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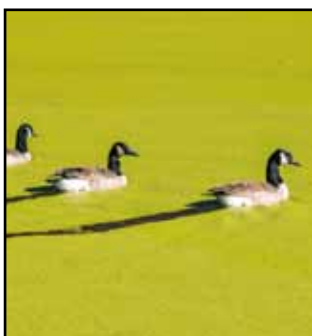
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'Never waste a crisis' — this is the aptly named title of the report generated from the Senate inquiry into waste and recycling in Australia. It's true, Australians work well in a crisis.

A prime example of a crisis that wasn't wasted is the millennium drought crisis, which definitely spurred government and water industry action and resulted in substantial water infrastructure improvements for Australia.

The waste crisis developed as a result of China's National Sword policy, which has affected 1.25 megatonnes of recyclables previously exported to China. And it seems that this may have been the crisis that the waste industry needed to spur government action.

There have been many announcements of state government funding for the development waste and recycling infrastructure and talk of introducing federal policies to phase out single-use plastics (and other material) which cannot be recycled in Australia. Of course the supermarket giants have also joined in and implemented their own bans on single-use bags. (This action may well have been helped along by ABC's *War on Waste* program, which has also increased the public interest in waste issues.)

Waste Management Association of Australia (WMAA) CEO Gayle Sloan welcomed the Senate inquiry and its emphasis on finding circular economy solutions. "Long before China's National Sword policy made this an economic challenge for Australia, our industry has been saying to government that we need to rethink the way we use recycled commodities in this country and create an industry for those commodities," she said.

In this issue, we highlight the dangers associated with the heavy reliance on one market, such as China, and the lessons that can be learned from the recycled organics industry — read more on page 6.

Carolyn Jackson

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Taking a leaf out of the recycled organics book

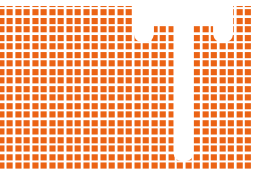


How can the lessons learned with recycled organics help the rest of the resource recover industry refocus post China Sword Policy?





The Sword Policy has exposed a weakness that has been in the system in Australia for decades – heavy reliance on one market and underdevelopment of local options.



The impact of China's Sword Policy has been devastating to councils and the resource recovery industry, but there's a strong chance

it's only going to get much worse. This opinion is from industry association Centre for Organic Research & Education (CORE), after spending over 20 years assessing and building markets for recycled organics around Australia, Canada, Singapore, United States and yes, China!

CORE'S brutal assessment is based on the association's activities in its China office where it is assisting local members recover and value-add recycled organics into high-value products. During this time CEO Chris Rochfort and Chairman Eric Love have been in advocacy dialogue with China's Ministry of Environmental Protection on behalf of members and stakeholders in the resource recovery industry throughout China. The bad news (for Australian councils and the resource recovery industry) is China is only starting to ramp up its own recycling efforts across all recyclables. This and the wholesale shutdown of polluting factories are the main reason China is now being selective in the types and quality of materials it will accept.

With a population of 1.3 billion and an increasing expansion of metropolis' innovation and affluence, China's own internal supply channels may soon outstrip demand for foreign recyclables completely. You can't really blame China – who would want to pay to have low-quality waste materials shipped halfway around the world when there is a lower cost alternative right under their noses? In addition, low quality means that a proportion of this material is likely to end up in China's landfills and incinerators, which is contrary to China's mandated environmental and sustainability reform agenda. Australia and the western world



may one day thank China for addressing the environmental impacts waste has on its society. The Sword Policy has exposed a weakness that has been in the system in Australia for decades – heavy reliance on one market and underdevelopment of local options.

This is diametrically opposed to the organics recycling industry where there is no export market. Recycled organics have low commodity values and shipping them to foreign lands for processing contravenes foreign biosecurity and quarantine laws. This led CORE in the late 1990s to develop comprehensive demand creation strategies for product and market development.

An updated blueprint for market development released by CORE in 2016 includes local strategies and programs aimed at assisting members to secure markets for the ever-increasing volumes of recycled organics being diverted from landfill. CORE's same product and market development principles and strategies are being implemented today for its members globally with the emphasis on local market development.

This is an approach the dry recycling industry should adopt. However, don't expect quick fixes, although short-, medium- and long-term strategies are all part of the mix, particularly contingency planning, which has been sadly lacking and now exposed by China's Sword Policy.

'Knee-jerk' funding for ad hoc projects should be resisted until a comprehensive strategy that includes product and market development is completed. Without prioritisation, proper cost modelling, and market and viability research being conducted, the rest is a waste of time. Again, there are lessons learned from some approaches in providing funding to the recycled organics industry that has been frittered away on projects that have little or no strategic significance. Another opinion is don't hire a lone consulting firm to prepare the strategy, as this leads to narrow, flawed and opinionated pieces of work that lack holistic approaches. Industry must own it and work it! Like CORE has done for more than 20 years.

www.core.asn.au

Australia is in the midst of a seismic change in the way we generate and consume energy. Never before have we had access to as many sources of energy and power generation as we do today.

Renewable energies such as solar PV, solar thermal, batteries and wind, which were considered uneconomical as little as 10 years ago, have all dropped in price — so much so that in many cases they are cheaper than conventional sources of electricity such as coal, gas and hydro. While there are many reports and publications that detail the specific numbers, the trend is clear: renewables will continue to lower in cost against the existing mature technologies.

The problem for Australian consumers is that this is not translating to lower energy prices. In fact, the opposite is true. The last five years have seen unparalleled increases in the cost of electricity and gas in the Australian market.

The price hikes are due to a number of factors. Australia's gas market is experiencing unprecedented export levels, which has restricted gas availability for the domestic market. It's not that there isn't enough gas; rather, too much is being exported and it's constraining the local market. In the case of electricity, the lack of investment in power generation over the last 30 years has created a similar result. The transition to renewables that is now underway has left gaps in our generation market. Until recent times, these gaps would have been readily filled by gas peaking power plants, but these are now unable to compete due to skyrocketing gas prices.

Meanwhile, consumers are left wondering how to respond to this change. At a domestic level, we have seen the reaction to this in the uptake of rooftop solar. At more than 20%, Australia now has some of the highest rooftop solar penetration in the world.



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a world
of rising
energy
prices



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For industry and the commercial building market, the solution is not so simple. Historically, industry has tackled the problems of rising energy prices with two- and three-year electricity and gas contracts, but with rising prices these strategies are no longer reliable. Indeed, as gas and electricity markets have tightened, many three-year contracts have delivered prices in the third year which are simply unaffordable. Companies are faced with a new economic reality that 'business as usual', when it comes to energy, is not sustainable.

Overshadowing this energy upheaval is the issue of climate change. For industry, it's clear that there will be a price of some form on carbon emissions. Our banks and large public companies now all have climate change policies requiring them to commit to and reduce their greenhouse gas emissions. Recently, we're seeing the commercial building industry embrace 'Net Zero 2030', with a commitment to buildings having net zero greenhouse gas emissions by 2030.

So, for industry the fundamental question is: how do we secure our cost of energy, both to sustain our business and reduce our emissions?

The answer is: keep your options open. We know that one thing is certain, and that is technology will change. It's vital that business owners ensure their building or factory is set up to make use of technologies, both now and in the future, to enable them to keep operating in a competitive commercial environment.

So, what does this look like for a building owner or in industrial applications?

The answer is it is a mix. A mix of what can be economically sourced from the grid, what energy efficiencies can be achieved internally, and what meter generation and storage system technologies are available to reduce energy costs today.

An example of this is the collaboration between Optimal Group and Walker Corporation. Together, they are developing a true microgrid

at Tower Three in the flagship Collins Square precinct. Each of the five towers at Collins Square includes fully integrated Capstone microturbine power generation. The trigeneration systems provide the central electricity, as well as all heating and cooling for the towers. The result is a NABERS energy rating of more than 5.5 stars. More recently, Tower Three had 100 kW of PV solar installed on the roof, bringing its rating to 6.2. This gives Tower Three the distinction of being one of only three commercial office towers in Victoria to carry a rating over 6 stars.

The microgrid system under development includes 150 kWh of battery storage, supercapacitors and Optimal's integrated energy management system. The long-lasting 80,000 h service life of the Capstone microturbines means that the system is poised to take advantage of new technologies and market opportunities in the future. For example, the expected introduction of hydrogen and biogas to the network in the near future will result in even lower greenhouse gas emissions.

Probably the most important, and as yet undeveloped, market opportunity for the Collins Square towers is a future grid response market. The buildings' trigeneration systems are ideally placed to provide demand response and frequency response at times of network instability or shortfall. In addition to this, the use of hydrogen or biogas will allow Collins Square to increase the output from its on-site generation from simply meeting the buildings' needs to exporting to the grid.

It's a really clear example of how rising energy prices are changing the way business and industry thinks about power security. Ultimately, businesses are able to utilise existing technology to both reduce electricity costs and carbon emissions now, as well as set themselves up to capitalise on future technology and market opportunities.

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Drip irrigation water containers.

Novel recycling options identified for waste vinyl

An ambitious research project spearheaded by the Vinyl Council of Australia has identified several novel recycling applications in a bid to use the 1.2 million m² of PVC advertising banners sent to Australian landfill sites each year.

Credit: Monash University MADA

The two-year REMAKE Project explored the challenges of previously difficult-to-recycle vinyl-coated polyester woven fabrics to find new uses for the billboard skins, as well as grain covers and truck tarpaulins totalling around 5000 tonnes, that are landfilled each year. The scale of the Australian market demanded innovative and lower cost reprocessing solutions than those that exist in Europe, with the cost of sending billboard skins to landfill averaging \$200,000 per year in NSW alone.

With funding from the NSW Environment Trust for research and design, the Vinyl Council coordinated the project under its PVC Stewardship Program. Project partners included Monash University; UNSW; Vinyl Council members Rojo Pacific, Welvic Australia and PMG Engineering; the Outdoor Media Association; and several potential end-product manufacturers.

Studies into cost-effective reprocessing techniques and potential end products and markets for the recyclate culminated in a number of possible applications, ranging from market bags to safety floor mats, garden watering containers and roof tiles. Following prototyping, three product designs are being assessed for commercial viability.



Roof tile prototypes made from recycled material.

The fresh approach of the students and product designers pushed beyond traditional reprocessing to 3D printing, rotomoulding, compression welding and de-inking. Recycling techniques included composite reprocessing with other end-of-life vinyl products, mechanical and chemical separation, and chemical engineering studies to evaluate recyclate properties.

Significantly, the project has encouraged government and industry investment of more than \$300,000 into PVC recycling in Australia. An industry partner has already patented a scalable chemical separation process for PVC and is attracting investment interest.

Vinyl Council Chief Executive Sophi MacMillan said the REMAKE Project participants

have made a valuable contribution to the industry's progress in finding a solution to the recycling of PVC-coated fabrics in Australia, with further work now needed to find a long-term, market-based, viable solution. The next steps include further refining processing technologies, identifying other potential end users of the materials and encouraging sector investment in collection/recycling schemes to drive the program's next stages.

"The durability, weatherability and flexibility of these materials make them an excellent choice for many applications, yet they have been previously difficult to recycle," MacMillan said. "As a priority recycling area, this project has shown great potential for recovering these resources for use in new products."

"Further encouragement by government and the community of circular economy programs like ours would lift recycling rates, support reprocessing of complex products as well as generate jobs and promote innovation. This would lead to a step change in diverting difficult but quality products from landfill and a move towards greater sustainability."

"While there is still more work to do, if we find a viable reprocessing technology and end-product solution, then this has the potential to be replicated overseas."

Vinyl Council of Australia
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Clever sorting system removes foreign particles from compost



The operators of composting facilities are faced with a dilemma. On the one hand, customers are demanding compost of increasingly higher quality. On the other, organic waste contains a steadily rising amount of foreign particles. Furthermore, the entire materials cycle is threatened if a company is unable to adhere to the quality criteria and standards for compost because the organic waste it is supplied with contains too many impurities.

To address this situation, processing companies are working together with the sorting specialist STEINERT on one of many components of a comprehensive solution. Among other things, the UniSort Black ejects foreign particles out of the structural material and creates a pure intermediate product.

In the first step of processing, magnets above the belt remove all of the iron components. Later on during the pre-processing stage, sieves and wind sifters precondition the material for processing. Once this process is finished, conveyor belts transport the material to the UniSort Black, which separates out all plastics as well as the remaining foils and metals. All in all, the technologies remove more than 98%

of the foreign particles. During this process, the technology can also sort out broken glass, stones and ceramics.

The sorting system consists of an NIR (near infrared) sensor for recognising NIR-detectable plastics as well as objects that are normally not detectable by means of NIR (such as dark-coloured and black plastics). Both types of material are sorted out during the same run-through, with the use of hyperspectral imaging (HSI) technology enabling the system to recognise both types of material simultaneously. Moreover, it also detects broken glass, stones and ceramics. A metal sensor can be installed optionally in order to detect and separate residual metals.

The system features a halogen light source and application-related analysis software. It has spectral resolution of $\lt; 3\text{ nm}$ and can conduct over 27 million detections per second. Depending on the application, the technology has a throughput rate of six to 10 t/h at a working width of 2.8 m; the grain sizes range from about 10 to 70 mm and from 70 to 350 mm. Valve distances of 12.5 and 31 mm are available, while working widths include 1000, 1400, 2000 and 2800 mm.

“The UniSort Black enables us to purify the structural material so well that it doesn’t have to be incinerated,” said a spokesperson for STEINERT. “This reduction of the incineration costs by up to 90%, the return of the material into the composting process as a structural material and the marketing of the quality-assured products pay off for the operator.”

“The UniSort Black helps us to ensure quality in the current situation,” added Klaus Remm, Head of Operations at the Olpe composting plant, Germany. “However, it cannot be the sole solution – municipalities also bear a responsibility, because they have to supply us with organic waste that is largely free of impurities.”

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Farmers to trade on a local renewable energy market



Latrobe Valley dairy farmers could be buying and selling locally generated renewable energy using blockchain, thanks to a study funded by the Australian Renewable Energy Agency (ARENA).

With \$370,000 funding from ARENA, the \$775,000 project will be led by New York's Brooklyn-based energy company LO3 Energy and focuses on the feasibility of creating a virtual microgrid across up

to 200 dairy farms, over 100 household consumers and around 20 other commercial and industrial customers in the Gippsland region.

A virtual microgrid is a local marketplace of connected energy users who can buy and sell electricity within a localised area.

The virtual microgrid will incorporate solar PV, battery storage, smart appliances and enabling technologies combined with the

LO3's Exergy peer-to-peer energy trading platform which uses blockchain technology to allow participants to securely buy and sell locally produced renewable energy.

This marketplace would allow Gippsland farmers to take greater control of their energy use, providing the opportunity to sell their solar power back to the grid, delivering savings on their energy bills.

Participants would be linked in an Internet of Things-based marketplace while using AusNet's distribution network. Participants would have a combination of solar, battery and smart devices to generate and store energy and manage usage.

Farmers would be able to participate at no upfront cost through loans provided by the Sustainable Melbourne Fund, repaid through council rates.

The study is expected to be completed by the end of 2018, and if successful the pilot microgrid could be rolled out in Gippsland in 2019.

The project involves a consortium of partners including AusNet Services, Sustainable Melbourne Fund, Dairy Australia and Siemens.

Dairy factory upgrades coal boiler to burn biomass

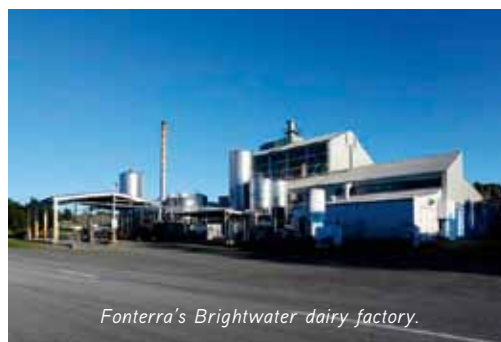
Fonterra's dairy factory in the town of Brightwater, New Zealand, is set to reduce its carbon dioxide emissions by 25%, in a move that will significantly reduce the site's reliance on coal.

Thanks to funding support from the Energy Efficiency and Conservation Authority (EECA), conversion is about to get underway on Brightwater's existing coal boiler, adding capacity to burn wood biomass to generate steam. It's a move that will cut emissions from the factory by around 2400 tonnes a year — roughly the same as taking 530 cars off the road.

Fonterra Chief Operating Officer Global Operations Robert Spurway said the move to a co-fired boiler is a significant step towards achieving Fonterra's emission reduction targets, with the move to convert the existing Brightwater boiler following a successful trial that was undertaken in 2017.

"Last year we joined forces with the Ministry for the Environment to develop a roadmap to a low-emissions future, which included a commitment to undertake a demonstration of co-firing wood biomass with coal at one of our sites," Spurway said.

"Now, with the support of EECA, we're putting our co-firing strategy into action. Brightwater's transition to a lower emission



energy source is a tangible step toward achieving our target of reducing our Global Operations emissions by 30% by 2030, and our longer-term goal of net zero emissions by 2050."

There are no known wood-fired boilers at scale in the New Zealand dairy manufacturing sector. This project will thus demonstrate a pathway towards full displacement of coal, both for Fonterra and other process heat users, and has

the potential to be a sustainability game changer.

"This is exactly the type of demonstration project that EECA looks to support," said EECA Business Group Manager Market Engagement Greg Visser. "Our funding helps de-risk investment in new technology applications where there are big emissions reductions on offer. It's a great opportunity for replication across Fonterra — and by others looking to adopt this technology to save energy."

Lytelton Engineering, the original manufacturer of the boiler, will be working on the conversion with engineering consultant WorleyParsons. It is expected that the boiler will be able to co-fire with wood biomass by October this year.

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Phosphorus reduction in wastewater treatment



Andrew Miley*

Phosphorus, usually in the form of phosphates, originates from sources such as human and animal waste, detergents and food residues. Food and beverage processing plants will very often have phosphate inputs from all of these sources.

Wastewater treatment systems that are commonly used in the food and beverage industry typically manage to reduce biochemical oxygen demand (BOD) and nitrogen effectively, but often are not as effective at reducing phosphorus to acceptable levels.

In order to protect the environment, industrial wastewater treatment plants are tasked with reducing the levels of contaminants, including phosphorus, so that the treated effluent meets environmental standards before it is discharged into a local water body.

Environmental impacts of phosphorus

Phosphorus is a naturally occurring nutrient found in soil and rocks that is required by all living organisms. Phosphorus (phosphates), together with nitrogen (nitrates), is an essential plant nutrient that is readily taken up by plants for growth. However, when these nutrients are available in unwanted excessive amounts, they can fuel rapid plant growth — which is why they are used extensively in fertilisers.

High levels of phosphates in aquatic environments can fuel algal growth, resulting in algal blooms that can potentially lead to eutrophication as the thick algal mats block out sunlight causing the algal cells to die off. Oxygen is stripped from the water column as the dead algae cells decompose, leading

to anoxic conditions that can result in mass die-offs of fish and other aquatic life. As the algae and other dead organisms decompose, the organic form of phosphorus bound in the dead organic matter can be converted to orthophosphate, making phosphate available to aquatic plants and algae once again. So in effect, internally recycled phosphorus can fuel another algal bloom, and this cycle can be continually perpetuated.

Phosphorus removal

The effectiveness of phosphorus removal during wastewater treatment can vary, depending on the available equipment and the treatment methods used. Only wastewater treatment plants that employ specialised phosphorus removal techniques will normally be able to remove phosphorus to the desired levels.

Many food processing plants ultimately treat their wastewater by discharging it to aerated settling ponds where the organic waste is broken down by aerobic bacteria. Upstream of this aerobic biological process there may be some primary treatment process such as a DAF or perhaps an anaerobic pond; however, neither of these stages of treatment provide a satisfactory reduction in phosphorus loads, if any at all.

There are two methods of removing phosphorus from wastewater: biological removal and chemical removal. Biological phosphorus removal can be achieved by cycling the activated sludge in anaerobic and aerobic conditions, which can build

up a population of microorganisms that are capable of storing phosphorus intracellularly as polyphosphate. If these specific microorganisms exist in sufficient numbers, then the phosphorus will be removed along with the waste activated sludge. Unfortunately, however, to establish and maintain biological conditions for effective and continuous phosphorus removal has proven to be quite challenging for the food and beverage sector.

A much simpler method of removing phosphorus can be carried out by dosing a metal-based coagulant into the wastewater. The metal targets phosphates via two routes:

1. When a metal is added to wastewater it reacts directly with phosphates present in the wastewater, forming the metal phosphate, which is insoluble.
2. The metal ions hydrolyse in water, forming a dense, gel-like precipitate (metal hydroxide), which binds with phosphorus to form the metal phosphate.

Once the metal combines with phosphorus to form the metal phosphate as discrete flocs, the flocs can be removed from the water phase.

Separation of the metal phosphate is a fairly simple process and can be achieved by filtration or clarification, the latter using settling or flotation methods. Filtration is rarely used as a sole method of treatment as the suspended solids level after the chemical treatment stage is usually too high, although filtration is commonly used downstream of a clarification stage as a means of protection and polishing.

When it comes to flotation (more specially, a dissolved air flotation system or DAF) versus clarifier, either process will work. A small dose of polymer upstream of the separation device will enable a clear virtually solids-free stream to be discharged. Which



Chemical treatment combined with physical removal in a dissolved air flotation system provides an effective solution for removing phosphate in industrial wastewater, allowing the clean treated effluent to be safely discharged.

process to select can depend on available space, cost or ongoing costs, or can simply be put down to a personal preference.

Conclusion

Phosphorus is an important plant nutrient that drives algal blooms in both freshwater and marine ecosystems, and is a key factor for triggering extensive blue-green algae (cyanobacteria) blooms that can be toxic

to humans and wildlife. High concentrations of phosphates from human inputs, such as industrial wastewater discharges, can cause eutrophication, resulting in the death of fish, shellfish and other species. As a result, environmental agencies are focusing more attention on phosphorus in wastewater discharges and imposing limits on how much phosphorus can be discharged with industrial wastewater. To ensure certainty

in the continuous and efficient removal of phosphorus to comply with given discharge limits, a physical chemical system wins hands down.

**Andrew Miley is Director, Global Market Development – Hydroflux Group. He is an experienced senior water industry professional with over 25 years in the water industry.*

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A key feature of the Turtle Tough GP-I Industrial pH Sensor is a compact-style, solid-state, non-porous, cross-linked polymer embedded in a HDPE support matrix. This enables the sensor to hold excess KCl, enabling saturation at all temperatures for stability and long sensor service life in applications where little or no maintenance will be performed. The standard glass is said to be many times stronger than common pH sensors and delivers a broad range performance. The CPVC immersion-style body has a 3/4" MNPT threaded connection on the front and back end.



Recommended applications include industrial, chemical, food and beverage, semiconductor, pharmaceutical and wastewater; any measurement where aggressive chemical cleaning is needed to remove fouling or low-maintenance operation is required with minimal cleaning and recalibration.

Additionally, the sensor is available with the Turtle Tough digital smart sensor technology (DSST). The plug-and-play sensor has a quick-connect fitting, eliminating the need for hard wiring to the analyser. Onboard sensor memory allows the storage of calibration data, analyser configurations and sensor service history. This allows the sensor to be conveniently maintained and calibrated off-site or in the laboratory and pre-programmed with calibration data and analyser configurations. This stored information automatically uploads to the analyser on connection and eliminates the need for any interaction with the analyser, simplifying the change-out of sensors. A service log stored on the sensors is suitable for maintenance and quality assurance records.

Leuze electronic Pty Ltd
www.leuze.com.au

ENERGY-EFFICIENT CONTACTORS

Schneider Electric has announced the TeSys D Green range of energy-efficient contactors for control and switching applications. The contactors are equipped with an electronic coil that requires up to 80% less energy and generates up to 50% less heat inside cabinets compared to electromechanical contactors, according to the company.

The contactors are designed to help keep processes up and running, with SEMIF47-compliant performance due to a wide band coil with high resistance to voltage disturbances on the grid. The range also features an electrically noise-free design, reduced contact bounce from mechanical shock and vibration, and repetitive actuation regardless of voltage fluctuations. The contactor can also help lower dissipation and energy consumption for an entire cabinet by combining with the TeSys LR9D electronic overload relay for less heat generation.

Ordering and inventory management has been simplified, with just four product references covering control voltages from 24 to 500 V in AC or DC. TeSys D Green products are also compatible with current TeSys accessories, while standard dimensions and terminal assignments enable direct replacement of other contactors, regardless of manufacturer.

The contactor offers easy integration with automation solution architectures. Its compact size takes up less space in machines and high-density electrical cabinets. To simplify design and reduce wiring and material costs, extension contactors rated up to 80 A enable direct PLC control from 24 VDC/500 mA static outputs, without requiring an interface relay. Contactors also include EverLink power connectors that ensure creep-free connections and low heat loss.

Schneider Electric
www.schneider-electric.com.au



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BMS maintenance

Traditional vs data-driven

BMS maintenance has been performed for years and has been a critical part of a building's operation in terms of tenant comfort, equipment longevity and energy efficiency. For the last 20 years maintaining electronic controlled HVAC systems has been much the same, but in the age of 'big data' how has the industry shifted to benefit?



Traditional maintenance typically involved arriving to site, checking the system operation by looking at the graphical headend and maybe manually manipulating the system to test control strategies. All too often this is only done on a single day a month (or quarterly) and only problems that are apparent on the day are rectified. The introduction of automated fault detection and diagnostic systems means the mundane task of staring at a screen all day is a thing of the past. Automated fault detection systems will functionally test equipment throughout its normal operation and identify issues as they occur, this allows the maintenance team to fix problems instead of looking for them.

Preventive maintenance models are the industry norm and still dominate the market. These models see maintenance staff perform time-intensive tasks that rarely improve the building's comfort or performance. These tasks involve the interrogation of graphics and trend logs, which becomes repetitive and often issues are missed. And typically only a couple of days' worth of data is checked at most. Once any issues have been identified

it is only then the equipment is physically checked, and any issues rectified. Because of this time-consuming process, maintenance procedures have adapted to only check equipment operation once a year and only certain pieces of equipment every month. This means that problems could potentially go unchecked until month 12 of the contract.

Data-driven maintenance is relatively new to the industry and has become more prevalent with the introduction of analytical systems. By using analytics to functionally check equipment and raise issues as they occur, maintenance time on-site can be focused to fixing the worst performing items of equipment. This removes the need for maintenance time to be used checking the BMS graphics for control issues and allows more time to rectify problems thus reducing tenant comfort issues and costly faults. A data-driven model would now see an allocation of time on-site to check poor performing equipment and perform some physical checks. For example, a time allocation to check the 'X' worst performing VAVs, AHUs, calibrate all sensors and physically check damper actuators. On-site checks still need to be performed to visually verify everything is ok.

A group of BMS technicians were interviewed and asked to list out the typical checks that need to be performed on each item of equipment and the time to do so. Table 1 outlines some of these tasks and time to perform. It was found on average a reduction of 45% could be achieved by using analytics to drive maintenance, this time saving is then reallocated to physically checking and rectifying issues. There are items that still need to be physically checked as per the traditional model; however, most functional checks can be performed via the analytics system.

By using data-driven maintenance the plant is operating as it's been designed to and all systems are working in sync, which results in lower energy consumption and better tenant comfort conditions. Table 2 shows a rolling energy consumption pre- and post- data-driven maintenance model.

As can be seen, the energy consumption dropped around 15% just by targeting the worst performing equipment through a data-driven maintenance model. This is a common theme throughout buildings that have moved away from the traditional maintenance model and more towards a data-driven model.

CopperTree Analytics Australia
www.coppertreeanalytics.com.au

VAV Maintenance Tasks			
Task	Time (min)	Traditional	DDM
Verify Damper operation	5	✓	
Check actuator is tight on shaft	5	✓	
Check pitot tubes	1	✓	
Check room temperature control	5	✓	
Check airflow control	5	✓	
Calibrate Room temp sensor	10	✓	✓
		31	10
		% less time using DDM	
		-67.74%	

Table 1

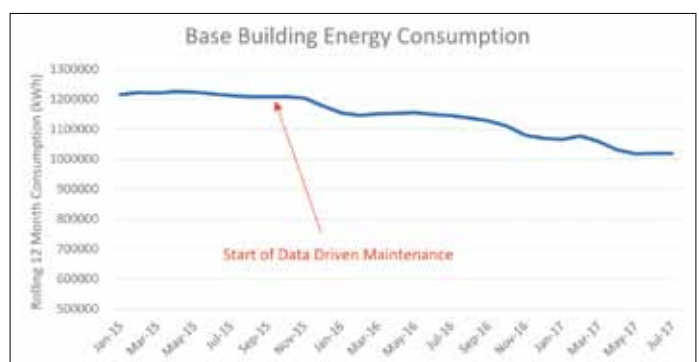


Table 2

Now you can calculate your organisation's 'nitrogen footprint'

Australian, US and Chinese researchers have collaborated on what is claimed to be the first tool to calculate the 'nitrogen footprint' of an organisation — using the University of Melbourne as a guinea pig.

Nitrogen has human and environmental health costs in the hundreds of billions of dollars and is a significant challenge to the sustainability of our society. For example, nitrogen run-off from agriculture in Queensland has resulted in damage to the Great Barrier Reef. Yet according to the researchers, nitrogen pollution is often disguised as other global change issues, such as climate change, which nitrous oxides and nitrogen oxides contribute to, or harmful particulate matter 2.5, which ammonia gas contributes to.

"Our earlier research showed that Australia has a large nitrogen footprint," said Professor Deli Chen from the University of Melbourne. "At 47 kg of nitrogen per person each year, Australia is far ahead of the US (28 kg of nitrogen per person per year), the second on the leader board of per capita reactive nitrogen emissions driven largely by a diet rich in animal protein and high level of coal use for energy.

"To understand more about Australia's footprint, we delved into the figures to measure institutional nitrogen footprint."

Together with Zhejiang University, the University of New Hampshire and the University of Virginia, the University of Melbourne developed a tool that calculates reactive nitrogen — the forms of nitrogen released to the environment from our daily activities. Working on an institutional scale, it takes the sum of individual activities as well as institutional activities, such as powering laboratories and lecture theatres in the case of a university.



According to the new tool, the University of Melbourne has a nitrogen footprint of 139 tonnes of nitrogen, with three factors playing dominant roles: food (37%), energy use (32%) and transport (28%). These results were published in the *Journal of Cleaner Production*.

"At the University of Melbourne, food plays a dominant role through the meat and dairy consumed," said University of Melbourne PhD candidate Xia Liang. "Nitrogen emissions from food occurs mainly during the production of food, whereas emissions from energy use is mainly from coal-powered electricity use and emissions from fuel used during business flights."

The study found that 96% of the nitrogen emissions occurred outside the university's boundaries. It also found that the detrimental effects are invisible to the person on the ground, with the burden of the pollution often borne far away.

"We also modelled the steps that the university could take to reduce its nitrogen footprint. We found that it could be reduced by 60% by taking action to cut emissions from the three main contributing

factors," said Liang.

"The good news is that if the university implements all the changes detailed in its Sustainability Plan — which includes strategies for reducing carbon emissions, such as transition to clean energy (solar and wind), optimising energy use and buying carbon credits — this would also reduce nitrogen pollution by as much as 29%," added Professor Chen.

University of Melbourne
www.unimelb.edu.au



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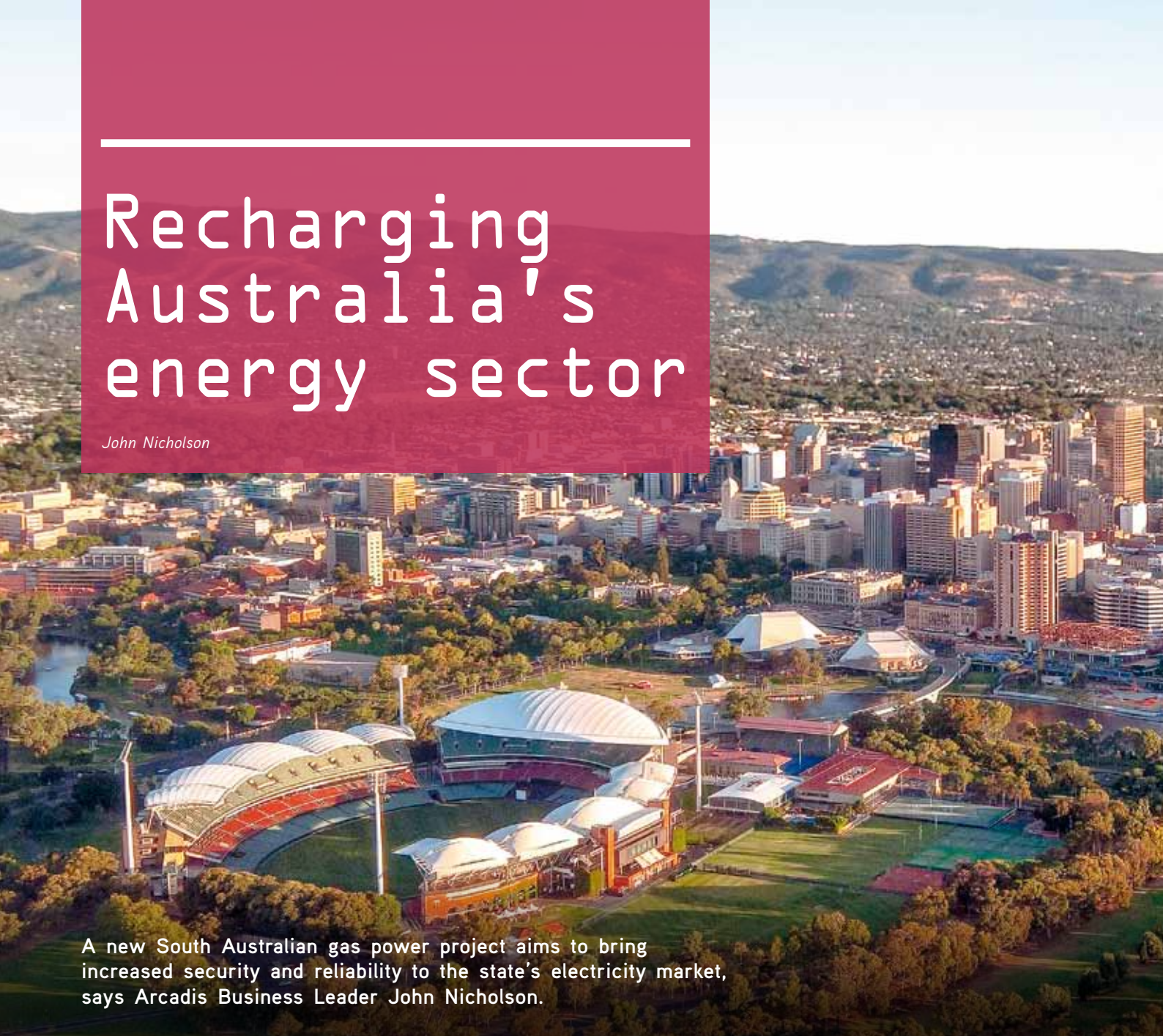


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Recharging Australia's energy sector

John Nicholson



A new South Australian gas power project aims to bring increased security and reliability to the state's electricity market, says Arcadis Business Leader John Nicholson.

The energy debate is alive and well in Australia, with massive shifts in the industry triggering a vigorous national debate and spurring a flood of reports, reviews and articles by both industry and governments.

Amidst all the noise it's often been difficult to get a clear picture of what's really going on. And, more importantly, what we need to do to fix any long-term underlying problems.

The trigger, as a recent Grattan Institute report, *Mostly Working: Australia's Wholesale Electricity Market*, points out, was the rapid escalation in electricity prices for homes, offices and businesses in areas around the country.

South Australia in particular is undergoing significant changes to the energy sector. With its high renewables penetration (more than 50%, compared with a national average of just 5%), and reliance on imported coal-fired power via the Heyward interconnector, South Australia has been exposed to higher electricity costs and reliability issues.

A state-crippling blackout in 2016 has led to improvements in the management of South Australia's energy sector and created opportunities for innovative developments, such as a new \$800m LNG-to-power project in the Outer Harbor of Port Adelaide.

The project is being developed by Melbourne firm IG Partners through its wholly owned subsidiary Venice Energy, with Arcadis as the main project study partner.

The project's ability to provide a firming product for renewables (particularly wind) and to deliver new local generating capacity is crucial to placing downward pressure on prices in South Australia's energy market and improving security of supply to the state's transmission network.

The Grattan study shows that wholesale energy prices quadrupled in South Australia between 2015 and 2017 as older, cheaper, mostly coal power generation assets were closed down and domestic gas supplies tightened.

The study concluded that while prices may never again be as low as they were a decade ago, the energy market is basically sound, even as it begins to adapt to a new era with diversifying electricity sources, higher costs, disruptive supply,



South Australia's state grid by late 2021 via a two-stage development, helping to provide a 'firming' supply at times when renewables aren't available and to fill a power gap that, by some estimates, will reach around 600 MW by early next decade.

The project is not planned to supply power continuously over a 24-hour period, but rather is being designed to support peak demand periods at the start and end of the day, or for seasonal surges during South Australia's long hot summers.

Arcadis, I'm pleased to say, is the study partner on the project, helping to manage the preliminary design and modelling for both the storage and generation, site assessment, development of the delivery strategy and market engagement.

Keeping the lights on

The Outer Harbor Project is a sign of some of the new and innovative solutions that are emerging in the wake of Australia's rapidly changing energy market, bringing improved energy security to South Australia without the need for public funding to develop or support it long term.

Many of the renewable electricity projects now happening around the country are taking a similar approach, bringing much needed innovation and diversity to our energy supply.

While it's clear Australia's energy future will increasingly rely on a mix of technologies, particularly as they improve in performance and fall in cost, we also need to continually work to guarantee reliable, affordable and low-emission electricity for everyone, no matter where they live or work.

The private sector, investors and entrepreneurs have a powerful role to play in this scenario, but so does government. As the Grattan report pointed out, government can help to create stable, consistent energy and climate-change policies that encourage new investment and innovation.



John Nicholson

Arcadis Pty Ltd
www.arcadis.com

demand technologies and rising environmental benchmarks.

The virtual pipeline

There's no denying the sheer level of innovation in the electricity market that's now taking place not only here, but internationally as well.

Australia is seeing a huge jump in investment in energy projects from overseas, alongside major market-led activity in most states and territories to fast-track clean-energy sources like solar, wind, tidal, hydro and even industrial-scale battery storage to help capture power as it's generated for later use.

It's a similar story for gas. Australian producers, with some pressure from government, have been boosting efforts to meet

growing domestic and international requirements, but supply challenges remain given the complexities and huge costs of finding and developing new projects.

The Outer Harbor Project in South Australia is a glimpse of just how far we've come in a couple of years.

The project's 'virtual pipeline' will import liquid natural gas (LNG) to a newly built wharf at Point Pelican near Adelaide where it will be stored, converted and used to supply a linked power station as well as sold into the state's gas markets.

Project approvals and construction of the gas supply infrastructure are expected in the first half of 2019 with gas available to the market by the second half of 2020.

The power station is expected to deliver 500 megawatts (MW) of electricity into

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Environmental protection takes to the road and sea

A highly efficient low-maintenance liquid-to-solid waste separator has extended its versatility by being offered in skid-mounted format that can be carried by truck or trailer to remote and environmentally sensitive applications.

The skid-mounted KDS separator is being introduced to Australasia and New Zealand by CST Wastewater Solutions, following on from the first permanent Australasian KDS installation, underway this year on World Heritage-listed Lord Howe Island.

The Lord Howe system, engineered by Australasian wastewater treatment company CST Wastewater Solutions, is part of a two-stage wastewater treatment system for the management and disposal of waste generated on the island.

The system — suitable for smaller, remote and ecologically sensitive applications — was selected by the Island Board of Lord Howe after extensive testing to determine the best solution for the management and disposal of waste generated on the island.

Now the skid-mounted KDS extends the versatility of the technology for compact dewatering applications, ranging

from food processing, poultry, meat, fish, dairy, mixed food waste, grease trap and waste oil through to municipal wastewater sludge, livestock manure and agribusiness processes.

The compact KDS multidisc separator can help minimise the environmental impact of resources industry camps as well as commercial food processing and agribusiness plants

located in sensitive coastal, island and inland areas where energy and water consumption are issues.

Local authorities also benefit from these environmental attributes, as well as the technology's capacity to reduce sludge disposal by 50% and more, while simultaneously removing solids that otherwise end up in sewage and waterways. The monthly savings on transport and disposal are claimed to be immediate and significant.

The largest energy-saving KDS unit can handle about 100 kg DS (dry solids) an hour at 98% solids capture, to produce this drier, lighter, more hygienic and more compact output that is easier and cheaper to handle and transport, said CST Wastewater Solutions Managing Director Michael Bambridge.

— is suitable for organisations which face the challenge of not only handling heavy, sticky wet waste, but also the cost and OH&S hazards of transporting such unhygienic material to disposal facilities.

"The new skid-mounted KDS technology offers potential users a highly effective ready-to-use solution to waste processing needs," said Michael Bambridge. Measuring only 3.8 by 2.2 m, it offers the type of low-maintenance high efficiency that is so important where industrial and municipal operations don't have the resources to place engineering staff on close standby.

KDS technology features a self-cleaning dewatering and conveying system with oval plate separation and transfer structure that prevents clogging and permits automatic continuous operation that handles oily and fibrous material with ease. The self-cleaning action is available in hydraulic capacities from approx. 1000–15,490 L/h with input solids content of 2%.

Designed for efficiency, sustainability and conservation of resources in small-to-medium applications, the energy-efficient KDS separator consumes as little as 0.06 kW/h of electricity and uses no wash water, said Bambridge.

Low energy usage, no water required

"This simple-to-maintain separator offers a high throughput within a small body, with the smallest model being just under 350 mm wide and weighing 50 kg. The compact rotational oval plate structure achieves high transportation and separation efficiencies, while the simplicity of the machine's overall structure offers low maintenance, achieving cost and OH&S benefits through less handling being required to clear hazardous materials.

"The KDS separator uses a fraction of the power of a centrifuge and no water usage during operation unlike a belt press or a screw press. For a relatively low investment cost, it offers a high-performance alternative to sludge drying beds and geobags, for example, said Bambridge.

Used for thickening of dissolved air flotation sludge — a common application throughout wastewater operations — it achieves solids capture of 97% thickened sludge at a dryness of 17%. Waste activated sludge dryness levels are typically 15–25%.

CST Wastewater Solutions' skid-mounted KDS separator, which, at 3.8 x 2.2 m, can be trailer- or truck-mounted for portability.



Ready to use

The high-quality Japanese-manufactured KDS — for which distributors are being sought by CST Wastewater Solutions

CST Wastewater Solutions
www.cstwastewater.com

Recycling program seeks to eliminate label waste

Three unlikely allies have come together to collaborate on a recycling program that seeks to deliver zero waste to landfills: materials science and manufacturing company Avery Dennison, beauty company L'Oréal Australia and waste management company Wasteflex.

Avery Dennison's liner recycling program will help brands divert glassine paper liner (waste from the label application process) from landfills into recycled products. Through the program, L'Oréal Australia will divert over six tonnes of glassine paper liner in Australia into recycled paper for use in the recycled paper industry. The program supports Avery Dennison's sustainability goal to help customers reduce waste from its products.

"As a materials science innovator committed to making a meaningful difference, we see sustainability as both a responsibility and an opportunity to lead," said Anil K Sharma, Vice President and General Manager, Label and Graphic Materials, South Asia Pacific and Sub-Saharan Africa, Avery Dennison. "With our liner recycling program, brands now have a solution that will enable them to reduce the environmental impact from discarded label liner waste. We are delighted to partner with L'Oréal Australia and Wasteflex on this sustainability journey."



"The savings from this program have been significant, but the biggest benefit for L'Oréal Australia is being able to meet our zero waste to landfill through the services and expertise of Wasteflex and Avery Dennison," said David O'Leary, National Logistics Manager, L'Oréal Australia.

"Wasteflex is proud to be part of the Avery Dennison liner recycling program," said Matt Tamplin, Chief Executive Officer, Wasteflex. "Through this program, we can offer the industry an exciting new solution that is easy to implement and will improve sustainability and commercial outcomes for business."

"As the pioneer of the pressure-sensitive label industry, Avery Dennison has always focused on helping customers and brand owners achieve their goals by delivering label materials that can elevate brands, improve productivity and help products become more sustainable," concluded Marcel Cote, Strategic Marketing Director, Avery Dennison. "With the launch of our Avery Dennison Liner Recycling Service, we can offer a sustainable solution to divert glassine paper liner from landfills and into recycled paper products."

Avery Dennison
www.averydennison.com

Pop-up solar system could replace diesel generators

Pop-up mobile solar PV could be set to replace diesel generators as a temporary power supply for military operations, disaster relief efforts and music festivals, thanks to a new innovation from Canberra-based company ECLIPS Engineering.

The company has designed, manufactured and tested its rapidly redeployable Container Roll Out Solar System (CROSS) – a factory assembled, relocatable solar array that has been developed to reduce the logistics challenges associated with deploying solar PV generators. Designed to fit inside a standard shipping container, the CROSS units can be stacked up to seven units high. The systems come available in 20' and 40' configurations, with a maximum output of 2175 W and 4350 W delivered in minutes ready for connection to an inverter.

The project has received \$289,725 in funding from the Australian Renewable Energy Agency (ARENA).

ARENA CEO Ivor Frischknecht said the CROSS units could see solar energy delivering temporary power as required in a remote location or an emergency situation.

"CROSS units can be deployed in off-grid and fringe-of-grid areas, displace or offset diesel consumption and improve the security of existing networks," he said.

"These renewable options can reduce some of the barriers to entry for potential renewable power users in remote locations, including short project durations and where power systems need to be periodically relocated," Frischknecht said.

"Renewable energy can provide an emissions-free, silent energy system that could replace diesel generators in the long run."

The project opens up markets to the renewables industry, including defence, disaster recovery, humanitarian, construction and temporary network augmentation.

ECLIPS Managing Director Shaun Moore said that the original objective of CROSS was to improve power self-sufficiency for defence.

"One of our early objectives was to provide rapidly deployable utility-scale PV generators to improve the self-sufficiency of Defence's deployed forward operating bases. Diesel consumption related to the provision of electricity can account for up to 70%

of deployed forces' fuel usage and is a significant cost driver. More importantly, deploying CROSS to forward operating bases also reduces the frequency of convoys for fuel resupply, which reduces the threat to soldiers in contested environments.

"These same logistics efficiencies and benefits are transferable to commercial and utility customers in remote areas of Australia," he said.



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Addressing energy efficiency, problem polystyrene

The City of Sydney has awarded 19 grants to commercial property owners, hotel operators and apartment block managers across Sydney to introduce efficiency measures through water, waste, recycling and solar energy programs.

Totalling \$229,108, the grants will see buildings undergo sustainability performance ratings and assessments, as well as efficiency recommendations. They are thus an example of how the City is taking practical action on climate change, according to Lord Mayor Clover Moore.



“Through our environmental grants program, we support building owners to undertake energy efficiency ratings and assessments so that they can better understand their environmental performance,” the Lord Mayor said.

“Without measuring and understanding how a building is performing, it is almost impossible to identify — and, critically, act on — opportunities to improve.

“These energy audits help us to reduce greenhouse gas emissions and develop more sustainable resources across our city.

In addition, \$15,000 worth of funding has been provided for a feasibility study at the University of Technology Sydney (UTS) to look at recycling and re-using polystyrene. Dr Nik Florin of UTS said the feasibility project will use digital technologies to reduce problem waste recycling, in the hope of recycling and re-using expanded polystyrene collected at the campus.

“Expanded polystyrene is a problem waste stream in the local area with few local solutions,” Dr Florin said. “This project will test a closed-loop recycling system to transform it into re-usable, durable products that benefit the community.

“The proposed system will reduce polystyrene waste through recycling, reducing the need for products made from ‘virgin plastics’, and develop an education campaign about problem waste recycling.”

Moore described the UTS project as “groundbreaking” and noted that, if successful, the system could be used by other organisations.

“Climate action requires a collaborative approach from governments, industry, academics and, of course, residents, and if the study goes well we could be rolling out this pioneering approach to waste management across our city in the future,” she said.

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Microgrid to help run mining operations in Pilbara



Technology company ABB has supplied a 30 MW battery energy storage system to enable uninterrupted power supply from Alinta Energy’s Newman Power Station, which supplies mining operations in Western Australia’s Pilbara region.

The solution is said to be one of the largest of its kind to be deployed in a gas-fired power plant. A 30 MW battery energy storage system can supply 6000 homes with the power supply, where the average supply would be 5 kW.

Mining is a key focus sector in Australia and accounts for approximately 6% of the country’s GDP. The Newman Power Station, situated around 1200 km north of Perth, supplies power to remotely located mining operations.

ABB’s microgrid solution will provide power supply to cover the time it takes to start up a new gas turbine, when there

is a fault in the running turbine causing power to trip. This back-up will enable uninterrupted supply of reliable power and prevent any disruption.

ABB’s modular and containerised microgrid will integrate five 6 MW ABB Ability PowerStore Battery energy storage systems with the power station’s existing gas turbines, providing a ‘spinning reserve’. ABB has supplied a range of transformers and switchgear to integrate the system.

The solution incorporates ABB’s Microgrid Plus automation and control technology that serves as the brain of the entire system to monitor the gas turbines and facilitate utility-grade power quality and grid stability. It is also equipped for remote service and maintenance.

“The company’s plug-and-play microgrid solution has been designed to meet complex automation requirements and will ensure grid

stability and fuel saving for Alinta’s operation,” said Massimo Danieli, head of ABB’s Grid Automation business unit. “Microgrids and energy storage are key focus areas in our Next Level strategy, supporting our quest to provide grid stability, fuel savings, and bring reliable power to people, while reducing environmental impact, as exemplified by this project.”

ABB received the order from storage solution provider Kokam, the battery supplier for Solar Impulse 2 — an experiment aircraft that made history in 2015–2016 when it completed a 40,000 km flight around the world exclusively on solar power. ABB was one of the main alliance partners for that historic flight.

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Turning food waste into revenue

The Monash Food Innovation Centre, in collaboration with the Indian Institute of Technology Bombay (IIT Bombay), is working with industry and farmers to help them transform food waste into profits while simultaneously improving their business model.

With more than \$5.4 billion worth of food being dumped annually in Victoria alone, Monash University is using a holistic approach to 'biomass valorisation' to help industry extract high-value components

such as the antioxidants, oils, pectin and protein from food disposal — ranging from mango, pomegranate and pineapple skin to spent coffee grounds and almond ash. This also extends to fresh produce that is disposed of for not meeting the 'cosmetic standards' of supermarkets.

Associate Professor Tony Patti from the Monash School of Chemistry said that this biomass valorisation approach, which looks at the entire fruit or vegetable and not just the part that is eaten or the juice extracted, is what currently provides the value to the grower.

"The skins, seeds, kernels, leaves and offcuts were seen as 'waste', adding to their disposal costs. These by-products are not waste, but a potential valuable resource, providing several components identified as being of high market value," Assoc. Prof. Patti said.

Monash is therefore working with Australian growers and businesses to diversify their potential market opportunities, including expansion into the pharmaceutical,

cosmetic and pet-food industries. Fruits such as mangoes have a particularly versatile range of applications, with offcuts such as the skin, seeds and husk ripe for transformation into everyday health supplements, oils and even cosmetics.

"Using this research, food and agricultural companies can tackle costly waste challenges, improve their environmental footprint and create a sustainable business that takes full advantage of growing demand in domestic and export markets for high-quality food products," Assoc. Prof. Patti said.

The Monash Food Innovation Centre and industry partners discussed strategies of how food waste can be turned into revenue during the half-day symposium 'Turning food waste into \$\$\$' held on 19 July at the Monash Food Incubator, within the Food Innovation Centre. The event presented attendees with the latest in science, research and technology to help them develop a food waste program with a focus on biomass valorisation.

Monash University
www.monash.edu



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Packaging made from waste wool wins big

Woolcool Australia has been acknowledged at the 2018 WorldStar Packaging Awards for its innovative insulated packaging solution, made from a product that is both sustainable and effective — sheep’s wool.

The Packaging Awards were presented at the Australian Institute of Packaging National Conference, held on 2 May in Surfers Paradise. Woolcool won bronze in the Packaging that Saves Food category for the development of its packaging solution, made from sheep’s waste wool combined with a recyclable, food grade liner.

Wool is a good insulation material as it is extremely effective at absorbing moisture from the air, which creates stable temperatures through minimising humidity and condensation. Woolcool’s technology combines a complex blend of wool fibres from different breeds of sheep to provide consistent optimal insulative properties. This wool is felted into a liner and sealed within a recyclable food grade film.

The result is a packaging product that keeps cold products cold and hot products hot, with the added benefit of a protective cushion to safeguard products in transit. These thermal qualities enable the product to ‘save food’ by reducing the wastage often experienced using traditional insulated packaging in the transport and delivery of temperature-sensitive food.

Sustainable, renewable, biodegradable, compostable, recyclable and re-usable, the product has been shown to outperform synthetic packaging materials, including polystyrene. It also has the potential to open new markets for cool chain supply companies, as it is

allowing frozen and chilled products to be transported much greater distances and still arrive in the same fresh condition.

Woolcool is proudly endorsed by Planet Ark, with the latter stating that the increasing use of expanded polystyrene (EPS) boxes for home grocery delivery services and pre-prepared meals is resulting in a range of negative environmental impacts.

“Latest statistics indicate that only 29.4% of EPS is currently recycled and the remainder either goes to landfill or ends up polluting our environment and waterways,” said Planet Ark Partner Relations Manager Kristie Baker.

“Woolcool offers a real alternative to traditional insulated packaging like EPS and we encourage businesses to shift their reliance from petrochemical-based products like EPS to renewable alternatives like Woolcool.”

Howarth says that since Woolcool was launched in Australia and New Zealand, an estimated 2.5 million boxes of polystyrene have been removed from the environment.

“That’s just a tiny fraction of the total number of petrochemical-based boxes used once and discarded across Australia and New Zealand every year,” she said. “Imagine the difference we could make if we eliminated polystyrene insulated boxes from our environment altogether — it’s now possible!”

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Self-desalinating sea water takes the pressure off industry

Scientists at Murdoch University have invented a 'self-desalination' system that requires no electricity at all and is carbon neutral.

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Current methods of desalination employed across the globe consume extremely large quantities of electricity in order to apply the high amount of pressure required as part of the process. As noted by Murdoch's Dr Ralf Cord-Ruwisch, "The high cost associated with desalination is primarily due to the high pressure that must be applied to sea water in order to separate the water and salt from one another in the process of reverse osmosis."

Now, together with Professor Liang Cheng, Dr Cord-Ruwisch has devised a 'self-desalination' concept that uses pressure generated by highly concentrated salt brine as the energy source to desalinate the less salty sea water. The merits of the concept have been evaluated by a research team led by Professor Wendell Ela.

"Normally, we use electricity to pressurise the water and drive reverse osmosis," Professor Ela said. "Ralf and Liang's device skips the electricity step, so it's not only simpler, but the environmental impact is immediately smaller."

PhD student Ivonne Tshuma has been working with the team to gather data and mathematically model the process to enhance the design of the original prototype. She said concentrated salt brine is the 'secret ingredient' to the system's success, which replaces the need for a pump to apply the necessary pressure to the sea water.

"The pressure generated between the concentrated brine and the brackish water pushes brackish water through the membrane, producing drinking quality water," Tshuma said. "The result is that the salt is left behind in one chamber, while desalinated water is produced in the other."

Once her research is complete, Tshuma is hoping to work with a company to fabricate the desalination system in commercial quantities, so it can benefit remote communities throughout the world which have limited access to water and power.

"As the result of my research, I am so confident that it is possible to produce potable water from brackish water and possibly even sea water without the need for electricity," she said. "My next steps are to rebuild the device on a larger scale so it can be taken out of the lab and then trialed in a remote location to see if it can meet the water requirements of a small household."

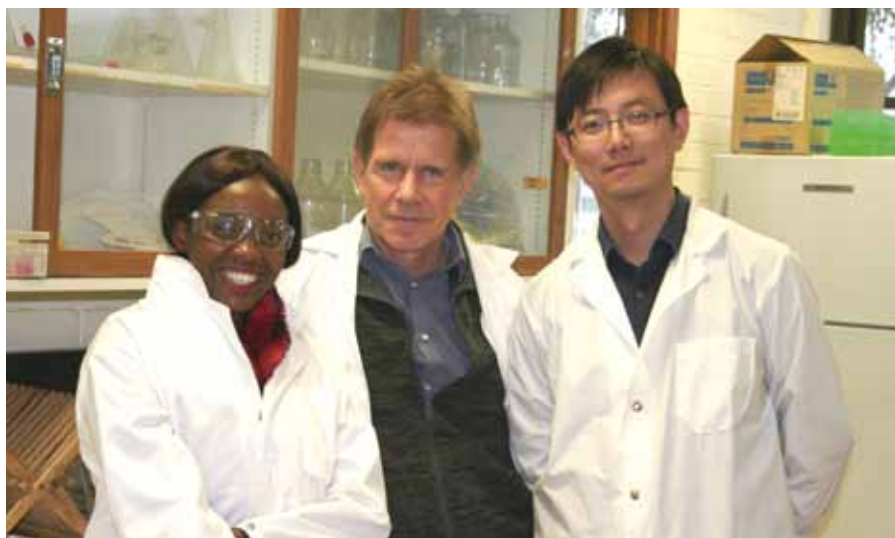
The research team believes the process could have impact in areas where salt lakes are located near brackish water sources or the coast, such as in regional Australia or as an extreme example, Lake Garabogazkoel in Turkmenistan.

"These areas have access to large amounts of salt brine to provide the fuel needed to complete the process of seawater desalination — with the resulting products being potable water and a somewhat diluted brine, which goes back out into the salt lake for continued concentration," Dr Cord-Ruwisch said.

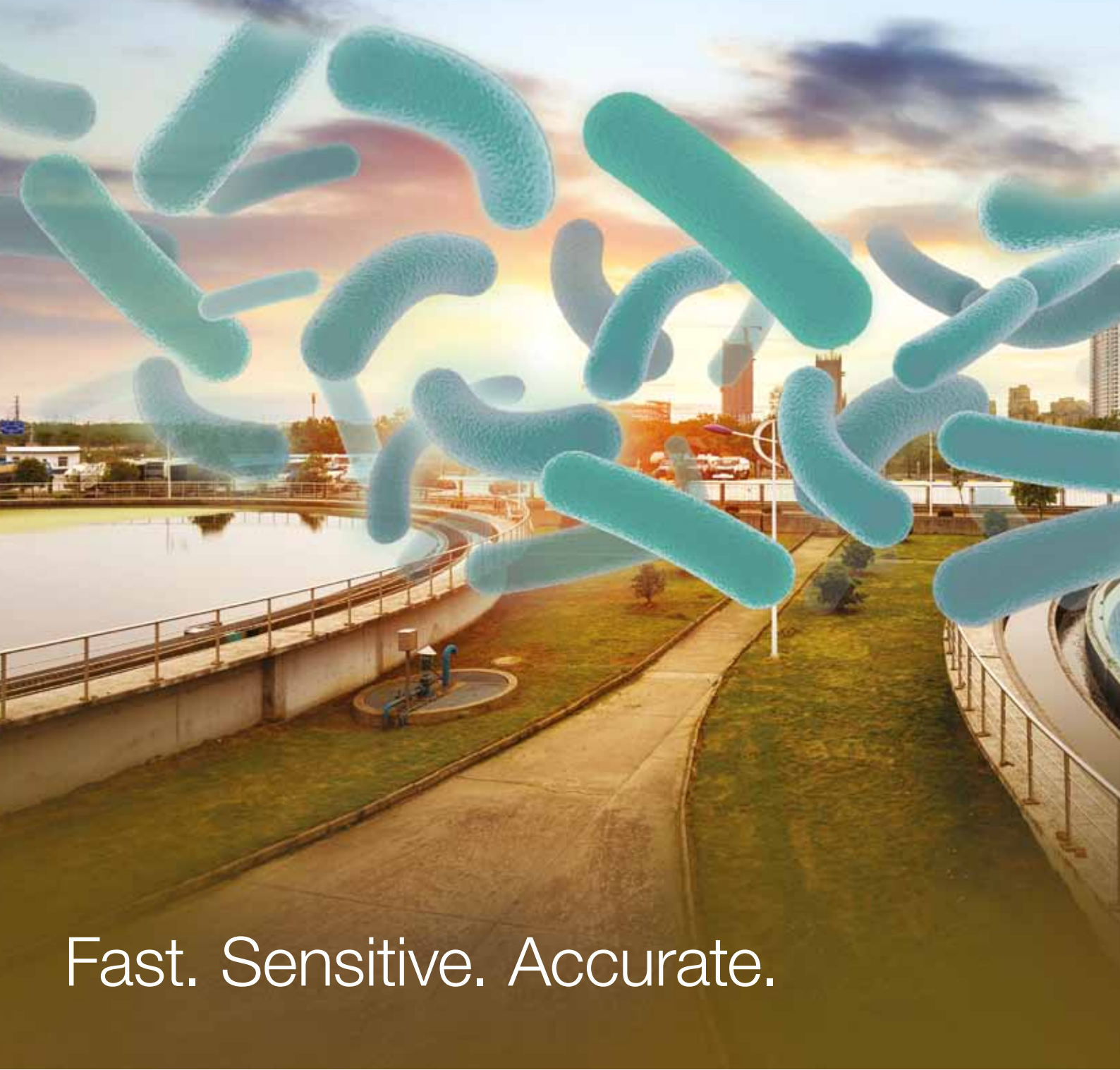
"In principle, this could allow for the use of renewable energy from solar evaporation, without the intermittency problems associated with other renewable energy sources."

The team is currently seeking an industry partner to help them develop a customised membrane for use in their desalination device.

Murdoch University
www.murdoch.edu.au



Third-year PhD student Ivonne Tshuma, Dr Ralf Cord-Ruwisch and Professor Liang Cheng have researched and developed a revolutionary way of desalinating saltwater without the need for electricity.



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The rugged ST100 Series Thermal Flow Meter from Fluid Components International (FCI) provides precision mass flow measurement, making it useful for engineers and operators responsible for measuring gas production from digester tanks at municipal or industrial wastewater treatment operations. With its no-moving parts and simple insertion-style design, as well as comprehensive, global HazEx approvals, the meter is suitable for digester gas flow measurement.

The meter can be calibrated for the specific digester gas mix composition and processes temperature conditions in flow ranges from 0.07 to 305 NMPS and with accuracy to $\pm 0.75\%$ of reading, $\pm 0.5\%$ of full scale. It can be installed in the pipe with a simple, retractable compression fitting or through a ball valve for easy access.

When selecting the meter, users have multiple options to communicate with DCS, PLC or SCADA, including 4–20 mA analog, frequency/pulse or certified digital bus communications of HART, Foundation Fieldbus, Profibus PA or Modbus RS485. Its graphical, multivariable backlit LCD display provides a sophisticated, continuous readout of all process measurements and alarm status for easy on-site viewing by technicians, and it has the ability to query for service diagnostics.

Included are a USB port, set-up and configuration software, an onboard data logger and a 3-point in situ calibration check capability. The transmitter/electronics can be integrally mounted with the flow element or may be remote mounted to 305 m away.

The transmitter enclosure is NEMA4X/IP67 rated and available in painted aluminium or stainless steel. HazEx agency approvals are on the entire instrument, not just the enclosure, and include FM, FMc, ATEX, IECEx, EAC/TRCU, CPA, NEPSI and Inmetro. All are CE approved.

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The GA5000 is an easy to use and calibrate portable gas analyser, built for the landfill gas market, which helps to standardise monitoring routines. It is safe and used to measure critical gases such as % CH₄, CO₂ and O₂, H₂S (up to 10000 ppm), NH₃, H₂ and CO (H₂ compensated). It has been specifically designed to provide peace of mind that at first-stage analysis, it will have accurate readings of $\pm 0.5\%$ after calibration for CH₄ and CO₂ ($\pm 1\%$ O₂).

With an easy-to-use menu, the analyser displays key information concisely and clearly for essential readings and comparisons. It has a technical assistance button which provides explanations, help and support through the monitoring process.

As a portable landfill gas analyser, the GA5000 is lightweight and easy to carry around. Designed and manufactured in the UK, it has been developed for use worldwide and features multilingual menus. Other personalised settings include the sound, display and brightness of the screen. Optional Gas Analyser Manager Software (GAM) is available to enable users to maximise the operation of the GA5000.

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ROTARY GEAR PUMPS

Gorman-Rupp's range of rotary gear pumps is suitable for handling process fluids or lubrication. Because of their modular design, the pumps can be configured to handle thin or viscous fluids, corrosive and/or abrasive fluids, and fluids with temperatures from -51 to +358°C. Flows of just a few litres per minute up to 2200 L/min can be achieved.

The heavy-duty series is capable of handling viscosities to 440,000 centistokes and develop pressures to 20.7 bar. A large 'end feed' area allows the pumps to run at pole speeds for many applications, removing the need for reduction gearboxes — minimising capital outlay and reducing maintenance for the life of the equipment.

The pumps include many features to promote longer service life, including an automatic idler pin lubrication system that cools and lubricates this usually hot and high-wearing part of the pump. The 'internal seal vent' system meanwhile ensures cooling of the seal area but also reduces pressure in the seal cavity, reducing load and heat from the seal faces and increasing seal life.

The pump is user-friendly for operators with features such as the 'back pull-out design' to allow service and maintenance without disconnecting the pump housing from piping and the 'adjustable no-leak pressure relief valve' which allows operators to adjust the valve during operation without leaking high-temperature or corrosive fluid.

The series also has a variety of sealing options. These include, but are not limited to: cartridge seals; balanced seals; double or tandem seals; seals with carbon, silicon carbide or tungsten carbide faces; and seals with viton, neoprene, Chemraz or kalrez elastomers; and gland packing or triple lip seals.

Heat-sensitive liquids can be catered for with heating jackets built into the pump head and body to keep those products molten while pumping. Depending on the product to be pumped, bushings can be bronze, carbon graphite, silicon carbide or tungsten.

The pumps are suitable for a wide range of applications including the pumping of hydrocarbons; viscous fluids such as adhesives and greases, acids, solvents, salts and caustics; paper-mill liquids; food products; abrasive products such as paints, inks, waste oils and paper coatings; and more.

Hydro Innovations
www.hydroinnovations.com.au

ROTARY SCREW COMPRESSORS

Kaeser Compressors has announced its latest generation SM series rotary screw compressors. For maximum efficiency, the SM 13 and SM 16 compressor models are now equipped with a Super Premium Efficiency IE4 motor. Current Australian regulation introduced in January 2015 only require the use of IE3 Class motors.

For greater intake volume and efficiency, the latest generation of SM series rotary screw compressors are also equipped with the SIGMA 06 screw compressor block, featuring further-refined Sigma Profile rotors. Together with the IE4 motor, Kaeser has been able to reduce the energy requirement of these compressors by up to 13%.

All SM series compressors incorporate a Sigma Control 2. With this internal controller, compressor performance can be precisely adjusted to match respective compressed air consumption for optimum efficiency. The control unit features an easy-to-read display, allowing all information to be viewed at a glance.

All maintenance work can be carried out from one side of the unit. The housing cover is easily removed to allow component accessibility. There is no need to remove the housing cover to inspect fluid levels or drive belt tension, as these can be checked via a convenient inspection window. Sound levels as low as 62 dB(A) ensure quiet performance, making the units a suitable choice for point-of-use applications.

The rotary screw compressors are available with drive powers of 5.5–9 kW and produce flow rates from 0.59–1.62 m³/min, at pressures of 7.5–15 bar.

Kaeser Compressors Australia
www.kaeser.com.au





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Increasing efficiency within the wastewater industry

Sulio Mustedanagic, Sales Manager, HRS Heat Exchangers Australia & New Zealand

Over the years, different wastewater companies have adopted different approaches to sludge treatment, but there is now a trend towards anaerobic digestion (AD) and away from incineration. This can be largely attributed to efficiency improvements within the wastewater sector, which is renowned for its approach to innovation.

Many of the original wastewater AD facilities are now looking to upgrade, switching from producing electricity to biomethane. However, small-scale improvements have been no less important in helping to boost the sector's energy output and upgrading an existing plant is an ideal opportunity to improve its overall efficiency, to maximise both energy production and overall greenhouse gas savings.

Heat exchangers improve efficiency

One of the easiest ways to improve efficiency is by recapturing heat. Heat exchangers represent the best way of doing this, having a much lower heat requirement than tanks with heating jackets (up to half of that of



One of the easiest ways to improve efficiency is by recapturing heat.

some systems). In fact, a well-designed heat exchanger system could recover and re-use 40% of the heat produced by a wastewater AD plant. But not all heat exchangers are created equal, and one size does not fit all. One range proving popular with wastewater operators is the DTI series from HRS, which is a corrugated double tube heat exchanger. The inner tube is corrugated to ensure improved heat transfer performance and good resistance against tube wall fouling compared to smooth tube and dimple tube variants, resulting in reduced maintenance periods. In addition, the tube-in-tube design permits the processing of fluids with particles or 'ragging' without any blockage, making it particularly suited to sewage AD plants where spiral-type heat exchangers often cause headaches for operators.

However, having recovered this valuable heat, what are water companies doing with it? With a typical 1.5 MW wastewater AD plant producing as much as 40,000 tonnes of liquid digestate each year — bringing significant economic and logistical challenges associated with its storage and transportation — many operators are using their surplus heat to improve their digestate

management systems. After all, if it is not concentrated, the volume and consistency of digestate can quickly become a costly bottleneck in plant efficiency.

Concentrated digestate is easier to manage

Using surplus heat to separate water from digestate by concentration can reduce the overall quantity of digestate by as much as 80%, greatly lowering the associated storage and transport costs. A well-designed system, such as HRS's Effluent Concentration System (ECS), will include measures to retain the valuable nutrients in the digestate, while the evaporated water can be condensed and returned to the front end of the process, reducing the amount of energy and water used by the plant. After concentration, the treated digestate dry solid content can be 20% or higher (often a fourfold improvement), making it much easier, and cheaper, to transport and handle.

By improving the efficiency of their wastewater plants, many water companies are enjoying increased ROI, helping to make their service more affordable and sustainable; particularly important as the water industry uses around 3% of all the electricity generated.



Self-priming wastewater pump useful for poultry producer

Hazeldene's Chicken Farm is a producer of free-range and RSPCA accredited poultry, located near Bendigo in Central Victoria. Hazeldene's has a state-of-the-art poultry production facility and its products are sold through Coles, Aldi, Woolworths, Harris Farm Markets, IGA, butcher shops, charcoal chicken stores and smaller specialty retailers. The company employs more than 750 people in the local Bendigo area.

In line with its focus on quality, Hazeldene's was looking for a suitable solution for its wastewater pumping needs. The company had previously tried several different brands of

self-priming wastewater pumps, but none were able to deliver the quality of service Hazeldene's engineers were looking for. They needed a pump that was capable of handling all the solids that form part of the wastewater stream in a chicken process plant (such as feathers, internals, feet, etc) and was also a reliable self-priming.

Hydro Innovations recommended a V3B60-B, which is part of Gorman-Rupp's range of Ultra V Series self-priming wastewater pumps. Adam Hazeldene, Hazeldene's Technical Services Manager, was well aware of Gorman-Rupp's quality reputation and was keen to see one installed in his wastewater system in order to solve the problems his company was experiencing.

The V3B60-B has a 100 mm suction and 80 mm discharge, and is capable of handling a 76 mm spherical solid along with stringy materials. The pump can also be placed on a suction lift up to 7.6 m, can deliver flows to 50 L/s and can be relied on to prime and reprime automatically every time it is asked to pump. For more corrosive environments, the pump can be supplied with 316 internal components; for abrasive applications, hardened iron materials can be fitted.

The pump was duly purchased and installed, and Adam has had no regrets.

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Internet of sewers being discussed at Waste Expo Australia 2018



Waste Expo Australia will return to Melbourne Convention and Exhibition Centre from 3–4 October. Waste Expo Australia is co-located with All-Energy

Australia, forming the most comprehensive event for the waste, recycling, clean energy and energy efficiency industries in Australia. These events will showcase over 300 suppliers, attract over 8000 visitors and feature 10 concurrent conferences that are free to attend over the 2 days.

Waste Expo Australia offers a number of unique opportunities for attendees including an exhibition, networking events, live demonstrations and the highly acclaimed Waste Summit conference. Waste Summit is Australia's largest free-to-attend waste management conference that will focus on four key themes including landfill and transfer stations, waste to energy, resource recovery and collections. These themes will address policy, legislation, circular economy and solid waste management, and will be where the industry tackles the most pressing issues. Hear from industry experts including Minister for the Environment and Energy, The Hon Josh Frydenberg, Victorian Minister for Energy, Environment and Climate Change, The Hon Lily D'Ambrosio and organisations such as NWRIC, ARENA, VWMA, ACOR, AORA,

Cleanaway, Sustainability Victoria, Melbourne Water and many more.

Answering the development and growth of Australia's wastewater sector, Waste Expo Australia will also launch a new conference in 2018, Wastewater Summit. Wastewater Summit is a free-to-attend conference that will confront the challenges and opportunities in wastewater treatment through technology, strategy and compliance. The Wastewater Summit conference will focus on three key themes — technology, strategy and compliance — and will be where the industry converges to source new technology and gain insights from industry-leading experts.

Among the key sessions on the Wastewater Summit program is a case study presentation lead by South East Water. This session titled 'Internet of Sewers using IoT to improve efficiency and safety of wastewater assets' will share learnings on how they leveraged machine-to-machine technology to transmit real-time technology to control wastewater

flows and identify faults in the network. This session stands among 12 others that will feature practical and innovative technology targeted at reducing operational costs and increasing efficiency.

Waste Summit and Wastewater Summit provide an unparalleled opportunity to all attendees to remain abreast in a dynamic and ever-changing industry. The conference programs, discussing the latest technological advancements and industry growth, will be greatly complemented by the ability to meet and network with the suppliers that have practically implemented these ideas on the show floor.

Waste Expo Australia is free to attend and open to all industry stakeholders looking for products, services and solutions for the waste and wastewater sectors. For more information on Waste Expo Australia and to register visit to www.wasteexpoaustralia.com.au.

Waste Expo
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OIL-WATER SEPARATOR AND SPILL CONTROL SYSTEM

Rocla's ecoSep product range is designed to reduce the risk for companies that handle oil and sediments from wastewater, with its 2-in-1 technology offering both a spill control system and oil-water separator in one.

The ecoSep oil-water separator is a below-grade device that permanently separates oil from water and virtually eliminates the formation of oil emulsions within the unit. The ecoStop spill control system that comes included in the separator contains any spills on-site in either a below- or above-grade area. The product is useful for oil as well as sediments found in wastewater and industrial runoff.

The separator eliminates sediments and oil from point source runoff in areas such as floor drains and non-point source stormwater run-off from industrial areas such as refuelling depots. The standard units are available in flow rates of 3, 10 and 20 L/s with custom-designed units to 100 L/s.

The system is supplied as a two-tank design. The first precast concrete chamber removes grit and other solids and the second chamber separates oil from the water through a combination of gravity and the coalescing separator. This chamber also contains the spill control system, which detects and responds to spills automatically.

The spill control system is installed in a precast concrete chamber, downstream from a segregated hydrocarbon containment area. When maximum storage or liquid capacity is reached, the shut-off valve will be activated to stop the discharge of materials into the surrounding area.

The ecoSep separator system has large access covers to allow for easier routine cleaning and maintenance. The ecoStop spill control system is included as part of the product but can also be purchased individually.

The system is suitable for locations including fuelling facilities, oil storage areas, repair workshops, treatment centres for industrial waste and more.

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Phoenix Contact Pty Ltd
www.phoenixcontact.com.au

WASTEWATER CHEMICAL SUPPLY AND PLANT SERVICING BUSINESS

Wastewater treatment company Aerofloat Australia has launched a wastewater chemical supply and plant servicing business, in response to market demands for a simple way to maintain wastewater treatment systems. The services will be available to existing customers, as well as non-customers who have a wastewater treatment plant requiring chemicals or ongoing maintenance. The chemical supply business supplies water treatment chemicals such as acid, caustic, coagulants and polymers. Expert engineers handpick the most suitable chemicals for use in wastewater systems to ensure optimal running results. Having the correct chemistry in wastewater treatment systems is imperative to the quality of effluent achieved and therefore affects the performance of the overall wastewater system.

The servicing business offers weekly, monthly and ad hoc wastewater system servicing contracts for businesses that don't have the capacity to provide regular maintenance themselves, stating that wastewater treatment plants that are regularly serviced have minimal downtime and maximum efficiency. The service technicians can diagnose and prevent potential problems, replace worn parts, carry out system cleaning, and use remote login to identify problems and provide advice.

Aerofloat (Australia) Pty Ltd
www.aerofloat.com.au

FLOW AND PRESSURE VALVES

SMC AS-R and AS-Q flow and pressure valves are designed to reduce energy consumption in air systems by cutting internal air consumption by up to 25% when using the AS-R pressure valve and an AS-Q flow valve on their cylinders.

The valves help to shorten the response time of the return stroke and harmonises stroke movements to prevent a harsh jerky start.

SMC's range of pressure and flow valves includes six AS-R and five AS-Q models. SMC supplies these in R1/8, R1/4, R3/8 and R1/2 connection sizes and for hose diameters ranging from 6 to 12 mm.

Users are able to choose between the latest AS-R series with its fixed 2 bar supply pressure and the older AS-R valves with fixed or variable set pressures, depending on the application.

The pressure valve and flow valves are mounted together on cylinders. The AS-Q flow valve is installed on the working stroke side and the AS-R pressure valve on the return stroke side. Both valve series have similar designs: the pressure valves consist of regulator, with a check valve and a throttle check valve. The flow valves in the AS-Q series contain a quick supply valve, an exhaust valve and a throttle check valve.

The valves are recommended for cylinders with a diameter of 32 up to 125 mm bore and an inlet pressure of at least 3 bar. Efficiency increases with larger cylinders or higher air consumption levels, and larger pressure differences between the working and return strokes.

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HEAT EXCHANGERS

The Unicus from HRS Heat Exchangers has been specifically designed to provide effective heat transfer with a wide range of difficult materials across a range of industries, particularly those which have a high fouling potential (therefore limiting heat transfer) but at the same time require delicate handling to preserve fragile product integrity. A process of continual improvement means that the heat exchangers are available with a wide range of scraper types, providing more choice for applications from food pasteurisation to biomass pretreatment.

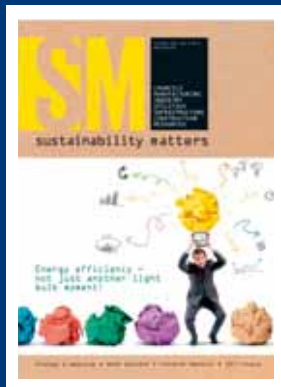
The series, which is designed for industrial and hygienic applications, is based on traditional shell and tube heat exchangers, with the addition of a stainless steel scraping mechanism which is hydraulically moved back and forth within each interior tube. This movement performs two key functions. Firstly, it minimises potential fouling of the product by keeping the tube wall clean. Secondly, the movement creates turbulence within the material. Both of these actions help to increase heat transfer rates; together, they create an efficient heat transfer process that is suitable for viscous and high fouling materials.

Another benefit is the fact that the separate hydraulic action means that the speed of the scrapers (which are available in a number of different designs) is controllable and can be optimised for the product being processed. This means that materials which are susceptible to shear stress or pressure damage can be handled gently to prevent such damage, while still providing high levels of heat transfer.

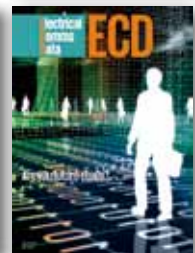
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Australasian Waste & Recycling Expo 2018

The Australasian Waste & Recycling Expo (AWRE) is taking place from 29–30 August at ICC Sydney.

Close to 2000 waste management professionals, business leaders and government representatives are expected to attend the two-day event at what is arguably a vital time for Australia’s waste and recycling industry.

“With new regulations and China’s import ban turning Australia’s waste and recycling industry on its head, AWRE couldn’t come at a better time for industry professionals looking to improve their waste disposal and resource recovery,” said AWRE Event Manager Andrew Lawson.

AWRE connects industry professionals, service providers, product manufacturers and industry associations across the different waste streams, offering collaboration

opportunities throughout the entire waste and recycling supply chain. The two-day event facilitates business opportunities for a more profitable and sustainable waste and recycling industry.

This year AWRE welcomes an array of partners who bring invaluable industry know-how and expertise and who will be sharing their insights and best practices, including:

- Waste Contractors & Recyclers Association of NSW (WCRA)
- Australian Packaging Covenant Organisation (APCO)
- Good Environmental Choice Australia (GECA)
- Australia and New Zealand Recycling Platform (ANZRP)

Attendees can expect an exciting showcase of innovative products, sustainable solu-

tions and cutting-edge technology to collect, process and recycle waste across machinery and equipment, software and services, bins, vehicles, food and organics, and more.

Hitachi Construction Machinery, Method Recycling, Isuzu, Caterpillar, Sea Electric and Simpro are some of the brands on show. Simpro’s Hiflow bin lift will be on the exhibition floor demonstrating its gravity-driven comb-hitch system, which grips waste bins without using expensive electric actuators.

The free-to-attend Speaker Series will bring together renowned industry leaders to discuss the most topical trends, developments and strategies on the Australian waste and recycling landscape.

To find out more and register for this free-to-attend event, visit awre.com.au.



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- View and discuss the latest advances in technical equipment, products and services with suppliers and trade consultants.
- Update their knowledge and skills through interaction with fellow water industry employees.

All industry personnel involved in the operation and maintenance of urban, rural and industrial water related infrastructure for the management, conveyance, treatment, discharge and reuse of water and trade wastes should attend this conference.

The Water Industry Operators Association of Australia (WIOA) is a national association facilitating the collection, development and exchange of quality information between people undertaking operational roles in the water industry.

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All-Energy Australia

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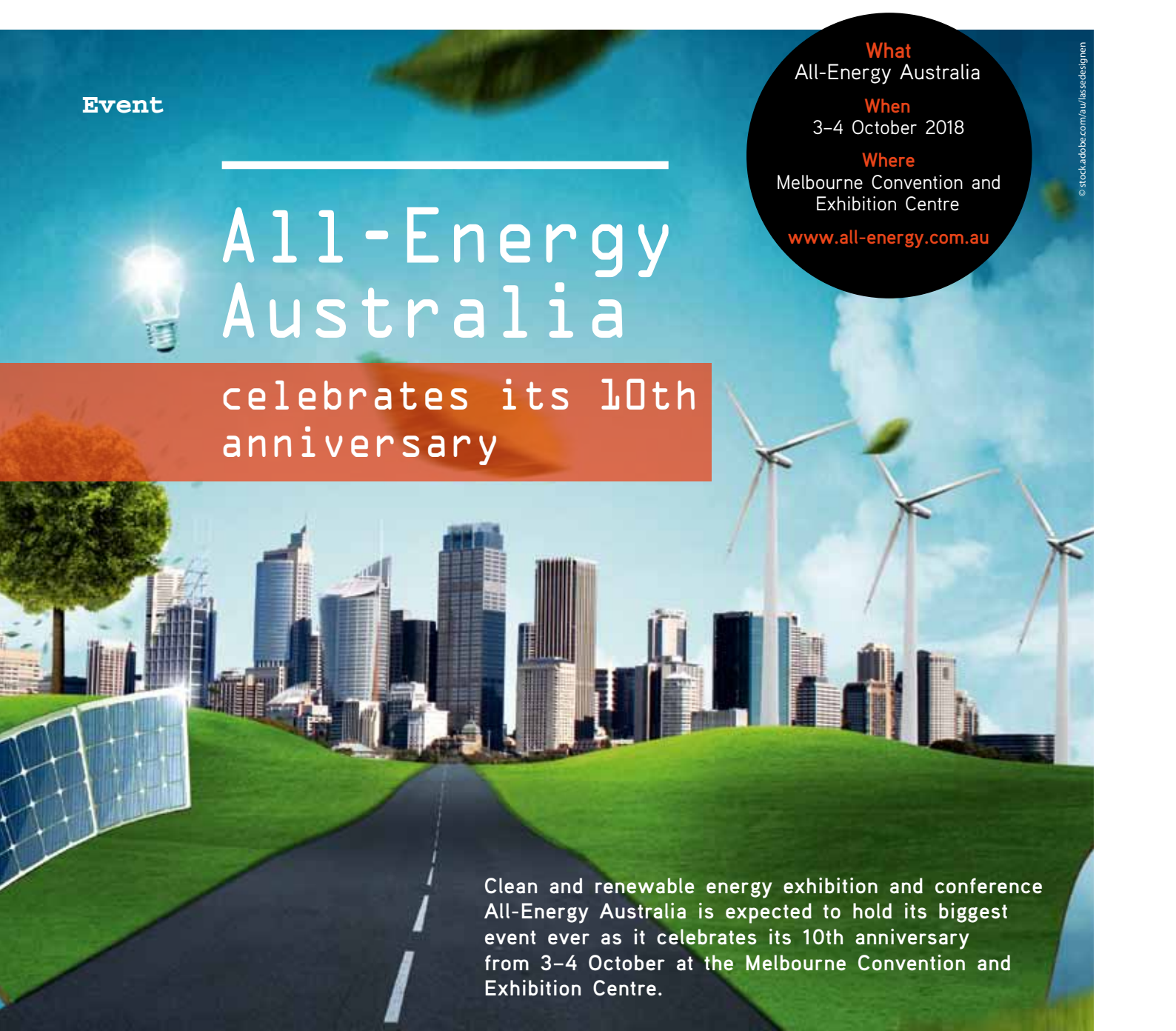
What
All-Energy Australia

When
3–4 October 2018

Where
Melbourne Convention and
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www.all-energy.com.au

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Clean and renewable energy exhibition and conference All-Energy Australia is expected to hold its biggest event ever as it celebrates its 10th anniversary from 3–4 October at the Melbourne Convention and Exhibition Centre.

All-Energy Australia 2017 was attended by more than 6500 renewable energy industry professionals from across the country and overseas, making it the largest attendance on record. According to Exhibition Director Robby Clark, the event's success is reflective of the remarkable progress in the renewable energy industry.

"Last year's attendance exceeded our expectations, with queues of people lining up to get into the plenary sessions and exhibition floor," said Clark. "The tremendous success of the event is an indication of the rapid growth of the renewable energy industry."

"All-Energy Australia has provided the perfect venue to celebrate the industry's successes and discuss the challenges and new market opportunities for Australia's en-

ergy system. We're confident that this year's program will maintain the event's reputation as the must-attend event for the renewable energy industry."

This sentiment was echoed by Kane Thornton, Chief Executive of the Clean Energy Council, which is the strategic partner for the event.

"The robust conversations and meaningful connections that come from this event are of immense value to an industry in the midst of an unprecedented boom," said Thornton.

"All-Energy Australia 2018 takes place at an important stage as we continue to work towards achieving our vision of an Australia powered by clean energy."

This year's All-Energy Australia is over 40% larger than the 2017 event, which means more companies showcasing innovations and emerging technologies. Over

180 companies are already confirmed to be part of the exhibitor line-up, including ABB, NEXTracker, Tesla, Fronius, Canadian Solar, SolaX Power, Array Technologies and Ecoult.

More than 180 industry leaders will meanwhile share exclusive insights and projections on how to tackle the future of the energy sector. The speaker list includes representatives from federal, state and local government, as well as the Clean Energy Finance Corporation, CSIRO, KPMG, Hydro Tasmania and Siemens.

The two-day event also includes exclusive business networking opportunities, such as the Grand Networking Event, the Clean Energy Council's Women in Renewables lunch, the Solar Design and Installation Awards, the Power Club lounge and the Meet the Speakers social.

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Australian farmers diversify with solar

With forecasters predicting a rapid growth in renewable energy use in Australia, and farmers facing both environmental and economic challenges, technology company ABB is helping transform the fortunes of Riverland farmers with the installation of sustainable solar plants.



Image courtesy of ABB Australia.

Rural Australia has been hit by successive droughts and poor crop prices, with farmers struggling to earn a living. However, a potential solution was identified by local business owner Mark Yates of Yates Electrical Services, based in Paringa, South Australia. He was convinced that solar energy could make a significant contribution to the sustainability of farming.

Yates teamed up with ABB to bring sustainable renewable energy to the Riverland region and revitalise the local economy, bringing new opportunities to grape and citrus growers. The partnership is helping to harvest the sun's rays and build a network of solar installations across the Riverland area.

"I was convinced that these redundant land parcels could be used economically with a solar plant to ensure constant energy harvest and profitability," Yates said. "With solar, not only can farmers significantly reduce their own energy costs, but they can also sell surplus power back to the local energy retailer, taking

advantage of the volatility of the wholesale energy market."

Yates called on solar experts from ABB, knowing that the company's experience and technical support would help win the confidence of farmers. Adrian Amato from ABB Australia noted, "We saw the opportunity to partner with Yates Electrical to put power back into the hands of the farming community and transform unused farming land, which was once dominated by fertile vineyards and citrus trees, into a powerful income stream."

The first solar farms were installed in the Riverland in 2016 using six 27 kW ABB TRIO inverters, housed in an on-site containerised solution. This was later reconfigured to take advantage of the versatility and durability of ABB TRIO-50 inverters.

The project's first prototype site, based in Renmark, South Australia, went live in March 2016. Based on calculations from data provided by AEMO (Australian Energy Market Operator), Yates Electrical Services forecasted a 10% ROI year on year. The first year of operation for the site resulted in a 14.75% ROI.

The success of the first installation inspired a community solar project called Redmud Green Energy, which involves building small-scale solar farms on vacant, redundant agricultural land parcels. Given the ample solar resources in the area, the project aims to help farmers and boost the Riverland economy.

"We wanted to offer land owners the opportunity to take advantage of South Australia's volatile wholesale energy market," said Yates. "A project like this not only introduces an entirely new industry and commodity to our regional centre, but the scale of individual projects also means that we are able to source and employ technicians and supplies, which creates local jobs and strengthens our regional economy."

To date, 28 solar farms have been installed, with 34 additional sites earmarked for development. The projects were built with TRIO-50 three-phase string inverters from ABB, whose modular design and wide input voltage range are a good fit for these projects.

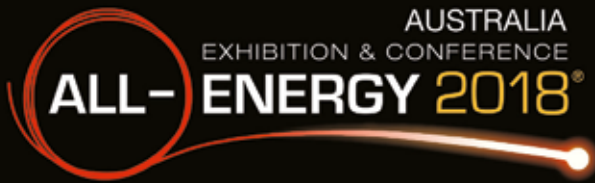
By selling energy to the National Electricity Market (NEM), farmers now have a second income stream, which in turn generates a stronger local economy. Yates Electrical and ABB have thus handed power back to the region's food producers, who are diversifying to succeed.

One of Redmud Green Energy's first customers was citrus and grape grower Sam Albanese, who replaced a block of under-producing vines with a solar farm. The solar farm earned Albanese a 15% return on investment and cut his power bill by one-third. The solar farm requires very little maintenance and Albanese has recently completed the installation of a second solar farm on another of his properties.

"Unlike vineyards, which require lots of care and attention, with the solar farm you don't need to do anything but occasionally spray the weeds around it," Albanese said. "It makes good economic sense and it's good for the environment, so it's a win-win."

"Farming the sun's rays is a powerful new way for farmers to diversify," said Amato. "It's about using the land in different ways to deliver the best possible return that is kind to the environment and can revitalise the local economy. We've seen the fruits of this with the Yates project in Australia in what is set to be a clear trend for the future."

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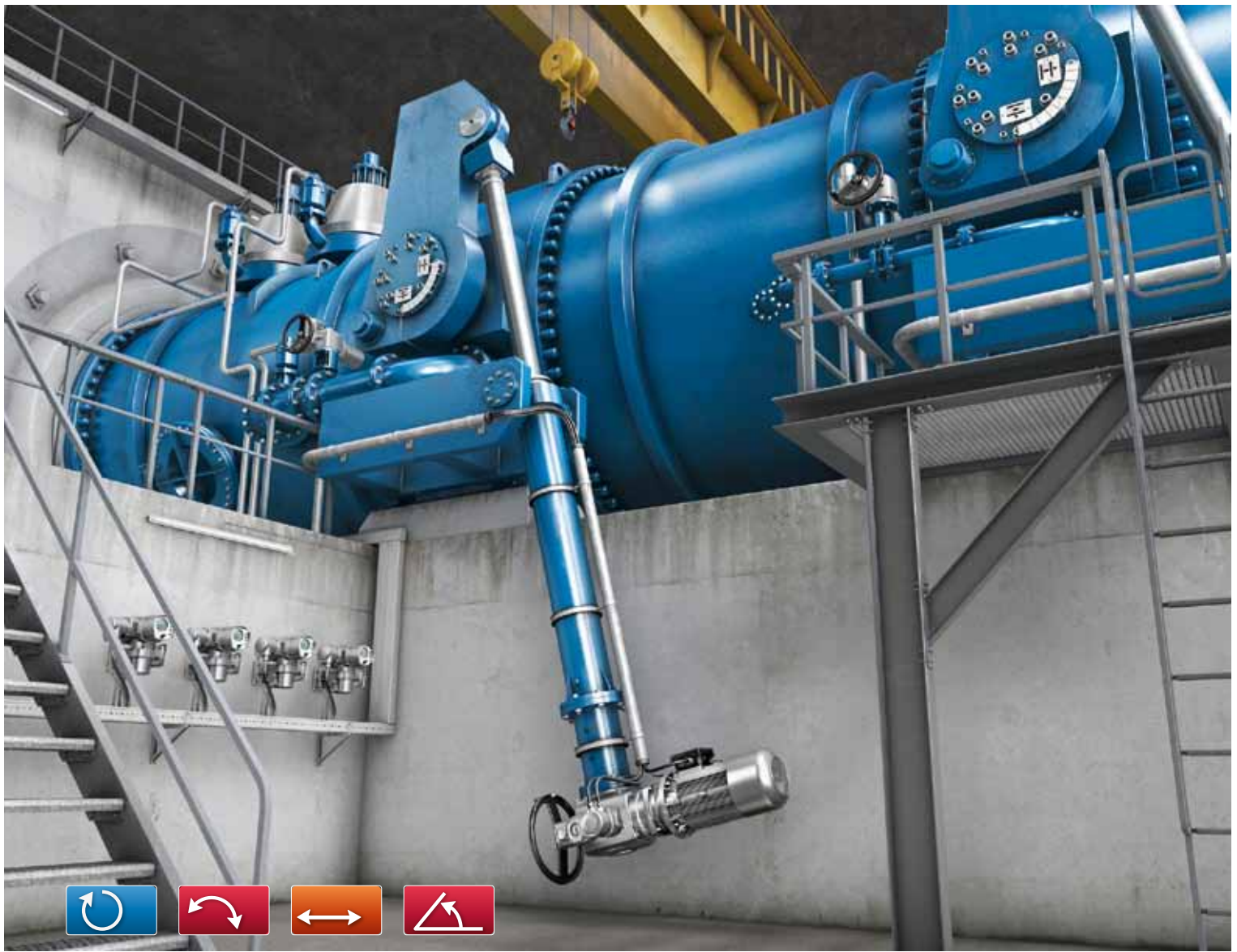


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