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# WORDS FROM THE EDITOR

Should we price nature to protect it? This question was the topic at a recent IQ2 debate organised by The Ethics Centre.

Many economists believe a market-based system will help protect the environment because if there is no price or cost for damaging our environment, then our land and water resources will continue to be damaged.

The economic case for low-carbon growth is even stronger than when the Stern Review was published in 2006, according to a paper by Nicholas Stern published in July 2015 by the Royal Society.

However, the 'against' team at the IQ2 debate convinced the audience by pointing out some of the risks of relying on market forces to put a price on nature, saying that the market can't get share prices — or for that matter Sydney houses prices — right so, they argued, how was the market going to get the price of nature right?

Both teams agreed that costs definitely influence behaviour, but there was no consensus that price alone could offer protection for nature. Some sort of government intervention with climate and environment issues was mooted. The 'against' team also pointed out, however, that when it comes to environmental issues, the power of the community should not be underestimated. While the financial case for a sustainability initiative is clearly important, community power can have a significant influence over government and business decisions. In this, our waste issue, we talk to Kimberly-Clark about some of its creative and innovative collaborations that have been helping it to reach its goal of zero manufacturing waste to landfill. This manufacturer is certainly committed to reducing its impact on the environment, saying it is something that forms part of its ethos.

We also look at the changing face of the waste management industry, which is more and more valuing waste as a resource that is worth recovering.

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# Collaboration – the key to recycling success

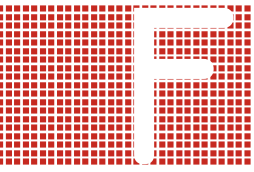


Jacquie Fegent-McGeachie  
Head of Sustainability and Corporate Affairs  
Kimberly-Clark Australia and New Zealand





the challenge for us was, how do we promote breakthrough innovations and how do we look at different ways of collaborating to establish new ways of recycling different materials and establishing viable local secondary markets for these materials.



From nappies to toilet tissues, most will be familiar with at least some of the indispensable hygiene products manufactured by Kimberly-Clark. What you may be surprised to learn is that the company has been making great strides to meet ambitious waste management strategies that minimise the impact of its products on the environment. However, achieving success with such strategies has not come without challenges.

Jacquie Fegent-McGeachie, Head of Sustainability and Corporate Affairs at Kimberly-Clark Australia and New Zealand, says that a key waste management challenge the company faces is the fact that the majority of the health and hygiene consumer products it manufactures are designed for single use. And although the company doesn't see itself as a recycler, it takes very seriously its responsibility in reducing the impact of these products on the environment. "In order to achieve the outcome we want, which is less waste to landfill, it has required finding innovative ways to partner with experts in the waste industry, as it requires new technology, new processes and the establishment of commercially viable secondary markets for the components recovered through the recycling process."

With trillions of dollars' worth of materials currently lost to landfills each year globally, there is huge potential for secondary markets for post-consumer recycled material. Therefore, it was surprising to hear that when Fegent-McGeachie first approached the traditional waste industry four years ago about how the company could partner in finding composting or recycling solutions for its post-consumer nappies, essentially the big players in the waste industry weren't so interested.

"It is heartening to hear the big players in the waste industry are now increasingly looking at more difficult waste streams and

how they might help to address the challenge of these waste streams going to landfill; but, in our experience, we have found the waste industry to be very conservative, taking a tried and tested approach. Therefore, the challenge for us was, how do we promote breakthrough innovations and how do we look at different ways of collaborating to establish new ways of recycling different materials and establishing viable local secondary markets for these materials. What we are now seeing is 'disruptive innovators' coming into the market."

Fegent-McGeachie describes one such example as 'mumprenuer' Elizabeth Kasell from Victoria. She was unhappy about the amount of flexible plastic packaging going to landfill and was told it couldn't be recycled as part of kerbside recycling, so in 2012 she set about establishing her own initiative called REDcycle. In a trial, Kasell teamed up with Coles and an organisation in Victoria called Replas that specialised in recycling this type of plastic into useful equipment such as outdoor furniture and play equipment. The initiative has now been scaled nationally, with a huge volume of flexible plastic packaging now being diverted from landfill.

Fegent-McGeachie says: "Since the launch of the REDcycle Program in 2012, RED Group has collected more than 100 million pieces of plastic that will never end up in landfill, on our beaches or in our waterways.

"The key to the success of this initiative was around collaboration. It is a great example of the unique collaboration between an entrepreneur who had a great idea and her success in getting on board a recycling innovator, consumer goods companies and retailers in order to solve an unmet need in the community."

Along with others, Kimberly-Clark Australia has introduced the REDcycle logo on the flexible plastic packaging of its consumer products to help increase awareness and inform its consumers about how to keep it out of landfill. Kimberly-Clark, along with other industry partners, is now working to

see if it can replicate a similar scheme in New Zealand.

In another example, entrepreneurial parents of two Karen and Karl Upston implemented a nappy composting innovation in New Zealand. Fegent-McGeachie explains how the couple loved the convenience of disposable nappies but didn't like the thought of all those nappies going to landfill, so they also set about doing something about it. They trialled a nappy composting solution in collaboration with HotRot Organic Solutions using its existing HotRot technology. "We heard about this great idea in regional New Zealand back in 2009 and thought they were onto something, so we came on board in the early stages," said Fegent-McGeachie. "We have since seen this nappy composting facility, called Envirocomp, scale up in New Zealand with a second facility in Wellington and a third planned for Auckland. It was also recently accredited under New Zealand's product stewardship scheme.

"We've been wanting to replicate this solution in Australia, but for a whole host of reasons it hasn't happened yet," said Fegent-McGeachie. "However, Australian entrepreneurs, again from Victoria, have started up a company called Relivit. The company licenses the Knowaste technology that has a different process to enable recycling of absorbent hygiene products (nappies and adult incontinence and sanitary products). At the end of last year we have come on board as a supporter of Relivit and hope that once their planned facility is built in Southern NSW that they can assist our Huggies consumers to divert their nappies, along with incontinence and sanitary waste, from landfill."

As well as partnering with Relivit on the post-consumer waste around its Huggies brand, this collaboration also has the potential to provide a solution for some of Kimberly-Clark's manufacturing waste.

Scheduled to start next year in Australia, the Relivit agreement will also include a component for the diversion of some manufacturing waste from Kimberly-Clark's

➤ continued on page 16



*Sustainability Matters* asks SUEZ environnement's Executive Director Infrastructure Emmanuel Vivant\* about the company's role in the 'resource revolution' in Australia and more.

W

hat has triggered your newly formed company, SUEZ environnement, to focus on the 'resource revolution'?

Our world's natural resources are limited. Ultimately, we need to abandon the linear model of consumption from cradle to grave and move towards the circular economy where recycling and re-use become the norm.

We believe SUEZ environnement has a significant role to play in leading this revolution. Our customers want smarter solutions to meet their waste needs, and globally SUEZ environnement is prepared to lead, to innovate and to invest in solutions that can continue to transform waste into new resources and energy.

For us in Australia, we have also recently brought our water and waste divisions together under the one brand and management team. This enables us to provide our customers with access to a fully integrated waste and water group offering a larger panel of solutions and expertise.

**What technology trends do you predict will help promote the resource revolution and improve the efficiency of recovering resources from waste in Australia?**

The resource revolution can be seen as a new era in waste management by improving the recovery rate of resources from waste, particularly in Australia. I believe the future of waste management locally, besides material recovery already in train, will be around energy across multiple facets: alternative fuels, dedicated small-scale cogeneration (steam and electricity) plants, large-scale energy-from-waste (EfW) and anaerobic digestion. While these are not necessarily new and innovative, they will see the introduction of new technologies in our market.

We have already significantly invested in resource recovery infrastructure in

# From waste to resource recovery —

## Q&A with Emmanuel Vivant





The 'resource revolution' can be seen as a new era in waste management by improving the recovery rate of resources from waste, particularly in Australia.

Australia, from our network of Advanced Resource Recovery Technology (ARRT) facilities through to our de-packaging facility. We will continue to leverage our global expertise to provide smart and reliable solutions to the local market.

**What are the unique challenges or road-blocks that may hold back the resource revolution in Australia?**

There have been unique challenges for resource recovery as a result of the disparity in waste policy across Australia. For example, the waste levy, which is a key driver for waste avoidance and resource recovery, varies significantly across the country. This unfortunately triggers behaviours as we have seen with waste being transported from Victoria and New South Wales to Queensland. Although progress has been made in New South Wales, the interstate transportation of waste is still an issue and concern. The long-term impact of such policy differences will be detrimental to the establishment of resource recovery solutions and subsequently the resource revolution in Australia.

Another significant challenge has been the disappearance of Australia's manufacturing industry as it has reduced the outlets for secondary products and recycled materials. It's difficult to propose and establish new processing solutions without the certainty of long-term customer relationships and offtake agreements. This has also been driven by the bottom line for most customers when landfilling is the cheapest option for waste disposal and does not require the customers to change their operations.

**Most know that aluminium, paper, PET plastics and glass, for example, can be recycled, but is there scope to improve the efficiency of these processes in order to achieve optimum recovery rates of these materials? If so, how and what is currently under development?**

There is always scope to do more with our technologies, and SUEZ environnement is investing in the research behind the innovation. For example, last year in France we opened PLAST'lab, an innovative laboratory dedicated to recycling plastic; and in Belgium, 'High 5', a glass recycling plant that is capable of separating mixed coloured glass. As a company in Europe, we hope to double the production of recycled plastics in the next five years and the opportunity for us to leverage our global expertise to provide the best local solutions for the Australian market.

**What types of material commonly found in the waste stream are proving to be the most challenging to recover and how can this be overcome? — For example, could the answer be waste avoidance of certain types of materials and how could this be achieved?**

The issue is not material specific, rather how materials are found in the waste stream eg, how they are presented for recovery. Cross-contamination and mixing waste streams are major factors limiting resource recovery and possible re-use. For example, there are a lot of plastics (bottles, films, bags) in residual domestic waste received at our ARRT facilities. These materials are very difficult to recycle. Firstly, their recovery requires a lot of processing (equipment, handling and staff), adding significant expense.

Secondly, when recovered their quality is a major issue for the downstream potential offtakers due to the cross-contamination, in particular with organic matters. The best solution to facilitate resource recovery and improve the quality of recyclables while overcoming cross-contamination is source separation. With e-waste including equipment, appliances and whitegoods, the issue is around the difficulty to deconstruct and separate the materials used in the product to produce good-quality secondary raw materials.



**In your opinion, what has been the key factor in the trending transition away from 'waste-to-landfill' in Australia and what else needs to be done to achieve zero-waste-to-landfill targets? That is, is a price on waste (ie, landfill tariffs) the only answer or is there scope to make current landfill sites more sustainable?**

There's a clear aspiration to reduce reliance on landfill in Australia. However, as I mentioned earlier, waste levies are a key driver for waste avoidance and resource recovery but they vary significantly across the country. Therefore, the intent of the levies is often undermined.

We would like to see more uniform levies across the country and the funds invested back into the resource recovery industry. Until resource recovery technologies evolve further, there still remains a role for well-managed landfills.

**What have been the drawback or challenges that have held back waste-to-energy projects on landfill sites in Australia?**

Australia is a large country with a lot of space. As a result, we haven't seen the urban pressures experienced in other markets. With collective governments' aspirations to reduce reliance on landfill and the develop-

ment of policy frameworks we can now see the emergence of EfW projects in WA. We've also seen discussion in NSW with the release of the EfW policy. While there are a number of practical elements at play, such as the long-term waste supply agreements and financial elements such as the price of electricity, we do see future opportunities in Australia. We operate more than 50 EfW plants across the world and we're currently exploring opportunities to leverage this knowledge and experience in Australia. **How can government policies help with the transition of the waste industry from a materials handling industry to a manufacturer of products from waste?**

As previously mentioned, there are significant differences across the Australian state and territory jurisdictions in terms of waste policy, in particular the application of levies. There is merit in Australian state and territory governments taking a more strategic and coordinated regulatory approach to waste policy, and this would be of great assistance to the industry and support the transition from materials handling to manufacturers of products.

We need regulatory frameworks for materials derived from waste that increase



*\*Emmanuel Vivant has worked with SUEZ environnement since 2001. He has over 17 years of international experience with SUEZ environnement in the resource recovery and waste treatment sectors having previously held roles in France and Hong Kong. Emmanuel has a Civil Engineering degree.*

their ability to compete with and replace traditional products. Changing government policy will hopefully encourage the use of secondary raw materials produced from waste and reduce what is sent to landfill. This also provides the opportunity for governments to lead in the procurement and use of secondary raw materials.

**SUEZ environnement**

[www.suez-environnement.com](http://www.suez-environnement.com)

SUEZ environnement announced in March 2015 that it was unifying its water and waste management brands — among them SITA Australia, Degrémont Australia and Process Group. The change to the single SUEZ environnement brand aims to achieve three major goals: to simplify a multibrand architecture for improved performance and commercial efficiency; to meet the new needs of customers as they face new environmental and societal challenges; and to reinforce the convergence between the group's activities so that the company can address the challenges of a circular economy.



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## Dairy processor halves energy costs of wastewater

Australian dairy ingredient processor Burra Foods recently installed a Hydroflux HyDAF Dissolved Air Flotation (DAF) unit for primary wastewater treatment and successfully halved its energy costs.

According to Burra Foods' Wastewater Treatment Plant Supervisor Daniel Tsivoulidis, they began to see results at the Korumburra site in the South Gippsland region of Victoria just one week after installation.

"Within a week we were already removing so many of the solids in primary treatment that our secondary treatment sequencing batch reactors did not need as much oxygen. We immediately saw a drop in electricity costs.

"With some more fine-tuning we saw even more improvements. We reduced our energy costs by almost half and the sequencing batch reactors can now process double the volume of water," he said.

Improving primary treatment also leads to improved secondary treatment performance, smoother processes and other benefits, according to Hydroflux Industrial Director Mathew Pugh.

"We see this time and time again. Getting the wastewater treatment right at the front end can have an incredibly positive effect for the rest of the plant as well as significant cost savings. It's a worthwhile investment with a fast return as it reduces the cost of operation," Mathew said.

Burra Foods HyDAF unit now removes 60 to 70% of contaminants in a continuous automated process and it has shown savings through reduced energy and chemical demand, as well as a reduction in operational expenses in downstream treatment.



The DAF unit also enabled improved pH fine-tuning and there is less downtime now required for washing the microfiltration and reverse osmosis plants that form part of downstream processes.

The Burra Foods site can use up to a million litres of water a day and final treated water is discharged to the environment. Improved primary treatment reduces water variations going into the secondary and tertiary treatment further guaranteeing the high quality of this discharged water.

Hydroflux Industrial is a wastewater treatment specialist in the Australian dairy industry working with clients such as Burra Foods, Parmalat in Sydney and Pactum Dairy in Shepparton.

**Hydroflux Pty Ltd**

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## Western Sydney councils collaborate on waste management

Ten Western Sydney councils are taking a regional approach to waste management with the formation of the Western Sydney Regional Waste Avoidance and Resource Recovery Strategy. Supported by the NSW Environment Protection Authority, the strategy aims to combat growing waste generation in a growing area.

According to the president of the Western Sydney Regional Organisation of Councils (WSROC), Councillor Tony Hadchiti, Western Sydney's waste generation is set to hit over 1 million tonnes per year by 2021. "This is the equivalent of garbage trucks filled with waste queued back to back from Sydney to Brisbane," Cllr Hadchiti said.

a WSROC-led waste management team will "ensure collaboration and knowledge sharing are central to how we approach waste moving forward". A number of Western Sydney councils have already won awards for outstanding waste management projects, he noted, so by working together, "councils can take advantage of these best practice initiatives".

Key strategy targets include:

- increasing household waste recycled to 70% by the year 2021,
- establishing 10 Community Recycling Centres (or similar waste management solutions) in Western Sydney by 2021,
- reducing per household waste generation,
- reducing littering and illegal dumping,
- improving regional cooperation and collaboration.

For more information on the strategy, visit [www.wsroc.com.au/issues-campaigns/regional-waste-strategy](http://www.wsroc.com.au/issues-campaigns/regional-waste-strategy).



WSROC President Cllr Tony Hadchiti.



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## Data centre powered by solar

MORE Solar Energy has completed the installation of an aggregated 51 kW solar system at the OMNIconnect Data Centre, located in Melbourne. The company worked with Enphase Energy to design and deliver a world-class system with maximum production capabilities.

OMNIconnect, a licensed telecommunications carrier and internet service provider, operates 24 hours a day and consumes nearly 400 MWh of energy each year. Reliant on this energy to deliver critical, high-value data around the clock, the company was running the risk of its demand outstripping supply from the grid.

OMNIconnect turned to MORE Solar Energy to install a solar PV system that would help not only increase its power source, but also reduce operating expenses and carbon footprint. In December 2014, MORE Solar Energy employed Enphase M215 microinverters for the first phase of the project - a 30 kW rooftop solar system.

OMNIconnect needed durable inverter technology built to last, and Enphase microinverters are rigorously tested for extreme weather conditions. They were designed to IP67 standards and only came to market after one million hours of power-on testing.

The second phase of the project saw the installation of a 21 kW solar system in May 2015, resulting in an aggregated



system of 51 kW. According to OMNIconnect CEO Peter Hutton, the system is expected to deliver "70 MWh of energy and over \$12,000 in tangible savings per year".

The installation also included an Enphase Enlighten monitoring system, which provides OMNIconnect with the ability to ensure the data centre's system is working at an optimum level at all times. According to MORE Solar Energy Project Developer Leon Fong, "OMNIconnect was extremely interested in a monitoring solution that would allow them to dig deep into the data and understand their system's production", and the system's real-time analytics enables the company to do just that.

Already a highly energy-efficient building, the OMNIconnect Data Centre houses a range of innovative environmental technologies, including economised cooling, lighting sensors, energy-saving lights, a water collection and filtration system, and natural ventilation. The company additionally uses a heat recovery system that uses hot air from the data centre to heat the office areas during winter months.

"The Enphase system works in concert with existing green initiatives to provide clean energy in the most efficient way possible," said Enphase Asia-Pacific Managing Director Nathan Dunn. "Not only does this reduce overheads and the building's carbon footprint, it also bolsters the stability of the facility's power supply - which is crucial for any data centre."

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Kiera Crosariol and Mike Ritchie,  
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## NSW Land and Environment Court Decision

A recent case in the NSW Land and Environment Court has highlighted the discord between NSW's planning laws and the environmental protection laws, which could impact the way that waste and recycling processors are approved and regulated.

**T**he case in question was between Glass Recovery Services - the owner of a glass beneficiation facility in Penrith - and the Department of Planning and Infrastructure. The conflict stems from the reprocessing of glass; specifically whether glass is a 'waste' for the purpose of reprocessing at a 'waste or resource recovery facility'. (This would require development consent, in comparison to a 'second-hand good' used for manufacturing, which would not.)

The Department of Planning and Infrastructure argued that glass reprocessing is the processing of 'waste' at a 'waste or resource recovery facility'. But when

Justice Nicola Pain looked for the definition of 'waste', she found that there was no unified regulatory definition of the word. It is different or non-existent depending on where you look.

The Environmental Planning and Assessment Regulation 2000 NSW Sch 3 defines waste as any "solid, gaseous or liquid or a combination of any solids, gases or liquids that is discarded or is refuse... A substance is *not precluded from being a waste... merely because it can be reprocessed, re-used or recycled* or because it is sold or intended for sale" (emphasis added).

However, this regulation - and therefore definition - only applies to 'designated developments'. The glass beneficiation application was classified as 'state significant development'.

The State Environmental Planning Policy (Infrastructure) (the Infrastructure SEPP) and the *Environmental Planning and Assessment Act 1979* (EP&A Act) do not define 'waste' at all. To add further confusion, the Infrastructure SEPP defines a resource recovery facility as a "facility for the recovery of resources from waste... *but not including re-manufacture of material*" (emphasis added).

With these issues in mind, the court sought a definition from the common usage via a dictionary, relevant case law and a definition in the *Protection of the Environment Operation Act 1997* (POEO Act), which defines waste as "any (thing) discarded, rejected, unwanted, surplus...". This definition is one that most people from the waste sector are familiar with.



## defining waste

Justice Pain found that 'waste' is discarded or unwanted, surplus or abandoned; but, in a relevant case (the Carter Holt case), that a former owner needs to have abandoned the material for it to conform to a common sense meaning of waste. In the case of Carter Holt, recycled paper had not been abandoned and was therefore not 'waste'. It was, as J Pain stated, a 'second-hand good'.

Using this definition, the Court found that the glass in question should not be classified as 'waste'. The Material Recycling Facility (MRF) process ensures that the glass has undergone a transformation from waste to 'second-hand good' (of which there is also no formal definition).

To put it another way, the MRF deals with waste, but once the glass is sorted (no matter how contaminated) it becomes 'second-hand' glass and is no longer 'waste'. (I have concerns that the issue of contamination was not better dealt with in the hearing or judgement. For example, what amount of

contamination renders 'second-hand goods' back into waste, if at all?) The impact of the case is that 'waste' is not consistently defined in either planning or environmental protection laws. Further, we have the entry of a new concept of 'second-hand goods' into the recycling and waste approvals space.

Think glass, plastic, steel, paper and cardboard, aluminium, timber, pallets, tyres, electronics, etc. At some point along the supply chain, they can presumably swap from 'waste' to second-hand goods with reference to the EP&A Act and this Court decision (but presumably not the environment protection acts, eg, POEO).

This difference will, of course, lead to confusion in respect of Planning consent applications and enforcement under the POEO Act. Of course, a simple remedy is for the Department of Planning to amend the EP&A Act to reference the same definitions as exist in the POEO Act.

But this case highlights a more strategic issue: when does waste cease to be waste

and become second-hand material? The organics industry has been arguing for years that once food/green waste is processed through a composting/pasteurisation process, it ceases to be waste; similarly the electronics, timber and paper industries (to name a few).

Perhaps it is time to reconsider the whole approach to defining waste in NSW; to take better account of the transformational effect of recycling and reprocessing, to converting materials from waste to recovered goods or, to borrow the phrase, 'second-hand goods'. That, of course, needs to be balanced against the requirement to protect the environment from waste potentially masquerading as 'second-hand goods'.

Whichever way government decides to go, this case highlights the need for a strategic approach to waste infrastructure development and particularly proper alignment of priorities between the Department of Planning and the EPA.

**MRA Consulting Group**

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## Continued from page 7



Huggies manufacturing site in south-west Sydney. Fegent-McGeachie explained: "The agreement with Relivit came about for three key reasons: one, Relivit's planned facility and the technology they use should provide a solution on an unmet community need. Secondly, they wanted the waste stream from the manufacturing off-cuts for its planned recycling process and thirdly, their fee structure is actually cheaper than current landfill costs, which makes it pretty remarkable."

Creative innovations are exactly what is required to achieve Kimberly-Clark's goal of zero manufacturing waste to landfill. A 96% diversion of waste from landfill has already been achieved at its largest manufacturing facility in regional South Australia even though it's a long way from recycling facilities. "So to get to where we are now has required establishing some creative local collaborations. For example, some of the tissue off-cuts go to a local worm farm in the Mount Gambian region.

"We still have 4% to go, and to get this, some small but tricky waste streams will

have to be solved. For example, we are doing some trials on the aloe vera resin from some of our tissues but haven't found a home yet."

With rising landfill cost and gate fees, especially in New South Wales, the business case for implementing zero-waste-to-landfill strategies is even more compelling. However, according to Fegent-McGeachie, the dichotomy that Kimberly-Clark faces is that most of its sustainability initiatives come at an upfront cost, but consumers won't pay a premium. "We know this, but as consumers become more engaged and involved on sustainability issues, the hope is companies, such as ours, will be rewarded via consumer loyalty to our brands and therefore the cost gap narrows.

"It is about weighing up the short-term cost against the long-term benefit and what also comes into the decision is our corporate social responsibility. We are committed to reducing our impact on the environment; it is something that forms part of our ethos, so that does help with the business case." □

## Titanium pump solves sewage spill challenge

Sewage spill containment at waste transfer stations means handling corrosive sewage. Specifying a suitable pump is a challenge for wastewater consultants.

Sydney Water's new sewage collection station at Douglas Park, southwest of Sydney, is emptied by tanker on a daily basis. The large spill containment pad ensures any corrosive sewage leaked during the transfer is collected in the sump pit.

The organisation required a pump that was capable of handling this liquid. MWH Global, the wastewater consultant that designed the sewage collection station, selected a Tsurumi TM series titanium submersible pump for the drainage sump.

"Ferric chloride is added to sewage in the holding tank for odour control," said Mark Rush from MWH Global. "As a result, the collection pit needed a pump that would handle corrosive liquids."

The series is particularly suitable for applications where corrosion is an issue. The stator housing is titanium, while the pump casing, stand and motor cap components are all manufactured from FRP resin-moulded material. Although the range was originally designed for sea water, it is also suitable for highly corrosive chemical applications in food and chemical plants.

The pumps are compact in design and are available with single- or three-phase motor drives. They are capable of a flow of 240 L/min right up to 350 L/min. Heads vary from 9 to 15 m.

The pump used in the Douglas Park station sump pit is a Tsurumi 50TM2.4S single-phase submersible with flows to 290 L/min and a max head of 12 m. The series features a vortex impeller made from glass-fibre reinforced resin. An antiwicking cable gland prevents water incursion due to capillary wicking should the power cable be damaged or the end submerged.

A dual silicon carbide mechanical seal is protected in an



Barry Cook, Sydney Water, installs a TM series titanium pump at the sewage collection station at Douglas Park to handle the sewage spills during transfer to collection tankers.

oil chamber so neither seal face contacts the pumped liquid. This eliminates abrasion and facilitates cooling and lubrication of the seal faces. The oil chamber incorporates an oil lifter that ensures lubrication even if the oil level in the chamber drops. This increases the time between routine pump maintenance.

The series is also available with floats for automatic operation, with the float height able to be preset. Installation is simple as there is no external control panel or additional wiring required.

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## Energy-efficient sewage pump system reduces blockages

Queensland water authority Unitywater has installed a new pump and controller partner system at several of its sewage pump stations, in order to reduce blockages and save energy.

The Flygt Exterior, by Xylem, is programmed to pump at the most efficient speed and times in order to move the most sewage using the least amount of energy. A trial undertaken at Unitywater's Bli Bli pump station resulted in energy

savings of 57% compared to the original pumping equipment.

Unitywater Executive Manager Infrastructure Services Glen Babington said the system can also detect blockages before they become an issue, stating, "The controller detects a blockage and the design of the pump allows it to pump backwards and reverse blockages.

"Fewer blockages equal fewer call-outs, so this equipment helps reduce call-out

costs and electricity costs," Babington continued.

The system has now been installed at seven Unitywater sewage pump stations and a further 20 locations have been identified to have the system fitted. An additional 34 sites have been proposed to have the controller fitted.

*Xylem Water Solutions Australia Ltd*  
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## A stormwater harvesting system at Sydney Park

Since 2004, the City of Sydney has invested \$23.25 million transforming a former brick-making factory on the site into the beautiful Sydney Park. On Saturday 17 July, the City officially opened an \$11.3 million stormwater harvesting system to support wetlands and wildlife in the park.



The water re-use system will capture and clean enough water to fill an Olympic-sized swimming pool every day, providing a sustainable supply for the park and its wetlands and returning any remaining water to Alexandria Canal. It is the third-largest stormwater harvesting system in NSW and the largest City project in Sydney Park.

"We have added a system to capture contaminants and sediment, boardwalks, picnic tables and better signage," said Lord

Mayor Clover Moore, who formally opened the upgrade. "With cascades and bush areas, the wetlands are already attracting new wildlife to the park, which has the highest population of native bird species in the local area."

Sydney Park offers a recreational area for people of all ages, featuring a cafe, a children's play area and a revitalised village green. Construction of a children's bike track is currently underway, while work will begin on a City farm later this year.

"Thanks to a lot of creative work by the City, Sydney Park is a much-loved open space, which has been made even better as a result of this water recycling system that will sustain its lawns and wetlands for generations of Sydneysiders to enjoy," the Lord Mayor said.

The weekend also saw Moore open an upgrade to Bamal Way, a 150 m green link completing the pedestrian connection between Coulson Street and Sydney Park Road. The elevated thoroughfare features plants growing in retaining terraces by stairs and a ramp connecting the open space with pavement a few metres below on Sydney Park Road.

A new section of ramp next to the stairs connects the pre-existing ramp, which had been locked off until the missing link was completed. Throughout the park, a landscaped pathway with turf, garden areas and trees work around retained trees.

"By opening up this new connection, we are improving access for the growing population of Erskineville to the open space and to St Peters Station," the Lord Mayor said.

"And the City is currently working with the RMS to get a new signalised pedestrian crossing for Sydney Park Road at the top of Bamal Way to connect the renewal area of Ashmore Estate."



*Images of Sydney Park courtesy of the City of Sydney.*



## The Mint set for greener energy

The Royal Australian Mint (the Mint) is one step closer to further improving sustainability and adopting a greener approach to coin production with the appointment of Origin Energy to install and manage one of the ACT's largest rooftop solar energy systems.

The installation of a solar panel photovoltaic (PV) energy system on the roof of the iconic building in Deakin will reduce the Mint's peak electricity consumption and introduce renewable solar energy to the site.

After a competitive process, Origin was awarded the tender to design, build, own, operate and maintain the solar PV system and sell the generated solar energy to the Mint via a 15-year power purchase agreement (also known as a PPA).

The system will consist of 924 solar panels, which will be installed in the coming months in areas that are not visible from the ground in order to preserve the aesthetics of the Mint's exterior.



© David Franklin/Dollar Photo Club

The Mint CEO Ross MacDiarmid said this new installation will reduce the Mint's carbon footprint, while having an additional financial benefit.

"This move by the Royal Australian Mint will make a significant environmental impact by reducing greenhouse emissions; and with a cost reduction, these panels are a real investment for the Mint's future," said MacDiarmid.

Origin Chief Executive Officer Energy Markets Frank Calabria said that Origin is pleased to be delivering a cleaner energy

solution for one of Australia's most iconic organisations.

"This is one of the largest solar PPA installations on a building in Australia to date, and demonstrates how large organisations are now making the most of solar energy. Solar can deliver businesses benefits to both their bottom line and their carbon footprint, and it is great that the Mint is leading the way for big business in Canberra," said Calabria.

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## Solar-powered valve for water industry



The manual operation of remote decentralised plants such as rainwater retention basins is costly in terms of both time and money. Energy-autonomous automation with photovoltaic or wind power could provide a solution to this problem.

Rainwater retention basins catch surplus water from sewers during heavy rainfall, thus protecting wastewater treatment plants and natural bodies of water from overload. Once the wastewater treatment plants in question have sufficient capacity again, the gate valves on the retention basins are opened and an appropriate amount of water is released. Since the plants are often located in places without electricity supply, it was previously necessary to operate the gate valves manually, which meant a time delay and associated labour costs.

An energy-autonomous solution from Festo can now be used to actuate the gate valves automatically by remote control. A photovoltaic or wind-power system supplies the necessary electricity for the operation of this valve terminal solution and a compressor generates compressed air.

Using a GSM modem, the entire system can be controlled and monitored remotely from the control room of a wastewater treatment plant. The opening and closing of the slide valves as

well as the status monitoring for the entire system can also be performed centrally.

The flow control gate valves are actuated with pneumatic linear actuators type DFPI and DLP, some of which are equipped with positioners. The pneumatic actuators are suitable for outdoor installation, often required in the water industry.

The energy-autonomous station is individually dimensioned in terms of size and performance. Among the most important parameters are:

- Location-specific data such as exposure to sunlight, orientation, presence of shade.
- Logging of the energy consumption profile on the basis of type of consumption, hours of operation, total operating period.
- Definition of length of period of autonomous operation required to ensure safe operation in the case of an energy source failure.

Advantages of this energy-autonomous pneumatic solution include: a plant without mains power can be remotely operated; operators can save time and money on manual operation; and it can provide continuous monitoring of the system.

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# An abattoir powered by biogas

**B**ioenergy company Quantum Power has secured its 10th biogas project, which will generate up to 1 MW of renewable energy at the Southern Meats sheep processing facility in Goulburn. The organic load from the abattoir's wet waste stream will be converted into biogas, which will then be refined and used as a fuel for a renewable power station to be constructed on-site. Sufficient renewable energy will be produced to offset the power consumption of over 400 homes.

"The engineered anaerobic digestion system and biogas-fuelled power station will take nine months to construct," said Quantum Power Business Development Manager Kunal Kumar. "Once built, the digestion system will convert the organic load in the waste stream to biogas, comprising approximately 60% methane.



Whilst this is Quantum Power's 10th commercial scale project, it also represents a number of firsts for the Australian biogas industry.

"The biogas would otherwise escape to the atmosphere, so instead this will be harvested and treated before being used as fuel for large electricity generators."

Kumar said the biogas project will offset 40% of grid-supplied electricity for the abattoir, making it the first instance where biogas-generated electricity will offset grid-supplied electricity at an Australian abattoir. He added that recent announcements regarding a bipartisan approach to the Renewable Energy Target and the success of the federal government's first auction of Australian carbon credit units under the Emission Reduction Fund were major catalysts for the decision to proceed with the project.

The project will be owned by Rural Funds Renewables, a subsidiary of agricultural fund manager Rural Funds

Management (RFM), while the power station will be operated, maintained, managed and administered by Quantum Power. This means the benefits will be shared between Southern Meats, Quantum Power and Rural Funds Renewables via long-term collaborative contractual agreements; the first time such a financing structure has been deployed in the Australian food processing industry for a biogas project.

"The project is great news for Southern Meats, the town of Goulburn and the red meat processing sector as a whole," said Southern Meats CEO Coll MacRury. "This project will lead to improved environmental outcomes, a more competitive cost base and will also lead to more jobs for the local community, as Quantum Power will give preference to local firms for construction and ongoing operating contracts."

RFM Managing Director David Bryant added that the project will "provide economic benefits and improved environmental outcomes in waste product management".

"Competitive returns, the opportunity to provide local employment opportunities and the delivery of tangible environmental benefits are critical to RFM when making any investment decision," Bryant said. "This project delivers on all of those criteria and we are proud to be part of the team making this happen."

A similar project installed by the Gold Coast-based bio-energy company has enjoyed great success in Bromelton, Queensland, for the past five years in converting production by-product wet waste into methane-rich biogas.

Since installation in 2010, Quantum Power has been able to provide a reliable electricity supply to the site around the clock during production times. The Bromelton project is expected to save 60,000 tonnes of greenhouse gas emissions per annum at full installed capacity.

The success of projects such as Bromelton have also contributed to a spike of activity within the Darling Downs region, which has been identified as Australia's first biogas farming hub.

Quantum Power Chairman Richard Brimblecombe said, "The Darling Downs will continue to be at the forefront of Australia's sustainable farming initiatives. We are in discussions regarding numerous other projects in the region and I believe, in the long term, the Darling Downs could support in excess of 20 separate biogas projects."

**Quantum Power Limited**  
[www.quantumpower.com.au](http://www.quantumpower.com.au)





## Pressure sewer system utilised in major housing project

The InviziQ Pressure Sewer System (PSS), from pump manufacturer NOV Mono, has been successfully utilised in the Pitt Town project - a major 940-lot housing project in NSW. The system, which is certified by the Water Services Association of Australia (WSAA), is said to provide more reliable removal of sewage from individual households than conventional alternatives.



The system removes sewage from each property and reduces it to a workable slurry, which can then be easily transferred for treatment using membrane bioreactor technology. This produces clean water, which is then used by the houses for toilet flushing, laundry and irrigation purposes. With over 200 Pitt Town houses currently connected to the system, its performance has already surpassed the expectations of the utility operator, Flow Systems.

"We are basically getting no screenings at all," said Andrew Horton, executive manager of Flow Systems. "We were initially worried that they were building up in the mains, but we flushed

them and found nothing. When we checked the bioreactor further upstream we found that no screenings had bypassed the InviziQ pumps. The Mono equipment seems to be grinding everything up."

The standard InviziQ system has a storage tank with an approximate 900 L capacity; a progressing cavity (PC) pump incorporating a macerator; and an automatic electronic controller which regulates the flow, monitors fluid levels and protects the pump. Its revolutionary Dry Well feature keeps the pump motor, fluid level sensor and electrical systems separate from the fluid being pumped.

A vertically mounted pump cassette, inserted into the tank through a hole in the Dry Well, ensures that the pump is suspended without the need for a foot, which can cause ragging. This makes accessing the system for servicing a far easier and safer process that involves no contact with the sewage.

Richard Pacholek, Mono's industry segment manager for pressure sewer, said the company worked closely with both Flow Systems and the Pitt Town project developer, Johnson Property Group, to ensure a satisfactory solution for all involved.

"We have supplied the equipment, handled the commissioning and worked hard to provide service that is second to none by looking after maintenance and service checks, any plumbing enquiries that arise and any reticulation issues within the network," he said.

Many more InviziQ tanks have now been installed ready for new houses to be added on the project, which will eventually feature 940 dwellings. Pacholek noted, "The project has been running for a number of years and there have been no issues with the InviziQ equipment. This really reflects the many years of innovation and development that have gone into the system."

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## Materials manufacturing with micro-explosions

Scientists from The Australian National University (ANU) have utilised laser-induced micro-explosions in silicon to create exotic new materials. According to the leader of the research, Professor Andrei Rode, the technique could lead to the simple creation and manufacture of superconductors or high-efficiency solar cells and light sensors.

By focusing lasers onto silicon buried under a clear layer of silicon dioxide, the group perfected a way to reliably blast tiny cavities in the solid silicon. This creates extremely high pressure around the explosion site — many times higher than the strength of diamond crystal can produce — and forms new crystal arrangements, or phases.

"The recently developed method of ultrashort laser-induced confined micro-explosions initiates a non-equilibrium disordered plasma state," the team explained in the journal *Nature Communications*. "Ultrahigh quenching rates overcome kinetic barriers to the formation of new metastable phases, which are preserved in the surrounding pristine crystal for subsequent exploitation."

Professor Rode said the team has created two entirely new phases in silicon and seen indications of potentially four more. He said, "Theory predicts these materials could have very interesting electronic properties, such as an altered band gap, and possibly superconductivity if properly doped."

Using a combination of electron diffraction patterns and structure predictions, the team

discovered the new materials have crystal structures that repeat every 12, 16 or 32 atoms respectively, said co-author Professor Jim Williams. "The micro-explosions change silicon's simplicity to much more complex structures, which opens up possibility for unusual and unexpected properties," he said.

Co-author Dr Jodie Bradby said the new method promises a cheap and industrially friendly method for large-scale manufacturing of these exotic materials, noting, "We reliably create thousands of micron-size modified zones in normal silicon within a second."

"The semiconductor industry is a multibillion-dollar operation — even a small change in the position of a few silicon atoms has the potential to have a major impact," she said.



# Googonians — 'Living the good life'

*Susan Farr\**

A Googonian is a proud new owner of a sustainable home in the new township of Googong, conveniently located between Canberra in the ACT and Queanbeyan in Southern NSW. This premium development is centred on values of sustainability, affordability and community, and has established innovative and ambitious sustainability goals that are serving to demonstrate best practice both in Australia and internationally.

**G**oogong, named after the nearby hills surrounding the Googong Dam, is being developed in partnership by CIC and Mirvac, and will provide over 5500 homes for a community of 16,000 as it evolves in stages over the next 25 years to become the largest urban development in the Sydney to Canberra corridor. AECOM has helped to develop the master plan, water sensitive urban design (WSUD) and landscape plan.

The township's approach to sustainability was a key enabler for the initial development approval and is a distinguishing feature attracting people who want to be part of a sustainable community. AECOM is now helping Googong apply for a 5-Star Green Star – Communities rating, which measures planning, design and construction outcomes against governance, design, liveability, economic, environment and

innovation criteria. If achieved, the five-star rating will symbolise Australian best practice.

## Planning and design

"If you build it, they will come" became the mantra in the first stages of the development, which included a clubhouse, sporting oval and parks to show how future Googonians were going to be part of a walkable and friendly community where children "are practically free range" and linked by parklands, wildlife corridors and safe pedestrian and cycle networks.

## Ecology and environment

Respect for ecological and environmental values is a key component of Googong Common, a large parkland meandering through the township that will be the 'green lungs' of Googong. 23% of Googong will be dedicated to parklands and open space, including Googong Common. This totals 183 hectares, just 6

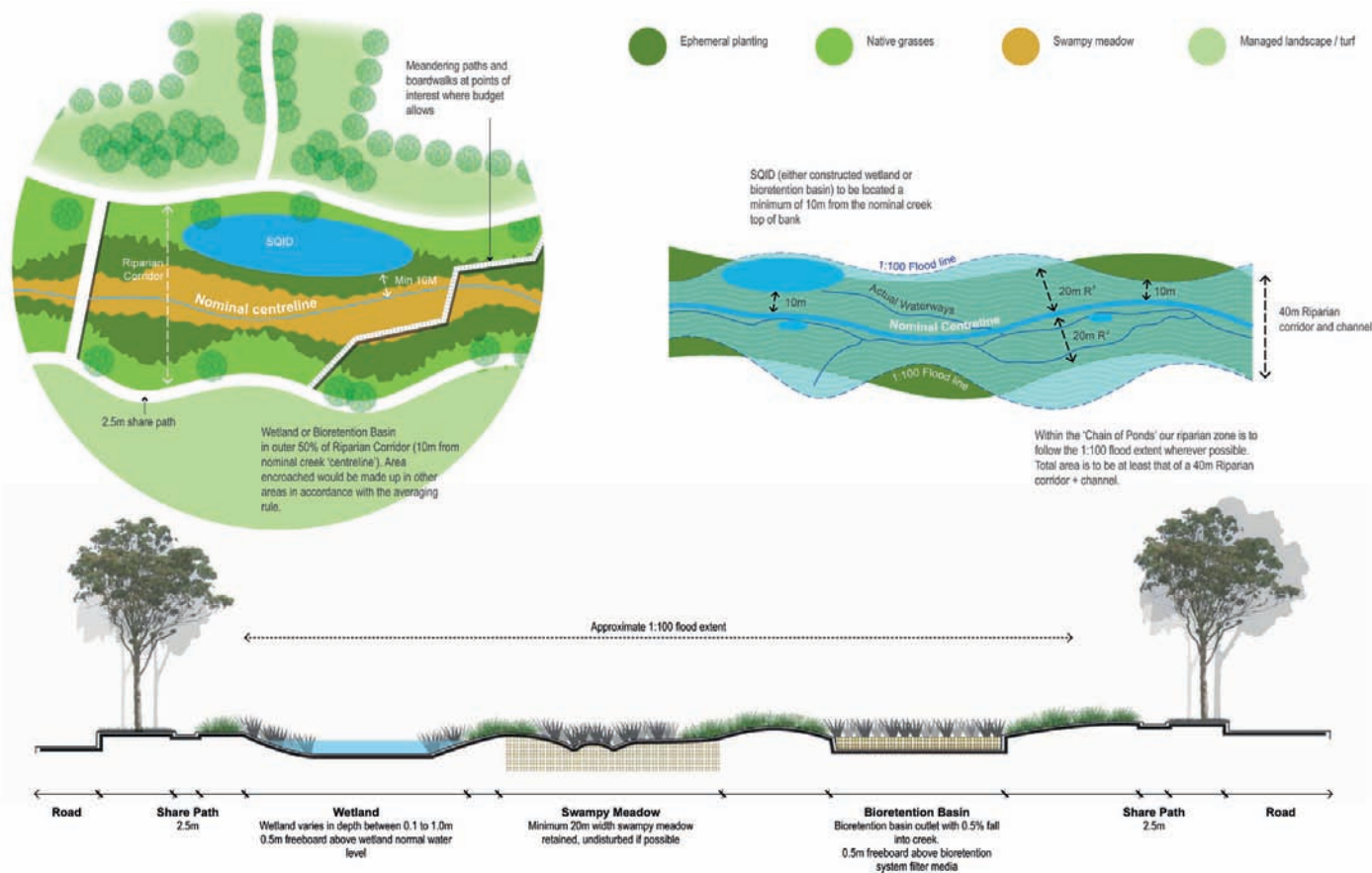
hectares less than Sydney's Centennial Park.

Montgomery Creek, as the centrepiece of the Googong Common, has its attractive natural features enhanced through WSUD that manages flooding and treats stormwater through the 'chain of ponds' — a series of natural ephemeral ponds, small channels and marshy meadows. The water-sensitive design incorporates a series of online and offline bioretention systems that will slow and treat stormwater as it flows through the watercourse.

Native bushland within the Montgomery Creek corridor will be regenerated using planting propagated from local species, while degraded areas will be revegetated with native species. Native grassland will be protected, along with habitats for other threatened species. Aprasia Park is named after the Pink Tailed Worm Lizard (a legless Googonian), a vulnerable species that will be offered protec-



## urban development



tion through the wildlife corridor integrated within the landscape plan.

### Integrated Water Cycle plan

The Integrated Water Cycle plan includes stretch targets for BASIX (NSW Government water/energy reduction regulation) water met through a dedicated 4 ML per day recycled water treatment plant and rainwater tanks on private property. The recycled water plant will ultimately support 18,850 equivalent persons and will help to support a reduction in potable water use of 62%, significantly reducing the discharge of treated wastewater to the environment.

The development also exceeds Queanbeyan Council stormwater quality targets through WSUD integrated into streetscapes and public open space, as well as through the chain of ponds.

### Energy and carbon footprint

The master plan has optimised solar orientation through home and street layouts. Homes are required to meet or exceed a BASIX energy-saving target of 40% compared to the regional Southern NSW requirement of 25%. Purchasers and home builders have therefore had to upgrade glazing and

insulation, and adopt higher rated heating and cooling systems and PV and solar hot water systems to achieve the energy target, which is mandated in the planning agreement between council and the developer, and required to be documented at DA/CC stage. They have access to free sustainable design advice from accredited professionals and green power options.

The master plan and urban design will reduce car dependency by locating town, schools and community facilities within easy walking and cycling distance of neighbourhoods. Googong will also have high-speed broadband connectivity, enabling people to work from home and avoid commuting.

### Liveability and employment

Googonians are one step closer to living 'the good life' through their own community garden. The local clubhouse includes a pool and gym facilities, and the design of parks encourages natural play for children. The parklands at Googong will provide spaces for sport and active recreation for teenagers, as well as quiet places for everyone to enjoy nature. There's already a special place for four-legged friends, with a dog park adjacent to the sports oval in the first neighbourhood.

Planning is now underway for the Town Centre, which will provide local jobs through retail, commercial, social and entertainment facilities. The Town Centre will be designed to reflect a contemporary country town providing essential services and a sense of community within a strong urban setting that encourages denser living.

The next stage of development will incorporate lessons learned and improve affordability through a more integrated approach to landscape and civil design. We will be listening to feedback from Googonians and have recently returned from a study tour of new developments in Australia to ensure Googong stays at the forefront of best practice in sustainable design.



*\*Susan Farr is AECOM's Market Sector Leader for Urban Development, Water + Urban Development.  
www.aecom.com*

*Content provided by: Jo Blackmore, Principal Landscape Architect, AECOM; Clive Alcock, Urban Design Manager, CIC Australia; Matthew Frawley, Landscape Manager, CIC Australia  
More information on the Googong Development is available at: <http://googong.net/>.*

## 6 Star Green Star for Commonwealth Bank Place

Office development Commonwealth Bank Place, Darling Quarter, has received a 6 Star Green Star - Performance rating from the Green Building Council of Australia (GBCA), adding to its 6 Star Design, As-Built and Interiors certifications. The rating measured the operational performance of the building in nine environmental and social areas to award 81 points — six more than the minimum 6 Star requirement of 75 points.

With 58,000 m<sup>2</sup> of commercial office space fully occupied by the Commonwealth Bank, Commonwealth Bank Place is said to emit 50% less greenhouse gas emissions and consume 80% less drinking water than the average Australian office building. This is equivalent to taking 680 cars off the road and saving 13 Olympic swimming pools of water per year.

Kylie Rampa, the managing director of property group Lendlease's Australian Investment Management business, said the new 6 Star rating confirms that Commonwealth Bank Place sets the bar for sustainable buildings and is in line with co-owner Australian Prime Property Fund (APPF) Commercial's focus on next-generation, highly sustainable commercial assets.

"From an ownership perspective, a better performing building delivers a number of direct economic benefits to stakeholders,



including more productive workplaces and precincts which generate greater value," Rampa said.

"APPF Commercial has a long-standing commitment to sustainability, which is emphasised by buildings that are outperforming on a global scale and a collection of 6 Star certifications that the GBCA classes as 'Global Leadership'."

Jennifer Saiz, head of group property for the Commonwealth Bank, added that

the Green Star-certified building supports the organisation's focus on creating innovative ways of working in sustainable buildings.

"We have worked closely with APPF Commercial and Lendlease to ensure this workplace maximises our energy and water efficiency while creating a healthier working environment for our people," Saiz said.

GBCA Chief Executive Officer Romilly Madew said that as investors look for direction to determine low-carbon and energy-efficient assets, a Green Star rating can help our industry demonstrate transparency and accountability, boost asset value and attract capital.

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# Wastewater re-use using UV disinfection



The UV disinfection industry has experienced tremendous growth over the last 25 years - particularly in Europe, the USA and South-East Asia. The development of new UV technologies over this period is a perfect example of an industry investing to meet market demand - in this case, demand for an effective, low-cost and environmentally friendly way to disinfect wastewater for re-use.

**T**he acceptance of UV disinfection at wastewater plants treating almost four billion litres daily is proof that UV is no longer an 'emerging' technology, but rather an accepted technology to be used routinely by engineers to safeguard human health and alleviate environmental pressures.

Wastewater re-use has been practised in various forms for decades, with the USA leading the way in re-use research. It is now a major issue in southern USA, southern Europe, the Middle East, Australia and many parts of Asia, where chronic water shortages are driving investment in re-use technology.

## New technology

The use of computational fluid dynamics (CFD) modelling has vastly improved UV equipment manufacturers' ability to predict with confidence the level of treatment required for wastewater using their proprietary equipment. All manufacturers will

soon use this tool to optimise the dose delivery of their reactors and minimise energy costs. Also, as manufacturers develop and improve optimised UV reactors, they will be able to validate the designs using recognised validation protocols.

Conventional UV lamp technology has also improved over recent years, with medium-pressure lamps continuing to see gains in energy efficiency, lamp life and power density, and Quartz coating techniques extending lamp life to well over 12,000 h.

New mercury-free UV-LED systems are now coming online. These small systems are suitable for low-flow applications and easily integrated into existing treatment applications. In addition, a new LED-based UV transmittance monitor, the Berson-Sense - claimed to be the first in the world to use UV-LED technology - provides accurate UV transmittance readings in all conditions over an extended lifetime, ensuring accurate UV dosing.

Finally, a new range of low-pressure, high-output (LPHO) multilamp UV systems

is being developed. Two versions are available: a 'U' configuration with a smaller footprint for lower UV transmittance (UVT) applications where higher doses are required (eg, wastewater re-use or virus removal) and an 'L' configuration for higher UVT and lower dose requirements (eg, drinking water applications). Both configurations create a rotational liquid flow, ensuring extensive mixing of the fluid and optimal disinfection performance while minimising head-loss.

## Concerns

A major concern to the UV industry is the issue of reactivation - the apparent ability of some microorganisms to repair the damage done to their DNA by UV, reactivating their ability to infect. DNA repair can occur in a closed (dark) system, but is more likely in open systems under direct sunlight (photoreactivation). The dose level and lamp type seem to affect the degree of reactivation, with low-pressure (single-wavelength) UV lamps appearing to be more susceptible to photoreactivation



### Case study

#### Arizona, USA

Two golf courses in Anthem, Arizona, are using UV-treated wastewater for irrigation. Founded less than 10 years ago, Anthem now has a population of over 40,000. As part of its rapid expansion, the town recently installed three closed-chamber, medium-pressure UV systems from Berson UV-technik to disinfect its wastewater. This allows the town to not only meet increased demands in its water and wastewater treatment capacity, but also to exceed the output quality standards.

"The wastewater is treated by three Berson InLine systems handling a combined flow of three million gallons per day," explained Anthem's wastewater foreman, Jeff Marlow. "They work in conjunction with microfiltration and nitrification/denitrification. We chose the Berson UV systems because they are optimised to meet the Arizona Pollutant Discharge Elimination System (AZPDES) Permit Program."

The two local golf courses currently use a combination of UV-treated wastewater and fresh river water for irrigation, but with an increase in population, it is expected that the courses will soon be using wastewater exclusively.

An automatic cleaning mechanism keeps the lamp sleeves free of organic deposits for consistent UV dosing. Each chamber is also fitted with UV monitors to measure actual UV dose for record keeping. With the addition of an optional online transmittance monitor, real-time transmittance values are used to automatically adjust the dose pacing of the UV system.



than medium-pressure (multiwavelength) lamps. A much larger research effort into the area of photoreactivation is required and will most likely be forthcoming over the next five years.

A significant amount of research has also targeted the question of UV disinfection by-products, specifically the most common water constituents such as chlorine, bromide, nitrate, ozone, natural organic matter and iron. At normal UV disinfection doses, no significant disinfection by-products have been shown to form.

### Benefits of UV for the re-use market

The most common method of wastewater disinfection for re-use has long been chlorination. Despite chlorine's impressive track record, concerns regarding disinfection by-products (DBPs) and, more recently, disinfection performance with

respect to pathogen inactivation are driving the conversion from chlorine disinfection to other disinfection methods such as UV, which does not produce any DBPs.

Closed-vessel UV systems are easy to install within existing pipework, so there is minimal disruption to plant operation. Day-to-day operation is simple and only minor maintenance is needed. The only regular requirement is changing the UV lamps and wiper rings once a year, a straightforward operation that can be carried out by on-site personnel.

UV systems for wastewater re-use are also validated to much higher doses than drinking water systems, according to protocols established by the National Water Research Institute (NWRI) in the USA. Drinking water-type product validation, with the accompanying rigour, will emerge as the dominant method of assessing suitability for these critical

applications. The ability to prevent photo repair will also emerge as key.

### Applications for wastewater re-use

Potential applications for wastewater re-use are extremely wide ranging and include any instance where water is needed for non-potable use. The most popular and widespread use is for agricultural irrigation, with California and Florida leading the way in the USA and a number of Australian states also making significant progress. Other irrigation uses include landscape and recreational applications such as golf courses, parks and lawns.

Reclaimed wastewater is also used for groundwater recharge applications such as aquifer storage and recovery or preventing saltwater intrusion in coastal aquifers. Other uses include toilet and urinal flushing, firefighting, foundation stabilisation in the construction industry and artificial snow generation. In all these applications, re-used wastewater relieves the burden on existing municipal potable supplies.

### Conclusion

The UV industry has matured considerably over the last decade and is now highly regulated and dominated by the world's major water technology companies. Conventional UV technologies have been field tested and now have considerable track records in a wide range of applications. Uncertainties surrounding regulations, royalties, technology and engineering have decreased and acceptance of UV is expected to grow rapidly over the next 20 years. Conventional UV designs have been greatly aided by CFD, which will be used as a routine sizing tool for future designs. The addition of UV-LED technology is also opening up many new markets for UV disinfection.

The stage is now set for dramatic growth in the wastewater re-use market, especially with increasing populations putting even more pressure on already overstretched water resources in many regions of the world. Tighter limitations on pollution discharge will also play an important role in the development of this technology.

Fluidquip Australia

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

## Pump provides protection for treatment plant

Pump manufacturer NOV Mono has delivered a turnkey project to provide an extra level of protection for a major water and waste treatment plant in Pembrokeshire, Wales. The project centres on an EZstrip progressing cavity pump, which is now being used on sewage transfer duties to ensure that the plant can guarantee the quality of the treated sewage under any flow conditions.

Powered by a 4 kW motor and operating at a duty speed of 226 rpm, the EZstrip pump draws sewage from the centre of the final settlement tank at Dwr Cymru's Crymych treatment plant. It pumps the sewage back up to the head of the treatment system, from where it returns back through the filter bed to the final tank. This ensures that the plant's biological filters do not dry out and remain effective, even in low-flow conditions. This in turn helps to maintain the quality of the final sewage within the required boundaries, at all times.

Mono's EZstrip design allows the progressing cavity pump to be maintained in place. This provides a quick and easy way to disassemble, de-rag and maintain the pump without the need to disconnect suction and discharge pipework, reducing a day-long maintenance operation down to just 30 min. Available in cast iron or stainless steel, and with a choice of rotor and stator materials, the pump requires only basic tools to maintain and can be retrofitted into existing installations where a Mono Compact C pump has been used previously.



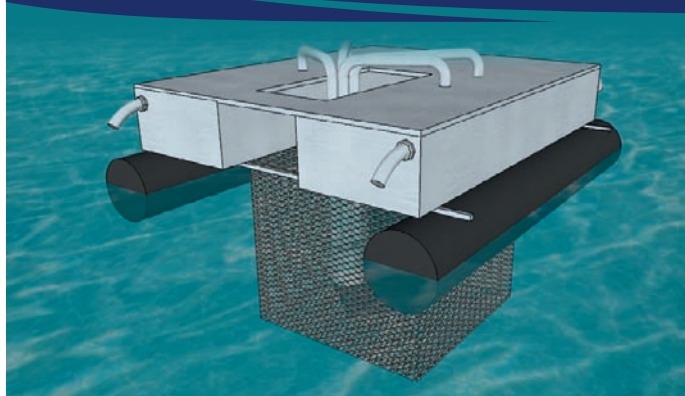
Mono was approached because of its ability to provide a full turnkey package which covered all the stages, from initial site survey, design and manufacture, through to full mechanical and electrical installation. Working closely with the project's civils contractor, Mono installed the pump, suction pipe, rising main, control panel, overpressure and high-temperature devices and completed the final testing and commissioning.

**NOV Australia Pty Ltd**

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

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Multiple units can also be used together to provide energy savings, mechanical redundancy and continuity of operation when compared with large LSM aerators.

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# Methane research shapes up at wastewater plant

A wastewater treatment plant in the US has used a dynamic imaging particle analysis system to monitor the condition and presence of methanogens in its anaerobic digestion process to find a potential correlation with methane production.

ESG Operations (ESG) in Augusta, Georgia, is a contract company that handles municipal utility operations. Pretty much anything a city needs to do from a wastewater and water treatment utility standpoint, ESG is contracted to operate and maintain. Methane production is becoming more of a focus for a variety of utility applications; therefore, understanding the conditions and presence of this biology has become increasingly relevant.

The anaerobic digestion process occurs when organic materials in an enclosed vessel, kept at a constant temperature, are broken down by microorganisms in the absence of oxygen. This process produces a gas consisting of methane and carbon dioxide.

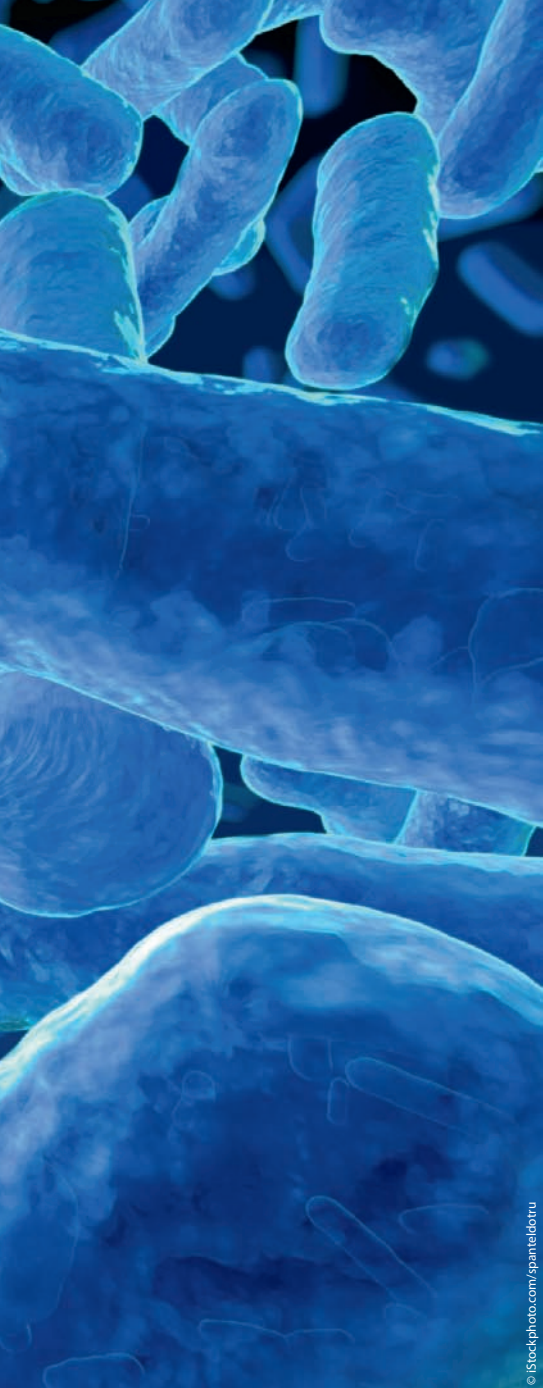
At ESG, anaerobic methanogen microorganisms break down sewage sludge and wastewater solids to produce methane that can be used to produce electricity and heat. The effectiveness of this anaerobic digestion process is determined by the methanogen population.

Methane formers are very delicate organisms and they're susceptible to dying off if you change their environment too much, so they need to be in a tightly controlled environment.

## The initial study shapes up

Percy Nolan is a project manager at ESG. He acquired the use of a FlowCAM dynamic imaging particle analysis system as part of a partnership/collaboration program with Fluid Imaging Technologies. One of the things that Nolan and his team theorised





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Methane production is becoming more of a focus for a variety of utility applications; therefore, understanding the conditions and presence of this biology has become increasingly relevant.

Nolan and his team analysed samples to determine particle shape. They found some that were the rod-shaped bacillus they believed to be Archaea particles. With its VisualSpreadsheet software, the FlowCAM can record over 30 different measurements per particle and can capture particle images at up to 22 frames per second allowing for high sampling efficiency and fast analysis times. It sorts and filters particle data and immediately displays all similar-type particles. The data they collected with the FlowCAM trended very closely to some of the performance parameters that they normally test for in their analytic digestion strains. "It was pretty exciting to see the characteristics and the fact that the particles trended so similarly," said Nolan.

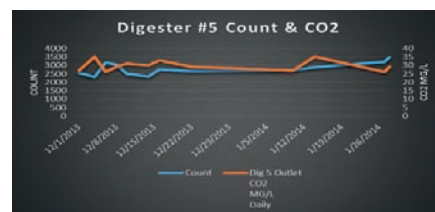
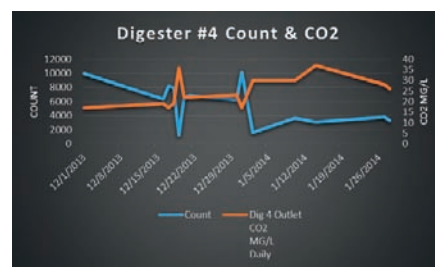
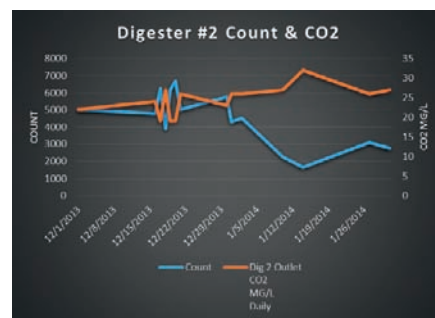
Nolan and his team found there was definitely some correlation between the bacilli-shaped microorganism images they were seeing with the FlowCAM and what was going on in their digesters. However, more in-depth testing would need to happen over a period of time in order to verify that what they had found was, in fact, an organism that produces methane. "I feel like we were able to hypothesise in a very short, abbreviated kind of study that we were correlating something to our performance criteria that normally trends in that process," said Nolan.

### The potential

The main focus at ESG is to reduce the solids amount as much as they can through digestion. But Nolan recognises the benefit of an application of a cogeneration system where these microorganisms could be producing enough methane to power a generator for other processors in the plant.

"It would require running your digestion train in series, not in parallel in order for it to be useful — which is what we happen to do here," said Nolan.

One of the benefits of running things the way ESG does is that there are dif-



*Increases in volatile solids reductions correlated to increases in image densities and decreases in CO<sub>2</sub> levels. CH<sub>4</sub> was not sampled as part of this study, so it was postulated that the decrease in CO<sub>2</sub> would be indicative of an increase in CH<sub>4</sub> levels. The correlations were surprisingly acute as it pertained to CO<sub>2</sub> levels. The trend graphs above demonstrate these findings.*

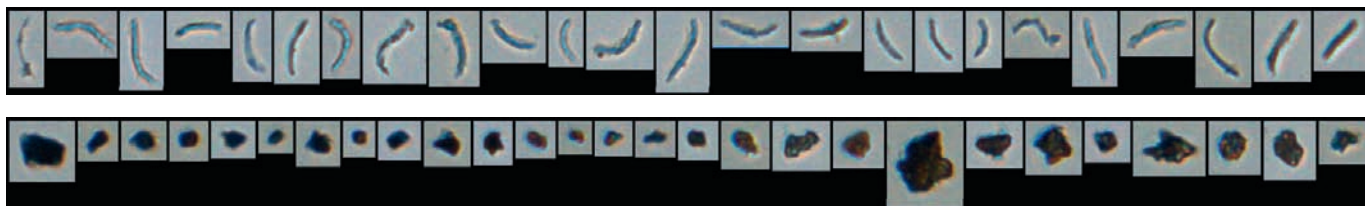
when using the instrument was that there was a correlation with methane production and the presence of methanogens in their anaerobic digestion process. They knew that a specific species of bacteria, Archaea, produced methane. They also knew about what size they were and they knew their shape. They felt that if they could easily see the particles and identify the shapes using the FlowCAM, a correlation with microorganisms may emerge. Then they might be on to something.

"Having an easy way to monitor our methanogen populations throughout our process would provide us with a cost-effective way to quickly see the effect of changes or modifications," said Nolan. "Ultimately, it has the potential to help us create a more streamlined and predictable process control strategy."

ferent feeds from different areas in the plant and the tanks all have different feed characteristics. It makes it much easier to figure out where an issue is coming from and to isolate it quickly compared to combing all the feeds into one digester.

"I combine the feeds after they've digested for a while," said Nolan. "This allows me to troubleshoot any problems on the initial run through the tanks well before they process to the secondary equipment tanks."





*Bacilli-shaped microorganisms and grit samples as imaged on the FlowCAM used at the Augusta, Georgia, treatment plant.*

If ESG had a FlowCAM in place, they could improve process performance. If the bacilli-shaped microorganisms turned out to be a methanogen population, they could predict with some reliability what they're going to be able to produce for gases and subsequently estimate how much natural gas consumption was required to supplement other equipment processes. When designing cogeneration systems, the big unknown is how much gas can be pro-

duced and how well can it be captured. For example, if it could be determined that Archaea was found, the FlowCAM would provide data on population counts.

"Through more in-depth research we would know if we have, say, 20 million of these microorganisms per millilitre, then that equates to some quantity of natural gas or methane," said Nolan.

The speed at which ESG could get information on potential methanogen

populations would be another benefit of using the FlowCAM. If the microorganisms could be genetically identified correctly and established in real time, it has the potential to save costs in digester process control at the plant.

**Fluid Imaging Technologies**

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

**Kenelec Scientific Pty Ltd**

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

## Crowdsourced power helps water-quality research

Crowdsourced computing has helped an international research team — including researchers from the University of Sydney — discover a new method of improving water filtration systems and water quality.

The team enlisted more than 150,000 computer volunteers worldwide to conduct the research. Together they created a network which was able to simulate water flow in carbon nanotubes at very low speeds — an activity that would normally require the equivalent of up to 40,000 years of processing power on a single computer.

The team's discovery has been published in the journal *Nature Nanotechnology*.

The research was led by the Center for Nano and Micro Mechanics (CNMM) at Tsinghua University in Beijing, with

international partners including researchers from the University of Sydney in Australia.

"Prior to our project, simulations of water flow in carbon nanotubes could only be carried out under unrealistically high flow-rate conditions," said the director of CNMM, Quanshui Zheng.

"Thanks to World Community Grid, the 'Computing for Clean Water' project was able to expand these simulations to probe flow rates of just a few centimetres per second — characteristic of the working conditions of real nanotube-based filters," the director said.

The paper's lead author, Ming Ma, a PhD from Tsinghua University, was also a visiting scholar at the University of Sydney working with nanotechnology expert Associate Professor Luming Shen on the research. The pair commenced their work together as members of the Computing for Clean Water project.

"The volunteers downloaded and ran the project on their computers. The project's results have important implications for desalination and energy conversion using salinity gradients. They can shed new light on the fundamental processes occurring in the nanoscale biological pores that funnel essential ingredients into cells," said co-author Associate Professor Shen.

"By simulating water molecules flowing through nanotubes we have shown how vibrations result in oscillating friction, leading to enhancements in the rate of water diffusion of more than 300%. Ultimately, this will help design new carbon nanotube-based membranes for water filtration with reduced energy consumption."

**University of Sydney**

[www.sydney.edu.au](http://www.sydney.edu.au)



## WA mine to be powered by solar



*Artist's impression of the solar installation and diesel power station.*

Sandfire Resources' DeGrussa Copper-Gold Mine in Western Australia will soon be the site of a 10.6 MW solar PV installation. The \$40 million project is set to be the largest integrated off-grid solar power system to be used in the mining industry anywhere in the world.

The project is a combination of a high-capacity solar power array which will be fully integrated with an existing 19 MW diesel-fired power station. It will involve the installation of 34,080 solar PV panels covering over 20 ha, plus single-axis tracking and 6 MW of battery storage to maximise the use of solar power. The diesel power station will continue to provide base-load power to the mine, with sufficient minimum load to ensure it can respond quickly to meet the power requirements of the process plant and underground mine.

Solar engineering company juwi will perform all engineering, procurement, construction, operation and maintenance on the project, which is owned by renewable energy firm Neoen. Online assembly will be undertaken in conjunction with Perth-based contractor OTOC. The Clean Energy Finance Corporation (CEFC) has committed up to \$15 million in debt finance, while the Australian Renewable Energy Agency (ARENA) will provide \$20.9 million in funding support.

The facility is designed to provide the majority of Sandfire's daytime electricity requirements, offsetting about 5 million litres of diesel fuel per annum — more than 20% of total diesel consumption — and abating over 12,000 tonnes of CO<sub>2</sub>-e. Under a six-year power purchase agreement, Sandfire will purchase the solar power at a fixed rate that is lower than the historical cost of diesel-generated power. If the mine continues operating past this point, the ARENA funding will be paid back as the plant continues to generate solar energy.

"ARENA support will help overcome the early-mover costs currently facing renewable mining projects," said ARENA CEO Ivor Frischknecht. "The undertaking at DeGrussa is supported by modelling showing similar projects could be viable without government subsidies in the near future."

"The Sandfire project shows that it is economically viable to use solar power in combination with battery storage on a large scale," added Amiram Roth-Deblon, juwi's regional director for Asia Pacific. "From a technical perspective, the project demonstrates that even a mine in the Australian outback can be safely and reliably supplied with solar power."

The facility is expected to be fully operational in 2016.

## Sustainable packaging from agricultural waste

Two companies in Germany, Zelfo Technology and Upgrading, have partnered in a trial production of an upcycled, wheat straw-based micro and nano fibrillated cellulose (M/NFC) packaging solution. The process effectively allows the food producer to become the raw material supplier of their own packaging material.

This trial used wheat; however, it is claimed almost all fibre-based crop residue or waste sources are suitable for conversion to packaging using the Zelfo/Upgrading system. The resulting product is recyclable, non-toxic and



biodegradable, and can be formulated using a mixture of upcycled, plant-based M/NFC at various percentages with new cellulose or de-fibred waste material.

In terms of carbon footprint, the de-fibred source material has a low embodied energy requirement, as it comes from the producers' own crop waste. Other benefits for the agro-business sector include: the production system is scalable and repeatable, and it allows for 'just-in-time' production.

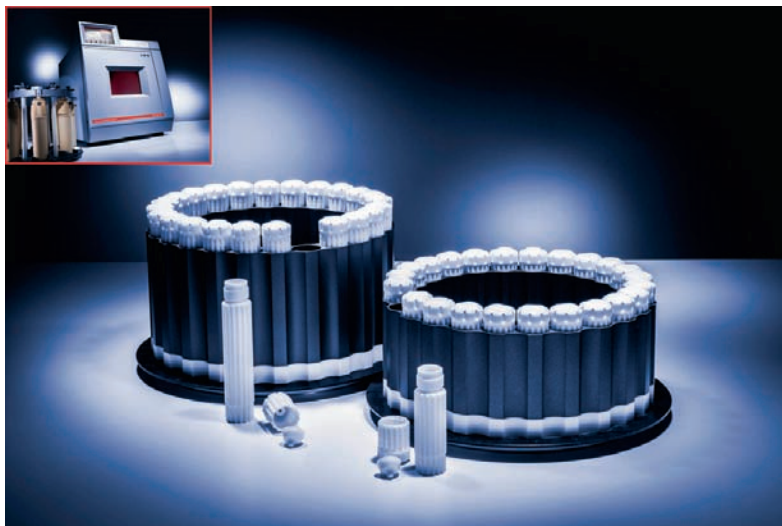
Zelfo Material Technologist Kathrin Otto, who is part of the ongoing development team, looks forward to handling the project at the pilot plant. "This is confirmation of the potential of M/NFC and an exciting new dawn for the bio-based economy," she said.



## SYSTEM FOR THE DIGESTION OF WATER SAMPLES

The Multiwave PRO, combined with the Rotor 24HVT80, enables the digestion of a broad range of samples, including water and wastewater, which require a vessel filling.

Based on the SMART VENT pressure-activated venting concept, the product's 24 vessels are suitable for digesting food, environmental and agricultural samples. Full reaction control is achieved without the need for any optional sensor. Overpressure inside the vessels is safely released via SMART VENT technology; the internal temperature of each vessel is determined and controlled via a contactless IR sensor implemented in the cavity of Multiwave PRO.



Employing the Rotor 24HVT80, users can safely digest samples with different types of reaction behaviour in the same run. Three different temperature control modes are available: the digestion can be controlled based on the hottest (most reactive) sample, the coldest (least reactive) sample or on the average temperature of all samples. Each vessel is equipped with cooling fins, resulting in rapid cooling and short overall process times.

Continuous low-intensity cooling during a run increases the vessels' lifetime, thus reducing running costs. The three-part vessel design provides easy and tool-free vessel handling and simple cleaning. On request, the product can be upgraded with other rotors to satisfy additional applications such as microwave-induced oxygen combustion, solvent extraction, sample drying prior to digestion and acid evaporation after digestion.

MEP Instruments Pty Limited  
[www.mep.net.au](http://www.mep.net.au)

## FILTER ELEMENTS

The Optimicron filter elements by Hydac offer a combination of good filtration efficiency and pressure drop. The technology provides a highly positive impact on differential pressure of the elements.

The filter mesh pack geometry HELIOS contributes to a stabilisation of the pleats and an increased free-flow surface. This is said to result in better flow behaviour and hence a lower differential pressure.

The high-performance micro glass media, as the core of the filter element, offers good separation efficiency and low differential pressure over the entire element service life. They are available in 1 and 15  $\mu\text{m}$ .

Depending on the element size, up to 30% lower differential pressure (compared to the Beta-micron 4) can be achieved through the interaction of the integrated innovations: HELIOS-pleat geometry, optimised filter media and a drainage layer. The outer wrap is said to feature increased robustness and an improved diffusor effect, thus achieving homogeneous upstream flow of the filter mesh pack.

The filter elements are suitable for all industries where filtration efficiency, high levels of cleanliness, significant energy savings and sustainable filtration play an important role.

HYDAC International  
[www.hydac.com.au](http://www.hydac.com.au)

## POWER SUPPLY FOR WATER DISINFECTION

The latest UV-Guard PLC-operated power supply box range features the integrated ability to operate on 12 and 24 VDC power supplies, making it suitable for off-grid and mobile applications that disinfect water via UV treatment. It also has a number of integrated features to ensure ease of installation, operation, monitoring and servicing.

The unit can control UV-Guard's UV systems up to a power of 40 W. This means that recommended UV dose rates can be provided at flows of up to 60 L/min using the SLF, SLT and S-Series of systems. It can also control the storage tank head-space disinfection systems, the T-series.

Features include: Australian designed and made weatherproof IP65 rated box; user-friendly service menu and digital display; digital lamp hour run meter to indicate when the lamp has reached its operational life; integrated UV intensity monitoring to ensure correct UV intensity and sufficient disinfection is being achieved; Building Management System (BMS) connection for remote monitoring; and remote controllable.

UV-Guard Australia Pty Ltd  
[www.uvguard.com.au](http://www.uvguard.com.au)



## BUTTERFLY VALVE

Emerson Process Management's Fisher 8590 high-performance butterfly valve brings together a selection of disk seals, actuator designs and material combinations to meet plant-wide throttling and on-off requirements. The product gives application engineers the ability to combine a single valve platform with a selection of technologies to control a diverse range of CL600 process demands.

Several dynamic disk seals are available to meet temperature conditions that range from low to moderate up to 538°C. Severe service and cryogenic applications can be met with the appropriate metal-polymeric or rugged stainless steel seal construction.

Utilising a lugged body design across the CL600 size range of NPS3-NPS24, the product can incorporate a splined shaft that accepts either a spring-and-diaphragm or pneumatic piston actuator. It is available with either a square or keyed shaft that combines with hand levers, handwheels or pneumatic piston actuators.

The pressure-assisted design of the disk seals provides tight shutoff and permits the use of smaller actuators in meeting full ASME B16.34 shutoff capabilities. The torque necessary to open and close the valve remains constant regardless of the differential pressure across the disk. Slam-shut conditions are not created as the disk nears its seat, which extends seal life and avoids actuator and piping damage.

Besides shutoff given by the choice of elastomer and metal disk seals, the optional ENVIRO-SEAL packing system combines with the valve's micro-smooth shaft surface to keep emissions below 100 ppm. For use with sour liquids and gases, trim and bolting materials are available to comply with NACE MR0175-2002, NACE MR0175-2002-2003, MR0103, and MR0175/ISO 15156.

With a CL600 rating per ASME B16.34, the valve's face-to-face dimensions meet EN558, API609, MSS-SP68 and ASME B16.10 standards. The valve body self-centres on the line flange bolts as a fast, accurate means of centring the valve in the pipeline.

Emerson Process Management  
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# Why existing buildings are the Holy Grail of waste minimisation

*Tony Arnel, Global Director of Sustainability, Norman Disney & Young*

If you're on the hunt for Australia's greenest buildings, start with the ones that already exist.

W

hy? Because it can take up to 80 years for a new energy-efficient building to overcome the climate change impacts created during its construction.

Any existing building represents an investment in terms of energy, water and materials. Every brick, pane of glass or concrete slab within a building required the burning of fossil fuels during its manufacture. Every length of timber was harvested and transported — sometimes from far-flung places. Every piece of steel was mined, manufactured and moved to the building site. When we destroy a building, we lose that embodied energy.

By conserving our existing buildings, we also reduce the energy usage connected with demolition, waste disposal and new construction. One study, 'Embodied Energy and Historic Preservation: A Needed Reassessment', demonstrates that even when a building is demolished, partially salvaged and replaced with a new energy-efficient building, it takes 65 years to recover the energy lost during demolition and reconstruction. This is longer than the life span of many modern buildings.

Sympathetic, sustainable retrofits are the solution. Many Australian buildings from the

1960s to 1980s are structurally sound but don't meet contemporary benchmarks for indoor environment quality, and they are, frankly, a little drab and dreary looking. Building owners can tear them down and start from scratch. Or they can give them a modern makeover.

Take 247 Adelaide Street in Brisbane. Designed in 1966 before 'energy efficiency' was even a consideration, the building was looking long past its use-by date. And yet, a clever upgrade has halved the building's energy consumption and elevated its NABERS Energy rating from 0 to 5 stars.

The \$980,000 building services upgrade included installing a high-efficiency, low-load HVAC system, a new building management

system, LED lights and a lighting control system. Inefficient equipment was upgraded and new strategies for controlling temperature and water flow were implemented. The upgrade is saving tenants around \$64,000 a year on energy costs — the equivalent annual spend of 50 typical households — and has reduced peak demand on the grid by 33%. It's been estimated that this alone could save the Queensland Government in excess of \$400,000 a year.

Perhaps most impressive is that the retrofit was undertaken without the loss of a single tenant — and with the building only out of operation for one weekend. By maintaining full occupancy with refurbishing rather than rebuilding, large quantities of





waste were diverted from landfill contributing to further reduction of the carbon footprint.

Another inspiring example is Australia Post's upgrade of StarTrack House in Sydney. Originally a mail sorting centre which was converted to offices in 1989, the quality of the workspace simply wasn't up to scratch. The space wasn't well used, and the facade was looking tired. The program of works, which encompassed a complete overhaul of electrical, mechanical, hydraulic and fire systems, as well as upgrades to glazing, the facade, lobby, interior fit-outs and landscaping, has breathed new life into the building.

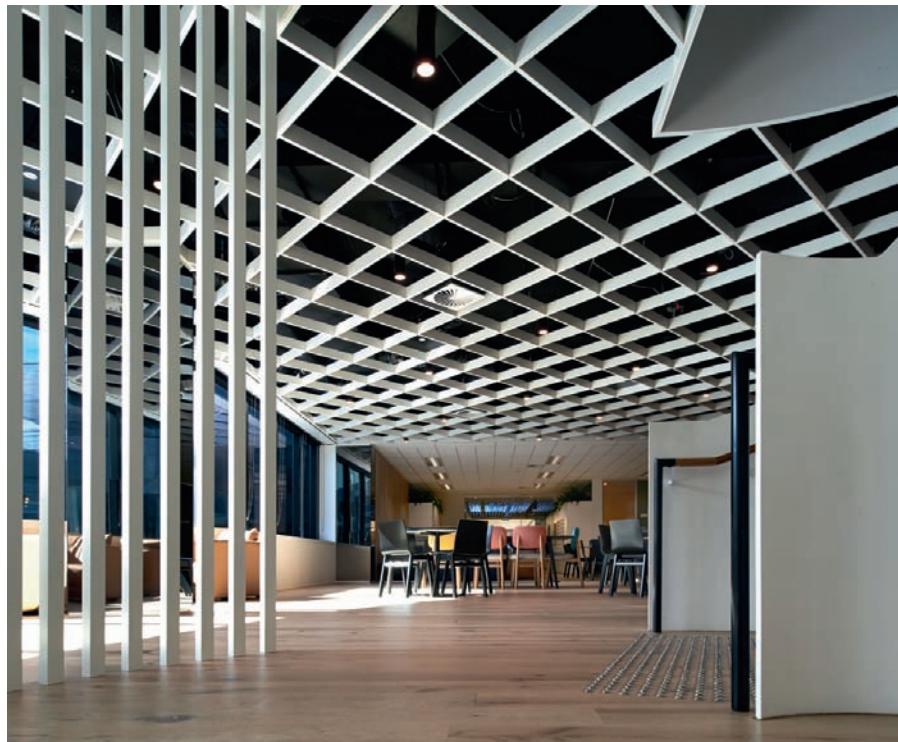
Energy-efficiency measures alone, including the largest solar array in Sydney's CBD, have reduced carbon emissions dramatically, and are saving \$340,000 in energy costs each year. But the energy savings are just one part of the sustainability story. Australia Post has made a clear statement about its commitment to reducing its carbon footprint while providing a high-quality working environment for its people — and it's managed to do so without sending truckloads of waste to landfill or trashing the embodied energy in an existing building.

The bottom line?

Building retrofits are not just about energy efficiency. Getting the best out of existing buildings can cut costs, enhance worker productivity and reinforce commitment to



By conserving our existing buildings, we also reduce the energy usage connected with demolition, waste disposal and new construction.



corporate social responsibility. Retrofitting can help us hold on to a building's embodied energy, eliminate the need for major construction and reduce the amount of waste

that winds up in landfill. And that makes existing buildings the greenest of them all.

**Norman Disney & Young**

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

## FLOW SWITCH

The V8 Flotect flow switch allows the user to operate a damper or valve, shut down a burner or actuate an alarm or signal, protecting unattended equipment from damage or loss of production. Operation of the product is said to be simple and dependable.

In most applications, the switch is normally off while there is sufficient flow of liquid or air. When flow stops, the vane spring moves the vane, actuating a single-pole double-throw switch rated 5 A @ 120/250 VAC to start or stop the motor, pump, engine, etc.

The flow switch has a leak-proof body and vane constructed of tough, durable polyphenylene sulfide, which has good chemical resistance. The full-size trimmable vane is provided with moulded-in graduations, allowing for installation in a 1-6" pipe. Operating pressures are up to 150 psig (10 bar) and temperatures to 100°C.

The flow switch can be used in various chemical processes, industrial systems and similar applications where process conditions are compatible with polyphenylene sulfide, ceramic 8 and 316SS. Examples include chemical processing, liquid transfer systems, water treatment, air conditioning, refrigeration, heating systems, cooling lines, machinery, food processing and machine tools.

**Dwyer Instruments (Aust) Pty Ltd**  
[www.dwyer-inst.com.au](http://www.dwyer-inst.com.au)

## DAF PUMP

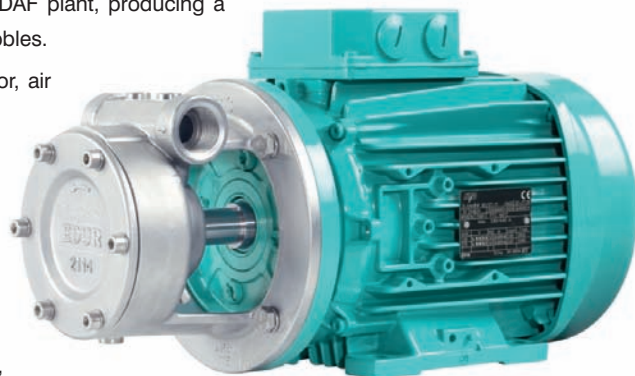
A single DAF (dissolved air floatation) pump is said to be able to replace the entire air bubble system on DAF plants, according to pump supplier Hydro Innovations. The company's Edur Multiphase pumps draw in air through a 'snorkel' in the suction line, shear the air, then feed it into the DAF plant, producing a discharge stream into the tank that is saturated with 30 to 50 micron air bubbles.

Conventional DAF systems normally consist of a wastewater tank, compressor, air saturation vessel and effluent pump. The effluent pump draws effluent from the tank and pumps it into the air separation vessel. A compressor pumps air into this same vessel. The air/water mixture is 'saturated' under pressure then released back into the wastewater tank at atmospheric pressure where tiny bubbles form and adhere to the suspended matter (fats, oils and other small wastewater particles). The bubbles (with their attached suspended matter) float to the surface of the tank where floatables can be skimmed off the surface.

By using Edur Multiphase pumps, which can produce their own microbubbles, asset owners can do away with the compressor, the air saturation vessel and any control and/or ancillary components for these items. The reduction of these system components and the simplification of the system design is said to result in lower investment costs and higher operational reliability. The Edur Multiphase DAF pump is also an efficient alternative, with one pump replacing the conventional pump, air saturation tank and compressor. Energy and maintenance costs of running the compressor are therefore eliminated.

Edur multiphase pumps can deliver flows from 1 L/s (for smaller DAF plants) to 15 L/s (for larger DAF plants) and produce pressures to 12 bar. A variety of materials and seal arrangements enable the pumps to operate in a very wide range of applications. Available materials include ductile iron, 'gunmetal' bronze, stainless steel and super duplex. Mechanical seals are available as balanced, double and tandem.

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



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## FLUE DUCT FLOWMETER

Flue or stack gases pose special challenges for single-point air/gas flow measurement sensing technologies because of their multigas composition, swirling air currents, high temperature, humidity extremes and sticky or abrasive particulates.

The MT91 flowmeter from FCI meets US environmental requirements for CEMS per CFR Title 40, Part 75. The unit is suitable for measuring mass flow almost anywhere variable conditions limit single-point flowmeter effectiveness.

The product features a multipoint averaging thermal mass flow sensor design. The design combines FCI's thermal dispersion flow element design with up to 16 flow sensing points while operating over a wide temperature range up to 454°C.

The flowmeter features a wide turndown range from 5:1 to 100:1 with a flow range from 0.08 to 46 NMPS. Up to four meters can be installed to measure air/gas in the largest of stacks. Measurement repeatability is  $\pm 0.5\%$  of reading.

All wetted surfaces are 316 stainless steel with nickel brazed joints per AMS 4777 (standard) or Hastelloy C-276 as an option. Coating materials, such as electroless nickel plating or chromium carbide, are also available.

The 316L stainless steel sensor assembly is available with flanged, threaded and retractable process connections with an IP66-rated (NEMA/CSA Type 4X) junction box. The flow element assembly is connected remotely by cable to the electronics package up to 304 m away. Dual 4-20 mA analog outputs of flow rate and temperature and dual DPDT relays are available for interfacing with DCS, PLC, SCADA, controllers or other recording devices.

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



## GAS MONITOR FOR CHLORINE AND SULFUR DIOXIDE

The TriGard Gas Monitor detects chlorine, sulfur dioxide, other toxic gases, remote combustible gases and oxygen deficiency or enrichment. The monitors are designed specifically for water and wastewater applications.

Features include: an adjustable range; multiple sensor mounting options; NEMA 4X design; LCD with highly visible LED indicators; piezo horn with horn silence button; long-life, MSA-designed sensors; and simple push-button calibration.

Available as a single- or three-point unit, the product can be AC or DC powered. Other features include sensor disconnect under power, interchangeable smart sensors and onboard LEDs and relays.

MSA Australia Pty Ltd  
[www.msa.net.au](http://www.msa.net.au)



## FLUE GAS FLOW MEASUREMENT SYSTEM

The PCME STACKFL W 400 is a flue gas flow measurement system designed to continuously monitor releases from industrial sources. The instrument complies with the European monitoring standards EN 16911-2 and 15267-3 for QAL1 and provides a complete solution for flow measurement according to EN 14181.

Suitable for measuring flue gas flow rates after both bag filter and electrostatic precipitator arrestment plant, the unit is engineered with in-built self-checks and features which satisfy emission release data reporting obligations from a regulatory perspective.

Due to the extended measurement path (400 mm), accurate and increased repeatable measurement is assured. Importantly, the unit facilitates stack velocity, volumetric flow and pollutant mass release calculations when linked to gas and dust CEMS (continuous emissions monitoring solutions).

Typical applications include waste-to-energy and incineration plants; emissions from steel, chemical and mineral processing applications; and gas turbines and coal-fired power plants.

Based on PCME's experience of particulate emission measurement in industrial applications, the STACKFL W 400 is also suitable for the aggressive monitoring environments found in industrial stacks.

Group Instrumentation Pty Ltd  
[www.groupinstrumentation.com.au](http://www.groupinstrumentation.com.au)



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The 2015 conference program will be published in August.

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Working even closer with ARCIA in 2015, Comms Connect brings you the Capital City Conference Series. One-day, streamlined conferences for the time poor and those unable to attend the two- and three-day events. Purely educational, with no exhibition, these new initiatives run in conjunction with ARCIA's Industry Networking Dinners.

**Next Instalment: Adelaide – 23 September, National Wine Centre**

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\* Feb 2015 research by Markets and Markets



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# Optimising waste and saving water

In the manufacturing of foodstuffs, huge amounts of non-edible waste occur, such as the peels of citrus fruit and potatoes, or blood from the meat industry. Their disposal as waste or jointly with the wastewater as well as the hygienic cleaning of equipment lead to an enormous volume of wastewater. Fraunhofer UMSICHT is jointly working with an international working group in the BioSuck project, which is redesigning waste management in the foodstuffs industry.

**B**y suctioning off the waste by means of vacuum technology, less wastewater is incurred, which reduces the disposal costs. At the same time, the waste that was transported hygienically and concentrated via the vacuum pipes can be used for bioenergy purposes or recycled.

In the project, a system and guidelines for decision-makers from the foodstuffs industry are being developed which provide information on when and where the installation of vacuum pipes for waste collection would be advisable.

## Increasing sustainability, saving money

Quality is of particular importance in the foodstuffs industry. These days, consumers not only demand an impeccable product but also responsible manufacturing and a conscientious handling of natural resources. Fraunhofer UMSICHT is working together with four project partners from Germany and internationally on optimising waste management in the foodstuffs industry.

In addition to water, costs for wastewater disposal can also be saved through the installation of vacuum lines for waste transport - from 50 to 80% (depending on the sector of industry).

In waste collection by means of negative pressure, foodstuffs residues reach a collection site hygienically and quickly via

a pipe system that is in compliance with the requirements of the foodstuffs industry. Residual waste can be used via incineration, converted to biogas or bioethanol in fermentation plants, or valorised into a lignite coal-like product by means of hydro-thermal carbonisation (HTC).

Furthermore, it is possible to feed the nutrients of concentrated organic wastes directly back into the industry or to use them as source material for nutrient-rich fertiliser instead.

The thin vacuum lines can be installed in a space-saving way on the ceiling; they prevent odour nuisance and can be adjusted to changes in the production process without major effort. The system is also closed off to vermin and rodents, which represents another significant advantage, particularly within the foodstuffs industry.

## Support system for decision-makers in the foodstuffs industry

The BioSuck project also strives to support customers with respect to sustainability. For this, the project team is developing guidelines and a system that supports decision-makers from the foodstuffs industry in strategic decisions and planning with respect to resource management.

In addition to data from literature, the waste streams of typical foodstuffs industries (beverages, dairy products, meat, fish, etc) are inspected for nutrients by means

of spectral analysis for the database of the system. Additionally, practice-focused case studies are integrated into the decision support system. For this, Fraunhofer UMSICHT is designing a test pilot system for waste concentration by means of vacuum technology that will simulate the practical application on a small scale.

The database will indicate exactly where waste is incurred, how it can be best collected and what further utilisation could be suitable. There are further plans for a sustainability analysis of the technologies and processes used in the form of a life-cycle analysis as well as an assessment of the environmental impacts. Based on this, the database will point out sustainable opportunities for improvement.

The BioSuck project is funded by the German Federal Ministry of Education and Research (BMBF) until the end of August 2016. Fraunhofer UMSICHT is the coordinator of this project. Scientific partners are the Norwegian University of Science and Technology (NTNU) and the Institute for Ecology of Industrial Areas (IETU) under the auspices of the Polish Ministry of the Environment. The industry is represented by IWR Ingenieurbüro für Wasserwirtschaft und Ressourcenmanagement GmbH (engineering office for water management and resource management) and Bilfinger Water Technologies GmbH.

[www.umsicht.fraunhofer.de/en](http://www.umsicht.fraunhofer.de/en)



## SENSORS FOR STATIC AND HIGHLY DYNAMIC MEASUREMENTS

Keller has released the M5 series sensors for static and highly dynamic measurements. The rear of the silicon sensor is soldered to a supporting element designed for good fluid dynamics, which in turn is secured flush at the front of the pressure connection.

The design enables good decoupling of mounting forces and structure-borne vibration, extensive media compatibility and the durability offered by the antioxidation coatings. Other features include overpressure protection of up to five times the measurement range and a pressure connection with an external thread of 5 mm for installations in space-limited locations.

The pressure sensors are intended for operating temperatures between -40 and +180°C with a narrow total error band of  $\pm 1\%$ . Without the remote signal converter, they come with a typical output signal range of 80 mV (based on a 1 mA supply) and an individual calibration certificate. The 3, 10 and 30 bar measurement ranges are available for absolute pressure measurements.

To avoid reduction in the piezoresistive pressure sensor's dynamic range of 50 kHz, Keller did not digitise the measurement signal - instead, the purely analog signal path is adjusted in real time via the compensation electronics, which are controlled by a microprocessor. This ensures the output signal, amplified to 0-10 V, retains the full dynamic range of the sensor signal. The measurement system, consisting of the pressure sensor and signal converter, undergoes end-to-end calibration once the user-specific parameters have been determined. The operating temperature range of -40 to +125°C for the remote electronics satisfies the demands required by engine test benches.

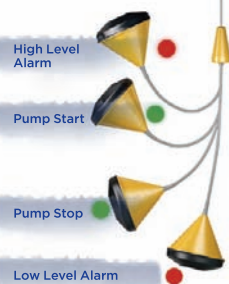
The thermally ultra-robust pressure transducers in the series support high-precision static and dynamic measurements up to a bandwidth of 50 kHz and at working temperatures of up to 200°C at the pressure sensor.

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## 4" SP SUBMERSIBLE PUMP RANGE

Grundfos has launched an extended range of high-efficiency, medium-sized SP submersible groundwater pumps. The 4" SP pump range has been expanded from two to three sizes (with one more to follow) and is built in stainless steel with three different material grades available, covering liquids from drinking water to seawater.

The European Ecodesign Directive Ecodesign requirements for rotodynamic water pumps are established using the Minimum Efficiency Index (MEI). The extended range of groundwater pumps surpasses the required MEI value of 0.40.

The range meets drinking water approvals wherever it is sold. The pump is CE labelled and is said to have increased wear resistance.

Built to deliver optimum efficiency during periods of high demand, the pumps are claimed to provide low long-term costs and high operating reliability regardless of the application. Made entirely of corrosion-resistant stainless steel, they are suitable for a wide variety of applications, such as groundwater supply to waterworks, irrigation, pressure boosting and in industry.

The range offers high efficiency, high resistance to abrasives and easy maintenance. In addition to dedicated motor protection devices, a complete monitoring and control system is available for constant optimisation of the pumping system.

Grundfos Pumps Pty Ltd  
www.grundfos.com

## AUTOMATED WATER SAMPLING TECHNOLOGY

The need for innovation in the Australian drinking water industry has been heavily influenced by changes to the *Public Health Act 2010* and the Public Health Regulation 2012. These Acts require drinking water suppliers to develop and adhere to a 'quality assurance program' (or drinking water management system), and from 1 September 2014, this requirement applies to water suppliers defined in the Act, including water utilities, private water suppliers and water carters.

The requirements of the Act can be met in different ways including manual sampling, analysers housed in roadside cabinets or service pits, which require external power supplies. The manual sampling process, however, can be time-consuming and power supplies are not always available or reliable. As a result of this, on-site manual water sampling and laboratory testing must be undertaken before problems within the network can be identified.

Reducing risk and streamlining the process of chlorine analysis is the newest product offering from Wallace & Tiernan, an Evoqua brand. The Chloroclam and Hydraclam technology allow for the deployment of analysers simultaneously across the network, providing a multi-measured approach. The process includes the measurement of total or free chlorine and temperature (Chloroclam) while turbidity, electrical conductivity and pressure (Hydraclam) can be monitored throughout the network simultaneously.

Transmitting measurements at preset time intervals, the analysers function automatically and do not require interaction from an operator. Powered by lithium batteries, these analysers allow samples to be taken directly from fire hydrants or from any point in the potable water reticulation system. Once a sample is taken, vital data is transmitted to the utilities provider via the mobile phone network. This enables utilities to receive their chlorination readings in near real time, allowing for quicker responses to any deviations of safe levels.

The automated water sampling technology assists utilities to rectify water-quality issues in a time frame shorter than manual sampling could do and helps provide the assurance that safe water is delivered to the public.

*Developed in conjunction with and manufactured under licence from Salamander.*

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

## DEGASSED CATION CONDUCTIVITY SYSTEM



Maintaining the purity of water used in the water/steam cycle in power generation is essential to ensure that sensitive equipment such as turbines is not damaged by contaminants. Mettler-Toledo Thornton has launched the DCC1000 Degassed Cation Conductivity System for use in pure water applications in power plants, helping technicians to make the best decisions for increasing load as well as for plant operations.

Monitoring corrosive contaminants is important at all stages of power plant operation. While starting up the plant, monitoring these contaminants can ensure the water quality is adequate for bringing the plant online. In a running plant, monitoring power steam quality can ensure contaminant limits specified in turbine warranties are met.

With accurate conductivity measurements using UniCond conductivity sensors, the DCC1000 System confirms water purity to maximise power production and minimise corrosion. The system was designed with ease of installation, use and maintenance in mind, offering the user a monitoring system that is also easy to operate.

Mettler-Toledo Ltd  
[www.mt.com](http://www.mt.com)

# BINTECH SYSTEMS

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## MOBILE SHREDDING PLANT

Stockpiles of abandoned tyres and conveyor belts can now be eliminated on the spot — no matter where they lie — following the commissioning of a mobile shredding plant, designed and built by engineers at Tyrecycle and its parent company ResourceCo.

The mobile shredder will enable Tyrecycle to clean up the stockpiles of abandoned tyres throughout regional and metropolitan Victoria, while eliminating the added expense of transporting whole tyres to a fixed processing location.

It is designed to not only assist councils burdened by stockpiles of end-of-life waste tyres and conveyor belts, but also to meet the needs of remote or regional mining and construction sites.

The shredder can process passenger, light truck and truck tyres — as well as conveyor belts — at a rate of 10 tonnes/h. It also has the ability to remotely process off-road tyres — common to the mining, agricultural and construction industries — into a size suitable for further manufacturing into powders and granules for use in high-valued recycled products or as tyre-derived fuel (TDF).

Built to withstand Australia's tough climate, the unit has a full safety lock-out system and can operate for 24 h on a single 620 L diesel tank at ambient temperatures of up to 45°C. With parts mirroring those used in Tyrecycle's large-scale, fixed processing facilities, replacements can be made quickly and easily when required.

Tyrecycle  
[www.tyrecycle.com.au](http://www.tyrecycle.com.au)



## WATER QUALITY ANALYSER

Introduced by Hach Pacific, the Hach SL1000 Portable Parallel Analyzer (PPA) platform is designed to streamline water quality testing. The platform is suitable for the drinking water industry and can be used in the drinking water distribution system and treatment plant. Compared to traditional methods of testing, the platform is claimed to provide faster testing of multiple parameters and reduced variability from test to test and operator to operator.

The handheld drinking water instrument is able to test up to four colorimetric and two probe-based parameters simultaneously, eliminating the need to run multiple tests back to back. It is claimed that the platform can perform the same tests with less than half the manual steps compared with traditional methods, while producing accurate and reliable results. This can help to minimise errors and saves time by testing up to six parameters at the same time.

The platform is available on its own or as a fully operational kit, including the instrument, probes and Chemkey Reagents. The simple-use model of the PPA platform provides operators of all skill levels with the flexibility to test for the parameters that are relevant to their process, including both colorimetric testing methods and probe-based measurements.

Hach Pacific Pty Ltd  
[www.hachpacific.com.au](http://www.hachpacific.com.au)



# Choosing the right approach to leverage big data for energy savings

*\*Cara Ryan, Offer Manager, Building Performance Centre at Schneider Electric*

Energy efficiency has been in the spotlight for decades, particularly in regard to buildings, which account for 20% of Australia's energy use. Facility managers rely on building management systems (BMS) to gather data about building performance and energy usage to reduce operating and maintenance costs, improve building comfort and save energy.

**T**he volume of building data available has risen rapidly in the last decade as facility monitoring systems become more complex and thorough.

But harnessing this 'big data' to leverage BMS potential requires significant training and in-depth knowledge of a facility and its history, along with an investment in IT and dashboards or automated analytics. Ageing infrastructure, reduced budgets, sustainability demands and lost expertise through personnel turnover are just some of the factors also contributing to this huge challenge for facility managers.

To help take advantage of big data, facility managers in Australia are considering the pros and cons of their approaches to BMS and what methods are the most compatible. Best-in-class software automatically trends energy and equipment use, identifies faults,

provides root-cause analysis and prioritises opportunities for improvement based on cost, comfort and maintenance impact.

Custom-built systems, software-as-a-service (SaaS) and managed software-as-a-service (MSaaS) are some of the most popular analytics approaches when dealing with big data in buildings.

Some facility managers choose the custom-built approach and create their own on-site building data analytics system designed specifically for, and integrated into, their building's systems. This gives building managers the greatest flexibility with the system as they have exclusive access to all the servers, software and tools. To utilise big data, however, storage capacity and processing power can require significant, and therefore costly, IT infrastructure to provide the level of data confidence required.

Not only does a custom-built solution require a substantial investment in the IT

infrastructure, it also requires highly skilled staff or vendors to build the diagnostics and maintain the systems to manage this big data. As well as this, customised systems rarely allow remote access or utilise web browser interfaces because of the high-cost browser updates and software to combat security threats.

An SaaS data analytics solution is cloud based and is a more cost-effective and efficient option than custom-built systems. Big data is automatically pulled from the BMS and analysed in a virtual cloud environment. This gives building managers both the powerful insights of data analytics and the flexibility of remote access and control.

Leveraging a 'mass customisation' approach, these subscription-based solutions cost less to deploy because an existing, fully built library of complex diagnostics can be customised to individual buildings very quickly. Additionally, the pace of technol-





ogy change is so rapid today that on-site solutions may become antiquated very fast. Cloud-based SaaS solutions can react to customer feedback and constantly deploy new versions with added features and functionality continuously at no additional cost to the user. Software upgrades and diagnostic improvements are also cost-effective and predictable, budgetable expenses because they are included in the subscription.

One issue with SaaS systems is that they require staff to manage the software, interpret the big data and act on the opportunities identified. Considering the scope and complexity of the information being collected in its raw form, a high level of expertise and in-depth knowledge of big data is necessary to take full advantage of this deluge by understanding and applying feedback effectively.

Facility managers can circumvent this necessity by choosing an MSaaS as an analytics solution. MSaaS combines the SaaS analytics solution with the oversight of remote engineering experts who can

specialise in big data. Remote engineering analysts use insights from the information to monitor, detect, diagnose and identify energy savings opportunities. They understand complex data and its relation to building issues so can deliver high-level recommendations for upgrades, repairs or maintenance based on business priorities.

Additionally, an MSaaS analytics solution can increase the efficiency of vendors and partners by consolidating and integrating data from various building systems. This data can then be made accessible to all vendors, saving them time and making building services more effective. The data can be leveraged to improve vendor management by ensuring issues are fully resolved by utilising analytic findings and monitoring capabilities. This ensures issues do not reappear.

Facilities owners have made significant investments in sophisticated BMS systems that generate a wealth of data about a building's performance. Data dashboards help facility staff visualise all this data, but dashboards tell only where inefficiencies exist - not why.

Comprehensive data analytics software can interpret this big data and convert it into actionable information so facility managers can prioritise and proactively address issues for long-term solutions.

This can have a real impact on energy consumption, operational efficiency, occupant comfort and the financial wellbeing of buildings. The right analytics approach to big data management will proactively help facility managers achieve performance goals and contribute to a lower carbon footprint - all while driving a positive ROI, increasing portfolio value and maximising investments.

**Schneider Electric Buildings Australia Pty Ltd**  
[www.schneider-electric.com](http://www.schneider-electric.com)



*\*Cara Ryan, Offer Manager, Building Performance Centre at Schneider Electric*

## International keynotes at All-Energy

Technology and innovation have been unveiled as the focus of All-Energy Australia's 2015 program.

Australian Renewable Energy Agency Chairman Greg Bourne has been confirmed as All-Energy's plenary chair and will lead the panel discussion 'The Clean Energy Evolution and Revolution'. The panel debate will feature industry voices including Enphase Co-founder Raghu Belur, DNV GL Regional GM Mathias Steck, Redflow BDM Bruce Ebzery, Power-shop Chief Executive Officer Ben Burge and Clean Energy Council Chief Executive Officer Kane Thornton.

Two international keynotes will be delivered by Mr Volker Beckers and the Rt Hon. John Gummer, Lord Deben to discuss the role of industry and government in the future of renewables and clean energy:

The Rt. Hon John Gummer, Lord Deben was the longest serving Secretary of State for the Environment the UK has ever had. As Secretary of State for the Environment, the NGO community called him "the best Environment Secretary we ever had". He has consistently championed an identity between environmental concerns and business sense. To that end, he set up and now runs Sancroft, a Corporate Responsibility consultancy working with blue-chip companies around the world on environmental, social and ethical issues. Lord Deben is Chairman of the Committee on Climate Change, Valpak Limited, and the Association of Professional Financial Advisors.

Mr Volker Beckers was Group CEO, RWE Npowerplc until the end of 2012 and prior to this, its Group CFO from 2003 to 2009. He has more than 20 years' senior experience within the energy industry and comprehensive knowledge of European energy markets. He has



*Rt Hon. John Gummer, Lord Deben*



*Mr Volker Beckers*

worked in a variety of trade and industry bodies, including the CBI President's Committee, on the board of the German-British Chamber of Industry & Commerce, and since 1999 as Deputy Chair of the Executive Commercial Management Committee at the German Association of Energy and Water Industries (BDEW) and was also member of the Executive Committee of UKBCSE (now Energy UK). Since 2009 he has chaired the Business Energy Forum and in 2014 he joined the Board of Trustees of Forum for the Future.

All-Energy Australia's partnership with the Clean Energy Council will also offer attendees both professional development and ATRAA sessions for installers free of charge.

New module sessions will consider small-scale technologies, hybrid energy through combining multiple power sources

and the future opportunities of residential and commercial energy storage projects.

Anthony Reed, Exhibition Director at Reed Exhibitions Australia, said the agenda complemented All-Energy's legacy as the key forum to debate and unveil the latest in Australia's clean energy sector.

"All-Energy Australia remains the single largest meeting point for the clean energy sector, attracting 4000 visitors, more than 100 exhibitors and top-tier talent from around the event all in one place," said Reed.

**What:** All-Energy Australia Exhibition and Conference

**When:** 7-8 October 2015

**Where:** Melbourne Convention & Exhibition Centre

**Web:** [www.all-energy.com.au](http://www.all-energy.com.au)

## Waste Expo 2015

Open to all industry delegates, Waste Expo's free education program features two days of thought-provoking panel sessions, case studies and seminars across areas such as: social licence, infrastructure planning, community engagement, behavioural change, using food waste, product stewardship/EPR, emissions reduction fund, resource recovery and more.

Key sessions include an opening address by Stan Krpan, CEO Sustainability Victoria; Statewide Waste and Resource Recovery Infrastructure Plan seminar by Sustainability Victoria and the Metropolitan Waste and Resource Recovery Group; Council bulky



waste collection: data and opportunities for recovery; Case study and practical lessons learnt for the circular economy; The 'Pull Through' effect case studies; Mixed plastic recycling; Mattress recycling; PVC recovery; and much much more.

Waste Expo features products, services, solutions and education for businesses including government, corporate, hospital-ity, commercial, transport and healthcare.

**What:** Waste Expo 2015

**When:** 7-8 October 2015

**Where:** Melbourne Convention & Exhibition Centre

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



# Smart waste technology key to circular economy



**N**ew and smarter ways to produce things is only half the cleantech picture: we also need smart management of what gets left

behind, says Tom Nickels, Managing Director of Waste Management New Zealand.

When it comes to environmental debate, one fact seems constant: new ways to tap and use energy are vital. But we also need to apply technological smarts to the disposal of goods when their usefulness is done. And the good news is that, although we need to do more to bring the public up to speed, real gains are continuing to be made.

Indeed in a sector that might once not have been recognised as cleantech at all, modern waste management technologies are now reducing emissions, stopping environmental harm and turning waste into electricity. Given its scale, the industry can help reduce high levels of transport emissions as well.

Real gains will, in my view, also mean shifting to a realistic understanding of modern sustainable landfill technology and the key role it will realistically play for the foreseeable future.

The word 'landfill' may conjure up pictures of old 'dumps' with seagulls. But a modern sustainable facility represents a lot of leading-edge engineering and an upfront investment of \$200 million.

Our operation at the Redvale Energy Park & Landfill in Auckland, for example, is now New Zealand's largest producer of renewable energy from waste, generating enough power for 12,000 homes.

Redvale accepts approximately 50% of the Auckland region's domestic, commercial and industrial waste, amounting to some 2500–4000 tonnes a day. All liquid components are captured. Organic waste decomposes anaerobically and over 90%

of the resulting landfill gases are captured by a network of 150 wells. These are then used to fuel advanced generators that supply electricity to the grid and hot water to a neighbouring aubergine grower.

This is all delivering environmental results that could only have been dreamed of in the past. It is even helping address some of the sins of former times: soil excavated for central Auckland building projects has been so contaminated by previous generations that landfill storage is the only viable storage option.

Given the number of trucks involved in the waste management industry, gains can also be made in thinking about where to locate future facilities. There is, for

example, no net environmental gain in having trucks travel to ever more numerous or distant landfills or treatment centres.

Other modern facilities, of course, deliver similar results, and we are all working to make further gains. As an industry though, I often believe we could be doing more to stand up and make sure the public debate on this issue is properly informed.

Waste management cleantech will always work best when it has the support of business and consumers. Reducing waste at source and separating items for easier recycling bring big benefits — and ensure the circular economy stays virtuous in protecting the environment.



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Tom Nickels is Managing Director at Waste Management NZ and is responsible for all Waste Management businesses comprising Solid Waste (Waste Management), Recycling and Liquid & Hazardous Waste. He has a strong focus on environment, health and safety, customer service and operational efficiency. Tom has a Bachelor of Engineering from the University of Adelaide and an MBA from Monash University.



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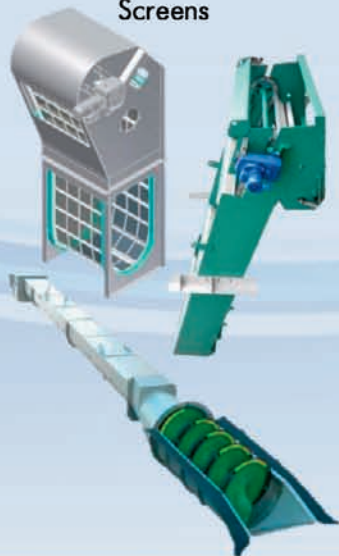
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