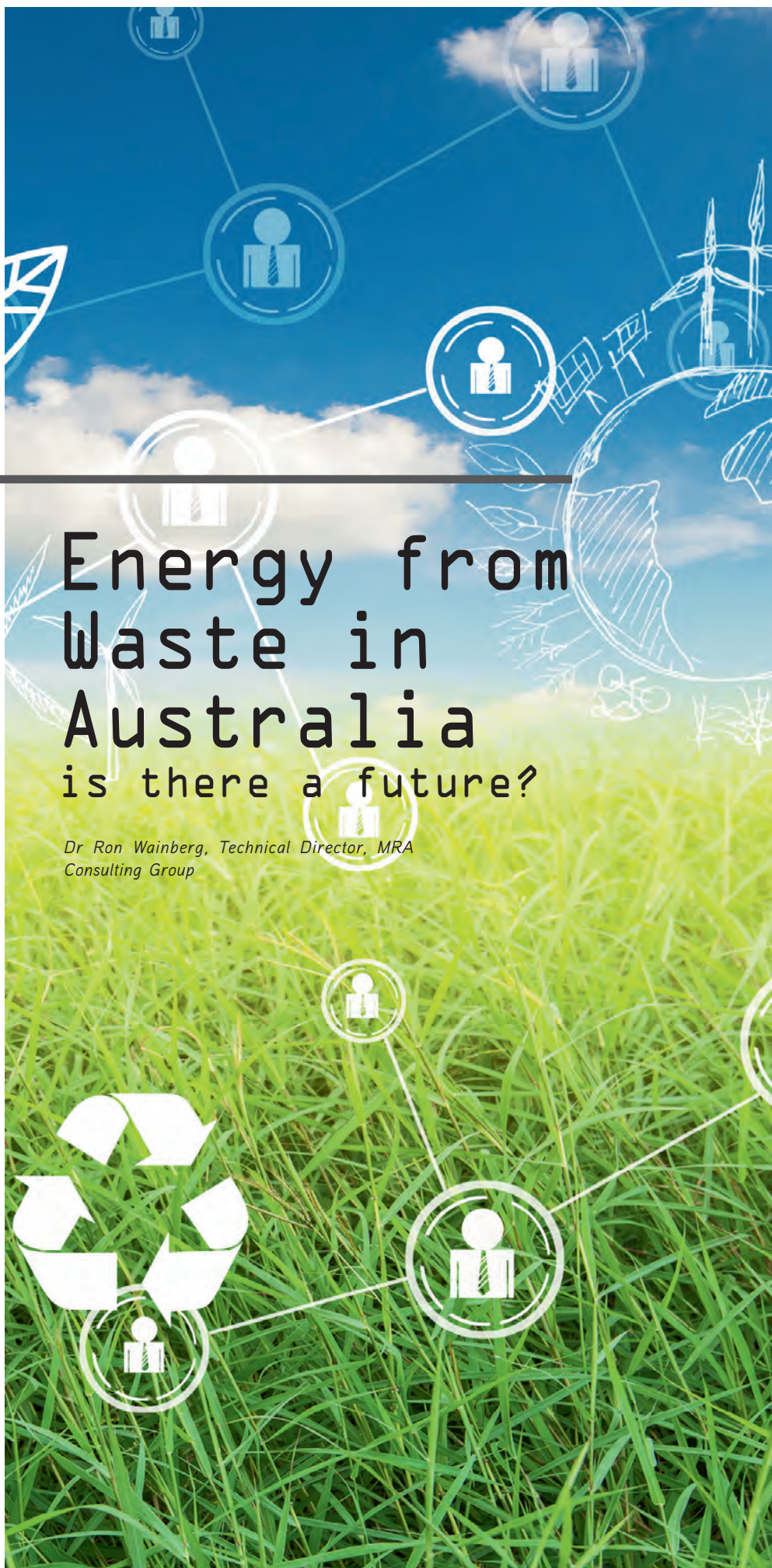
To be fair, Australia does recover some energy from its waste. As shown in Figure 1, there are over 60 installations feeding electricity derived from waste into the national grid<sup>[1]</sup>.

However, the majority of these systems (which exclude anaerobic digestion systems) are based on the combustion of landfill gas and bagasse, a by-product of sugar production. The potential to recover energy from the bulk urban solid waste stream is largely ignored.

The scale is small too. Table 1<sup>[2]</sup> shows the nameplate generating capacity of the

# Energy from Waste in Australia is there a future?

*Dr Ron Wainberg, Technical Director, MRA Consulting Group*





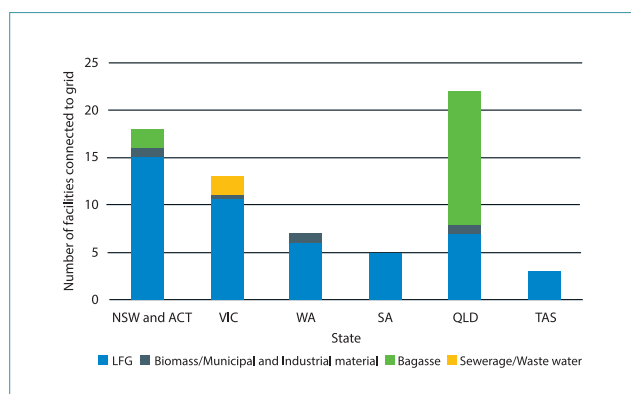


Figure 1. Number of facilities connected to grid by feedstock type.

STATE	NAMEPLATE CAPACITY BY FUEL TYPE (MW)				TOTAL (MW)
	LFG	Municipal/Industrial biomass	Bagasse	Sewage/Wastewater	
NSW & ACT	57	4	68	0	129
Vic	50	0	0	2	52
WA	20	40*	0	0	60
SA	13	0	0	0	13
Qld	14	30*	320	0	364
Tas	5	0	0	0	5
<b>TOTAL</b>	<b>159</b>	<b>74</b>	<b>388</b>	<b>2</b>	<b>623</b>

Table 1: Nameplate capacity of EfW facilities connected to distribution networks. (\*Wood waste generation plants)

EfW facilities. The total power generated is only 623 MW.

More facilities are proposed to treat urban wastes, as shown in Table 2. These amount to around 200 MW generation capacity with a capital investment of nearly \$1.5 billion.

In addition, there are a number of facilities being planned to manufacture Refuse Derived Fuel, or RDF (sometimes referred to a Process Engineered Fuel, or PEF). These fuels are generally targeted at the export market. Only the RecourceCo facility in Adelaide produces a fuel which is used locally, in cement production and not power generation.

Australia currently sends around 23 million tonnes of urban waste to landfill. The breakdown state by state is shown in Figure 2, but not all of it would be suitable as fuel.

The portion of the landfilled waste which would be suitable as a fuel (plastics, paper and cardboard, wood and textiles) is estimated to be approximately 6.3 million tpa<sup>[3]</sup>. The na-

tionwide distribution of these 'fuels' is shown in Figure 3. While additional materials in the waste could be used as a fuel, it would be at the expense of established resource recovery and recycling operations. This may prove to be a major issue for proponents seeking to justify EfW with the regulatory authorities as well as environmental stakeholders and the general public. It is worth remembering the Sustainability Guide from 2005.

The calorific value of the fuel currently being landfilled is estimated to be 63 million GJ per annum. If the material is used for electricity production it would generate around 13 GJ per annum of power (assuming 20% efficiency). Australia's electricity consumption in 2014-15 was 700 million GJ, so the potential to supply energy from Australia's urban wastes represents around 2% of the annual demand.

This is very much a 'back-of-the-envelope' analysis, but it does demonstrate a need to

Proponent	Proposed location	Estimated cost	Waste feedstock (tpa)	Energy outputs (MW)
New Energy	Port Hedland (WA)	\$180 million	60,000	15
New Energy	East Rockingham (WA)	\$160 million	225,000	18.5
Phoenix Energy	Kwinana (WA)	\$380 million	400,000	32
EMRC	Hazelmere (WA)	\$25 million	13,000 Wood waste	3.5
Dial-a-Dump	Eastern Creek (NSW)	\$700 million	1,200,000	140
City of Sydney	Sydney (NSW)	Unknown	42,000 MSW (minimum)	Unknown

Table 2: Thermal facilities in pipeline or proposed.

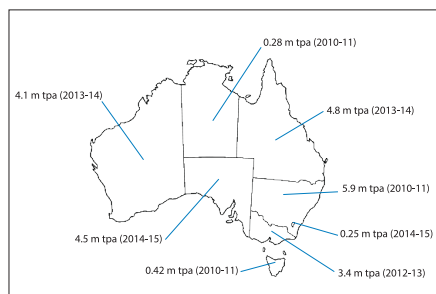


Figure 2. Waste to landfill in Australia.

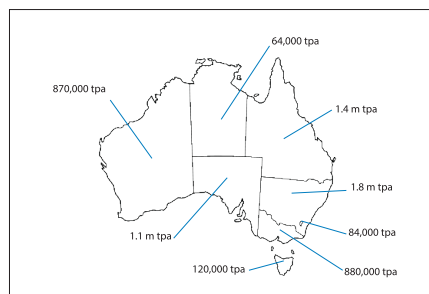


Figure 3. Potential fuels in urban solid waste.

keep EfW in perspective from the point of view of the power generation industry.

From a waste and resource management perspective, on the other hand, EfW will be vital if the high rates of landfill diversion targeted by state governments are to be achieved.

The waste industry has very different drivers to energy generation. Increasing landfill charges, decreasing landfill volume and the difficulties in gaining community acceptance of new landfill sites, together with a broad community expectation to do more than simply bury waste, are driving the search for alternative waste management approaches. Given these factors, it simply does not make sense to bury things which have a recoverable energy content but have no viable alternative option for recovering their material value.

EfW is not cheap. While a direct comparison needs to be treated with caution, UK gate fees<sup>[4]</sup> for EfW range from \$130–\$264 per tonne. The high cost of landfill in most Australian states, especially NSW, means that the financial viability of EfW is improving. This is exactly what the landfill levy was originally designed to achieve.

So, apart from price, what are the impediments? Why is the recovery of energy

from urban waste in Australia not further developed?

The answer lies in all the other hurdles which need to be overcome to get EfW off the ground:

1. The need for a clear government policy. Victoria has published *Guidelines*, WA has a *Position Statement* and NSW has a very restrictive *Policy*. The other jurisdictions are silent. A clear set of national guidelines, supported by all jurisdictions, would be preferable so that proponents and their financiers know exactly where they stand and what the rules of the game are.
2. There has to be a market for the outputs. Unless there is a use for the power (or heat, or RDF) produced through EfW, the project's viability will be challenging.
3. Unless the power generated is for internal use, the EfW facility must be connected to the national grid and a power purchase agreement established with an energy distributor. This can be a long and expensive process, and given the relatively small contribution EfW will make to a market which is presently oversupplied, it is easy to understand the reluctance of energy providers to become involved.

4. A site will be needed for an EfW facility. This site will require development approval and appropriate licensing. Satisfying these requirements can be a lengthy and expensive process.

5. The EfW facility must comply with air emissions regulations. This is not negotiable and can represent a significant portion of the overall facility cost. It also means that a degree of quality control must be applied to the fuel in order to keep contaminants within acceptable limits.

6. There must be community acceptance of the facility. Community consultation must be commenced early and be both sustained and transparent. Past experience has taught that if this is not achieved, the difficulties facing the project will escalate dramatically. Ensuring and demonstrating that EfW does not cannibalise resource recovery will be an important consideration.

7. There needs to be a secure source of fuel for the facility, and guaranteed quantities, if the project is to gain financial closure. This is more complex than it sounds. While 'waste' represents unwanted stuff, its collection and management is controlled by local governments (municipal waste) and a relatively small group of waste collectors (commercial & industrial and construction & demolition waste). There is an existing network of commercial arrangements which manages these materials and 'owns' the feed and products. Gaining access to the required quantities of the right materials will involve significant commercial negotiations.

None of these issues need to be show stoppers, but they do need to be considered by proponents. The success of the project will depend on heeding lessons learned in the past, receiving the right advice and, above all, patience.

MRA Consulting Group

[www.mraconsulting.com.au](http://www.mraconsulting.com.au)

[1] AEMO 2015 and WA Department of Finance 2015.

[2] *Ibid.*

[3] Based on generic waste composition data.

[4] UK WRAP Gate Fees Report 2015.



# TAKE CONTROL OF YOUR CHLORAMINATION PROCESS.



The **Hach 5500sc Ammonia Monochloramine Analyser** helps you streamline your disinfection process and reduce chemical usage. With PROGNOSYS, the analyser's onboard predictive diagnostic software, you will have early insight into the measurement reliability and service requirements of your instruments.

**Contact us today and improve your chloramination process!**

[www.au.hach.com](http://www.au.hach.com) | 1300 887 735



# Eyes on efficiency at Canberra Airport

The Canberra Airport terminal is renowned for its sustainability and energy-efficiency initiatives, winning multiple awards for its leading-edge approach to building design and operation. With over 55,000 m<sup>2</sup> of terminal building and a 24 hour airport, it was crucial that the new terminal was one of the most carbon friendly in Australia.

This environmentally sustainable development uses a combination of initiatives in water and energy savings. The roof of Canberra's new airport can harvest a massive 1.3 million litres of water that is used in toilets, air conditioning and landscape irrigation. Energy is saved by the use of two trigeneration plants that produce electricity on-site from gas and capture the waste heat to cool and heat the building. This has reduced the building's carbon emissions by 75% compared to the old terminal facility. Canberra's new terminal also uses waste recycling, fuel reduction and fully programmable low-energy fittings to reduce its environmental footprint.

After the upgrade of the terminal, focus was turned to operating it as efficiently as possible. CopperTree's analytics



Automation to implement the strategy. The economy cycle strategy was modified to operate off the enthalpy while incorporating an outside air temperature lockout. This new strategy stopped the economy cycle from operating on days over 24°C and days under 12°C.

Although this new strategy was implemented in late January, it has already shown a significant reduction in chiller energy consumption. Figure 1 shows the monthly average chiller consumption for days with maximum temperatures of less than 20°C, between 20 and 24°C, between 24 and 30°C

and days over 30°C. The consumption between 24 and 30°C (purple) was fairly steady from October, then a drop occurred in January, as there were 10 days of the month with the new strategy operating. A significant drop occurred in February for both temperature ranges as this was the first full month of the new strategy operation; consumption for days between 24 and 30°C reduced by 99% and days over 30°C by 78%. This is a significant drop in energy consumption and equates to a total reduction of over 70% on total chiller energy consumption.

The effects of poor air-handling unit control can have significant implications on the thermal plant energy consumption. It is extremely important that all pieces of equipment work together and do not fight one another to achieve the most efficient system operation. The new economy cycle control strategy has the potential to save in excess of 300,000 kWh per year without a negative impact on occupant comfort.

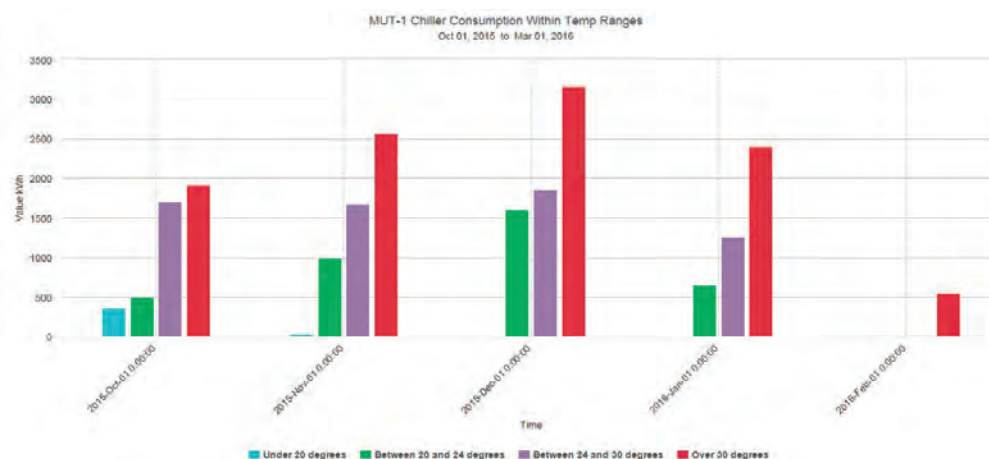


Figure 1: Monthly average chiller consumption within temperature ranges.

software was installed to assist with the performance, tuning and monitoring of the airport terminal. The analytical software acts as eyes, monitoring the building's operation 24 hours a day, looking for inefficiencies in equipment operation and faults in mechanical systems. After a single day of analysis on all air-handling units, it was noted that the economy cycle strategy was operating just off outside air enthalpy, which was highly inefficient for the Canberra climate.

CopperTree's engineers wrote a new functional description for the economy cycle operation and engaged Delta Building



# we know water and wastewater



Protecting and nurturing local community, industry and  
critical resources takes innovation and management.  
We can help you find a better way.

 [linkedin.com/company/wiley](https://www.linkedin.com/company/wiley)  [@wileytalk](https://twitter.com/wileytalk)  [/wileytalk](https://www.facebook.com/wileytalk) [wiley.com.au](https://www.wiley.com.au)

BRISBANE • KUALA LUMPUR • MELBOURNE • SYDNEY • TOOWOOMBA



**WILEY**

Excellence reimagined





# Sydney Water committed to sustainable energy projects

*Philip Woods, Energy Manager and Peter Anders,  
Contract Services Manager, Sydney Water*

Along with the provision of world-class water and wastewater services, protection of the health of our customers and protection of the environment are part of Sydney Water's core values.

**S**ydney Water has reduced its carbon and ecological footprints by 45% and 35%, respectively, since 2007–08. This has been achieved despite an increasing population and the need for more energy-intensive water sources.

Pumping and treating water and wastewater uses large amounts of energy. Sydney Water recognises the sustainability benefits in producing our own power on-site and exporting some to the electricity grid. In doing this, we produced 72,600 MWh in 2014–15, which is enough energy to power around 10,000 homes each year. Of this, we exported 6000 MWh to the electricity grid.

Operationally, Sydney Water is already generating more than 17% of its total energy use through an extensive portfolio of renewable energy projects. This reduces greenhouse gas emissions by over 60,000 tonnes a year.

Through our innovation, we continue to keep electricity purchase to below 1998 levels.

## Case study: Bondi Wastewater Treatment Plant

The Bondi wastewater treatment plant became a net energy producer last year. Generation of electricity in 2015, through the co-digestion process, exceeded electricity demand by 13%.

Codigestion is still in its infancy in Australia, but the results of Sydney Water's Bondi Glycerol Pilot Project have exceeded expectation by leveraging international best practice — with the potential to double our biogas production. We use biogas to generate green energy from waste.

In 2012 we built two 50 L digesters at Bondi that were used for testing glycerol co-digestion. Glycerol is the waste by-product from the production of biodiesel. This work showed that by adding just 2% glycerol to wastewater received at the plant, we could double biogas production.

We commenced a pilot project at our Bondi wastewater treatment plant in October 2014 to co-digest up to 600,000 L of glycerol

with wastewater sludge. So far we have processed 220 kL of waste and produced 440 MWh of additional renewable energy.

Our long-term 2020 plan is to provide a service for most or all organic waste streams for our customers. Our audit of waste streams identified two streams that provide the best combination of benefits, risk management and potential long-term scale — beverage waste and glycerol.

Sydney Water will deliver one new codigestion pilot project per year over the next three years, with larger scale commercialisation planned from 2020.

We recently commenced work on a collaborative codigestion research project with Wollongong University, which is supported by the Australian Research Council. As part of this, two 1000 L research digesters were built, to be located at Shellharbour wastewater treatment plant. This work will help to optimise the value of co-digestion by determining maximum feed.



environment and in the provision of services to meet both customer and community expectations.

We are using hydro-power generation at North Head wastewater treatment plant, on the Warragamba pipeline, and a pipeline from Woronora Dam. These hydro power plants use pressure reduction and gravity flow in water and wastewater streams to generate energy.

We continue to keep electricity purchase to below 1998 levels and know we will continue to achieve this cost-effectively through the use of our purpose-built Cost of Carbon Abatement Tool. The tool was developed to standardise and simplify the assessment of carbon mitigation opportunities. It helps us determine the potential greenhouse gas volume reductions and identify the most economical forms of abatement investments.

### Solar energy

In 2008/9, Sydney Water investigated the use of solar power plants to increase renewable energy generation on its sites. The outcome was a 60 kW pilot plant built in 2009 on the roof of our Potts Hill warehouse. No further solar plants were considered until 2013 as the projects were not financially viable. However, a 70% drop in construction, supply and installation costs for solar power has significantly improved the project economics. Since 2015, eight solar plants totalling 100 kW have been commissioned across eight Sydney Water sites.

### Modelling

Sydney Water has now assessed around 1700 sites for their solar suitability. An in-house assessment tool is used to model and re-model sites for their financial viability in future. It is expected that solar prices will continue to fall, although not as rapidly as between 2008 and 2015. This will further increase the attractiveness of this kind of renewable energy generation for Sydney Water. The federal government's renewable energy incentive — Small Scale Technology Certificates or STCs — is another criterion facilitating solar plant rollout across Sydney Water sites.

### Selection criteria for Sydney Water's solar plants

To find the most suitable sites across

Sydney Water, the following selection criteria were assessed:

- Heritage permissions to install a solar plant were sought from Sydney Water's heritage department.
- Orientation to the north.
- No shading from trees.
- An on-site load is required to take the produced power instead of exporting it to the grid; this ensures faster amortisation periods as the price for exported power is much lower than for power imports.
- Sufficient roof space.
- Is the site prone to vandalism?
- Are future upgrades of the roof or building planned, potentially shortening the period in which the plant can be amortised?
- Acceptable amortisation periods.

A variety of sites (eight sites in total) were chosen, allowing Sydney Water to gather experience with different roof designs.

### Future projects

Sydney Water will continue to investigate projects to minimise our carbon and environmental impact while at the same time providing the services that our customers demand.

Future solar power opportunities are currently being investigated.



What is exciting is the opportunity to utilise a series of different products, currently considered to be waste, as a resource to generate additional power through our co-digestion processes at wastewater treatment plants.

This will have a significantly positive impact in reducing the waste stream while at the same time creating a green alternative to power production.

*Sydney Water Corporation*

[www.sydneywater.com.au](http://www.sydneywater.com.au)

A second pilot project taking pulped fruit and vegetable waste will commence at Cronulla in early 2016.

Sydney is preparing for additional pilot projects to process wastes such as beverage waste, dairy, bakery and fats, oils and grease.

With this work, Sydney Water is aiming to set a new standard for resource recovery in the Australian Water Industry. The projects leverage our expertise and infrastructure for processing liquid organic waste and turning it into usable resources — energy and biosolids fertiliser. These projects will also help reduce our environmental impacts and the transportation of wastes.

The NSW Office of Environment and Heritage (OEHL) recognised the value of Sydney Water's work to date and future plans for co-digestion by providing a \$150,000 grant in 2014.

### Sustainable stepping stones

Sydney Water aims to set and achieve enhanced targets in the quality of Sydney's



## Longreach Airport goes solar

Longreach Airport is taking advantage of Central West Queensland's long sunlight hours and high summer temperatures with the installation of a solar panel system. Mount Isa-based company Q Energy Solutions installed the 396 Trina Solar TSM-250 PC05A solar panel system in 18 strings of 22 panels.

"It operates through SMA Sunny Tripower SMA STP25000TL-30 inverters, which gives zero export functionality through active power limitation and protection relay to meet Ergon utility connection requirements," said Q Energy Solutions Director Matt Brewster. "This means the inverters ramp up and down their output to match the site load and no power feeds back into the Ergon network."

"The terminal roof is flat and we designed the system to utilise as much area as we could to achieve the maximum result of 205,485 kWh per annum."

"This more than satisfies the current peak load of 68 kW during the hours of 9 am and 5 pm seven days a week, with



three commercial ducted air conditioners consuming most of the power."

Kevin Gill, chief operating officer of Longreach Airport, said the company was motivated by a desire to drive a social responsibility agenda by installing the system. Gill said the airport expects the system to fulfil 95% of its daytime energy requirements, save \$30,000 to \$40,000 a year off its power bill and, most importantly, to cut CO<sub>2</sub> emissions by 184.9 tonnes.

"Our current annual energy cost from the coal-generated grid is between \$40,000 to \$50,000, but the installation cost of our solar system is into six figures," said Gill.

"So even with the considerable financial saving, it will take a number of years to recoup the cost."

"But to us, the real winner is the environment as we are focused on sustainability."

**Trina Solar**

[www.trinasolar.com.au](http://www.trinasolar.com.au)

## Generating revenue from biomass residues

A Western Australian oat miller is using the Organic Rankine Cycle (ORC) turbogenerator system from Italian company Turboden to generate clean electricity using oat husks as fuel to power its Wagin facility.

Previously, the residues from the processing of the oats had been used to generate steam that was used only in the milling process itself. With the introduction of the turbogenerator, the steam is used

to generate power and displace a significant portion of the internal demand of electricity at the facility, which is located 230 km from Perth.

Carlo Minini, Turboden business development manager for Oceania, explained that: "ORC systems are particularly suitable for distributed power generation and have now reached a level of full maturity in biomass and waste-to-energy applications." He said that in

Europe and North America, over 200 ORC units are in operation using biomass, and this is actually the company's second Aussie plant, "as the company installed its very first turbogenerator 30 years ago in Perth — a small solar thermal ORC back then".

The relatively small generator installed in WA — 600 kWe is the full load capacity — is not set to export unused electricity to the grid and for the time being will only be fed with the steam excess from the milling process: the combination of these two operating conditions means that the turbine will be subject to variable load patterns.

"The beauty of the ORC technology lies exactly in its flexibility and good efficiencies retained even at very partial load — and the fact that the ORC is fully automatic and doesn't need permanent attendance, which translates into highly reduced operation and maintenance costs."

"Interestingly enough, the other two major components of this station — the biomass boiler and the aircooler — are also made in Italy, by companies Uniconfort and Lu-Ve Contardo respectively," Minini concluded.

**Turboden S.r.l.**

[www.turboden.eu/en](http://www.turboden.eu/en)



**VEGA** WE ♥ RADAR

## Introducing a new world class!

VEGA, the world market leader in radar level measurement will soon be presenting a new star in the galaxy of sensors. Get ready for the technology of the future. Look forward to a new generation full of innovative possibilities. We'll keep you updated!

[www.vega.com](http://www.vega.com)





## Extending the life of culverts

Combining traditional tunnelling technology with modern-day rehabilitation techniques enabled ITS PipeTech to submit and provide a solution to RMS (Roads and Maritime Services) to extend the life of an existing set of culverts that crossed the M1/Princes Highway outside the University of Wollongong.

The objective of the work was to provide structural integrity and equalise the bores of a triple-cell culvert that passed beneath one of the busiest arterial routes in Australia. A secondary consideration was to minimise disruption to the motorway that carries over 18,000 vehicle movements a day just two metres above the top of the culverts.

The culverts carry the Dallas Street branch of Fairy Creek, which crosses under the motorway via a three-cell precast concrete pipe. As the Princes Motorway was upgraded, the original 1350 mm triple culvert set was

profile similar to the remainder of the culvert. Debris barriers with vehicle access would be installed to the culvert entrance for access to undertake maintenance and routine debris clearance under the project scope.

ITS PipeTech suggested tunnelling around the existing inlet pipes to standardise the three cells into a common profile to meet the hydraulic demands and reduce the potential for blockages and water retention in the upstream valley. The void profile of the existing culverts had to be created and structurally lined together with the existing pipe to complete the structural rehabilitation process. The proposal also took into consideration any potential damage to the riparian zone and the effects this would have on damage to local flora and fauna.

The proposal was to remove the initial 6.5 m of 1200 mm ID concrete pipework to each of the three cells and replace with a cast in situ reinforced structural pipe bore. Matching the existing diameter, it could be structurally relined with a UV-cured Berolina GRP liner to provide an uninterrupted free-flowing three-cell underpass to meet hydraulic requirements.

ITS proposed a modified tunnelling system using a three-stage heading arrangement commencing with the outer right, then the outer left before finishing with the middle bore. As the heading advanced, the existing concrete pipe could be broken up and removed from the workings, leaving a space large enough to facilitate casting a structurally reinforced surround to form a bore at a diameter similar to the existing downstream pipework.

ITS's designs needed to accommodate SM1600 and 45-tonne axle loadings. The company opted for the use of its Tunneline

cast in situ structural lining system to construct the three bores that were set at 1350 mm ID to match the internal main cell diameters. Each bore was cast in a single operation using 40 MPa structural concrete.

The final stage in the operation was to install a 1350 mm high-strength UV cured fibreglass Berolina lining through the culverts to provide a smooth bore structural lining with a design life of 75 years. ITS completed the work efficiently, effectively and to the client's specification.



extended to take additional traffic lanes. The northern extension, however, was sized at 1200 mm, which, at times of heavy rain, was restricting the flow of water into the culverts. This caused flooding to the upstream creek valley and threatened local property and the university campus.

The project identified the probability of one or more of the culverts becoming blocked under a one-in-100-year storm event, resulting in flooding to the surrounding area and the possibility of an eventual collapse of the culvert that would risk the security of the motorway. Therefore, the feasibility review recommended that the pipes at the upper ends of the culvert set be enlarged to a common

ITS PipeTech  
[www.itspipetech.com.au](http://www.itspipetech.com.au)



Type 8905

Reliable drinking water analysis  
has never been this easy!

**bürkert**  
FLUID CONTROL SYSTEMS

**Executing the reliable measurement, storage and transmission of all relevant water parameters.**

- The compact housing contains the display unit and up to six sensor cubes. Currently the following sensor cubes are available: ORP, pH, chlorine, turbidity, conductivity. Coming soon: SAC 254 & iron.
- The hot-swap function makes it possible for a single sensor to be removed or added without interrupting operation.
- The user interface allows user-friendly operation of the device and can also display additional sensors outside of the housing. (Up to 30 sensors)

**Now with a simple cleaning process!**

- The control module automatically carries out the cleaning in a time-controlled process.
- The cleaning system enables measurements with long-term stability.



*Compact cleaning module for the Type 8905 means seamless & simple cleaning.*

Want to know more? Call us on 1300 888 868.

[www.burkert.com.au](http://www.burkert.com.au)



# Simpler solar cell design

removes the need for doping

©PVLab-EPFL

An international research team has developed a new silicon solar cell, said to promise cheaper manufacturing processes and better power output in just seven steps.

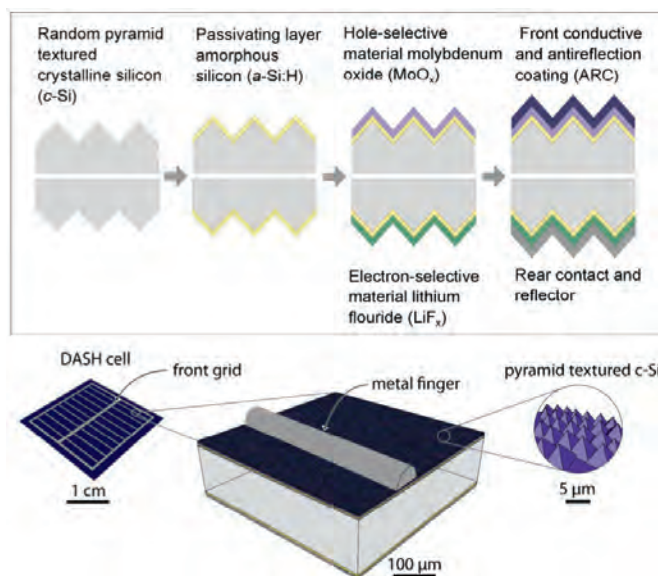
**P**ublished in the journal *Nature Energy* by US, Swiss and Australian researchers, the breakthrough saw the application of a new mix of materials to a standard solar cell design.

The goal of the research was to eliminate the need for a process called ‘doping’, which introduces foreign atoms to a solar cell’s crystalline silicon wafer in order to enhance electrical conductivity. These atoms either have electrons to spare when they bond with silicon atoms or alternatively, generate electron deficiencies — so-called ‘holes’.

The two types of dopant atoms are required at the electrical contacts to regulate the way that electrons and holes travel across a solar cell so that sunlight is efficiently converted to electrical current flowing out of the cell. However, the method can also make a solar cell device’s processing more complicated and cause losses in performance.

In contrast to this process, the researchers took the crystalline silicon wafer and applied layers of dopant-free amorphous silicon for surface passivation. They then applied ultrathin coatings of a material called molybdenum oxide at the sun-facing side of the solar cell and lithium fluoride at the bottom surface. The two layers act as dopant-free contacts for holes and electrons, respectively.

“Moly oxide and lithium fluoride exhibit extremely high and low work functions,



*In this illustration, the top images show a cross-section of a solar cell design that uses a combination of moly oxide and lithium fluoride. The bottom images shows the dimensions of the DASH solar cell components. Image credit: Nature Energy 10.1038/nenergy.2015.31*

respectively, which make them ideal for dopant-free electrical contacts,” said lead senior author Professor Ali Javey from UC Berkeley and the Berkeley Lab. The difference means that when sunlight hits the silicon and creates an electron-hole pair, the electron is drawn to the lithium fluoride, while the hole goes the opposite way, which creates an electric current.

The dopant-free silicon cell — referred to as a DASH cell (dopant-free asymmetric heterocontact) — promises a low energy footprint because it is manufactured below 200°C, in contrast to conventional doped cells which are made at above 800°C. The cell also does not require the often

toxic chemicals used to dope conventional materials.

“If you look at the architecture of the solar cell we made, it is very simple,” said lead author James Bullock, a PhD student who was visiting the Berkeley Lab and UC Berkeley from The Australian National University (ANU). “That simplicity can translate to reduced costs.”

While dopant-free silicon cells have never before exceeded 14% efficiency, the new cell has an efficiency approaching 20% — close to that of a doped cell.

“[And] there is nothing to say we can’t get to the world-record efficiencies, over 25%, using this approach,” said co-author Professor Andres Cuevas from ANU.

**Cerlic****ELETTA**  
GROUP**WASTEWATER  
SYSTEMS**

# IF YOU CAN'T MEASURE IT, YOU CAN'T CONTROL IT

## CERLIC SLUDGE BLANKET PROFILE SENSORS

### *See the sludge level...*

#### PROVEN NEAR INFRARED (NIR) TECHNOLOGY

- Directly measures total suspended solids concentration (mg/L, ppm or %TSS)
- Choice of 2% or up to 5% TSS (e.g. primary or thickened sludge) models
- Not an indirect, compensated ultrasonic echo or turbidity sensor

#### FULLY AUTOMATIC (MOTORISED) CBX

- Measure Sludge Blanket & Fluff (unsettled or rising solids) when triggered by rake, SCADA or timer
- Real-time TSS concentration vs depth for full sludge profile
- Continuous 4-20mA or Profibus DP (including temperature)
- Tilt switch for tangle prevention & self-cleaning (cable + sensor) for low maintenance

#### HANDHELD MULTITRACKER UNIT

- Plug 'n play Sludge Blanket Profile, DO & RAS / WAS (5% TSS)
- Backlight display, datalogging (with PC sync) & alarm points

### *...rather than trying to hear it!*

#### KARI FLOAT SWITCHES



Reliable pump / valve control with multiple level alarms from a single float for tangle free operation



#### WEKA MAGNETIC VISUAL LEVEL INDICATORS

- Custom made locally
- +GF+ PVC & PVDF
- 316SS
- Measuring scales & level alarms.





## A filtration system for heavy metals

Researchers from ETH Zurich have developed a filtration system that is very efficient at removing various toxic heavy metal ions and radioactive substances from water. Their research, published in the journal *Nature Nanotechnology*, could be used to combat one of the most serious problems in the world today.

Until now, no satisfactory technical solution has been found for the treatment of water contaminated with heavy metals or radioactive substances.

Existing methods used to remove water from heavy metals have several disadvantages: they are too targeted at a specific element, their filter capacity is too small or they are too expensive.

Now, Professor Raffaele Mezzenga and researcher Sreenath Bolisetty have created a simple filtration system with a hybrid membrane at its heart. Heavy metal ions can be almost completely removed from water in just a single pass through the filter membrane.

The hybrid membrane is made up of activated charcoal and tough, rigid whey protein fibres — both of which are cheap to obtain and simple to produce. The whey proteins are denatured, which causes them to stretch and ultimately come together in the form of amyloid fibrils. Together with activated carbon, these fibres are applied to a suitable substrate material, such as a cellulose filter paper.

The hybrid membrane absorbs various heavy metals in a non-specific manner, including industrially relevant elements, such as lead, mercury, gold and palladium. It also absorbs radioactive substances, such as uranium or phosphorus-32, which are relevant in nuclear waste or certain cancer therapies.

Moreover, the membrane eliminates highly toxic metal cyanides from water. This class of materials includes gold cyanide, which



*Sreenath Bolisetty and Raffaele Mezzenga examine a sample of their novel filter membrane in the laboratory.*

is used commonly in the electronics industry to produce conductor tracks on circuit boards. The membrane provides a simple way of filtering out and recovering the gold.

The filtration process is very simple: contaminated water is drawn through the membrane by a vacuum, which could be something as simple as a hand pump. As they are drawn through the filter, the toxic substances 'stick' to the protein fibres, which have numerous

binding sites. The large surface area of the activated charcoal can also absorb large quantities of toxins. In addition, the protein fibres lend mechanical strength to the membrane and at high temperatures allow the trapped ions to be chemically converted into metallic nanoparticles.

In tests with mercury chloride, the mercury concentration present in the filtrate fell by more than 99.5%. The efficiency was even higher with a toxic potassium gold cyanide compound, where 99.98% of the compound was bound to the membrane, and with lead salts, where the efficiency was larger than 99.97%. With radioactive uranium, 99.4% of the original concentration was bound during filtration.

The efficiency of the filtration system can be increased to the desirable requirements by simply increasing the protein content in the membrane, allowing even large volumes of water to be filtered cost-effectively. For example, to filter half a litre of contaminated water, the researchers used a membrane weighing just a tenth of a gram, of which 7% was made up of protein fibres.

"One kilo of whey protein would be enough to purify 90,000 litres of water — more than the amount of water needed in a human lifetime," said Professor Mezzenga.

## Switch to solar for Telstra

Telstra has switched on its largest ever AC Grid Connect solar power systems at the Deer Park and Lyndhurst exchange buildings to help improve its environmental footprint.

The buildings' new 30 kW solar panel systems are each expected to produce

around 40,000 kWh of energy from the sun every year.

The solar energy generated will be used to power the exchange buildings, reducing Telstra's grid consumption at each site by around 10%.

Solar panels on Telstra exchange buildings are common across rural and remote parts of Australia; however, the installation of large capacity AC Grid Connect solar systems to metropolitan exchange buildings is a first for the company. Telstra Property Executive Director John Romano said it was envisioned more solar panels would be installed in the coming months.

"Our network facilities consume energy 24 hours a day, seven days a week and account for 89% of Telstra's carbon emissions.

Last year, we reduced our overall carbon emissions intensity by 27% by closely managing our energy use and adopting innovative ways to bring it down."

Romano said with approximately 120 large exchange buildings across the Melbourne metropolitan area alone, there was a significant opportunity to continue reducing their environmental impact.

"We will continue to assess and monitor how successful these panels will be in reducing costs and the impact these buildings can have on the environment," he said.

"In the coming years we will look to further expand the rollout of solar panels to ensure that we can continue to meet the targets set out in our environmental action plan."



# INTELLIGENT WATER QUALITY NETWORKS

The revolution of intelligent water networks started with the integration of mobile telephony technology as a communications platform for analytical equipment, the first of which started with battery-powered pressure and flow monitoring devices. These pressure and flow monitoring data loggers were used to great effect to reduce non-revenue water loss during the millennium drought in Australia. The loggers had general packet radio service (GPRS) communications so that they could be deployed in remote areas, with the data being transmitted back to a central location for analysis.

With the internet of things (IOT), today's technology is growing at a rapid pace. While pressure and flow monitoring is still a very current issue, the need to understand and manage more water quality parameters has seen the development of analytical sensors using GPRS/GSM technologies.

Evoqua Water Technologies is offering two products to address this need with sensors providing high-resolution monitoring of critical water quality parameters, as well as pressure and turbidity monitoring.

## Chloroclam® Water Quality Monitor

The battery-powered, GPRS/GSM-enabled device provides free or total chlorine measurement using the Wallace & Tiernan® FC1 or TC1 membrane probes, while also measuring temperature. Customers using the Chloroclam monitor have been able to optimise network re-chlorination, understand water age and identify chlorine dead zones in their networks. The Chloroclam monitor has reduced the need for time-consuming manual dihydropyrimidine dehydrogenase deficiency (DPD) testing, and has reduced health and safety issues associated with manual dosing of sodium hypochlorite. The Chloroclam monitor also has a smart phone app, which visualises the chlorine residual reading in real time. The app can also provide on-site calibration adjustments to the Chloroclam monitor via Bluetooth communications.

## Hydraclam® Water Turbidity and Pressure Monitor

The battery-powered Hydraclam monitor has the ability to measure



pressure, low-range turbidity and electrical conductivity. The Hydraclam monitor measures water quality parameters to help customers to calibrate hydraulic water models, understand the flow patterns of mixed water sources and predict water discolouration events in the network, among many other applications.

The Chloroclam and Hydraclam monitors communicate via a secure web portal. The web portal incorporates Google Maps for device visualisation and network location. The web portal enables alarm functionality for user-defined alarms that can be sent via SMS or email. The web portal also offers a data analysis tool to understand the data that is being transmitted from the devices. The sampling frequency and data upload times can be adjusted by the customer to suit their data requirements.

The Chloroclam and Hydraclam monitors are highly mobile and portable loggers. They connect to existing fire hydrant points in the reticulation network, so no mains tapplings are required. Evoqua Water Technologies also provides mechanical protection (enclosure) options for both sensors, fast and safe connection, fittings and instructions. The high mobility of the loggers enables customers to rapidly deploy the loggers across their network zones.

Gone are the days of waiting for water quality laboratory reports to highlight issues in the reticulation network. Next to real-time water quality data is available now with the Chloroclam and Hydraclam monitors.

These innovative products complement the large Wallace & Tiernan® product line of analytical and control equipment for water treatment/disinfection in gas or liquid chlorination.

Wallace & Tiernan® — the inventors of the chlorinator more than 100 years ago, still delivering safe water solutions for generations to come.

**Wallace & Tiernan®**  
an EVOQUA brand

**Evoqua Water Technologies Pty Ltd**  
[www.evoqua.com.au](http://www.evoqua.com.au)



## E-waste processing in a blue box



The Victorian Government has put \$470,000 towards the purchase and installation of a state-of-the-art machine capable of processing large quantities of electronic waste in a fast, efficient way.

The BluBox, developed in Switzerland, has been licensed for use by PGM Refiners in Australia and New Zealand. Victorian Minister for Environment and Climate Change Lisa Neville visited PGM Refiners to launch the automated e-waste processing system in January.

The technology will be able to process 2500 tonnes of e-waste each year — from laptops and tablets to hairdryers and toasters — recycling more than a tonne of e-waste an hour. It will produce saleable commodities through resource recovery, which can be used by local manufacturers to create new products.

The Victorian BluBox is specifically designed to process LCD screens, as traditional LCD manual dismantling can be an environmental and



safety hazard. This is due to the backlighting tubes, which contain hazardous mercury vapour and mercury solid. The new process captures this vapour and solid.

"This Australian-first technology represents a significant advancement in how we process e-waste, demonstrating our commitment to keeping these materials out of landfill," said Neville.

"This machine will reduce environmental and health impacts by eliminating the need to manually dismantle products, which can be unsafe and labour-intensive."

## Farting microbes serve as a source of biogas

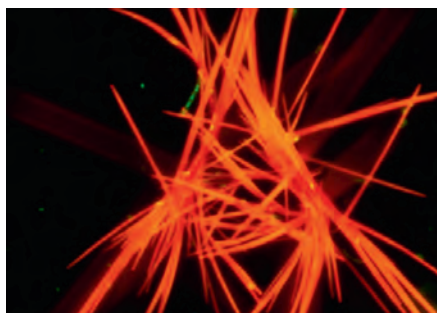
Researchers from the University of New South Wales (UNSW) have discovered a way to increase the amount of methane gas emitted by naturally occurring microbes living in coal seams and on food waste. Their work could extend the lifespan of coal seam gas wells, as well as improve the economics of using woody crops and leftover food as commercial sources of biogas.

Writing in the journal *Energy & Environmental Science*, the researchers explain that their technique involves the addition of small amounts of a synthetic dye that forms previously unobserved needle-like crystals to help the methane-producing microbes grow faster.

"If the microbes grow faster, they fart more methane," said the study's senior author, Associate Professor Mike Manefield.

The researchers studied a small synthetic molecule called neutral red that has been used for more than 150 years as a textile dye or for staining cells under a microscope. Associate Professor Manefield explained, "We knew it was able to shuttle electrons about, and we wondered if it could deliver them directly to the microbes that produce methane."

"When we added neutral red in the laboratory to a mixture of coal and naturally occurring groundwater microbes, in the absence of oxygen, we discovered it formed crystals that had never been seen before," he continued.



"The crystals act as electron sponges, harvesting electrons from minerals and bacteria in the mixture and then transferring them with a lot of power to the methane-producing microbes, boosting their growth."

The technology was also tested in a real-life environment in coal boreholes near Lithgow. Small amounts of neutral red were injected 80 m underground at three sites into the water-saturated coal

seam. A fivefold to tenfold increase in methane production was observed during a 12-month period.

"Our research in the lab and in coal boreholes near Lithgow has shown that the crystals can lead to a massive leap in methane production — a tenfold increase from coal and an eighteen-fold increase from food waste," said Associate Professor Manefield.

Biogas emitted by microbes will be vital for meeting the world's future energy needs and helping reduce greenhouse gas emissions from the burning of other fossil fuels, according to Associate Professor Manefield, who said the discovery is "likely to be a game changer".

"Coal seam gas wells usually have a short lifespan and spent ones litter the countryside," he said. "Enhancing their methane production could reduce the need to build new ones."

"We also expect our approach will work with renewable feedstocks for methane-producing microbes, such as woody plant material and the by-products of municipal wastewater treatment."



# arbs 2016

17-19 May 2016 MELBOURNE CONVENTION & EXHIBITION CENTRE

air conditioning, refrigeration & building services exhibition



## PEOPLE - PRODUCTS - NETWORKING WE CONNECT YOUR INDUSTRY

The largest international HVAC & R and Building Services  
trade exhibition ever held in Melbourne

- ❄ hundreds of national & international manufacturers & suppliers
- ❄ cutting-edge products & technologies, informative seminars & tech talks
- ❄ the ultimate networking event

Register **NOW** at **arbs.com.au**



SEMINAR  
REGISTRATION  
OPEN!



## New wastewater treatment option for SA councils

A wastewater treatment system designed at Flinders University has been accepted as an alternative to existing passive lagoon systems for use in South Australia. Flinders University Professor Howard Fallowfield said the new system is smaller, faster and more effective than current systems, creating the potential to reclaim more water for alternative use.

Wastewater treatment systems are used by South Australian councils for towns outside metropolitan areas sewered by SA Water and in locations such as mining camps. Centralised treatment systems are commonly installed in non-sewered (mostly rural) areas, generally where disposal of effluent by on-site systems is made difficult by space constraints, poor soil absorption, failed soakages or other issues that create a potential public health issue.

With funding from the State Community Wastewater Scheme (CWMS), the Flinders research team installed a high-rate algal pond at Kingston-on-Murray for a side-by-side trial with a conventional system. The trial saw the new system independently evaluated and subsequently approved by the SA Department of Health.

"Our final report demonstrated that our system occupied about 40% of the area previously required, with the smaller footprint opening up the technology to other rural communities that previously had insufficient land area," Professor Fallowfield said.



*Professor Howard Fallowfield at the trial high-rate algal pond system at Kingston-on-Murray.*

"These sustainable, low-energy systems are [also] cost-effective to run, and the capital cost of construction is also about 40% of the previous system for effluent-only schemes and marginally higher for blackwater schemes."

Independent reviews by the Australia Water Quality Centre validated the system and found that its ability to remove pathogens was equal to, or better than, the existing system. Professor Fallowfield noted, "Whereas the current system takes 66 days to do the treatment, we can do it in between five and 10 days."

Professor Fallowfield said with more reclaimed water available to irrigate woodlots, the new system is a winner both environmentally and economically. Furthermore, "With the configuration pre-approved, a consulting engineer can apply the technology off the shelf," he said.

The SA Department of Health Wastewater Management Group, the regulator of the state's wastewater treatment systems, has accepted the new system. The SA Local Government Association, which administers state subsidies for new council wastewater treatment systems, will meanwhile be alerting councils to the new option.

**Flinders University**  
[www.flinders.edu.au](http://www.flinders.edu.au)

## Solar project saves more than just energy

A 6 kW<sub>p</sub> ground-mounted solar system for rail freight business Pacific National is expected to generate over 12,000 kWh of clean energy annually in sun-saturated Parachilna in South Australia.

Designed, constructed and installed by YINGLI 4 YOU partner Linked Group Services, the north-orientated Parachilna

Wayside Rail Monitoring Site was connected in May 2015 and consists of 24 YGE Polycrystalline 250 W panels from Yingli Solar, four Schneider Electric MPPT60 inverters as well as the Schneider SW4024 inverter.

Pacific National required a stand-alone power supply that included a 6 kW<sub>p</sub> ground-mounted solar system and a building that would house rail monitoring equipment, which can be accessed remotely, all confined within an eight-metre rail corridor.

Located north of Port Augusta, Parachilna is an area that sees hundreds of compartments filled with cargo that travels across the railway tracks of interior Australia.

Not only does the installation generate enough energy to meet required load and air conditioning as well as provide two days

of autonomy with a back-up generator, it also significantly reduces the chances of derailment of a train in the Flinders Ranges.

Pacific National's mechanical equipment specialist, Matthew Robertson, said the company is thrilled with the project outcomes.

"We are so impressed with the result of the monitoring site in Parachilna, South Australia, we are looking to develop more in Queensland," said Robertson.

"Our focus is to reduce Pacific National's carbon footprint by implementing environmentally sustainable changes whilst accessing remote areas more efficiently."

**Yingli Green Energy Australia Pty Ltd**  
[www.yinglisolar.com/au](http://www.yinglisolar.com/au)



Image courtesy of Linked Group Services

10-12 May 2016

Melbourne  
Convention and  
Exhibition Centre

AUSTRALIAN<sup>®</sup>  
WATER

ASSOCIATION

Water: For Liveable  
Communities and  
Sustainable Industries



ozwater'16

*Australia's international  
water conference & exhibition*

**REGISTER NOW!**

**Some of Ozwater'16 keynotes include:**

- Kerry Bodine – Co-author of Outside In: The Power of Putting Customers at the Centre of Your Business
- Professor John Thwaites – Chair of ClimateWorks, Chairman of Melbourne Water
- Aromar Revi – Director, Indian Institute for Human Settlements
- Holly Ransom – CEO, Emergent Solutions

**Ozwater'16 will showcase the latest in:**

- Liveable and Sustainable Cities of the Future
- Operations and Asset Management
- Governance, Regulation and Structure
- Customers and Community
- Contemporary Management
- Water for Rural, Remote and Regional Communities
- Sustainable Industries

**Ozwater'16 will feature workshops on:**

- Transitioning to a water sensitive city – part 1 and 2 – CRC for Water Sensitive Cities
- Validating Water Treatment in Integrated Water Management: Introducing 'Waterval' – Australian Water Recycling Centre of Excellence
- Future water infrastructure investment – where will the money come from? – Aither Pty Ltd
- Enhancing Business Outcomes through education – Australian Water Association, Water Education Specialist Network...and more

PRINCIPAL SPONSORS:

For a detailed program and to register visit

[www.ozwater.org](http://www.ozwater.org)





## Tackling tough water treatment jobs

UK water treatment specialist Siltbuster has reported that a number of recent applications have seen its Bredel hose pumps, from Watson-Marlow, tested to the full.

Since the launch of the original Siltbuster unit in 2003, Siltbuster has become an authority on water treatment, wet waste and the prevention of waterborne pollution from construction and industrial sites. Among the company's solutions is a range of equipment for silt management and the prevention, control and treatment of water contamination.



"We've been using Bredel pumps in our solutions for a number of years and have amassed quite a number," said project engineer Alex Spyropoulos. "Sludge transfer on DAF (dissolved air flotation) units is a good example of an application where we have extensive numbers of Bredel pumps in action. Here, we use Bredel 25, 40 and 50 heavy-duty hose pumps to help manage sludge production.

"Bredel pumps produce much higher pressure on the discharge side, which also makes them favourable over electric diaphragm pumps in applications where there is a steep gradient or deep tank. The fact that they are self-priming offers additional process benefits over some alternative pump technologies."

Spyropoulos can recall a couple of recent applications where the product being pumped tested Bredel's technology to its limits.

"One of the applications I have witnessed involved a switch from a progressive cavity pump to Bredel hose pump at a brewery which had kieselguhr (diatomaceous earth) amongst other difficult media in the sludge," he said. "It proved to be highly abrasive on the PC pump, but the Bredel managed very well. This, in addition to the fact the Bredel units are able to handle a considerable volume of sludge, means we consider this technology to be tough and fit for purpose."

Elsewhere, Spyropoulos recounts an application at a refinery, where Bredel 50 pumps were deployed to pump crude oil.

"Pumping crude oil is a very aggressive application, so we used Bredel CSM hose elements to ensure chemical compatibility and good hose life," he said.

In applications such as these, the selection of hose elements is critical to ensuring pump performance and durability. Bredel CSM composite-reinforced hoses are constructed from high-quality compounded rubbers

reinforced with four individual layers of braided nylon and finished by high-precision machining.

Bredel hose pumps have tackled tough media such as kieselguhr and crude oil with ease, indicating that the robust pumps are suitable for extreme tasks.

**Watson-Marlow Fluid Technology Group**

[www.wmftg.com.au](http://www.wmftg.com.au)

## Ready for the field?

## AMS

**AMS INSTRUMENTATION & CALIBRATION PTY LTD**

Phone: +61-3-9017 8225  
Fax: +61-3-9729 9604  
E-mail: [sales@ams-ic.com.au](mailto:sales@ams-ic.com.au)  
Internet: [www.ams-ic.com.au](http://www.ams-ic.com.au)



Being a field calibration technician is a tough job: you need to have many skills and carry multiple devices, environmental conditions can be challenging and constantly changing, documentation of data takes time and is difficult in the field and work efficiency requirements are demanding. However, having the right gear makes the work much easier and also more efficient. Learn more at [beamex.com/readyforthe field](http://beamex.com/readyforthe field)



**beamex**

WORLD-CLASS CALIBRATION SOLUTIONS

[www.beamex.com](http://www.beamex.com)  
[info@beamex.com](mailto:info@beamex.com)

# CITY OF SWAN IS THINKING GREEN

**A** local government is using a grassroots approach to engage its residents in sustainability through a 'Thinking Green' series.

City of Swan Mayor Mick Wainwright said the City operates on a Place Management approach, meaning each Place area within the City is considered individually for its needs, programs and approach.

"We have used this Place Management model to make sure that residents in all areas can access quality information on sustainable living that is relevant to them," he said.

"The City of Swan stretches over 1,044 square kilometres and takes in residential, rural, industrial and commercial areas.

"Thinking Green has been delivered through our libraries and has proven so popular with the community we have expanded the program to additional areas, holding workshops in community halls in places where we don't have libraries."

Mayor Wainwright said increased attendances from 2014 to 2015 and considerable registrations for this year's program showed a strong interest in the community for more information on sustainable living.

"In 2015 we had 602 community members attend the 22 workshops offered, nearly double the attendance of the first Thinking Green series presented in 2014 despite there being three less workshops," he said.

"The community of Gidgagannup may be small, with about 2,800 people, but we have found them to be particularly receptive to the workshops.

"We extended the program to the township in 2015 and had 106 people attend the five sessions there.

"This year we have extended to include the Swan Valley and will run a total of 30 workshops throughout the City.

"We already have strong registrations across the City for the 2016 sessions, including some fully booked workshops on worm farming and chemical free cleaning."

Mayor Wainwright said the City attributes part of the growing success of the Thinking Green program to listening to and working with the community.

"At every workshop we seek feedback from attendees to find out their thoughts on the session they have just completed but also so we know what other workshops they would be interested in attending; we use this information in our forward planning.

"Through this program, the City is also supporting the community to embrace sustainable living by providing a subsidy towards the purchase of a worm farm for residents and ratepayers who attend the worm farming workshops.

Workshop topics in 2016 include greywater systems, chemical free cleaning, worm farming, edible weeds, living the small



*Kevin Smith from the Worm Shed, presenting at a Worm Farming workshop at Guildford Library.*

holding lifestyle, introduction to beekeeping and birdwatching talk and walk sessions.

There will also be special workshops in April for children called Spineless Wonders, where they learn about insects and other invertebrates and experience a hands-on encounter with live mini-beasts.

Additionally, the City has organised "eco home audits", which are offered to the community for free to help them make their energy and water use more efficient and reduce household waste.

As part of this program, an experienced auditor from Environment House visits the resident's house to consult with them and identify actions they can take to reduce their carbon footprint.

Mayor Wainwright said the Thinking Green program was part of the City's broader commitment to a sustainable region.

"The City has a strong environmental focus, both on reducing our own carbon footprint and helping our community to do the same," he said.

"Thinking Green is a partnership between our Sustainable Environment team and Swan Libraries, working with our community to help them to achieve their own sustainability goals.

"It isn't enough for the City alone to be working on being more sustainable; we need to have the community at all levels 'thinking green' and it is part of our responsibility to help them achieve this where possible."

**City of Swan**  
[www.swan.wa.gov.au](http://www.swan.wa.gov.au)





# Sustainable wastewater treatment thanks to codigestion

Mitch Laginestra and Ross Carter\*



Can wastewater treatment become more sustainable?

While the goal of treating wastewater is to minimise the impact on the receiving environment, the processes themselves are usually powered by electricity generated by fossil fuels. In particular, aeration for BOD reduction and biosolids management contributes to a high carbon footprint and, potentially, low sustainability aspect.

However, things are improving with energy costs driving reduction targets. A number of benchmark studies and installations demonstrate significant sustainability improvements.

Energy efficiency at treatment facilities is usually aimed at efficient aeration, low energy pumping and possibly solar and wind power installations. However, the greatest opportunity lies in the waste-to-energy program. This typically involves utilising anaerobic digestion for sludge stabilisation and producing biogas, with cogeneration used to produce electricity. There are several examples of cogeneration using biogas around Australia.

Consulting company GHD has been involved in a number of cogeneration projects both in the industrial sector and for municipal applications. The company is currently working with SA Water on a codigestion project at SA's largest plant, Bolivar Wastewater Treatment Plant (WWTP). Codigestion involves tanker offloading of high-strength waste to feed the anaerobic digesters, supplementing the existing WWTP sludge, which consequently produces more biogas to convert into electricity.

SA Water has been very progressive in establishing cogeneration facilities at its WWTPs. Trials at Glenelg WWTP (capacity of 60 ML/day) have led to a full-scale installation, which has boosted energy production to a point where the electricity self-sufficiency of the plant now lies at 72%. At Bolivar WWTP (150 ML/day), cogeneration and electrical production are currently at 63% self-sufficiency.

The current project aims to boost this even more with a permanent installation to receive additional external wastes. This will not only provide benefits to the plant opera-

tion's bottom line, but will also likely reduce the waste going to landfill. It will also deliver a significant economic benefit for the state through cost-effective disposal for certain types of trade waste and lower operational costs factored into water rates — a win-win situation.

GHD has also worked on codigestion plants in the USA, at Ithaca WWTP (38 ML/day) in New York and at Hill Canyon Treatment Plant (50 ML/day) in California. The latter recently upsized cogeneration (700 kW) and installed solar panels (150 kW). To further boost biogas production, Hill Canyon now receives a variety of high-strength waste streams in its codigestion process and, as a result, the plant has now achieved 100% self-sufficiency of its energy usage.

*\*Mitch Laginestra is GHD's Service Line Leader – Wastewater Treatment & Recycling. Ross Carter is a project manager at SA Water.*

GHD Pty Ltd  
[www.ghd.com](http://www.ghd.com)

# Reduce maintenance and operating costs

- Qdos metering pumps slash chemical costs with accurate and linear flow, even when process conditions vary
- ReNu pumphead fully sealed for life, one minute maintenance
- Peristaltic design means no costly valves, seals or liners to gas lock or maintain
- Bredel pumps use between four and six times less process water\*
- Bredel hose pumps can handle extremely high dry solid content, up to 70% by volume



**Bredel**

*Hose Pumps*

\* vs centrifugal pumps

[www.wmbpumps.com.au](http://www.wmbpumps.com.au)  
Tel: 1300wmbpumps

**WATSON  
MARLOW**  
Fluid Technology Group





# GRUNDFOS HELPS YOU UNDERSTAND EFFICIENCIES FOR WASTEWATER PUMPS

**Increasing concerns about CO<sub>2</sub> emissions and energy costs has led to greater focus on energy use worldwide. Grundfos is uniquely positioned to ensure a correct understanding of efficiencies and how these combine with hydraulic free passage and constructional robustness in state-of-the-art wastewater pumps.**

**E**nvironmental issues have led to legislation that places new requirements on wastewater handling. Pumping wastewater through the collection network or around the treatment plant already accounts for a substantial part of the energy bills faced by municipalities and water utilities.

By choosing state-of-the-art wastewater pumps with the highest total efficiency, no compromise on hydraulic free passage and constructional robustness, you are well on the way to bringing down CO<sub>2</sub> emissions and reducing operating costs for wastewater pump systems.

Below you will find how Grundfos talks efficiencies on wastewater pumps. Unfortunately there is as yet no minimum efficiency standard for wastewater pumps, unless they are driven by fan-cooling electrical normmotors. At Grundfos, we have vast experience working with efficiency standards, and we also set our own standards to ensure optimum motor efficiency for our customers. We have prepared the following guide about wastewater pump efficiency, which will help you make the correct pump selection and avoid the most common pitfalls.

## Total efficiency

What matters to your energy bill is the total efficiency — meaning the total wire-to-water efficiency defined in the ISO 9906:2012 — and ANSI/HI 11.6 standards to which all wastewater pumps are tested. In a wastewater pump there will be electrical, mechanical, and hydraulic losses. A pump manufacturer needs to master all of these without compromising reliability. Grundfos does precisely this and can therefore supply high efficiency products.

## Electrical efficiency

The IEC 60034-30 - Part 30 (Ed.1.0) standard defines the minimum efficiency classes (IE codes) for electrical motors, single-speed, three-phase, cage-induction fan-cooled motors. When Grundfos states that a wastewater pump is made from IE3 motor components, it means that the motor components (i.e. stator and rotor), if built into a fan-cooled electrical norm motor, will meet and pass the IE3 efficiency class mentioned in the IEC 60034-30 standard.

Why not mark the wastewater pump with an IE3 label?

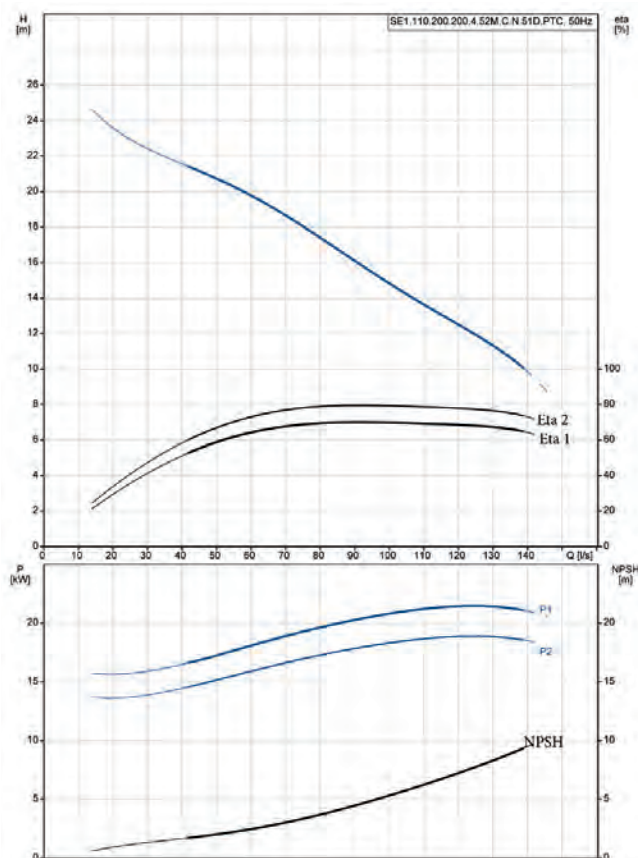


Figure 1

This cannot be done based on two points: First of all the IEC 60034-30 standard does not apply to other motors than single-speed, three-phase cage-induction motors i.e. not motors integrated in wastewater pumps. Secondly the constructional differences between a norm motor and a wastewater pump with integrated motor adds additional mechanical efficiency losses to the wastewater pump motor (e.g. angular contact bearings, shaft seal, etc.).

The Grundfos Product Center is an online search and sizing tool that helps you choose the right pump for installation or replacement, or find information about pumps you already have. Go to [www.grundfos.com.au](http://www.grundfos.com.au) and follow the links.



### Mechanical efficiency

Pump efficiency is only interesting if reliability is not compromised. Pump maintenance is costly, whether planned or unplanned, and Grundfos does not compromise on reliability with our products. For constructional robustness with key components, Grundfos for example, uses:

- Angular contact bearings: Even though angular contact bearings have higher friction losses compared to ordinary roller bearings, we have decided to keep these types of bearings to gain longer lifetime in heavy-duty operation.

To realise the hidden savings in your pumps, we offer a Grundfos Energy Check. By simple inspection of your pump installation, we calculate potential savings and make suggestions for high performing, energy efficient solutions.

A free report is included with every Grundfos Energy Check detailing your current pump installation and operation costs and how you can improve it to realise the savings. Find out more here: [www.expertenergycheck.com](http://www.expertenergycheck.com)



- Shaft seal: Grundfos pumps come with double mechanical shaft seals in a cartridge solution. This robust construction consumes additional energy, but ensures longer operational time and less downtime. Replacement is easily done in the field without the use of special tools.

### Hydraulic efficiency

Traditionally there has been a trade-off between free passage in hydraulics for reduced clogging, and high efficiency. Grundfos has resolved this traditional compromise and is able to supply wastewater pump systems that offer superior hydraulic efficiency over a wide operating range without compromising free passage.

### Reading curve charts and technical information

When reading curve charts and technical information the following needs to be observed. First of all one needs to be sure that the information given is according to the international performance acceptance test standards ISO 9906:2012 or ANSI/HI 11.6. Otherwise it will not be possible to compare the different pump manufacturers' products against each other.

Secondly always make sure to use the total efficiency as reference. Only by learning about the total efficiency can you be sure that all internal losses due to friction developed in bearings, shaft seals, etc. are included.

An example of this can be seen in Figure 1. In the curve chart the pump performance curves are shown. The upper efficiency curve (Eta2) is the pump efficiency curve (eta pump). The lower efficiency curve (Eta1) is the total efficiency curve (eta pump + motor), taking all electrical, mechanical, and hydraulic losses into consideration.

The difference between the two efficiency curves is the sum of all other losses (electrical and mechanical), and includes hereby also friction losses from e.g. angular contact bearings and shaft seal that is needed to make a robust wastewater pump.

Many companies publish "motor efficiency" as well, often as one figure valid for the best efficiency point (BEP). When using the motor efficiency, always pay attention to what is included, as some include only the electrical losses, and hereby ignore the mechanical losses.

So — once again — always compare total efficiency during pump selection, as it is the only efficiency figure defined by international standards, and what matters to your energy bill.



Grundfos Pumps Pty Ltd  
[www.grundfos.com.au](http://www.grundfos.com.au)



## A refuse-collecting robot

The Volvo Group is working on a joint venture, together with three universities and waste recycling company Renova, to develop a robot that automatically collects and empties refuse bins, with the help of a drone on the roof of the refuse truck.

The idea is that when it is time to begin waste collection, the driver of the refuse truck presses a button. This starts the robot

Another example is a camera on the truck that detects if someone comes too close while the bins are being emptied. If this occurs, the process automatically stops.

It took the students and researchers from the three participating universities four months to design and build the prototype robot that automatically collects and empties the refuse bins. Sweden's



Illustration: Adrian Wirén, Mälardalens Högskola.

and lifts the drone from the roof of the truck. Flying through alleyways, the drone quickly finds the location of the refuse bins and communicates their positions to the robot. This is followed by automatic waste collection and emptying by the robot. In the cab, the driver is able to monitor the exact location of the robot and the emptying process.

A prerequisite for the robot's work is that it already knows the neighbourhood in the form of a map of both the manoeuvrable area and likely bin locations. The robot then uses a number of different sensors to keep itself positioned within this map, enabling it to automatically perform its tasks. The sensors include GPS, LiDAR, cameras and IMU data, which uses accelerometers and gyroscope for navigation as well as odometry, where motion sensors measure the position changes over time.

Many of the robot's sensors are also used to ensure safety. One example is an emergency button, which immediately stops the robot if, for example, a child or a dog runs out in front of it.

Mälardalen University was responsible for designing the robot itself, while Chalmers University of Technology developed systems for bin detection, safe emptying and overall system coordination. Meanwhile, Penn State University in the US developed the web-based 3D interface that allows the driver to monitor the situation and, if need be, control the robot.

The project, called ROAR (Robot-based Autonomous Refuse handling), demonstrates how smart machines will soon be able to communicate with each other to facilitate everyday life in a large number of areas — not just refuse handling.

"We predict a future with more automation," said Per-Lage Götvall, project manager for robot development at the Volvo Group. "This project is intended to stimulate our imagination, to test new concepts that may shape transport solutions of the future."

*Volvo Group Australia Pty Ltd*

[www.volvo.com](http://www.volvo.com)

An advertisement for Veeder-Root sensors. It features a close-up of a person's eyes, looking directly at the viewer. The eyes are blue and have a digital, pixelated appearance. The background is dark and textured. Text is overlaid on the image, including the company name 'VEEDERLINE' and a website address.

HVAC  
Dynapar Veeder-Root Eagle Signal Line Seiki Keyence Maple Greystone Novotechnik TWK AECO  
PLCS  
Time Count Rate Flow  
Enhancers HMI's Controllers  
ph: 1 300 553 500 enhance your sensors VEEDERLINE [www.veederline.com.au](http://www.veederline.com.au)

A graphic for a disclaimer notice. It features a person in a yellow shirt and black pants, holding a large white sign with a blue border. The sign has the word 'disclaimer' in large, bold, black letters, and the word 'notice' in smaller, bold, black letters below it. The background is a solid blue color.

**disclaimer**  
**notice**

All material published in this magazine is published in good faith and every care is taken to accurately relay information provided to us. Readers are advised by the publishers to ensure that all necessary safety devices and precautions are installed and safe working procedures adopted before the use of any equipment found or purchased through the information we provide. Further, all performance criteria was provided by the representative company concerned and any dispute should be referred to them.

# Detecting changes of water quality at an early stage



## Series DCX-22 CTD

Data Logger for Conductivity, Temperature and Depth (Pressure)

- ✓ Maintenance-Free
- ✓ Autonomous
- ✓ Ø 22 mm
- ✓ Stainless Steel, Hastelloy or Titanium
- ✓ Including Logger 5 Software

Conductivity  
Temperature  
Depth

Ranges from 0,2 to 200 mS/cm  
Accuracy 0,1 °C  
0,02 %FS, up to 200 m

The KELLER  
Water Website



keller-H2O.com





## Diffuser system cuts wastewater treatment costs



*Diffusers in action at South Rockhampton Sewage Treatment Plant providing high-efficiency oxygen transfer and generous mixing.*

Many Australian councils face the three-pronged challenge of treating the growing amounts of wastewater caused by population growth, managing the cost of this treatment and meeting and complying with new and stringent discharge limits. Rockhampton Regional Council is one such council.

The South Rockhampton Sewage Treatment Plant currently serves a population of more than 19,000 people, which is no mean feat — especially given that the price of electricity in Queensland rose more than 20% in July 2013 and that the plant must keep under the effluent limit of 5–10 mg/L for total nitrogen.

However, thanks to an upgrade of the treatment plant — which includes using a diffuser system said to be one of the most efficient in the world — the Rockhampton Regional Council has achieved a total nitrogen limit as low as 3.1 mg/L while aiming to reduce electricity costs by up to 20%.

“More than half of the energy used in a treatment plant such as ours is consumed in the biological/aeration process,” said Cr Greg Belz of Rockhampton Regional Council. “This is why we have upgraded the plant by retrofitting it with the highly efficient aeration system of AeroStrip diffusers.”

The diffusers are used to supply oxygen in biological reactors for the treatment of municipal and industrial wastewaters. With their tiny 1 mm bubbles and perforated polyurethane membrane, they have good efficiency and

longevity. The diffusers were installed by Hydroflux Huber.

“Aerostrips are easy to retrofit into existing sites,” said Hydroflux Huber Director Luis Bastos. “What makes them particularly popular is that, as a result of the superior materials used in their construction, they outlast all other diffuser technologies on the market.

“The main benefits of the AeroStrip diffusers are the significant power savings they achieve by the high oxygen transfer rate 4–5 kg O<sub>2</sub>/kW and the robustness of the membrane, which has a life of greater than 12 years. All of this is without fouling or loss of pressure.”

“We chose Hydroflux Huber to install 80 of these four-metre Aerostrips not only because they will cut our energy use while reducing our carbon footprint, but also because Hydroflux Huber provided performance guarantees for the installation,” said Cr Belz.

Since the installation, the site is achieving outstanding effluent quality and energy efficiency. Independent testing verified the oxygen transfer rates guaranteed by Hydroflux Huber.

“Aerostrips have been installed at over 2000 sites worldwide,” said Bastos. “They have proved particularly popular in Queensland as Aerostrips also deliver cost savings in electricity and by lowering maintenance costs.”

*Hydroflux Pty Ltd*

[www.hydrofluxhuber.com.au](http://www.hydrofluxhuber.com.au)

# Dwyer

## THE ACCURACY YOU NEED, THE DEPENDABILITY YOU WANT.

Our high quality level transmitters have been trusted for years by those wanting only the best. We know many applications call for a cost effective yet highly accurate solution. That's exactly what we deliver.



TO LEARN MORE  
**(+61) (0) 2 4272 2055**  
[dwyer-inst.com.au](http://dwyer-inst.com.au)



## Hindu temple powered by solar

In the western Sydney suburb of Kings Park, a Hindu temple has embraced solar power.

A recent installation at Shree Swaminarayan Temple Sydney, completed by RK Solar and Consulting Services, comprises 100 Trina Solar Honey 260 W panels with Enphase M215 Generation 4 inverters, plus the provision to upgrade the system to utilise storage batteries. The system is estimated to produce 33 MW per year.

One of the founders of the Sydney Shree Swaminarayan Community, Dhanji Varsani, said the temple comprises two halls which are used every day from 6 am to 10 pm. "Our energy consumption is quite high," he noted, "as the buildings are centrally air conditioned and every weekend we cook food for our members." Lighting is also required to spotlight statues and paintings, he added.

Varsani said the new installation serves as a continuation of the community's solar generation policy. He said, "As the solar panels are now on one roof, we plan to increase our generating capacity by installing panels on the second roof."



Kunal Kapoor, of RK Solar and Consulting Services, said the installation was completed in two days. He expects the \$26,000 cost to be covered by the temple's savings in energy costs in three-and-a-half to four-and-a-half years.

"As the temple plans to have batteries installed at a future date, this would also reduce their evening and night-time usage of grid power," he added.

**Trina Solar**

[www.trinasolar.com.au](http://www.trinasolar.com.au)



### EVERYTHING YOU NEED TO STAY CONNECTED

ICS Communication Trailers now incorporate world-class Reserve Energy in our turnkey trailer solutions, ensuring vital communications remain connected.

- ✓ Ideal for harsh environments
- ✓ Highest energy density
- ✓ Up to 15 years design life
- ✓ Up to 2 years shelf life
- ✓ High reliability
- ✓ Vibration resilient

LEARN MORE



1800 010 027

[www.icsindustries.com.au](http://www.icsindustries.com.au)

[www.enersys.com](http://www.enersys.com)





© iStockphoto.com/Sean Locke

# Refrigerant trends for food retail in 2016

The quest for new, green refrigerants is on. Amidst alternatives, CO<sub>2</sub> is emerging as the most efficient, safe and clean refrigerant preferred by a growing number of global, regional and local retailers. Danfoss predicts 2016 will see a rapid increase in the number of CO<sub>2</sub> systems and new technologies to make the 'climate friendly' refrigerant an attractive solution.

**T**he last couple of years have seen difficulties for decision-makers in food retail to make a final choice when it comes to refrigerants and system type. Many refrigerant options and system configurations have been battling to receive attention. Supermarket refrigeration has been in the environmental spotlight and it has been revealed how leakage of HFCs in centralised systems is a major challenge. At the same time, energy efficiency has gained top priority in order to save costs and reduce the carbon footprint.

From this disarray, CO<sub>2</sub> is emerging as one of the most efficient, safe and clean refrigerants for food retail. In 2015 alone, Danfoss has seen an increase of more than 20% in the installed base of transcritical CO<sub>2</sub> systems in supermarkets compared to the

year before. Driven by the F-gas regulation in Europe and the SNAP regulation in the US, the installation of CO<sub>2</sub> systems is expected to accelerate in 2016 and 2017 led by major, global retailers.

The market is ready for this huge transformation in food retail refrigeration and the required technical solutions are in place. For the last 15 years, Danfoss and other refrigeration specialists have pioneered technologies for transcritical refrigeration. Today, a complete and well-tested product portfolio is available for climate-friendly and energy-efficient solutions.

## Heat reclaim is trending in food retail refrigeration

2016 will see a continued growing interest in transcritical CO<sub>2</sub> systems with heat reclaim. The solution is fast becoming standard and,

20 years from now, people will look back and wonder at the huge amount of surplus heat that is today wasted from the cooling systems of supermarkets.

The impressive amount of transcritical solutions with heat reclaim installed by now — mostly in colder climates — is only seen the tip of the iceberg. The installations have all confirmed that the refrigeration system can provide ample heat to fulfil demands for heating and hot water, eliminating the need for separate heating installations in the supermarket.

The heat reclaim solutions have returned energy savings of 20% or more and payback times of less than two-and-a-half years.

Looking further ahead, supermarkets will not only cover their own heating demand by heat reclaim, they will move from energy consumers to energy suppliers by offering the surplus heat to the local district energy grid. The obvious advantages are new revenue streams and reduced carbon footprints for the supermarkets.

## New technologies pave the way for CO<sub>2</sub> refrigeration in warm climates

CO<sub>2</sub> refrigeration is progressing to warmer climates, and 2016 is likely to see a breakthrough in transcritical solutions for subtropical and even tropical climates. New technologies are emerging as energy-efficient solutions that help retailers reduce complexity and meet current and future regulation on traditional refrigerants in all climates.

One such technology is the ejector, devised by Danfoss in close cooperation with refrigeration specialists from SINTEF. It increases the energy efficiency of parallel compression significantly and enhances the viability of transcritical refrigeration in warm climates.

The ejector is still in the prototype stage, but the initial trial set-ups in 10 supermarkets have shown that the simple ejector technology can increase the efficiency of the parallel compression system significantly. Furthermore, the technology allows smaller and more compact compressor packs to be installed in the first place.

Danfoss (Australia)

[www.danfoss.com.au](http://www.danfoss.com.au)

## WATER ANALYSIS SYSTEM

Bürkert's Type 8905 Online Analysis System has been designed for the continuous monitoring of treated and untreated waters and storage of the most important measurement parameters before water enters the supply network. The technology is aimed at plant construction companies and operators of drinking water treatment plants.

In the event of disturbances and/or exceedances, the system will be able to respond based on its programming, for example, by interfering with the treatment process or by sending messages to the personnel in charge. With its multiple capabilities, the online analysis system is suitable for any operator of water treatment equipment, optimising settings and controls for various process steps and contributing to the safe and efficient production of drinking water.

The product's sensor chips are integrated in so-called analysis cubes. The basic version comprises five measuring parameters laid out as separate analysis cubes: pH, reduction potential (ORP), conductivity, free chlorine and turbidity. Each cube fits into a housing measuring 7 x 7 x 4 cm.

The modules have hot-swap capabilities. As soon as a new sensor is plugged into a free slot of the fluidic backplane, it logs into the system and makes its features available to all other modules present in the system. The sensor knows the setting data that will be required for operating menus, configurations and its specific functionalities.

Users in the field can operate the system and/or individual modules using a 7" touch display. It also contains all the electronic modules required for control and for connecting to the various technical processes. In addition, it is possible to connect a PC to the system.

Bürkert Fluid Control Systems  
[www.burkert.com.au](http://www.burkert.com.au)



## Looking for Australia's best consultancy?

MRA's award-winning team\* provides specialist services that are proven to deliver both commercial and environmental benefits.



**Mike Ritchie**  
Director



**Roslyn Florie-George**  
Data and Analytics



**Julien Gastaldi**  
Carbon



**Ron Wainberg**  
Commercial Strategy



**Jodie Larsen**  
Auditing



**Tiffany Key**  
Education and Strategy



**David Cocks**  
Strategy and Infrastructure



**Sheelagh Laguna**  
Planning, Approvals and Compliance



**Virginia Brunton**  
Organics

To discover what MRA can do for your organisation please call **02 8541 6169**, email [info@mraconsulting.com.au](mailto:info@mraconsulting.com.au) or visit [mraconsulting.com.au](http://mraconsulting.com.au)

\*as voted by Inside Waste readers 2013-2016



**MRA**  
Consulting Group

THE SPECIALISTS IN  
RECYCLING, WASTE  
AND CARBON





## HIGH-PRESSURE, ZERO-LEAKAGE KNIFE GATE VALVE

Pentair Valves & Controls has launched the Keystone OS1700 — a bidirectional, zero-leakage ASME Class 150-rated knife gate valve designed to provide users in sectors from mining to pulp and paper with good performance at higher pressures.

The product has a full-round port and seat design that places the elastomer seat outside the flow path, minimising turbulence to extend the life of the valve and protect downstream pipework and equipment. It is suitable for inline or dead-end service up to full rated pressure.

Built to MSS-SP135 short pattern specifications, the valve is said to require less maintenance than other styles of knife gate valves. The MSS-SP135 short pattern face to face matches MSS-SP81 dimensions, so upgrading an existing knife gate installation is simple.

The product is suitable for challenging applications such as high-pressure slurry and oil sands applications. It also suits users looking for a product to protect against process pressure spikes that could damage an ordinary knife gate valve and any associated equipment.

It is available in sizes from NPS 2 to 48 (DN 50 to 1200). The precision-moulded elastomer seat — which is available in EPDM, HNBR or GUM — enables the valve to operate at up to 200°C.

Pentair Valves & Controls  
[pentair.com/valves/](http://pentair.com/valves/)

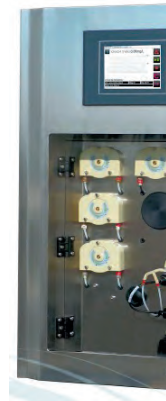


## ONLINE WATER QUALITY ANALYSER

The TOPAZ analyser is designed for automatic and continuous monitoring of several parameters amongst a large range of chemical compounds in all types of water. The product carries out water quality monitoring using a combination of analytical methods (colorimetry, titrimetry and potentiometry or selected absorption). With multistream capabilities up to six channels, the TOPAZ-F fulfils the industrial requirements and demands of fluoride analysis.

The analyser is suitable for the control of industrial processes such as raw waste industrial water, water treatment plants (urban and industrial), residual concentration of active chlorine, chlorine production and electro-chlorination, activated or recirculation sludge tank, effluents and influents continuous monitoring, and compliance with environmental regulations and guidelines. Further applications include alert stations and environmental monitoring for drinking and surface water, and refineries and exploration for the oil and gas industry.

AquaGas Pty Ltd  
[www.aquagas.com.au](http://www.aquagas.com.au)



Stand K27  
 OzWater 2016



## Data You Can Trust

The new Hydrolab **HL4**  
 Multiparameter Sonde

For measurements of popular  
 water quality parameters



**RELIABILITY**  
 know your instruments is working properly  
**EASE-OF-USE**  
 streamline calibration and troubleshooting  
 tasks to maximize uptime  
**METADATA**  
 produce valid, scientifically defensible  
 conclusions



[www.aqualab.com.au](http://www.aqualab.com.au)



## PERISTALTIC CASED PUMP

Watson-Marlow Fluid Technology Group has introduced its 530 peristaltic cased pump for metering and transfer applications such as surface coating, printing and lime addition.

The models meet the demands of rugged and remote environments and are built to operate 24/7 without interruption. It is possible to quickly check control parameters and avoid errors with visual status through a bright colour display, while an intuitive menu structure makes for easy operator interaction.

Users will benefit from the models' integrated PROFIBUS networking capabilities. With two-way, real-time communications, the range is said to offer increased diagnostic capability and faster response. This helps to optimise process control and minimise plant downtime.

The range of process pumps offers four drive options and nine pumphead variants. This enables users to choose from manual operation or fully automated control, including the ability to link up to 16 pumps and provide real-time communication.

The pumps deliver flow rates from 0.0001 mL/min to 3.5 L/min. It is the pumphead that determines both the flow rate and the pressure that can be achieved to match the needs of the specific process. The pumps can be fitted with either continuous tubing pumpheads or with LoadSure tube element pumpheads for pressures up to 7 bar.

The pumps have no seals, valves or diaphragms and do not suffer gas locking, corrosion or clogging. They require just a single spare-part inventory — the tube.

Watson-Marlow Fluid Technology Group  
[www.wmftg.com.au](http://www.wmftg.com.au)









## Look what we have for you!

The VN8001 is the first member of a new series of compact vibration sensors.

It is used for online monitoring of overall vibration of machines and equipment according to ISO 10816.

This unit is distinguished by its simple set-up, requiring no PC software for parameter setting.

The unit is based on the proven, reliable **efector octavis** technology and can also be used on applications in the mobile sector.

The sensor measures the average vibration in Velocity RMS or Peak. Measurement value and switch point conditions are visualised on the LED display.

## ifm – close to you!

Contact us today! 1300 365 088  
[sales.au@ifm.com](mailto:sales.au@ifm.com) · [www.ifm.com/au](http://www.ifm.com/au)





## ANAEROBIC WASTEWATER TREATMENT

Hydrothane offers an anaerobic process design that saves on space and removes noise, odour, corrosion and maintenance issues. The process is suitable for industries with organically laden wastewater, such as chemical, food and beverages, and pulp and paper.

The Hydrothane External Circulation Sludge Bed (ECSB) and Upflow Anaerobic Sludge Blanket (UASB) include a dual-layer separation design, creating good process stability and capacity. The products remove organic content from wastewater, thus purifying it, and use the waste to generate green energy.

Loading rates of the ECSB reactor are typically in the range of 15–35 kg COD/m<sup>3</sup> per day, providing a small footprint. The vertical design therefore achieves treatment even within a limited available space.

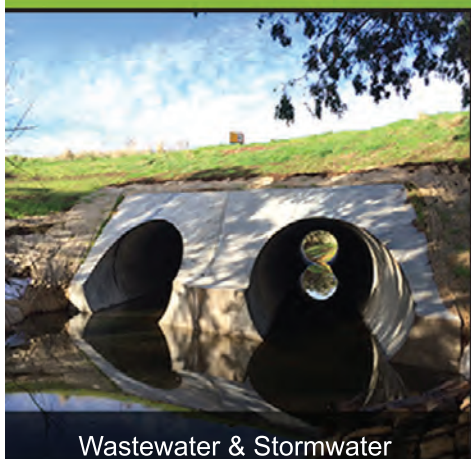
The overpressurised design can stop air getting in, which would lead to corrosion. It also contains and controls all odour and noise.

Fully controlled hydraulic mixing is achieved by means of an external circulation process. Within the reactor there is no complex internal or rotating equipment, which stops clogging and eliminates maintenance.

Hydroflux Industrial Pty Ltd  
[www.hydrofluxindustrial.com.au](http://www.hydrofluxindustrial.com.au)

# ITS PipeTech

## Pipe Rehabilitation and Construction



Wastewater & Stormwater



Potable Water



Road & Rail Culverts

### New South Wales

1/13 Stanton Road, Seven Hills NSW 2147  
 Ph: 02 8603 2000 — Ph: 1300 692 043  
 Email: [Enquiries@itspipetech.com.au](mailto:Enquiries@itspipetech.com.au)

### Queensland

2/49 Links Ave Eagle Farm QLD 4009  
 Ph: 07 3630 2333 — Ph: 1300 692 043  
 Email: [Enquiries@itspipetech.com.au](mailto:Enquiries@itspipetech.com.au)

### WA Office

20 Baretta Road, Wangara WA 6065  
 Ph: 08 9408 1648 — Ph: 1300 692 043  
 Email: [Enquiries@itspipetech.com.au](mailto:Enquiries@itspipetech.com.au)

[www.itspipetech.com.au](http://www.itspipetech.com.au)

**ITS**  
**PipeTech**

Pipeline Rehabilitation & Construction



## ENERGY STORAGE CELL

The Akasol neoQube is an intelligent lithium-ion battery storage solution for any solar power system. Innovative and efficient, the product is designed to store excess power produced during the day so it can be used at any time needed, even during the night. With a storage

capacity of 5.5 kWh, the cell can be used to maximise the efficiency of solar PV systems up to 5 kW.

By enabling users to create, store and maximise the electricity produced by a solar PV system, it will reduce electricity demands from the energy providers and provide good return on investment. The rate of return on investment is increased with how the product efficiently manages your household's daily energy requirements.

During daylight hours, electricity is provided directly from the solar PV system. Any excess energy that is not consumed quickly charges the lithium-ion batteries. Once the battery capacity is at a full state of charge, electricity is allowed to feed into the grid. For power requirements over 5.5 kWh, the system offers a good combination of storage and flexibility.

The ready-to-operate unit comes in five configurations, from the base 5.5 kWh to a full 27.5 kWh system. The modular-based system is configured for extendable storage capacity, allowing the system to grow with the home's future energy requirements.

Powerbox Australia Pty Ltd  
[www.powerbox.com.au](http://www.powerbox.com.au)



## COD ANALYSER

The Thermo Scientific Orion 3106 COD analyser is the latest addition to the portfolio of Orion products serving the wastewater industry. Chemical oxygen demand (COD) analysis is used to detect levels of organic pollutants in water; early identification of these contaminants can indicate an issue in the treatment process of wastewater.

The analyser combines a digestion step with colorimetric analysis to measure the concentration of organic compounds that can affect water quality. Particularly high levels of COD may require additional treatment processes. The presence of high COD levels during the disinfection process will lead to additional hypochlorite dosing. This results in the formation of chloramines, which, if present in high levels, can be carcinogenic.

The analyser is designed to reduce ongoing operating costs due to its low maintenance and reagent consumption. Furthermore, by controlling the treatment process, users can reduce disinfection costs. The intuitive user interface simplifies navigation for an enhanced operator experience.

Thermo Fisher Scientific  
[www.thermofisher.com.au](http://www.thermofisher.com.au)

## GETUP CLOSE WITH OUR NEW BLOWERS AT OZ WATER 16

The word is already out that our new ZS screw and ZB turbo blowers are changing things. With more turndown, unlimited start and stop, and up to 35% reduction in energy consumption with VSD drive. Water treatment is not going to be what it once was. Get close to our latest products at OZ Water 16 at Melbourne Exhibition Centre, stand M7 and learn more about our solutions for water treatment.

**Call 1800 023 469**



**Atlas Copco**

Compressed Air | Vacuum | Blowers | Industrial Gas | Service



# Corporate Renewable PPAs on the rise

**T**he market for the corporate renewable energy power purchase agreement is on the rise according to a global report by Baker & McKenzie.

The report, based on a survey of more than 100 senior executives, indicates a number of businesses are now purchasing electricity under long-term renewable PPAs directly from independent generators, as well as investing in generation assets instead of buying power direct from utilities.

Corporate renewable PPAs can bring economic and sustainability-related advantages to the contracting parties, which is propelling the trend across the globe. Almost 90% of surveyed corporates, utilities, IPPs and investors believe more corporates will enter into PPAs in the next 18 months than in the past 18 months.

"The report reveals that PPAs in the global renewable energy sector show no signs of slowing down as companies appreciate the economic and sustainability benefits," Baker & McKenzie Partner Paul Curnow said.

"This is good news also for the Australian market, as the renewable energy industry here has faced obstacles in recent years with uncertainty over the Renewable Energy Targets (RETs) and project developers obtaining the necessary finance.

"Unlocking the corporate appetite for renewable energy through corporate PPAs opens up some new market opportunities for Australia. It provides new customers for renewable energy projects and enables corporate customers to directly access renewable energy sources of their choice that to date they've only been able to access through GreenPower," Curnow said.

Curnow added that corporate PPAs provide contractual price certainty for projects, enabling financing and ultimately implementa-

tion. They provide corporate customers with the benefit of reduced and relatively certain electricity prices and a boost to their green and sustainability profiles.

"The traditional market uncertainties as to how aspects of these projects should be structured, including accessing and transporting electricity to customers, are issues that are now being addressed by key stakeholders including regulators.

"Addressing these factors will continue to help unlock Australia's renewable energy project pipeline, which includes 1000s of megawatts of new wind and solar projects across the country," Curnow said.

The Baker & McKenzie report, *The rise of corporate PPAs — A new driver for renewables*, is available at [www.bakermckenzie.com/Australia/CleanEnergyRenewables/](http://www.bakermckenzie.com/Australia/CleanEnergyRenewables/).

## Report highlights include:

- **PPAs to surge globally.** Corporate renewable PPAs are especially on the rise in the US, where almost 1.6 GW of renewables capacity was contracted in H1 2015, up from 1.4 GW in 2014 and more than double the 600 MW contracted in 2013. According to the firm's report, the last three years have seen a significant increase, compared to the total of 650 MW that was contracted between 2008 and 2012.
- **Smaller companies enter market.** Early entrants into the corporate renewable PPA market were some of the world's largest technology companies. Recently, the mar-

ket has seen a diverse set of corporates including retailers, pharmaceuticals and industrials entering into renewable PPAs. "Outside the US and especially in Europe, I am now seeing corporates forming consortia with others to get experience of how they work through power demand," noted Curnow.

- **Economic benefits drive PPA growth.** Some 60% of surveyed corporates exploring renewable PPAs cited economic factors as their primary reason for doing so while 30% cited environmental motivations.
- **Price fluctuations biggest risk.** The benefits of corporate renewable PPAs to offtakers and generators are huge, but careful consideration needs to be given to risks that are unique to these deals. According to the report, power price fluctuations top the list of corporate renewable PPA risks, with additional risks including counterparty credit risk, accounting considerations and regulatory/subsidy issues.
- **Synthetic structures favoured.** There are numerous ways to structure corporate renewable PPAs. According to the survey, large corporates appear to prefer synthetic rather than standard PPAs.
- **Financing can be challenging.** Financing renewable energy projects with corporate PPAs is more challenging than financing projects with standard utility PPAs due to the often lower credit ratings of corporates, more frequent fluctuations in power demand, collateral allocation and other issues.

Baker & McKenzie  
[www.bakermckenzie.com/Australia/](http://www.bakermckenzie.com/Australia/)

## SMART GRID METERING SOLUTION

SATEC has enhanced the input design of the standard PM175/PM180 power quality and energy meter to accept the low-level signals provided by the sensors. The upgrade provides the utility industry with a new system to monitor, coordinate and operate distribution systems in real-time mode.

The insulators with sensors replace the standard insulators and incorporate a built-in CT and PT function. These sensors can easily be installed without having to de-energise or cut and terminate the main line wire. They produce a small voltage signal instead of the normal 120 V and 5 A outputs of standard CTs and PTs. Special inputs have been designed into the PM175/PM180 power quality and energy meter to fully interface with the low-level sensor outputs for line voltage and current.

Full measurements and data can be obtained from the meter, including waveforms and harmonics. A custom SATEC enclosure for the PM175/PM180 input connections and a GPRS modem and/or Ethernet for real-time data communication direct to a SCADA system simplify installation. Utilities can process this information to analyse power flow and determine MW-reduction capabilities. They can use this data to execute commands to operate and control equipment such as voltage regulators, capacitor controls, loading switches and system outage reporting. Today, this information is usually limited to just what the voltage regulators can provide from their single source of regulation, which has been deemed insufficient. There is a need to increase monitoring to many critical points along the grid.

The company's approach can control demand reduction during peak load times to deliver the power needed by the system during high-demand periods. This can help minimise losses on the distribution system and optimise efficiency as well as the quality of the power and locate fault issues.

SATEC (Australia) Pty Ltd  
[www.satec-global.com.au](http://www.satec-global.com.au)





## ONE LESS THING TO WORRY ABOUT



**Rising overheads, reduced budgets, OH&S compliance... these days we all face a number of challenges. Wouldn't it be nice to have just one less thing to worry about?**



For applications that require a low pressure compressed air solution, KAESER presents a range of exceptionally energy efficient, durable and dependable turn-key blower systems - all backed up with 24/7 and nationwide service support.



With KAESER, that's one less thing to worry about! Discover your blower system solution today, phone **1800 640 611**

**www.kaeser.com.au**

**25**  
anniversary  
years  
in Australia 1990 - 2015

**KAESER**  
COMPRESSORS





## DOUBLE-ENDED ULTRAFILTRATION SYSTEM

Evoqua Water Technologies has introduced an ultrafiltration system that allows users to design submerged membrane systems with low cost of ownership, according to the company.

The Memcor CSII Ultrafiltration System has fibres open to filtration at both ends. Double-ended filtration delivers a more efficient use of air, with the module able to operate at a 23% lower relative aeration rate. There are no changes to the ability of backwash to remove solids, and stability is assured during high-turbidity events.

The module design results in a reduction in the module footprint of over 50%, with plant footprint reduced by 30%. Higher design fluxes reduce the total number of modules needed for a given plant size. There is no change to the module diameter, ensuring no loss in solids handling ability.

The product has good performance in pressurised systems, with lower head loss saving on pumping energy by 7–20%. Upcoming projects can use the system at low risk, as it enables the use of largely established componentry, while an easy upgrade path is enabled for existing plant owners.

Evoqua Water Technologies Pty Ltd  
[www.evoqua.com](http://www.evoqua.com)



## CONTROLLERS FOR MULTIPLE COMPRESSOR INSTALLATIONS



Atlas Copco's ES controllers increase the efficiency of multiple-machine installations. Offering a range of control and monitoring functions, the controllers can help reduce the pressure band of the compressed air or vacuum installation, equalise the running hours and minimise the unloaded running of the machines.

With a multiple compressor installation, the ES system will select the machine(s) to run based on demand and when air is needed in the air net, which ensures efficient use of energy. In an installation with multiple VSD air compressors, one compressor will regulate the demand and the other compressors will run at optimal speed.

The core function of the system is to equalise the running hours of a multiple air compressor or vacuum pump installations, which will enable effective and equal use of all machines within the installation. This will ensure most effective use of the installation as well as enable all machines to be serviced during a single visit.

The controllers will eliminate the need for operators to manually change settings on a continuous basis. Higher-end versions have the ability to be programmed to change the installation's sequences automatically.

Atlas Copco Compressors Australia  
[www.atlascopco.com.au](http://www.atlascopco.com.au)



8235 Flush Diaphragm Pressure Transmitter



8252 Industrial Pressure Transmitter



8473 Frontal Diaphragm Pressure Transmitter



**Dart Instruments**  
*...sense the RELIABILITY*

**Dart Instruments Pty Limited** A.C.N. 109 479 763  
 Phone: 61 2 8456 7550 Fax: 61 2 8456 9988  
 Email: [sales@dartinstruments.com.au](mailto:sales@dartinstruments.com.au) [www.dartinstruments.com.au](http://www.dartinstruments.com.au)



## WATER QUALITY INSTRUMENT

The Hydrolab HL4 is a multiparameter water quality instrument from OTT Hydromet. Its ease of use and metadata are said to produce water quality data the user can trust.

A self-monitoring system reports the status of the instrument, reveals where potential problems are and gives assistance on how to solve issues. User-scheduled calibration intervals indicate when calibration is due, guided and semi-automated calibration routines lead the user through the calibration process and a check calibration procedure can be used to avoid a complete calibration. A sensor status that is saved with every line of data and calibration reports store information about previous calibrations, enabling valid, scientifically defensible conclusions to be produced.

The product connects to rugged deployment cables and the Surveyor HL for attended monitoring applications that require equipment designed for field use. The Surveyor HL is a lightweight, compact, fully IP67 handheld with a full-colour screen that is visible in bright sunlight. For unattended continuous monitoring applications, the device has onboard data logging and dedicated communications modules that are used for easy integration with external data loggers and telemetry systems.

Aqualab Scientific Pty Ltd  
www.aqualab.com.au



## Environmental Monitoring and Process Control

- ✓ Industrial Emissions (CEMS)
- ✓ Process gas (LNG, biogas, syngas...)
- ✓ Ambient and indoor air (AQMS, OH&S)
- ✓ Pure gases
- ✓ Engine exhaust

ProCeas / LaserCEM



### Online monitoring of

H<sub>2</sub>O, CO<sub>2</sub>, O<sub>2</sub>, H<sub>2</sub>, HCl, HCN, HF, NO, NO<sub>2</sub>, NO<sub>x</sub>, N<sub>2</sub>O, NH<sub>3</sub>, SO<sub>3</sub>, SO<sub>2</sub>, H<sub>2</sub>S, COS, CH<sub>4</sub>, VOCs, THC (...)

Thanks to the combination of two Ap2e patented technologies

- **LPS (Low pressure Sampling)**
  - No heated lines
  - No sample preparation
  - Fast sample transfer
  - Reduced maintenance and operating costs
- **OFCEAS (Enhanced Laser Spectroscopy)**
  - Interference free
  - No drift / No need for calibration
  - Low detection limit
  - Wide dynamic MR (from ppb to %)
  - Mean Time between Failures – 5 years



TUV certified EN 15267-3 : 2008 / QAL 1 de EN 14181

- ✓ Surface and ground water (WQMS)
- ✓ Discharge and process water
- ✓ WWTP influents and effluents
- ✓ Drinking water

Topaz / Onyx / Cristal



### Online analysis in all type of water of

True TOC, TN, Ammonium, Free or Total Chlorine, Hydrazine, Morphine, Phenol, Sulphates, Colour, Silica, Phosphates (Orthophosphates), Hardness, Aluminium, Chromium VI, Iron, Nickel, Lead, Zinc, TH, Alkalinity, Chlorides, Cyanides, Fluorides, Peracetic acid VFA, Ca Mg, turbidity, Total Organic compounds, Total Hydrocarbons, suspended hydrocarbons and oil, oil in water (...)

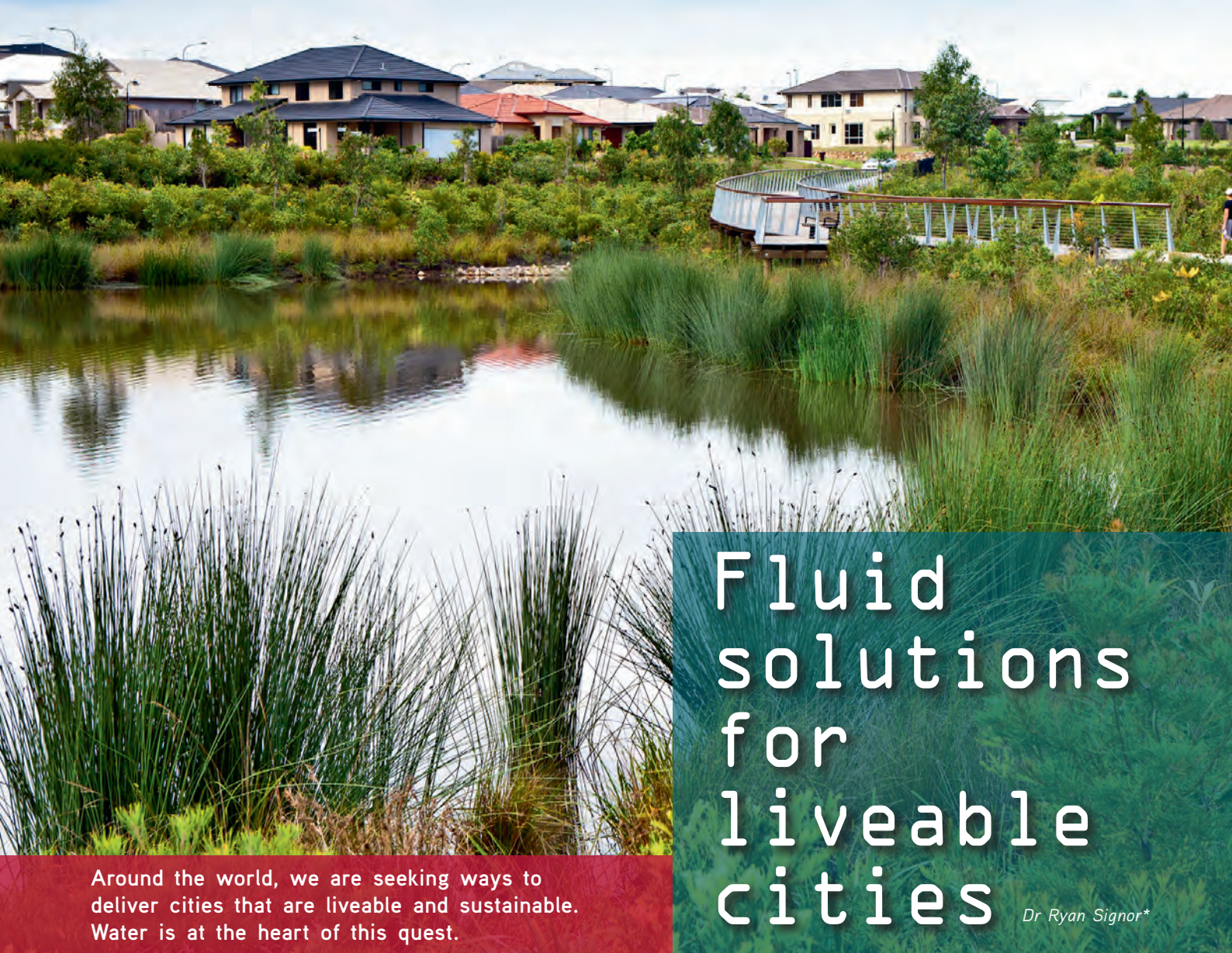
- **Broad range of technologies**
  - Colorimetry, Titrimetry, Conductivity
  - Nephelometry
  - Oxidation and NDIR
- **Flexible and innovative design**
  - Multistream
  - Multiparameter
  - Ease of integration

SERES online analysers meet the international water quality monitoring standards - TUV certified IMO and ATEX



1300 850 862 | www.aquagas.com.au | info@aquagas.com.au | 3 Wirranina Place - Currumbin - 4223 QLD





Around the world, we are seeking ways to deliver cities that are liveable and sustainable. Water is at the heart of this quest.

# Fluid solutions for liveable cities

*Dr Ryan Signor\**

Water contributes to liveability through the services and values it provides, including productivity opportunities, public health, urban climate control, green space and amenity, senses of place, recreation, irrigation and ecosystem services, among others. To realise these, it needs to be managed sustainably — from how we deal with flood and drought, keep it clean and safe, source and use it, keep it affordable and reliable, and so on.

Recently, the water services industry has shifted its focus accordingly to embrace these ideas. At least in Australia's capital cities, the utilities and planning authorities are placing customer, community and liveability at the centre of strategic planning and moving towards 'whole water cycle' thinking and water-sensitive urban design. The main driver of this is need and good intention — resources are limited and we want to make sure they are properly allocated. Done well, such integrated urban water planning will

unlock the opportunity water creates for liveable cities. The hard part is determining what mix of investment in efficiency, infrastructure, community facilities, smart technology and other things will prolong the community benefit.

What's guiding us? Communities are creating a growing demand for water systems that add value to the urban landscape. At the same time, urban areas are being gentrified and expanded. To keep pace, designers and developers seek quick and accessible guidance on water management. These include:

- blunt instruments such as regulated water planning rules, laws and standards;
- persuasive instruments that include national, state and local guidelines, scientific and academic advice, and industry guidance;
- voluntary instruments such as community liveability and sustainability rating schemes like the Green Building Council Australia's 'Green Communities' scheme, which sets stretch goals for meeting liveability indicators.

Is it working? The increased awareness around integrated urban water planning is

something to celebrate. The focus on providing diversity and resilience in water supply and the changes in community expectation and behaviour that bubbled over during the millennium drought will carry on for generations. Streetscapes are changing as rain gardens, permeable pavements, stormwater systems that incorporate wetlands, ponds and water harvesting are routinely being considered and delivered. Water recycling schemes around the country are operating. 'Water sensitive urban design' is business as usual, not a buzzword.

However, time and again I have watched planners, designers, engineers and managers be blinded by seeking 'compliance' with the various instruments. In our hasty reliance on these, might we be giving away some of our ability to innovate? Consider the story of a recent urban development project:

A greenfield site developer wants to deliver a leading sustainable and liveable community, with the highest 'Green Communities' rating targeted as the main measure. A system is developed that goes far towards meeting the most ambitious targets for water-related





criteria on peak flow discharges leaving the site, flooding management, water quality and water recycling. The local planning codes had additional requirements, in this case for buildings' water efficiency and potable demand replacement. Central to the concept is a big stormwater harvesting scheme which alleviates site discharges and flooding, reduces pollution to nearby waterways, meets recycling targets and replaces potable water. But it will cost a lot. Consultation highlights concerns about the ongoing maintenance and diversion from standardised infrastructure approaches. There's no working model right now to operate and regulate it in these parts. The team goes back to the less stringent design codes and base planning requirements to configure a scheme that meets just these. There's no need for a stormwater harvesting scheme in this new arrangement, but they find that the same ponds and wetlands layout will be required and these are maintained as community assets. A financial benefit-cost and a 'triple bottom line' assessment is undertaken to compare the scenarios. Ways are sought

to attribute values and costs to everything. More people are consulted. Does the stormwater harvesting scheme stack up financially? Perhaps not, and then there's all the other risks to manage. Who will end up paying for it — the householders? Is it worth it all to keep some parks a little greener?

This scenario encompasses many of the issues that hamper genuine attempts to achieve 'liveability' centred water management. Here are my main insights:

1. Meeting some aspirational targets around water management that were meant to contribute to liveability didn't necessarily justify the investment costs based on a 'first principles' benefit assessment. But what if the guidance was taken at face value? In this case it was only tested because it was voluntary; how often do we test the blunt instruments to see if they're achieving what is intended?
2. There is often reluctance to implement something new, based on uncertainties about performance, governance and time-lines. The default position is to push back to existing and standardised approaches, to point to basic code requirements and to place faith in the instruments. We feel safe. This sense of security is a barrier to trying new things.
3. Amid all the guidance on environmental and physical systems requirements, there is less on how to go about assessing the social and economic contributions of water to liveability, which would be more useful for decision-making and community building.

What else can we do? A positive from the scenario was in holding 'liveability' at the centre of the community development and exploring how water may enhance it, and at what cost, to inform robust discussions. This is in contrast to old models where water was considered as a problem that required management rather than an opportunity to (sustainably) exploit. Here are some other things we could do:

4. Wider adoption of targets based on risk and opportunity. Where possible we could move away from hard and universal targets around factors such as water efficiency, flood control or runoff quality and determine tailored targets based on the risk or opportunity for communities that the local urban context presents.
5. Encourage flexibility. Where outcomes-based targets will persist, could regulators, liveability rating assessors and others be more open to hearing alternative ideas that can still achieve the guidance's intent? To be fair, these avenues exist widely already. However, there could be greater encouragement to pursue innovation and to work in partnership to enhance community outcomes.
6. Seek alternate funding. We need innovative funding mechanisms so that the ongoing financial support of water infrastructure comes from the places to where the value flows. This could address one cause of reluctance to challenge the status quo. New pathways for revenue generation should be explored that can cross-subsidise the creation of liveability benefits. Suddenly new management approaches might stack up. One concept is known as 'value capture', something AECOM is at the forefront of exploring in the water sector.
7. Develop consistent economic and decision-making guidance. Let's keep working on how to measure liveability to determine the right level of investment in it. To this end, we need to attribute values to all categories of services (like health, wellbeing and productivity) and water's contributions consistently and in a common currency. The lack of such a framework is something to overcome to justify the wide-scale benefits of managing water for liveability.

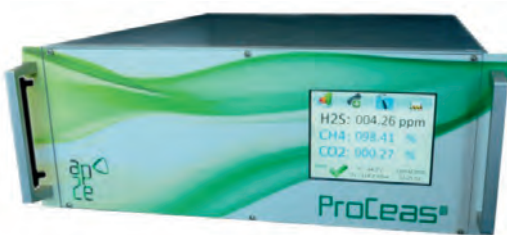
Aecom

[www.aecom.com](http://www.aecom.com)



*\*Ryan Signor has spent over a decade consulting to the Australian and international water industry as a strong advocate for evidence-informed policy. He specialises in risk and sustainability management and is AECOM's Water Advisory Practice Leader for Australia and New Zealand. Ryan will be presenting his paper 'Shooting for the Green Stars' on Tuesday 10 May at Ozwater'16 in Melbourne.*





## ONLINE GAS ANALYSERS

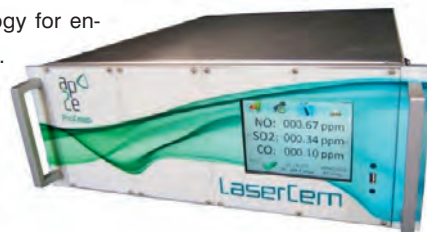
The LaserCEM and ProCeas online gas analysers, from AquaGas, are durable in harsh process conditions.

The LaserCEM is a complete precalibrated multicomponent (NO, NO<sub>2</sub>, NO<sub>x</sub>, SO<sub>2</sub>, CO, HCl, CO<sub>2</sub>, H<sub>2</sub>O, H<sub>2</sub>S, NH<sub>3</sub>, N<sub>2</sub>O, COS, SO<sub>3</sub>, CH<sub>4</sub>, HF) laser infrared spectrometer. The field-proven, robust and user-friendly product is designed for continuous emissions monitoring across applications including gas and coal-fired power stations, pharmaceutical and chemical industries, refineries, cement plants, waste incinerators and more.

The ProCeas is a complete precalibrated multicomponent (H<sub>2</sub>S, CO, CO<sub>2</sub>, H<sub>2</sub>, H<sub>2</sub>O, HCl, HCN, HF, N<sub>2</sub>O, NH<sub>3</sub>, O<sub>2</sub> and CH<sub>4</sub>) laser infrared spectrometer. The field-proven, robust and user-friendly product is designed for online monitoring of combustion process, natural gas (LNG), pure gas (trace) and ambient air (trace). It fulfils the requirements of waste recycling facilities, large-scale methanation processes, refineries, coal seam gas, gas production lines, biogas and syngas plants.

Both units feature the LPS low-pressure sampling system, eliminating the need for a 'heated' sampling system. They use OFCEAS IR laser technology for enhanced specificity, selectivity and stability (no span or zero drift).

AquaGas Pty Ltd  
[www.aquagas.com.au](http://www.aquagas.com.au)



AUSTRALIAN SOLAR COUNCIL

## SOLARENERGY EXHIBITION & CONFERENCE

**Wednesday 4 May 2016 at 8:30 am**  
**to Thursday 5 May 2016 at 5:00 pm**  
 Melbourne Convention  
 and Exhibition Centre

**Solar Energy Exhibition & Conference 2016**, the 54th annual Australian Solar Council industry conference and exhibition is a showcase of the people, projects and products that are driving solar and storage to new heights of innovation and excellence.

**FREE  
TO  
ATTEND**

## SC | ENERGY STORAGE COUNCIL CONFERENCE

The **Energy Storage Council's** second annual conference will be held alongside the Solar Energy Exhibition & Conference. A two day forum for energy storage industry participants to network, share information and build knowledge.

Principal media partner: **Solar & Storage**

**Solar Energy Exhibition & Conference 2016** is proudly sponsored by:

**NEXTracker**  
POWER ON.

**ACSolar**  
Warehouse

**Alpha-ESS**

**DNV GL**

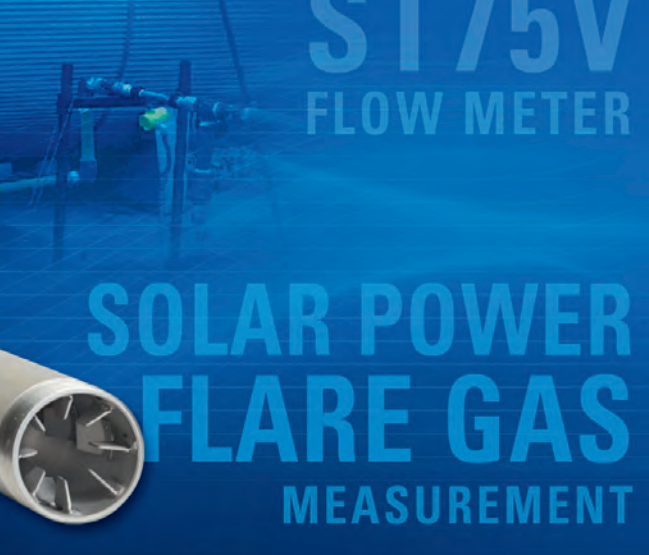
**ecogeneration**

**ENPHASE**

**IronIUS**  
SHIFTING THE LIMITS

**Supply Partners**

**REGISTER NOW at [www.solarexpo.com.au](http://www.solarexpo.com.au)**



## SOLAR-POWERED THERMAL MASS FLOW METER

With its no-moving-parts thermal dispersion mass flow sensing element, a solar-powerable FCI Model ST75V Flow Meter with built-in Vortab flow conditioner provides direct mass flow measurement of a gas site without the additional equipment required with other flow measurement technologies. Its non-clogging sensor design operates over a wide flow range with low-flow sensitivity. The flow conditioner provides a fully developed flow profile in seven total pipe diameters.

The flow meter is compatible with solar power systems that provide 24 VDC power without any special modifications. With its rugged NEMA 4X/IP67 rated enclosure, it is suitable for dirty oil and gas

production field installations. It features an inline-style flow body providing accuracy to  $\pm 1\%$  of reading with flow ranges from 0.04 to 560 SCFM (0.07 to 950 NCMH), depending on pipe size, and repeatability of  $\pm 0.5\%$  of reading. It is suitable for line sizes from 6 to 51 mm diameters.

The flow element is constructed with a 316L stainless steel body and Hastelloy C-22 thermowell sensors to resist corrosion. The instrument is approved for use in hazardous/explosive oil/gas production environments. The transmitter outputs include dual 4–20 mA analog outputs, which are user-assignable to flow rate and/or temperature, a 0–500 Hz pulse output for totalised flow and a serial RS232C I/O port. The optional digital display/readout is a two-line LCD displaying flow rate and totalised flow or flow rate and temperature.

In applications with difficult access or display readability, the transmitter can be remote mounted up to 15 m away from the flow element inserted in the pipe.

AMS Instrumentation & Calibration Pty Ltd  
[www.ams-ic.com.au](http://www.ams-ic.com.au)

## Measuring devices for your energy management



### Monitor & communicate energy data

EMpro measuring devices detect and monitor the characteristic electrical data of your machines and systems.

Using network-capable devices ensures that all measuring data is available centrally and on site.

With EMpro, you can be confident you have the right measuring device solution for your energy management.

[phoenixcontact.com.au](http://phoenixcontact.com.au) | 1300 786 411





## SELF-CLEANING SUMP FOR WASTEWATER

Developed by Hydro-Plus in conjunction with Gorman-Rupp, the self-cleaning sump addresses many of the issues confronting owners of sewage pump station assets, such as high capital costs, high energy consumption and the cost of intervention for the likes of sediment, solids or fat build-up or for removing chokes from pumps.

With the self-cleaning sump, the conventional 2–3 m diameter cylindrical wet well is replaced by an inclined collector pipe from which self-priming pump suction lines access the wastewater. Nothing electrical or mechanical is in the sump. The system is used in conjunction with VFD-controlled pumps and an air bubbler liquid level control system to reduce energy consumption over the conventional DOL or soft-starting pump systems.

The philosophy behind the system is to keep solids in suspension and moving, and to take all issues associated with operator intervention to the surface where it is easier and safer for operators to address. Keeping the solid matter in suspension and removing it quickly does not allow time for fibres and rags to ball and mat together or allow sediment or fat to build up. This should reduce the incidence of pump blockage caused by balling rags and the need for 'vac truck' intervention.

Because pumps are mounted on the surface, there is no need for operators to open wet well lids or employ lifting devices. This makes any sort of intervention easier and safer for operators. Blockage removal, clearance adjustments, oil inspection or changes, valve greasing or exercising can all be done safely by one operator working out of a standard vehicle.



The civil construction costs are said to be much lower using the system because of the HDPE collector pipe (cheaper than a full concrete wet well/valve vault combination) and the smaller excavation footprint.

Hydro Innovations  
[www.hydroinnovations.com.au](http://www.hydroinnovations.com.au)



## METERING TECHNOLOGY FOR ENERGY AND LOAD MANAGEMENT

SATEC introduces the next generation of multicircuit branch feeder metering for energy and load management. The BFM II is a modular format for 18, 24, 30, 36, 42 and 54 single-phase circuits and/or a combination of 6, 8, 10, 12, 14 and 18 three-phase circuits.

Enhancements in metering technology provide ever-expanding capabilities for the energy management sector, including the ability to monitor and provide data logging for cold water, hot water, grey water and gas, supporting a large number of pulse inputs for expansion of energy monitoring. Increased memory provides further mechanisms to enhance the meter's functions for more advanced applications.

The ability to reduce cabinet space and provide ease of installation, along with improved support for value-added functions such as programming, data validation and commissioning on-site, ensures the user's needs are fully met with energy metering. Software solutions for electricity billing, energy management and power quality forensic analysis further enhance the credibility of ongoing support and the display of energy data either locally or remotely.

SATEC (Australia) Pty Ltd  
[www.satec-global.com.au](http://www.satec-global.com.au)

## HYDROSTATIC TEST PUMPS

Meeting strict National Association of Testing Authorities (NATA) compliance and industry standards, Kennards Hire Test & Measure's Hydrostatic Test Pumps enable automatic pressure testing of pipeline systems, vessels and containers.



The pumps are designed for the plumbing and civil industries to pressure test water-main, pipeline and sewer force mains for possible leaks. They supply efficient and effective readings against pipeline leakages, resulting in well-managed reservoir and dam water supplies.

The unit has been designed with ease of use in mind. A portable 14 L water tank and conversion hoses enable use with an on-site reservoir. Other features include: a 5.5 HP engine; flow output of 30 L/min; pressure output of 100, 250, 450 and 550 psi; and a 100 mm testing gauge.

Kennards  
[www.kennards.com.au](http://www.kennards.com.au)



# LEADING CITIES OF THE WORLD ARE PLANNING FOR 100% RENEWABLE.



25 SPEAKERS



2 DAYS



1 - 2 JUNE 16



REGISTER NOW

**Renewable Cities Australia** is a two-day forum for local government and industry to showcase and share the plans, achievements and challenges of Australian cities moving to renewable and innovative energy systems for electricity and public transport. The forum will be co-located with the successful **Australian Energy Storage Exhibition** and will enable delegates to view emerging technologies and low carbon transport options that will change the energy landscape of Australian cities.

THE INAUGURAL RENEWABLE CITIES AUSTRALIA, WILL BE HELD IN SYDNEY  
BETWEEN 1 & 2 JUNE 2016 AT AUSTRALIAN TECHNOLOGY PARK.





## WATER-INJECTED SCREW COMPRESSORS

Atlas Copco's AQ 15-30VSD water-injected screw compressor, available in water-cooled and air-cooled versions, is designed to meet users' needs for pure, oil-free air while offering high-pressure capability and improved energy efficiency. Developed especially for applications demanding the highest levels of purity, such as pharmaceutical production, food processing and water treatment, the compressor eliminates the risk of oil contamination with its water-injected screw technology.

Zero risk of contaminations — over the past decades Atlas Copco enhanced the development of water-injected screw compressors and today the technology featured in the AQ 15-30VSD removes all the potential for contamination of the compressed air. Water-injected screw technology can completely eliminate the risk of oil contamination in the compressed air and in the condensate. Because there is no oil whatsoever used inside the compressor, there is no waste oil to remove or dispose of. No oil means protection of the environment from oil contamination.

Energy efficiency — Atlas Copco AQ 15-30VSD has an integrated variable speed drive claimed to deliver energy savings of up to 35% compared to traditional compressor technologies. It can also help users on their way to sustainability with its energy efficiency, with the proven technology of a water-injected screw element and its certified CLASS 0 oil-free air and zero harm to the environment. The AQ 15-30 is a small compressor that can have a big impact on the user's business and the environment.

Atlas Copco Compressors Australia  
[www.atlascopco.com.au](http://www.atlascopco.com.au)



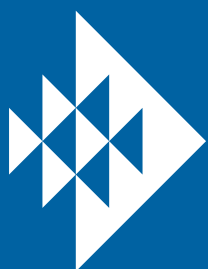
## CONTROL BOX FOR SENSORS

To keep up with changing plant standards, Cerlic has released a 24 VDC version of its centralised BB2 controller.

Still capable of managing up to four separate sensors with any combination of the X-Series sensor range of suspended solids (ITX, CTX-LC and ITX-IL), dissolved oxygen (O2X Duo), pH (pHX) and redox (ReX), the low-voltage DC unit is reverse-compatible with existing Cerlic equipment and can directly replace a line-voltage unit as part of a upgrade, with no further hardware required.

The Swedish-built BB2 provides up to four 4–20 mA analog output channels with the option of Profibus DP for digital control circuits. Like with the line-voltage (240 VAC) model, there are still two independent (dry contact) relays in the BB2 which can be programmed for high/low alarms or to trigger the self-cleaning of sensors (pressured air or water).

Control Components Pty Ltd  
[www.controlcomponents.com.au](http://www.controlcomponents.com.au)



# PENTAIR

INSPIRED SOLUTIONS FOR A CHANGING WORLD

[www.pentair.com.au](http://www.pentair.com.au)

## REAL-TIME ENERGY MANAGEMENT INFORMATION SYSTEM

Emerson Process Management has announced Energy Advisor, a real-time energy management information system that automates the process of monitoring and managing energy consumption across mills, plants and refineries. With real-time, meaningful information about a site's energy performance, process manufacturers can identify inefficiencies and irregularities and take corrective action, saving around 5 to 10% in energy costs annually. In energy-intensive process industries, where energy is often 30 to 50% of the operating expense, these savings can have a significant impact on the bottom line.

The product pulls energy data from various sources - including Emerson's DeltaV and Ovation distributed control systems, as well as its wireless infrastructure - to provide real-time analysis and historical context. Using Emerson's process models, manufacturers are able to analyse and compare three critical items: the amount of energy a system is designed to use, what it has used over time and what it is consuming in the moment.

Energy Advisor integrates seamlessly with current site control and information systems, allowing a straightforward implementation. Key features include: Consumption Monitoring, which identifies and logs root causes for energy overconsumption events; Data Integrity Checker, which verifies the integrity of energy data before it is used; Energy Target Calculator, which creates models from past historical data to predict target energy consumption; and Standard Reports, including cost per unit of production, energy performance trends and electrical demand cost.

Emerson Process Management Aust P/L  
[www.emersonprocess.com.au](http://www.emersonprocess.com.au)



## Gorman-Rupp Super T Series Pumps now available with:

**ERADICATOR™**  
 Solids Management System

**GORMAN-RUPP  
 SOLIDS  
 MANAGEMENT  
 SYSTEM**

Designed For **"TODAYS SEWAGE":**

**SANITARY WIPES • PLASTIC BAGS • FIBRES • SLUDGE**

The system consists of a new, patented lightweight inspection cover, an innovative back cover plate incorporating an obstruction free flow path, and an aggressive self-cleaning wear plate including laser cut notches and grooves, along with a revolutionary tooth designed to clear material from the eye of the impeller.

- COVER PLATE WITH OBSTRUCTION FREE PATH
- REVOLUTIONARY CLEANING TOOTH
- LIGHT WEIGHT INSPECTOR COVER



**Retrofit Kits Available For Current Super T Series Pump**

Exclusive Australian Distributor — [HydroInnovations.com.au](http://HydroInnovations.com.au) — 02 - 9898 1800





## International speakers announced for energy storage conference



The 2016 Australian Energy Storage Conference and Exhibition will take place in Sydney from 1–2 June with the theme 'Thinking smart about energy storage'. The multistream conference will see 40 speakers present innovative solutions for the changing energy storage landscape, with the first international speakers now announced.

John Jung, president and CEO of Greensmith Energy Management Systems, will present on 'Grid-Scale Energy Storage & Grid 2.0'. Jung and his company will present a case study of a 1 MW, behind-the-meter, solar-integrated storage system on the island of Puerto Rico. By leveraging intelligent and flexible software, this site integrates multiple applications such as ramp rate control and easing island grid congestion — while improving the system's return on investment.

Catherine Von Burg, president and CEO of SimpliPhi Power, will present on 'Micro Grid Deployment — Maui Brewing Company: Safety, Accessibility & Power Security in the Age of Climate Change, Cyber Attack & Political Uncertainty'. The microgrid concept is able to address the integration of geographically dispersed energy resources, for both the local community and/or the utility,

thus avoiding significant technical problems that may affect the security of operation.

Conference attendees will also hear sessions outlining intelligent storage systems, the business models of major energy companies, utility-level solutions, relevant case studies and more. The accompanying exhibition will meanwhile focus on the latest state-of-the-art energy storage technologies.

This year's exhibition will move into the main exhibition hall at Australian Technology Park, enabling a display of energy storage solutions from over 40 exhibitors including Toshiba, Kokam, S&C Electric, Redflow, Saft and many more. The exhibition provides the opportunity to source new solutions, network with peers, experience new technology and keep pace with the industry.

The event will also see the debut of **Renewable Cities Australia**, to be co-located with the conference and exhibition. This offers a two-day forum for local government and industry to share the plans, achievements and challenges of Australian cities and towns on the path to 100% renewable energy.

**What:** 2016 Australian Energy Storage Conference and Exhibition  
**When:** 1–2 June 2016  
**Where:** Australian Technology Park, Sydney  
**Web:** [www.australianenergystorage.com.au](http://www.australianenergystorage.com.au)

## Ozwater'16



Ozwater is an international water conference and trade exhibition run annually by the Australian Water Association (AWA). The event will attract a diverse audience including water professionals, decision- and policy-makers, students, scientists and researchers.

With the theme of 'Water: for liveable communities and sustainable industries', Ozwater'16 will put a spotlight on sustainability inside and outside the water sector. The

water industry has seen significant change over the last decade with the introduction of recycling, water efficiency gains of 40% and many cities now having a desalination plant. It is anticipated that this change will continue, particularly as the population is forecast to double over the next 50 years.

The conference program will feature more than 150 sessions over eight streams with 11 specialist workshops. National and international keynote speakers will outline

the challenges being faced by the water sector and innovative new solutions. The trade exhibition will meanwhile display the latest water industry science, innovation, technology, products and services for all water professionals and associated industries.

**What:** Ozwater'16  
**When:** 10–12 May 2016  
**Where:** Melbourne Convention and Exhibition Centre  
**Web:** [www.ozwater.org](http://www.ozwater.org)

## Solar 2016 in Melbourne



Presented by the Australian Solar Council and the Australian Energy Storage Council, the Solar Energy Exhibition and Conference is being held on 4 and 5 May in Melbourne.

The Australian Solar Council Chief Executive John Grimes said: "We are on the crest of an unstoppable wave. A technological wave that will link renewable energy, batteries and smart energy systems. For the first time consumers, rather than power companies, will be at the heart of the energy system."

The rapidly emerging storage sector is universally described as a game changer, a smart, dynamic and disruptive force. It has attracted innovators, entrepreneurs and thought leaders keen to take part in the clean-energy revolution, many of whom will be seen and heard on the podium at the conference.

There will be three free conference streams: energy storage, market and technology, and professional development.

that features the latest, and arguably the smartest, solar and energy storage products and services from Australia and overseas.

The event is suitable for battery and panel manufacturers, inverter innovators, commercial and residential PV installers, large-scale developers, technicians, trainers, trading certificate agencies, policymakers, bureaucrats, builders, architects, consultants, academics and more.

Conference topics include: energy market in transition; solar and storage business model innovation; energy innovation and the new economy; why utilities should love solar; the grid of the future; internet of energy; and cracking the code on commercial solar.

A range of expert speakers will educate and inform about every aspect of the exciting changes underway. Among the invited guest speakers are John Hewson, Martin Green, Ric Brazzale, Tim Buckley, Simon Corbell, Oliver Yates, Christine Milne and Finn Peacock.

Complementing the conference is the industry exhibition

**What:** Solar Energy Exhibition and Conference

**When:** Wednesday 4 May and Thursday 5 May 2016

**Where:** Melbourne Convention and Exhibition Centre

**Web:** [www.solarexpo.com.au](http://www.solarexpo.com.au)

## FREE SUBSCRIPTION

*Sustainability Matters* is **FREE** to qualified industry professionals in Australia\*.

To **continue** receiving your free copy you will be asked to register every three years.

\* For qualified industry professionals outside Australia, the digital magazine and eNewsletters are available FREE of charge. If you would like the print magazine, contact [circulation@westwick-farrow.com.au](mailto:circulation@westwick-farrow.com.au) for subscription prices in your region.



QUICK REGISTRATION @ [www.SustainabilityMatters.net.au/subscribe](http://www.SustainabilityMatters.net.au/subscribe)



# Sustainable buildings the tipping point for change

**B**uilding Management Systems and the way that we manage and control buildings have remained largely unchanged for 30 years. Our cars and phones are smarter than some of the most expensive assets on the planet. But this is going to change. Everyone's talking about it. You probably are too — 2016 is the year of Internet of Things (IoT) and the year for making smarter buildings a priority.

Real estate executives are looking for ways to better manage their portfolios. The C-suite is applying pressure to reduce the costly line item in the financial statements. Internet of Things (IoT) and Industrial Internet are more than merely an emerging trend or a tech buzzword from Silicon Valley. At its most basic, IoT in buildings is simply connecting devices and building systems to software applications via the internet so that users can access information from wherever they are. The tech giants like Microsoft and Intel are investing millions into IoT, cloud and security for the property sector. Add each of these factors together and we're sitting at a tipping point of transformative change.

This is the type of change that's going to rattle the sustainability of buildings:

## Water

Real-time data for water consumption in a building allows for early detection and leak correction, which may otherwise go unnoticed for years. Yes, water is still cheap, but that doesn't mean that companies shouldn't be vigilant. And on a portfolio-wide scale, water leaks can cost an organisation tons of wasted time and resources every year.

Think about how beneficial interval-level electricity data has been for the industry... Being able to visualise building water profiles gives us the power to detect problems earlier and help prevent 'bill shock', a common scenario with quarterly or six-monthly billing cycles. Plus, the number of 'estimated' bills in this space is widespread and unnecessary.

Some of the more common findings we see are underground pipe leaks, poorly automated

irrigation systems, faulty ball float valves, tenants leaving taps on, water theft and bathroom leaks. These are all easily hidden from view if there isn't adequate and timely monitoring in place. Having a platform to visualise this data and notify you of possible issues enables you to work with the site teams and contractors to investigate the source of these leaks quickly and, most importantly, solve them!

## Energy

This is the big one! Energy is expensive and getting more so every year. Buildings need constant monitoring to meet and maintain high performance standards. There is no 'set and forget' mentality here! Buildings are a constantly moving feast, thus we see tons of opportunities for waste.



**Farmers need to be empowered with a sense of ownership in fair trade and this could be accomplished with fair trade re-engaging the farmer at a grassroots level.**

Contractors leave equipment and lighting in manual mode; meters aren't installed or commissioned properly; energy efficiency mode isn't automated on equipment; the economy cycle doesn't work; dampers get stuck; people change setpoints unknowingly; out-of-hours air conditioning is left on all weekend; building system readings are faulty... You catch the drift — the list is extremely long and the stories are the same the world over!

Ultimately, IoT for buildings gives facilities and property managers the information they need to identify sources for immediate improved energy efficiency, cost savings and carbon reduction.

Not only can IoT prevent wastage, it can also allow you to fine-tune your building and understand the impacts that altering one parameter has on other parameters. For example, how does trialling a floating setpoint based on outdoor conditions affect the building's energy consumption as well as tenant comfort? What about modulating air conditioning according to occupancy loads? Being able to predict or shift demand can help owners reduce hefty demand charges by automatically shedding loads or starting up generators.

IoT also allows users to determine which sites have the biggest energy consumption or which pieces of equipment are the most inefficient, which then helps to prioritise

energy projects in order of impact. IoT also then allows easy measurement and verification to confirm results and measure operational cost savings as well as the return on investment.

Finally, IoT can also be an important part of a preventive maintenance strategy, allowing early detection of issues before the system fails and better identification of issues that may be able to be fixed remotely, avoiding expensive contractor call-outs.

The Tipping Point is here — futureproofed sustainable buildings are possible now. Therefore, the time to act is now, lest you be left even further behind.



*Christina Hughes brings a deep background in sustainability and energy efficiency in the Australian commercial property market. She's spent time advising on how to upgrade energy and water efficiencies and reduce waste to create more sustainable workplaces. She also has expertise in Australian legislative reporting such as NERS and Mandatory Disclosure, NABERS, green building rating schemes such as Green Star, and international sustainability benchmarks GRESB and DJSI. And when she's not busy serving as the Switch Automation National Accounts Manager for Australia and New Zealand, she's busy perfecting her baking wizardry skills.*



# COMMS 2016 CONNECT

Events for critical communications  
users and industry

**Sydney** 22-23 June 2016 | Sydney Showground



## Confirmed speakers include:



**STATION OFFICER  
GRAHAM TAIT**

Operational  
Communications  
Systems Officer  
FIRE & RESCUE NSW



**ASHLEY MARSHALL**

National Business  
Development Director  
BAI  
COMMUNICATIONS



**MARK LONEY**

Executive Manager,  
Operations, Services &  
Technologies Branch  
ACMA



**BIDAR HOMSEY**

Principal Consultant,  
Public Safety &  
Security, Global  
Industry & Society  
ERICSSON



**ROSS SPEARMAN**

CTO  
TAIT  
COMMUNICATIONS

**PLUS**

An exhibition with dozens of local and international manufacturers and distributors will have their experts on hand to help you find the solutions you're looking for.

Early bird  
registration  
closes  
13 May

Digital Partner



Platinum Sponsors



Delegate Bag Sponsor



Gold Sponsors



Magazine Partner



Supporting associations & media organisations



Association Partner



**In conjunction with the ARCIA Industry Gala Dinner  
— 22 June 2016 — Novotel, Sydney Olympic Park**

Visit [www.arcia.org.au](http://www.arcia.org.au) to book your tickets

Interested in exhibiting or sponsoring?  
**Contact Paul or Narelle on +61 2 9487 2700**

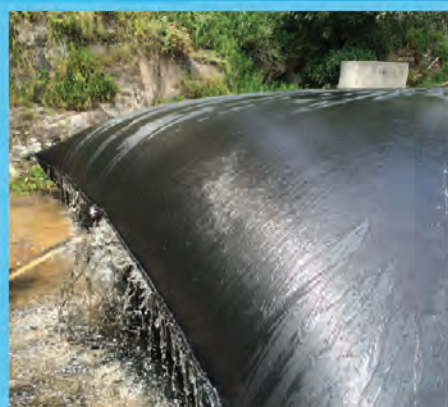
[www.comms-connect.com.au](http://www.comms-connect.com.au)

follow us on





# CRS ENVITUBE<sup>®</sup> DEWATERING CONTAINERS



Traditional methods of dewatering industrial and municipal high water content sludges involve the use of expensive operating and capital cost equipment such as centrifuges and belt presses. The alternative is passive dewatering using CRS Envitube<sup>®</sup> Dewatering Containers made from woven polypropylene geotextile. Sludge can be fed from storage ponds or directly from the process / digesters, using lower dosage rates of polymers and producing exceptional quality filtrate. Depending upon the length of time sludge remains within the CRS Envitube<sup>®</sup> units to dry, solids of > 45% w/w can be achieved, as with water treatment sludges.



- High volume containment
- Contained sludge will not rewet in rain events
- Cost effective
- Double the dry solids vs mechanical dewatering
- Lower polymer dosage rates
- 24 hour unattended dewatering
- Automated level controller available

**For application details contact...**