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# WORDS FROM THE EDITOR

Greater use of renewables across the world will not only be good for economic growth, it could create new employment opportunities, enhance human welfare and contribute to a climate-safe future. These are the findings from the latest report from IRENA called Rethinking Energy 2017 — [www.irena.org](http://www.irena.org).

The report highlights that global investment in renewables has grown from less than US\$50 billion in 2004 to a record US\$305 billion in 2015. But it says we need to pick up the pace in order to keep benefiting from renewables; more work is needed, particularly in policy development, heating, cooling and use of renewables in transportation. The report predicts that battery storage capacity will also increase from 1 GW currently to 250 GW by 2030 and this will play a large part in the integration of variable renewables.

In tough economic times, organisations continue to tighten their belts and become more and more efficient. However, organisations shouldn't forget to consider sustainable and smart technologies, which have been developing at a rapid pace and save them money in the long term.

Preeti Bajaj, Vice President – Strategy & Transformation at Schneider Electric, explains further in our article on page 8, saying: "There's no denying that as a society we are becoming more conscious of our environmental footprint... In order to stay relevant, organisations are competing to develop or obtain the latest technology for increased operational efficiency, improved product offering or greater cost savings."

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# Building on smart-city thinking



A sustainable built environment is dependent on smart technology — and that means the entire property industry must work together to open its systems, said serial disruptor Catherine Caruana-McManus.



The “rubber hits the road” when technology provides the industry with practical tools to understand how spaces can be better designed and managed.

Caruana-McManus recently stepped away from her role as director for IBM’s smart cities business in Australia after seeing a “massive opportunity to help cities and communities stop talking about smart cities and start doing it”.

But what exactly is a ‘smart city’?

Caruana-McManus said smart, sustainable cities depend on the “ability to use data and systems to improve things that matter to people the most”.

But building sustainable cities is such a big challenge that we need “whole-industry collaboration”. The way to do that is to promote interoperability — the ability for one system to work with another — and the Internet of Things (IoT) — the ability of ‘things’ such as buildings to connect to the internet.

Without these “we end up with all these silos within our built environment. And this has a direct effect on whether a community can manage its carbon and take an integrated approach to energy, water and waste,” she said.

The strategy director for Meshed, an IoT integrator, Caruana-McManus has launched successful internet businesses including whereis.com and whitepages.com.au. She is also the chair of the Internet of Things Alliance Australia and leads the global online community Giant Ideas for Smart Cities.

So, what can property companies do today to embrace smart cities thinking?

The first step is to “build a smart connected framework”, Caruana-McManus explained.

“This should look at every aspect of a business, and examine how the use of smart technologies can improve operational efficiencies and processes, as well as engagement with staff and the communities they serve.”

Companies also need to “start thinking about how to embed technology such as IoT into what they do. Because then they have access to a richness of information that can help them understand what is happening with their buildings and develop models that are repeatable.”

The “rubber hits the road” when technology provides the industry with practical tools to understand how spaces can be better designed and managed. Using data can refine the design process and iron out inefficiencies, she said.

“By using smart sensors, we can access granular data of not just if a space is being used, but by how many people.”

IoT also offers the opportunity for a rethink of the underlying linear systems within a built environment and could drive the development of a circular economy.

“For the first time ever, we have the technology to identify, authenticate, locate and track materials so they can be maintained and recovered. IoT technologies will play a vital role in enabling circular economies,” she explained.

IoT, using smart sensors and connected technologies, such as cloud and analytics, can play a key role in providing valuable data about things like energy use, underused assets and the material flows to make cities and industry more efficient.

Cars are a good example of the potential. “Cars are currently underutilised 95% of the time — and now with connected vehicles and IoT sensors we can not only improve the maintenance and lifespan of existing cars, and gather a wealth of new data to inform the design of autonomous vehicles, but also use smart apps to support car-sharing services.”

EY’s recent report on industry megatrends, ‘Will the Australian property sector seize the upside of disruption?’, identified IoT and big

data as two of the industry’s biggest future disruptors, and the report’s authors suggested business leaders may underestimate the pace of change.

Caruana-McManus says building management will be one of the first areas to be disrupted by IoT.

“The building industry has been very good at creating high-end, high-intensity software for building operation. But my feeling is this will be disrupted by the IoT as more open architecture will enable us to create better buildings.

“Building management systems are usually completely closed, but every local council I talk to is looking at open systems across their portfolios. Without it, they can’t get the data out of their buildings.

“If your security cameras use a different protocol to the smart streetlights, then how do they talk to each other?”

Caruana-McManus is working with governments and industry to bring global interoperability standards such as Hypercat to Australia to ensure that “one smart city solution can talk to the other”.

Meshed is also deploying public access IoT networks for cities and universities by pulling together a combination of open standard IoT platforms to help people install smart sensors and track and share information such as real-time environmental health of their area.

“Currently, we have all these disparate technology systems based on proprietary software that can’t talk to other parts of the system.”

While that is a problem, it’s one that can be solved by the industry working together.

Caruana-McManus will be presenting at Green Cities alongside Chris Pike from sensor specialist Aclima, Cleve Schupp from Tesla and John Batten from design consultancy Arcadis. For further details, visit: [www.greencities.org.au](http://www.greencities.org.au).

Facility managers in today's world face a difficult dilemma when it comes to investment choices in their facilities. Increased awareness of climate change, public pressures and legislative pressures is driving a demand for our buildings to be as energy efficient and sustainable as possible. While at the same time, organisations, with the need to drive profits, continually look for areas to increase cost savings and improve their overall operating functionality.

**M**ore than ever, decision-makers need solutions for work spaces that are productive, purposeful and efficient. They are looking to drive down costs while also making their buildings greener.

As a facility manager, these two ideals seem like contrasting drains on budget and can often lead to the assumption that it is too expensive to implement the latest and greatest technologies. Contrary to this belief, however, the latest facility management tools are capable of fulfilling the priorities of two agendas with one investment, achieving both increased efficiency and functionality through greater facility insight. Managers are finding that what may have initially seemed like a short-term pain often leads to long-term gains.

### **The 'dilemma': are climate change and regulation at odds with innovation and cost savings?**

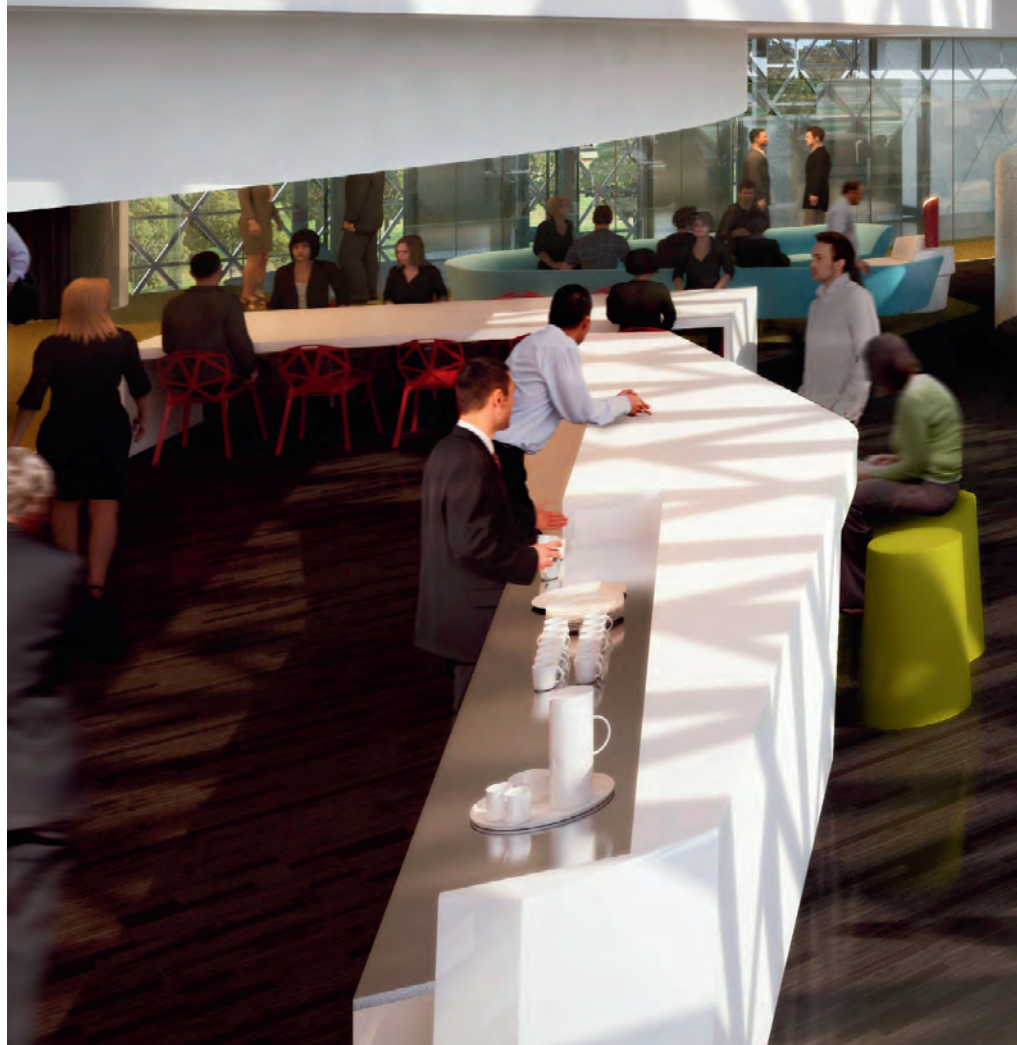
There is a growing awareness in Australia that innovation is vital for the nation's future economic growth. From the innovation agenda led by our Prime Minister and the hotbed of disruption coming through Australia's start-up community, through to the innovative lens through which many established businesses are now viewing their future, it is unquestionable that innovation is changing Australian business.

In order to stay relevant, organisations are competing to develop or obtain the latest technology for increased operational efficiency, improved product offering or

# Lower operating costs while increasing efficiencies at facilities

## A dilemma or an opportunity?

*Preeti Bajaj, Vice President – Strategy & Transformation at Schneider Electric*







greater cost savings. At the same time, there's no denying that as a society we are becoming more conscious of our environmental footprint. Whether that is in our homes at an individual level, in our workplaces at an organisational level or in our parliament, conscious decisions are being made to lower energy misuse and inefficiencies.

At the top level, new legislation from July 2017 will require commercial spaces that are 1000 m<sup>2</sup> or greater to meet the NABERS energy efficiency rating and present an energy efficiency certificate on selling or leasing the building.

While such legislation may appear to be a cost burden, this mandated compliance could also be a blessing in disguise for facility managers looking to innovate.

### The opportunity: leveraging the data explosion

With the development of the next generation of integrated control and management systems and the proliferation of the Internet of Things (IoT), buildings are producing a substantial amount of data. Such data, if properly used, can give managers greater insight over energy use, such as:

- where is power being used?;
- what are the peak times of energy use?; and
- what is it being used for?

An understanding of the answers to these questions could be the insight needed for managers to make changes in their organisations that help achieve their compliance goals. Unfortunately, immense amounts of data can be overwhelming, and coupled with an increased pressure to deliver results at minimal costs, large amounts of data often go unused and are not properly analysed or actioned.

Fortunately, new tools and services, including Schneider Electric's Facility Insights, offer smart data capturing and accessible analytics to help building owners increase facility performance, save money and improve operation efficiency.

### Building control and management systems: achieving a sustainable and productive future

By investing in smart tools, businesses can

improve operations of their buildings, better manage their assets and decrease overall energy costs.

The best in-market tools offer insight in the form of predictive analytics on complex data sets. For example, Schneider Electric's product is able to use external data, like weather forecasts and travel patterns, to predict temperature drains and employee movements. This, coupled with internal data sets, such as floor usage and movement around the building, can then be leveraged to predict how a workplace will be used on particular days of the week and how best to manage energy usage. Based on these predictions, adjustments can then be made to operations, such as automatically switching off lights or air conditioning in an area that isn't used all day.

Further to this, through analytics of energy use, facilities will have greater understanding of what equipment uses power, whether it is doing so efficiently and whether it is likely to need maintenance in the near future because it is operating outside of its typical energy readings.

Overall, the innovative tools offer improvements across four interrelated areas that incentivise sustainable action by appealing to financial and sustainable motives.

#### 1. Energy savings

Smart solutions, like Facility Insights, which have oversight over a building's energy usage, are able to detect abnormal consumptions like wasted energy, over heating/cooling or water leakages. By tracking energy performance, the tools are able to identify trouble areas, allowing the facility manager to make adjustments accordingly. Of course, energy savings result in long-term cost savings, so the benefits for organisations are double here.

#### 2. Operational efficiency

Leveraging this intuitive technology will condition your building to work at optimum efficiency. Even sites with multiple tenants can be improved by allocating a cost per tenant and activities while benchmarking each site's performance. These technologies are able to recognise regular activities and report on abnormal conditions on equipment that will optimise equipment efficiency and avoid breakdown.

### 3. Equipment downtime prevention

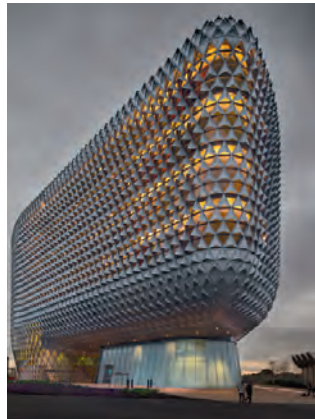
Aside from the environmental benefits, maintaining functional equipment is paramount to ensuring business operation runs smoothly. If one piece of equipment is down, it can often affect the whole supply chain and ultimately cost the business. Whether through lost revenue, slimmer margins, unhappy customers, lost business hours, food contamination or spoilage, and/or high repair cost, malfunctioning equipment can be a huge burden on an organisation. Smart solutions will therefore not only help reduce environmental burdens through increased efficiency, they can also save an organisation financially by diagnosing equipment faults remotely, saving time with a faster response as well as improved coordination.

### 4. Maintenance efficiency

Particularly important to facility managers working across multiple sites, today's facility management tools allow business owners to plan and manage the maintenance of equipment across multiple sites from any location, run maintenance at the right times to minimise impact on operations and track all maintenance events on all equipment for improved historical records.

The growing awareness of sustainable buildings isn't a trend that will disappear in the near future. Driven by the success of existing organisations reaping the rewards of their investments, the number of facilities using data insights is only set to grow.

Locally, projects that Schneider Electric Australia has worked with prove the benefits this new technology can bring. The South Australian Health and Medical Research Institute (SAHMRI) houses researchers from leading cancer and heart charities and the three top state universities. The iconic building uses an Integrated Control and Management System that incorporates innovative technologies in heating, cooling, hydraulics, lifts, fire monitoring, electrical monitoring, lighting, security and lab controls. This allows the building to maximise energy efficiency and performance, saving money throughout the life cycle of the building.



As increased regulation continues to force businesses to improve their energy efficiency, those who view the change as an opportunity for overall innovation rather than as a burden of forced compliance will stand to benefit the most.

### Society expects more: align your organisation's future

As increased regulation continues to force businesses to improve their energy efficiency, those who view the change as an opportunity for overall innovation rather than as a burden of forced compliance will stand to benefit the most.

Today, we expect more from our organisations. Whether employees or customers, Australians are more comfortable interacting with organisations that support a sustainable future throughout their daily practice.

In addition, studies have shown that high-performance ventilation, thermal control and lighting make building occupants (including employees) more productive. Interestingly, building occupants report 27% greater satisfaction with ideal conditions, a direct payoff of smart management, achievable through data-optimised operations.

Overall, the challenge for businesses to simultaneously achieve increased efficiency and reduced costs is real. The upfront cost can often place investments with longer term

payoff to the back of mind for management, meaning one of the largest challenges is in leadership having the foresight to invest in long-term rewards.

Fortunately, the insights provided by new technology are making it possible to align the previously conflicting interests of improving operational performance and sustainability performance by investing in smarter buildings.

Furthermore, as sustainability targets are increasingly mandated by legislation, as we will see in July, investing in the right technology can become an investment in the future of your organisation, the environment and, in line with popular sentiment towards sustainability, your reputation.

*You can learn more about building control and management systems and how they can improve your facility's performance in sustainability and operational efficiency at: [www.schneider-electric.com.au/en/product-range/63092-facility-insights-services/](http://www.schneider-electric.com.au/en/product-range/63092-facility-insights-services/).*

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# Better urban design could create healthier cities

A new series published in *The Lancet*, led by the University of Melbourne and featuring authors from leading global academic institutions, quantifies for the first time the health outcomes that could be gained through changes to urban design and the transport system.

**T**he three-paper series, launched at an event hosted by the United Nations Sustainable Development Society Network in New York, compares six global cities with a variety of livability indexes. Cities examined include Melbourne, London, Boston, Delhi, Sao Paulo and Copenhagen.

With the world's population estimated to reach 10 billion by 2050, with 75% living in cities, city planning is now being recognised as a part of a comprehensive solution to tackling adverse health outcomes. The series unravels the intersection of urban design, transport and population health outcomes to provide a paradigm shift for approaches to tackle the growing burden of chronic disease and road trauma in cities.

The authors identify the health gains that could be achieved if cities encouraged a modal shift from private motor vehicle use to active transport, namely bicycling and walking, and increased public transport use, services and amenities. The findings offer policymakers evidence that substantial health benefits can be achieved for urban populations by adopting different approaches to urban and transport policy and planning.

Series lead Professor Mark Stevenson said momentum and awareness is growing around the health and wellbeing benefits

available through changes to city planning and transport modal shift. "By quantifying the need for integrated city planning and its focus around modal choice for cities," he said, "[the research] emphasises the need for sustainable transport that will deliver health gains for the future."

The first paper of the series, led by Professor Billie Giles-Corti, identifies eight integrated interventions that, when combined, encourage walking, cycling and public transport use while reducing private motor vehicle use. These include having services and facilities within walking distance, a mix of employment and housing across the city, reducing the availability and increasing the cost of parking, infrastructure that supports safe walking and bicycling, open spaces, reducing distance to public transport and making neighborhoods safe, attractive and convenient for public transport.

"We concluded that focusing on walking and cycling infrastructure alone is critical but not enough — to create cities that promote health needs joined-up policies and input across multiple sectors: land use, transport, housing, economic development, urban design, health and community services, and public safety," Professor Giles-Corti said.

The second paper proposes a 'compact city' model that incorporates health-inclusive urban planning interventions. The model

is based on a 30% increase in land-use density, a 30% reduction in distance from public transport, a 30% increase in diversity of land use and a 10% shift away from private vehicle use.

"Adopting the compact cities model, that places an emphasis on active transport, provides a huge reduction in chronic diseases burden, particularly respiratory and cardiovascular disease and Type 2 diabetes," Professor Stevenson said. "The provision of safe infrastructure for active transport also reduces road trauma and transport-related particulate emissions."

For Melbourne, this would result in improved health outcomes, with a 14% reduction in Type 2 diabetes and a 19% reduction in cardiovascular disease, resulting in 622 healthy years of life gained for 100,000 residents.

The final paper in series focuses on how data can guide city-planning policy and practice to create compact cities that promote health.

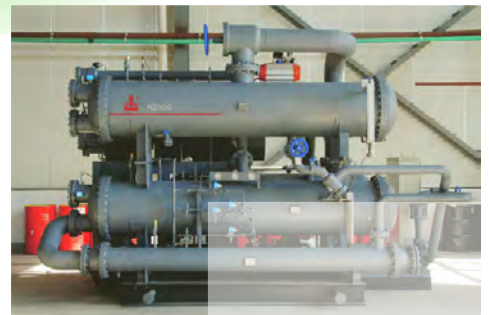
The findings provide a blueprint for achieving a number of the United Nations' Sustainable Development Goals that include promoting healthy living by making cities inclusive, safe, resilient and sustainable.

To access the article series, visit [www.thelancet.com/series/urban-design](http://www.thelancet.com/series/urban-design).

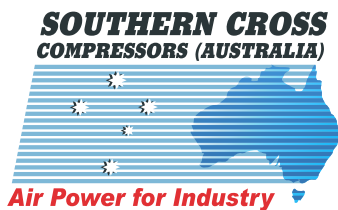


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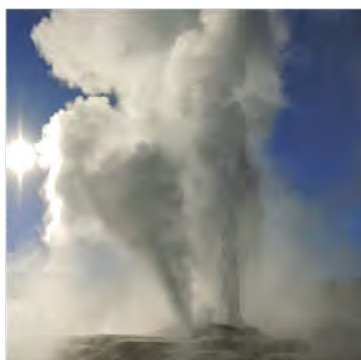
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# Programmable cement particles create stronger structures

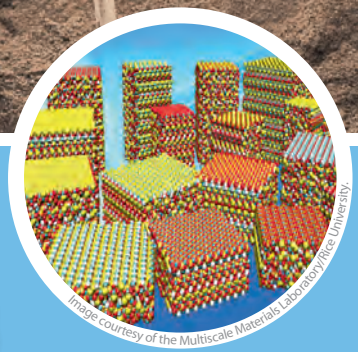


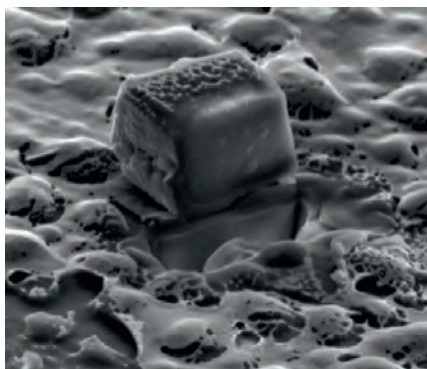
Image courtesy of the Multiscale Materials Laboratory/Rice University

US scientists have decoded the kinetic properties of cement and developed a way to ‘program’ the microscopic, semicrystalline particles within.

**D**eveloped at Rice University and published in the *Journal of Materials Chemistry A*, the process turns particles from disordered clumps into regimented cubes, spheres and other forms that combine to make the material less porous and more durable. The technique may lead to stronger structures that require less concrete, making them more environmentally friendly.

Lead author Rouzbeh Shahsavari and his colleagues decoded the nanoscale reactions — or ‘morphogenesis’ — of the crystallisation within calcium-silicate hydrate (C-S-H) cement that holds concrete together. Previous techniques to create ordered crystals in C-S-H had required high temperatures or pressures, prolonged reaction times and the use of organic precursors, but none were efficient or environmentally benign.

The Rice researchers created their cubes and rectangles by adding small amounts of positive or negative ionic



An isolated cement cube created by the lab of Rouzbeh Shahsavari. Image courtesy of the Multiscale Materials Laboratory/Rice University.

surfactants and calcium silicate to C-S-H and exposing the mix to carbon dioxide and ultrasonic sound. The crystal seeds took shape around surfactant micelles within 25 min.

Once the calcite seeds formed, they triggered the molecules around them to self-assemble into various shapes that can pack more tightly together in concrete than amorphous particles. Carefully modulating the precursor concentration, temperature and duration of the reaction varied the yield, size and morphology of

the final particles. Decreasing the calcium silicate yielded more spherical particles and smaller cubes, while increasing it formed clumped spheres and interlocking cubes.

“The seed particles form first, automatically, in our reactions, and then they dominate the process as the rest of the material forms around them,” Shahsavari said. “That’s the beauty of it. It’s in situ, seed-mediated growth and does not require external addition of seed particles, as commonly done in the industry to promote crystallisation and growth.”

The new technique has several environmental benefits, Shahsavari said. “One is that you need less of it [the concrete] because it is stronger. This stems from better packing of the cubic particles, which leads to stronger microstructures. The other is that it will be more durable. Less porosity makes it harder for unwanted chemicals to find a path through the concrete, so it does a better job of protecting steel reinforcement inside.”



“The LafargeHolcim Awards is most significant – it is the only competition that focuses purely on innovation in the context of sustainability.”

Maria Atkinson AM, Co-Founder Green Building Council of Australia.  
LafargeHolcim Foundation Board member since 2013.

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# LafargeHolcim Awards

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## A PV microgrid for remote communities

A microgrid system that could potentially provide power to the world's most remote communities has been designed by a student at the Victoria University of Wellington.

Graduating with a PhD in Engineering — the first from Victoria's Smart Power and Renewable Energy Systems Group — Daniel Akinyele's research examined new energy systems for small communities that are not connected to a central power grid and which rely largely on petrol-powered generators as a power source. Akinyele focused on developing solar photovoltaic microgrids which capture energy from the sun and turn it into electricity.

"Microgrid systems are basically smaller versions of the big electricity grid," he said. "Instead of waiting for the government to extend the main electricity grid to remote communities, which is usually not economically feasible and may not materialise in the short term, I wanted to create a customisable energy system that could be installed on-site and which would ensure these societies could meet their daily energy demands." Akinyele used

his home country of Nigeria as a case study, stating, "I wanted to use my knowledge to help address the energy challenge in my country. I had the opportunity to visit several remote areas and interact with the people there, get to know them and their energy requirements, and what their preferences were. With that information I could create a solar power system that works for them."

Akinyele said the beauty of his research is that the knowledge he's developed can be applied to any setting, so long as he is supplied with the metrics and design parameters. "It could be suitable for some of New Zealand's remote areas, or parts of the country cut off by an earthquake, for example," he said. "I am currently researching photovoltaic microgrids for off-grid Maori communities in New Zealand."

Akinyele's thesis has so far been the basis of 15 scientific papers which have been published in some of the world's top renewable



energy technology journals — one of the papers is the *Sustainable Energy Technologies and Assessments* journal's most downloaded and most cited article. And Akinyele says his PhD research is just the beginning.

"I'd love to design systems using other sources of renewable energy, such as wind, hydro or biomass," he said.

"The concept has got a lot of potential, and I'd like to examine the microgrid system from a more holistic perspective in the future."



## Solar with 30 degrees of difficulty

Brunswick Town Hall is an iconic Melbourne landmark which was built in 1876 and only survived the wrecker's ball in 1974 after a local protest campaign. Although it earns its keep today as a popular social venue, it was one of the top ten energy users in the municipality.

This did not fit well with Moreland Council which was the third accredited carbon neutral council in Australia. However, installing solar panels on

the three storey historic building with a 30 degree slope on its corrugated iron roof presented some difficult installation problems. The main roof area was also found to be insufficient to house enough conventional solar panels to generate the required energy level of 100kWp and using the lower roof area was seen to be inefficient as it is subject to shadowing for part of the day.

The eventual solution was to use the High Efficiency PERC Mono Trina Solar 290Wp panels. Using these high-efficiency panels not only reduced the number of panels that were required it also reduced the installation time.

The final installation used 345 panels on the main roof which will generate 111kWh per year. To achieve the same energy output with conventional 260Wp would have required more than 400 panels. According to lead electrician on the install, Nick Garric it was the



most difficult job he's tackled in the seven years he has been an installer.

"Our installing team members were in safety harnesses for the four week installation period and because of the number of panels, we had to lay them in a landscape pattern, rather than the usual portrait configuration.

"This meant our roof access had to be up the 30 degree slope, rather than along the roof.

"Because of the age of the building and the roof, another difficulty we had to overcome was in running the cables from the panels to the inverter.

"Clearly the 290Wp panels were the solution for us to get enough panels on the roof to generate the required level of energy and we had no handling difficulties compared to the standard 260Wp panels.

"Being on a 30 degree slope the panels are largely self-cleaning, whereas if we had to use the lower flat roof areas there would have been significant soiling as the traffic in busy Sydney Road generates a high level of road grime," Garric said. Trina Solar Sales Manager Govind Kant said that the Brunswick Town Hall installation is the first use of the 290Wp solar panels in Australia.

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



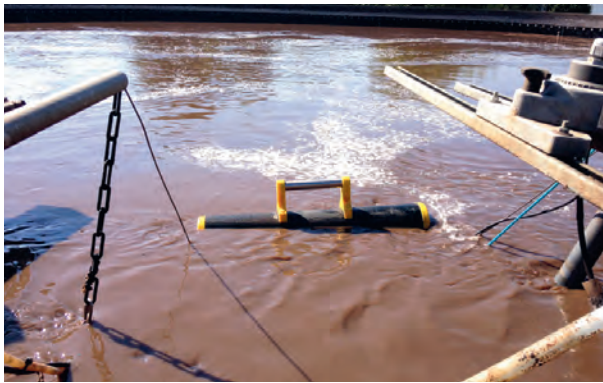
# INNOVATIVE ANALYTICAL SENSORS FOR WATER

*TriOS has developed a new generation of testing equipment*

Begun as a university spin-off in 1998, TriOS develops and produces optical sensors (and associated equipment) for water quality analysis. The reagent-free sensors are used in environmental monitoring and process control in a broad range of applications such as surface/drinking water, marine research, industrial and wastewater treatment (inlet and outlet).

At their German facilities, in-house production of nearly all components allows TriOS to put great importance on quality control and sustainable manufacturing. Their efforts were recognised when entered as the German representative for Environmental and Corporate Sustainability at the European Business Awards 2015/2016.

The TriOS family covers a range of parameters with online photometers, fluorometers, radiometers and other sensors.

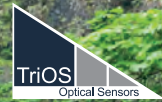


Typical applications include the measurement of nitrogen (nitrate and nitrite), BOD equivalent (BODeq), CODEq, SAC254, UVT, radiance/irradiance, colour, concentration of oil in water and algae such as cyanobacteria (blue-green algae).

Replacing expensive and time-consuming lab tests, the OPUS is a new generation of optical sensor for online analysis of nitrogen (nitrate/nitrite) and carbon compounds (CODEq and BODeq). Manual maintenance is reduced by the use of revolutionary nanocoated (hydrophobic) lenses and built-in air cleaning. The sensor's reagent-free spectral measurement allows for field mounting of the OPUS to deliver real-time, continuous and reliable information for automated control.

All products are supported with a full range of mounting alternatives such as process mount (floats and flowcells), inline and remote operating solar-powered buoys. The innovative TriOS G2 interface allows sensor configuration either through one of the TriOS centralised controllers or remotely over any web browser. Communication outputs include analog (4–20 mA) and digital Modbus (Ethernet or Wi-Fi).

**For more information on the TriOS range of online sensors, please contact Control Components.**



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<b>LISA color</b> Low-cost state-of-the-art Colour sensor		<b>NICO</b> NO <sub>3</sub> -N	
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			<b>HS100</b> G2 DIN rail interface module
<b>Parameters</b>			
<ul style="list-style-type: none"> <li>• NO<sub>3</sub>-N</li> <li>• NO<sub>2</sub>-N</li> <li>• CDOM</li> <li>• COD</li> <li>• BOD</li> <li>• TOC</li> <li>• DOC</li> <li>• HS</li> </ul>	<ul style="list-style-type: none"> <li>• Phenol</li> <li>• NH<sub>4</sub>Cl</li> <li>• Bacteria (Tryptophan)</li> <li>• Radiance/Irradiance</li> <li>• NH<sub>4</sub><sup>+</sup></li> <li>• TSS</li> <li>• SAC254</li> <li>• Colour</li> </ul>	<ul style="list-style-type: none"> <li>• Oil-in-water</li> <li>• Oil-on-water</li> <li>• PAH</li> <li>• Algae</li> <li>• Turbidity</li> <li>• pH</li> <li>• DO</li> <li>• Conductivity</li> </ul>	



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# From bulk sewage to biocrude oil

Wastewater treatment plants across the United States may one day be turning ordinary sewage into biocrude oil, thanks to research at the Department of Energy's Pacific Northwest National Laboratory (PNNL).

Sewage sludge has long been viewed as a poor ingredient for producing biofuel because it is too wet. PNNL's approach eliminates the need for drying required in a majority of current thermal technologies, which historically has made wastewater-to-fuel conversion too energy intensive and expensive.

The technology — hydrothermal liquefaction (HTL) — mimics the geological conditions the Earth uses to create crude oil, enabling organic matter such as human waste to be broken down to simpler chemical compounds. The material is pressurised to 3000 psi — nearly 100 times that of a car tyre — before the pressurised sludge then goes into a reactor system operating at about 315°C.

The heat and pressure cause the cells of the waste material to break down into biocrude and an aqueous liquid phase. This biocrude can then be refined using conventional petroleum-refining operations.

"There is plenty of carbon in municipal waste water sludge and, interestingly, there are also fats," said Corinne Drennan from PNNL. "The fats or lipids appear to facilitate the conversion of other materials in the wastewater such as toilet paper, keep the sludge moving through the reactor and produce a very high quality biocrude that, when refined, yields fuels such as gasoline, diesel and jet fuels."

Water Environment & Reuse Foundation (WE&RF) investigators said the process has high carbon conversion efficiency, with nearly 60% of available carbon in primary sludge becoming biocrude. Furthermore, the liquid phase can be treated with a catalyst to create other fuels and chemical products.

A small amount of solid material is also generated, which contains important nutrients. For example, early efforts have



*Light: Sludge from Metro Vancouver's wastewater treatment plant has been dewatered prior to conversion to biocrude oil at PNNL. Right: Biocrude oil, produced from wastewater treatment plant sludge, looks and performs virtually like fossil petroleum. Images courtesy of WE&RF.*

demonstrated the ability to recover phosphorus, which can replace phosphorus ore used in fertiliser production. HTL may also be used to make fuel from other types of wet organic feedstock, such as agricultural waste.

"The best thing about this process is how simple it is," said Drennan. "The reactor is literally a hot, pressurised tube. We've really accelerated hydrothermal conversion technology over the last six years to create a continuous and scalable process which allows the use of wet wastes like sewage sludge."

PNNL has licensed its HTL technology to Utah-based Geniefuel Corporation, which is now working with Metro Vancouver to build a demonstration plant at one of the latter's wastewater treatment plants. Once funding for the plant is in place, Metro Vancouver will move to the design phase in 2017, followed by equipment fabrication, with start-up occurring in 2018.

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## Intelligently solving wastewater challenges in Victoria

**N**orth East Water's municipal sewer pump station at Jordyn Terrace in Wangaratta, Victoria, is located within a busy residential area and close to a retirement village. It receives very challenging wastewater containing a large quantity of sanitary items, and other fibrous waste objects, that cause 'ragging' of the pumps. This resulted in pumps having to be lifted and unblocked twice or three times every week.

In July 2016, North East Water installed Xylem's Flygt Concertor system with the aim of resolving this issue and delivering clog-free pumping to Jordyn Terrace wastewater pump station.

"Regular clogging of the pump station was a serious issue for us," North East Water Manager Assets and Operations Grant Waite said. "As a result, operation and maintenance staff had to leave their daily work schedules to travel to the pump station, unclog the pump and get the station up and running again. In addition to man-power, a maintenance crane truck was needed to perform the pump lifts, which meant it had to be taken away from other projects, which added further expense to the repair job."

The team had high hopes in this new system, as it combines Flygt's self-cleaning hydraulics, Adaptive-N, as well as intelligent functionalities like pump cleaning. This function activates when a clogging instance is detected and starts operating the impeller at different speeds and directions to remove the debris.

Since the installation, station managers have reported no blockages or clogging issues at the station, as well as a cleaner station with less visible material in the sump.

Waite said: "We have found Xylem's Flygt equipment to be of excellent quality so we were happy to trial the new wastewater pumping system. The trial pump we received is still running in our station and so far we haven't had one single case of clogging."

Concertor's short-term results in Jordyn Terrace were certainly a relief for the station's operators but their main concern was to find a sustainable solution that can bring peace of mind in the long run.

This is where the system's flexibility played an important role. One of its main hardware elements, the pump impeller, is offered in three different materials, to adapt to different conditions: Hard-Iron, duplex stainless steel and stainless steel.

A high chrome alloy, Flygt Hard-Iron is claimed to be five times more wear resistant than duplex stainless steel. In accelerated wear tests, Hard-Iron kept working efficiently and showed minimal wear after pumping water with a very high concentration of extremely abrasive particles. This durability and reliability can save time and money.

Waite stated, "The Hard-Iron impeller will ensure that the current pump performance is maintained for extended periods. In an application like this, with wastewater that contains a high level of non-biological solids, it is the best option."

The results include:

- clog-free pumping with no emergency call-outs since installation;
- a cleaner pump station with less visible material in the sump;
- fewer site visits by maintenance truck and staff — a positive result for North East Water as well as for residents living in the surrounding neighbourhood.

Flygt Concertor is proof that new technologies with sophisticated integrated intelligence for wastewater pumping do not require more components or complexities; rather, Concertor is user friendly and simple to install, commission and operate.

"Since Flygt Concertor has been installed we haven't experienced any clogging issues at the station, which is a dramatic improvement to how the station's old pumps had been running. The new wastewater pumping system has also had a positive impact on the local community — fewer visits to the station by large maintenance trucks and personnel. Station managers have also reported that the sump is cleaner as a result," Waite concluded.



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## Wood waste recycling enabled by Bin Trim

With financial assistance from a NSW EPA Bin Trim rebate, co-owned businesses Pallet Collars Australia (PCA) and Recycling Technologies Group (RTG) have been able to implement an innovative and profitable wood waste solution for themselves and a neighbouring sawmill.

Based in Eden, Bega Valley, PCA manufactures and supplies thousands of wooden packaging solutions every year. The production of this quantity of packaging creates a large amount of wood waste – 2.5 tonnes per month on average. PCA and RTG also knew that wood waste was being burnt by a neighbouring sawmill as a means of disposal.

As a business that offers recycling infrastructure solutions for manufacturers, RTG understood the opportunities of creating a higher value for that wood waste – in this case, recovering wood waste, such as sawdust, shavings and wood offcuts, and creating heater pellets for domestic pellet heaters. By using recovered wood waste, there is the additional environmental benefit of not using raw forest materials.

Pellet heaters look similar to other domestic combustion heaters. However, rather than burning logs of wood, they create heat by burning small wood pellets. Wood pellets burn efficiently because of their density and dryness.

PCA and RTG contacted the NSW EPA Bin Trim program to see if it could help cover the cost of purchasing the required equipment to transform wood waste into heater pellets. The program enables eligible small and medium-sized businesses to access a free waste assessment and a rebate from \$1000 up to \$50,000 to help with purchasing recycling equipment.

PCA and RTG were given a rebate of \$12,904, lowering their capital investment cost to purchase the new recycling equipment and therefore increasing the financial viability of the enterprise. The equipment enables PCA and RTG to take their wood waste, along with large quantities of the wood waste from the neighbouring sawmill, and turn it into high-energy, 6 x 30 mm pellets for household heating.

PCA and RTG are now recovering 90% of their wood waste, reducing their waste disposal costs significantly. They are also recovering up to 3 tonnes a week of the neighbouring sawmill wood waste, greatly reducing the amount of wood that the mill needs to burn as a means of disposal. In total, PCA and RTG are now recovering approximately 180 tonnes of wood waste per year.

“It’s part of our business to make waste into resources, so we knew the potential of re-using the large amount of wood waste in this way to produce a really useful product,” said Kari Esplin, director of PCA and RTG.

“What the Bin Trim Rebates Program does is it takes a solution that will work and will provide a return, and it adds a level of security to its future.”

Furthermore, the project has enabled PCA and RTG to diversify their business and demonstrate a re-use solution that can be replicated in almost any facility that has a similar wood waste problem in Australia. RTG has also used its own wood waste recovery model to sell pellet production plants to other businesses with similar wood waste problems.

“Manufacturers commonly consider waste as waste, but actually it can be a valuable resource,” said Tony Esplin, owner of PCA and RTG. “Businesses just need to know how to use that resource.”

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## Energy-efficient sludge treatment at winery

Wine harvesting season can be challenging for wastewater treatment plants. This was the case in the wine-growing community of Edenkoben in the Palatinate region of Germany. When the grapes were processed, the effluent load rose steeply — by a factor of 17. High-load anaerobic digestion provided a flexible solution that cut power consumption by 20%, generated over half of the required electricity on-site and reduced sewage sludge volumes.

The increase in the effluent load also pushes up the plant's power consumption, which can surge to three times the normal level at harvesting time. Small-scale wastewater plants use a technique known as aerobic stabilisation to prevent the sludge produced during wastewater treatment from developing unpleasant odours. This involves prolonged aeration to stabilise the sludge. The downside is that the aeration system consumes a lot of energy. Edenkoben's wastewater treatment plant has operated far more efficiently since the introduction of the high-load anaerobic digestion, a process developed by researchers at the Fraunhofer Institute for Interfacial Engineering and Biotechnology IGB in Stuttgart.

"We converted the plant to a process based on high-load anaerobic digestion with the help of colleagues from several engineering companies. The new process implemented in Edenkoben has numerous advantages. First, it generates energy instead of merely consuming it.

Second, it reduces the quantity of sludge that would otherwise have to be disposed of at great cost," explained Fraunhofer IGB scientist Dr Werner Sternad.

Energy consumption is 20% lower because the process doesn't require a power-hungry aeration system. Of the power actually consumed, 50% or more is generated from sewage gas on-site in two cogeneration units. This means that less than half of the electricity the wastewater plant needs is bought in. Sludge disposal is another area in which it has been possible to slash costs. In the past, the sludge had to be dewatered on a daily basis. Anaerobic digestion produces so little sludge that now the filter press runs only twice a



week, except during the wine harvest. One of the researchers' main priorities was to design a solution for Edenkoben adapted to the local situation, namely wide seasonal variations in the effluent load. "We installed two digestion tanks, which can be operated in parallel during the wine harvest, or in series at other times of the year. This makes it possible to adapt the process flow to the volume of sludge produced and optimise sludge treatment," Sternad said.

The new plant entered service in early 2016. When operating in series mode, it is processing approximately 40 m<sup>3</sup> per day. During the wine harvest, however, it can now go up to 130 m<sup>3</sup>.

## Adelaide Airport's solar system is now complete

Adelaide Airport's rooftop solar power system has begun generating electricity, contributing to almost 10% of the airport's total energy consumption.

The short-term multistorey car park rooftop solar power system is expected to offset 100% of the car park's electricity consumption, with excess power generated to be consumed within the main terminal. The new system brings the total rooftop solar capacity to 1.28 MW.

Solgen Energy Group Executive General Manager David Naismith said Solgen designed the 1.17 MW solar power system under a competitive bid process. He said, "The system that Solgen delivered represents an optimal solution to site constraints such as shade from other existing and potential infrastructure while ensuring financial and environmental goals are exceeded."

Almost 4500 Trinasmart solar panels were installed, mitigating the effects of shading across the array from



existing and potential infrastructure. In addition, a remote single switch will allow immediate shutdown at panel level, which enhances the overall safety of the system in the event of an emergency.

"Most solar panels are installed in 'strings' with each panel linked to others, which means that in the event of shading the output of all the panels in the 'string' is reduced," explained Trina Solar Sales Manager Govind Kant.

"Our Trinasmart system is able to optimise the maximum output of each panel independently, which means it is the perfect solution for installations where shading of the solar panels can occur during the day. This minimises the

impact of shading and translates directly into dollars saved off the electricity bill."

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## Plant upgrade enables irrigation via treated wastewater

By upgrading the Gracemere sewage treatment plant (STP), Rockhampton Regional Council has ensured that the local sports fields, golf club and grazing land are fully irrigated by wastewater — once treated — that is discharged from the plant.

Now more than 40 years old, the STP currently manages and treats sewage from 8000 people. To improve operational performance and increase safety, Rockhampton Regional Council was looking for a modern new inlet works systems, to be installed by Waternish Engineering.

“We chose the Hydroflux HUBER solution because reliability is critical and because of the efficiency of the component parts — two RPPS inlet screens, a Vormax grit removal system and a RoSF4 grit washing classifier,” said Waternish Managing Director Simon White.

“The RPPS is a perforated inclined drum screen which delivers twice the screenings capture of bar/step type screens. It also includes integrated compaction and washing, which does



away with the need for a separate washing compactor,” he continued. “The RPPS units are super-efficient screens which remove very high levels of materials, such as rags, cotton buds and plastics, and the Vormax grit traps remove sand and grit.

“These materials, if not removed, would otherwise accumulate in the downstream process and lead to maintenance and performance issues. The RoSF4 plays its part too by drying and removing the sand to reduce off-site disposal costs.” To facilitate installation and reduce site time,

Waternish delivered the structure that holds the equipment as a free-standing stainless steel unit, most of which is prefabricated off-site.

John Koumoukelis, a director of Hydroflux HUBER, claimed the HUBER Vormax Grit Traps and HUBER RoSF4 Grit Washing Classifiers represent “the highest-performance technology available in the Australian market”.

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## Condition monitoring of pumps

The Perlenbach water supply association supplies fresh drinking water to roughly 50,000 residents in seven municipalities in the Eifel region in Germany each day. Around 2.4 m<sup>3</sup> of water, which has been filtered and treated using complex methods until it meets the high requirements defined in the German drinking water regulations, is supplied in the area each year.

The Perlenbach water supply association is now using Schaeffler’s FAG SmartQB condition monitoring, which can identify problems in advance and recommend preventive actions. The preconfigured plug-and-play SmartQB unit, which has just been released in Australia, provides information about the condition of up to six machines or assemblies using plain text messages. As part of a pilot project at the Perlenbach water supply association, two centrifugal pumps were equipped with two FAG SmartQB sensors each and linked with the FAG SmartQB. In the event of irregularities, the FAG SmartLamp installed next to the FAG SmartQB illuminates red and the system generates a message. With only two additional clicks on the touch display, the maintenance technician can view more detailed information about the fault and specific recommended



actions. The system has proven to be reliable after only a short period. The maintenance personnel were able to react quickly and in a targeted manner thanks to the information and specific fault assessment provided at an early stage about the onset

of bearing damage. Both bearings in the 8-stage centrifugal pump were replaced by the maintenance personnel in a short period of time, thereby preventing severe damage to the facility. Unplanned downtimes of up to several weeks in combination with considerable damage amounting to several thousands of euros could be prevented this way.

“The technology used by the Perlenbach water supply association is readily available across Australasia, and is our easiest to use condition monitoring device,” said Mark Ciechanowicz, industrial services manager, Schaeffler Australia. “It’s designed to generate plain text messages on its screen, so that any in-house technician can operate the unit without additional knowledge of vibration technology.”

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# Why bother with the circular economy?

Mike Ritchie, MRA Consulting Group

We are hearing more and more of the circular economy, an approach to resources that keeps materials away from waste and brings them back into the productive economy. It rejects the status quo “take-make-dispose” linear economy in favour of cycling biological and technical materials.

**I**t is an approach that goes beyond improving recycling. A circular economy is attempting to close the loop by influencing not just end-of-pipe recycling but also design, logistics and the entire value chain.

The World Economic Forum report ‘Towards the Circular Economy: Accelerating the scale-up across global supply chains’ (“the WEF Report”) describes the scale of circular economy reforms:

1. Substantial net material savings, estimated to be over a trillion dollars a year globally.
2. At least a million additional jobs globally in entry-level and semiskilled positions.
3. Mitigating price volatility and supply risks for resources.
4. Reinvigorating innovation in the economy, and particularly in manufacturing.

## Is it happening?

The circular economy is an approach that feels obvious, even overdue. The sort of thing that has been talked about for decades but still isn’t happening to any real scale.

Our economy is still built around take-make-dispose, and economists will hesitate to describe such a situation as ‘market failure’. Insofar as they consider the problem at all, they look at the decisions of each of the actors in the marketplace and consider these decisions to be rational.

It is economically rational to extract resources through mining of virgin resource fields rather than through mining urban waste

streams if the former is cheaper than the latter. Similarly, if landfill costs less than recycling of products into the circular economy, then the decision to landfill reflects an efficient market at work. Just because you don’t like the outcome, it doesn’t mean that the market has failed.

This reasoning was exemplified by the Australian Government’s Productivity Commission in its 2006 inquiry into Waste Generation and Resource Recovery. The inquiry report concluded that there is a role for landfill levies to cover the economic externalities from landfill disposal; however, these externalities were estimated to be low (less than \$5/tonne of waste for properly located, engineered and managed landfills that capture gas). The levies suggested by the Productivity Commission would be far too low to change landfilling behaviour.

The Productivity Commission made a strong case against a circular economy, instead arguing that the market should be left to determine whether resources are sufficiently valuable to recover or not. Governments should not intervene because they will interfere with the efficiency of the market by creating price distortions.

The Productivity Commission was particularly ambivalent about arguments for ‘resource efficiency’ for materials that become solid waste (as opposed to fossil fuels that are burnt), arguing that these materials can be recycled “either immediately or through future mining of landfill” (p.112). That is, if there came a time when the price of already landfilled materials became high enough, then the landfills could be mined. It is an approach informed by an ideology of all value being reducible to price, an approach that ignores

## waste management



factors such as resource preservation, the contamination of land-filled materials by asbestos and other contaminants, or indeed the degradation of resources within a landfill.

### Was the Productivity Commission wrong?

How, then, can the World Economic Forum (a forum of business leaders, politicians and economists) take the opposite view and support a circular economy for its economic benefits?

The key is that the Productivity Commission argues for a pure form of the marketplace logic. This logic builds on the premise that actors in the marketplace make decisions to advance their own self-interest. From this premise, the economic rationalist argues that self-interest leads to efficient markets, and in turn to the greatest public good.

This 'economic rationalist' takes a very limited view of the world. Market decisions are seen as minor in the context of the market (or the world as a whole), and so actors rarely consider the impact of their decisions on the market itself. Nor do they consider the impact of the market on things not directly priced within the market (such as the environment).

Appreciating the limitations of this view is important, as rational market decisions can, in aggregate, destroy the market. The ability for self-interested markets and market players to create system-wide failure is simplest described by Garrett Hardin's Tragedy of the Commons. Hardin described how self-interested individuals are able to make self-interested, rational decisions that lead to their own profit at the expense of the collective. In the absence of social norms to regulate this tendency, the endpoint is the collapse of the market. This theory has been used to describe how overfishing occurs, and the logic of pollution in general.

A blind faith in unconstrained, unregulated markets is a very limited view. It is not a true picture. The true picture requires a broader field of vision, a vision that only governments (regulators) and strategic actors (such as the World Economic Forum) have, or are empowered with.

### The case for government intervention

The underlying premise of the Productivity Commission that the market is efficient in its isolation is wrong. The market does not

act in a vacuum; it never has. Government often intervenes to shift market behaviour; it always has. Intervention is always policy led, such as to develop underdeveloped resources (ports enabling coalmines) or to mitigate greenhouse gas emissions (bans on incandescent light bulbs leading to 90% cheaper LED bulbs).

It is neither unusual nor unreasonable to expect that government should take a similar, policy-driven approach to removing the constraints that impede the circular economy. These might be constraints imposed by regulation (or a lack of regulation), incentive structures, public infrastructure or service provision.

So to answer the rhetorical opening question, we should bother with the circular economy because it won't happen by itself.

Government can and should lead the way for a circular economy because the endpoint is an economy that is more valuable, creates more jobs, is healthier and most importantly, has significantly less impact on the environment. Individual businesses or sectors of the economy cannot do it by themselves. They do not have the market scope. They will act in localised self-interest, unable to overcome local constraints. Constraints that only government can overcome.

Over the past few decades 'productivity' has been an end in itself, leading to the creation of the powerful Productivity Commission to uncover obstacles to improved productivity. The thinking behind the Productivity Commission is that obstacles to productivity are many and varied, best unveiled through focused inquiry.

### We need a circular economy commission

The circular economy is a profound shift in the market, a shift that can be led by the market if the various constraints are realigned. Understanding these constraints also requires focused inquiry.

A bold government would recognise the immense opportunity in fostering the circular economy, perhaps even forming a Circular Economy Commission akin to the Productivity Commission. A commission that would look to untangle the thicket of obstacles that prevent the market from delivering on the benefits of a circular economy.

## Mt Martha recycled water upgrade lowers emissions

The Victorian Government has announced the completion of a \$60m upgrade to South East Water's Mt Martha Water Recycling Plant that will deliver a vital alternative source of water for local business and community organisations, while reducing the environmental impact of its water treatment processes.

Member for Eastern Victoria Daniel Mulino MP officially opened the upgraded facility and met with customers already making use of the plant's new recycled water supply.

Central to the two-year project is construction of a tertiary treatment plant, which is already delivering high-quality Class A recycled water to farms, wineries, businesses and council facilities. At its peak, the plant will produce 26 ML of Class A recycled water per day.

The upgrade also includes a thermophilic anaerobic digestion process (TPAD), an Australian first, in which organic matter is broken down faster than most other processes through the use of higher temperatures.

Unlike traditional anaerobic digestion processes which maintain organic matter at body temperature during treatment, TPAD makes greater use of the biogas emitted during the digestion process to heat the material to 55°C, cultivating bacteria that deactivate pathogens and remove volatile organic content more quickly.

Not only does this help to create a more efficient treatment process, but it significantly reduces the recycling plant's environmental impact by capturing and using more methane and producing less odour.

In line with its commitment to the 100% re-use of biosolids, a by-product from the treatment process, South East Water has



also constructed two solar dryers as part of the upgrade. The dryers reduce the need for open-air drying pans, which produce more odour and occupy a greater footprint within the plant.

Most importantly, they can cut the biosolids drying time from one year to as little as two months, getting a higher quality fertiliser into the hands of local farmers more quickly, using a fraction of the energy of standard alternative technologies such as gas-powered dryers. South East Water now has five solar dryers and produces more than 3000 dry tonnes of biosolids each year.

"We're now working closely with customers to further boost recycled water use and enhance the resilience and livability of this growing region," said South East Water Managing Director Kevin Hutchings.

**South East Water Ltd**  
[www.southeastwater.com.au](http://www.southeastwater.com.au)

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# BREAKTHROUGH IN TREATING HIGH BOD WASTEWATERS

## A green-tech solution to reduce discharge fees

As environmental laws around the world enforce stricter compliance and higher fees for wastewater discharge, many food and beverage producers need effective, low-cost ways to treat and reduce BOD loads on-site.

For any food processing company, biochemical oxygen demand (BOD) can represent a costly challenge when managing its liquid trade waste. Water health is typically measured by BOD concentrations. High BOD can be expensive to discharge and cause rapid erosion of infrastructure such as sewers and pipes.

### Maximising the power of microbiology

Microorganisms are Nature's best recyclers and decomposers and used in most wastewater treatment systems.

"Our concept is to create the perfect, oxygen rich environment so the microorganisms can perform at their best, consuming pollutants from the wastewater," explained John West, Executive Chairman of BioGill.

The breakthrough BioGill Towers are above ground biological bioreactors which are proving particularly effective in reducing soluble nutrients such as BOD, COD and nitrogen, as well as fat, oil and grease.

The technology is also an ideal performance boost for existing wastewater treatment plants, with excellent results recorded in the Philippines and the Middle East.

"By combining science, smart technology and natural biological processes, we have delivered an extremely effective and compelling green-tech solution for wastewater treatment," added John.

### No aeration — save on energy use

Conventional submerged wastewater systems aerate the wastewater to provide oxygen for the microorganisms. This aeration process is inefficient, energy hungry and expensive.

BioGill technology takes a more innovative approach. Heat generated by the biofilm creates natural convective air flow inside the unit, so no powered aeration or energy hungry blowers are required.

"From wineries and breweries, to candy producers, meat processors and dairies, across Australia, Asia and North America, our bioreactors are reducing the nutrient load in wastewater and helping producers meet environmental targets," said John.



### Winery tackles BOD on-site and wins

Canadian winery Cave Spring Cellars is committed to environmentally friendly and sustainable winemaking.

In October 2015, a system using four BioGill bioreactors was installed and proved highly effective, lowering the BOD in the winery wastewater by up to 99%. Prior to treatment, the BOD from the non-vintage loads can be up to 9,645 mg/L. Following a 22-hour treatment cycle, the BOD has been reduced to 101 mg/L.

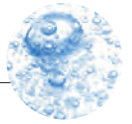
Cave Spring Cellars has since been awarded Ontario's first certified sustainable winery for its wastewater treatment, waste management and energy savings initiatives.



*Demand is increasing globally for natural, low energy biological water treatment solutions. With projects operating in more than 18 countries, BioGill is now seeking additional Distributors for the Asia-Pacific region. For details contact P: +61 2 8543 2200.*

**BioGill Operations Pty Limited**  
[www.biogill.com](http://www.biogill.com)





## SMS MODULE FOR REMOTE UV PURIFICATION MONITORING

UV water purification systems are an environmentally sustainable option for a variety of water treatment applications. The problem has been monitoring the equipment in areas that are remote or difficult to reach. Now, anyone with mobile phone coverage can monitor their UV water purification system anywhere and anytime.



UV-Guard has released an SMS module that will send status alerts to maintenance staff or facility operators via SMS. The alerts include warnings of lamp failure, low UV intensity readings, power failure, end of lamp life and system operation initialisation. The module integrates into UV-Guard's programmable logic controller (PLC). It provides specific UV system status descriptions so the user knows exactly what the issue is in real time. As a result, maintenance interventions can be arranged easily and efficiently. The SMS module is suitable for UV water treatment systems located in hard-to-access areas like roofs. It can also be used by mining and remote communities as well as farmers.

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

## BIOLOGICAL WASTEWATER TREATMENT

With wastewater from kitchens, bathrooms and public areas to consider, hotels need a solution that is effective and easy to maintain. For many, environmental impact is also a significant consideration.

To prevent blockages, many hotels are turning to biological drain products to 'clean' wastewater, but many of these solutions use solvents or free enzyme treatments which can damage the environment and don't prevent odour. NCH provides a biological concentrate that improves effluent flows throughout the drain network, reduces foul odours and provides more sanitary environments.

The drain liquid is being used in hotels for maintaining grease traps, drain lines, septic tanks and sewage treatment systems. It is claimed to contain 1000 times more bacteria than the nearest competitor, with 30-500 trillion live bacteria delivered daily into drains.

With traditional treatments, most bacteria get flushed through the pre-treatment system before they become active. NCH provides bacteria that are live and begin feeding and multiplying the instant they enter the wastewater stream or drain system.

The service has NSF L2 approval, making it appropriate as a bacterial/enzyme drain and sewer treatment for use in and around food processing areas, which reduces manual cleaning, hydro jetting and the amount of waste in grease traps while extending pumping intervals.

NCH Australia  
[www.nchasia.com/en-au](http://www.nchasia.com/en-au)

## Compact vibration monitoring of two measurement points.



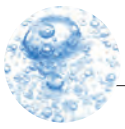
### Offers more than ISO monitoring

- VNA001 for vibration monitoring of an external measurement point, alternatively 4...20 mA current signal, e.g. temperature
- Two vibration values e.g. velocity and acceleration or shock and bearing noise
- Freely adjustable frequency bands e.g. for monitoring according to ISO 10816
- Integrated display with colour change in the event of infractions of the limits



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## water quality feature



### TEST KIT FOR MICROCYSTINS IN WATER

Microcystest is a test for the detection of microcystins and nodularins (hepatotoxins) in water. The kit is based on the protein phosphatase 2A (PP2A) activity inhibition by microcystins and is therefore able to detect the potential toxicity caused by microcystins in water samples.

Under normal conditions, the phosphatase is able to hydrolyse a specific substrate that can be detected at 405 nm. Samples containing microcystins will inhibit the enzyme activity proportionally to the amount of toxin contained in the sample. The concentration of the toxin in the sample can be calculated using a standard curve.

Microcystest is based on the inhibition of phosphatase activity and therefore able to detect potential toxicity of the sample, offering a great advantage against HPLC or ELISA. Therefore, it is able to detect all microcystins variants. The kit does not need standards of each known or unknown microcystins. The only standard used is Microcystin-LR, and results are calculated as equivalents of Microcystin-LR.

The kit is supplied in two different formats: microtitre plates and tubes. The plate kit is designed for a quantitative assay with a working range between 0.25 and 2.5 mg/L. The tube kit for semi-quantitative or quantitative determinations, with a working range from 0.5 to 2.5 mg/L, does not require a microtitre plate reader — just a normal photometer.

Each kit includes a certificate of analysis, showing the quality controls checks that assure performance.

Novasys Group Pty Ltd  
[www.novasys.com.au](http://www.novasys.com.au)



### WATER TREATMENT TECHNOLOGY

Hydro-dis has developed water treatment technology that provides immediate disinfection and is said to improve the efficiency of metal removal. It also provides residual chlorine, which reduces contamination after treatment and gives the water a level that meets the standard of drinking water.

The treatment technology uses in situ electrocatalytic generation of chlorine to disinfect water and can be used for various industries to treat potable water, non-potable water and wastewater. The technique creates chloride ions from salt already present in the water even when it is present in very small amounts, making it suitable for freshwater and saltwater sources.

The machine can be attached to a pipe so that dirty water flows in one end, is treated and then flows out the other side clean. Systems are scalable and can churn up to 10 million litres a day. The device also works to prevent scaling and fouling.

The product is suitable for rural communities which may otherwise use gas plants to treat water. If this gas runs out, it has to be replenished, with trucks travelling out to refill the gas station. Hydro-dis technology does not require additional raw materials such as gas because it used minerals and salts already in the water to fuel the process.

Hydro-dis Water Treatment Systems  
[www.hydro-dis.com.au](http://www.hydro-dis.com.au)

### ABOVE-GROUND BIOREACTOR

BioGill technology offers food and beverage processors a solution to improving on-site treatment and reducing the nutrient load in wastewater.

The breakthrough product is known as the BioGill Tower. It is an above-ground bioreactor that is highly effective in reducing soluble nutrient such as BOC, COD and nitrogen, as well as fat, oil and grease.

BioGill Towers are scientifically designed to provide the right liquid/air, oxygen-rich environment for microorganisms to grow, multiply and consume pollutants from wastewater. This can lead to savings in discharge fees and improved environmental operations.

BioGill Operations Pty Limited  
[www.biogill.com](http://www.biogill.com)



## Water treatment unit delivered to Ichthys LNG Project

Veolia's MPPE unit will be used to treat the gas/condensate produced water stream on the Ichthys LNG Project's floating production storage and offloading facility (FPSO), an initiative of oil and gas company INPEX. The unit will remove dissolved and dispersed toxic constituents like aromatic (BTEX), polycyclic aromatic hydrocarbons (PAHs) and oil, resulting in zero harmful discharge to the environment.

The Ichthys LNG Project will involve offshore preliminary processing of gas from the Ichthys Field to remove water and extract condensate before being transported to onshore LNG processing facilities in Darwin via an 890 km pipeline. Most condensate will be sent to an in-field FPSO, from which it will be shipped to market. The project is expected to produce up to 8.9 million tonnes of LNG and 1.6 million tonnes of LPG per annum, along with approximately 100,000 barrels of condensate per day at peak.

During the production of gas and condensate, formation and dehydration water is co-produced containing toxic dissolved and dispersed aromatics, aliphatics and polycyclic aromatic hydrocarbons. MPPE technology is able to remove all of these toxic compounds securely and in a single process to comply with the



strictest requirements for zero harmful discharge. Two fully automated MPPE units are delivered in one module.

The MPPE unit was designed and built following high offshore standards and is designed for an operational lifetime of 40 years. "We are very proud to deliver this high-tech water treatment system

to help INPEX achieve their ambitious goals," said Erik Middelhoek, managing director of Veolia MPP Systems. "It was a challenging project with a fantastic end result."

*Veolia Australia and New Zealand*  
[www.veolia.com.au](http://www.veolia.com.au)



### NCH Australia offers advanced Wastewater and Water Treatment solutions minimizing energy, water and maintenance costs.

**Wastewater** deliver significant improvements in Wastewater quality and drain solutions.

**Chem-Aqua** specialize in ensuring the safe and reliable operation of critical systems through providing custom water treatment programs.



Contact us for more info: [marketing.australia@nch.com](mailto:marketing.australia@nch.com) [www.nchaustralia.com](http://www.nchaustralia.com)

**NCH**

energy-saving technologies



# Kaishan

## takes the heat off energy wastage

With global requirements for renewable energy sources becoming increasingly significant, it is imperative that Australian industry keeps pace with development in energy-saving technologies.

China-based Kaishan Group manufactures a huge number of air compressors which add almost 1500 MW of electricity demand onto the global energy grid per annum — that's the equivalent of adding a large power station to the world's energy demand each year.

The group is currently making exciting advances available to Australian industry through its fully owned subsidiary, Southern Cross Compressors. Southern Cross Compressors now offers a range of custom designed and built screw expander power plants, improving isentropic efficiency by up to almost 90%.

The broad range of power regeneration options — which include gas, steam and organic Rankine cycle (ORC) — converts otherwise wasted energy into usable electricity, channelled directly back into production or returned to the grid for a significant energy cost reduction to the source company. Using an organic actuating medium to absorb low-grade heat (over 80°C) to drive the rotary screw process, the ORC screw expander technology doesn't need any additional fuel source to generate clean, non-polluting electrical energy from otherwise wasted heat.

The expander system is suitable for geothermal, diesel engine heat discharge, gas pipelines, furnace and waste steam applications. Installing an expander will typically see a return on investment in 12 to 18 months, subject to current energy costs and conditions.

Kaishan Group has already successfully installed a number of operating systems in companies around the world, including the USA,



Indonesia, China and Canada. For example, Chena Hot Springs Resort in Fairbanks, Alaska, developed a business partnership with Kaishan to make the rotary screw expander its complete source of power. To realise this vision, Kaishan created a 300 kW generator utilising rotary screw expansion and synchronous generation technology to turn excess geothermal (hot water) heat into the primary power source.

With a strong presence in over 60 countries and regions, manufacturing plants located in multiple countries and products that meet many applications, Kaishan Group can deliver its energy-saving products all over the world, thereby helping businesses lower costs and improve productivity.

*Southern Cross Compressors (Australia) Pty Ltd*  
[www.southerncrossaircompressors.com.au](http://www.southerncrossaircompressors.com.au)



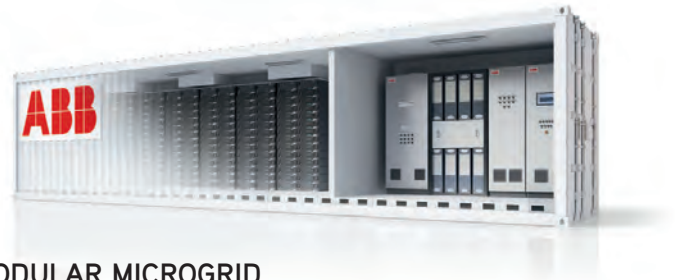
## BATTERY STORAGE PRODUCTS

TrinaBEST has released its lithium iron phosphate PowerCube battery storage products in 9.6, 7.2 and 4.8 kWh configurations, attractively cased and in a variety of colours. The system, once installed, is AC-coupled, enabling it to operate independently of the grid during outages and allowing the stored energy to be sold to the grid as well as used in the home.

The products feature a modularised, lightweight design that facilitates handling by a single technician. The engineering and design characteristics also allow energy storage to be retrofitted to an existing residence without the need to abandon or disable pre-existing inverters, thus reducing the cost.

The products are said to be suitable for a majority of Australian households, as they can be easily tuned in to existing rooftop systems without wastage of previously acquired equipment.

MPOWER  
[www.mpower.com.au](http://www.mpower.com.au)



## PLUG-AND-PLAY MODULAR MICROGRID

ABB has announced a modular and scalable plug-and-play microgrid to address the growing demand for flexible technology in the developing market for distributed power generation. It is relevant for mature and emerging countries and will help maximise the use of renewable energy sources while reducing dependence on fossil fuels used by generator sets.

All the equipment required to run the microgrid — ABB's power converter and dedicated control system, Microgrid Plus, as well as battery storage — has been integrated into a container for fast, easy and safer deployment. The user can choose to configure the microgrid to integrate energy from solar, wind, main grid or diesel generator supply, based on the application and local conditions.

ABB's PowerStore Battery and Microgrid Plus control system not only provide power access to remote areas, but also secure uninterrupted power supply to communities and industries during both planned and unplanned power outages from the main grid supply. Operations and maintenance is enabled via a cloud-based remote service system. The modular microgrid is compact and has four predesigned variants in the range of 50 to 4600 kW to meet varying user needs. The standard integrated functionalities include grid-connected and off-grid operation with seamless transition.

ABB Australia Pty Ltd  
[www.abbaustralia.com.au](http://www.abbaustralia.com.au)

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Municipal waste

# Ray of light for underground waste collection

An underground waste collection system is being launched in the Sunshine Coast Council area as part of a major redevelopment program that will deliver some of the nation's most sustainable building design and create over 30,000 jobs by 2040.

**E**nvac, which invented underground automated waste collection in the 1960s, will handle the waste of over 2000 apartments, retail outlets and commercial space in Maroochydore, which was declared a Priority Development Area by the state government in July 2013.

Replacing traditional bins will be Envac's waste inlets, which connect to an underground pipe network and transport waste using airflow to a central waste collection station. The system will collect three waste streams including general, organic and recyclable waste.

Sunshine Coast Mayor Mark Jamieson has said that the waste system will be installed in stages over the coming decade and make the 53-hectare Maroochydore City Centre one of the cleanest and greenest cities in the country.

"I'm very proud the Sunshine Coast is leading the charge in Australia with this innovative waste collection solution and I'm sure other cities and major urban projects will soon be following in our footsteps. The rubbish revolution means that city workers and residents will never have to walk past rows of wheelie bins or be woken early by noisy garbage trucks in the Maroochydore City Centre. Common aspects of waste collection such as odours and vermin will be avoided, and the costs of daily street cleaning

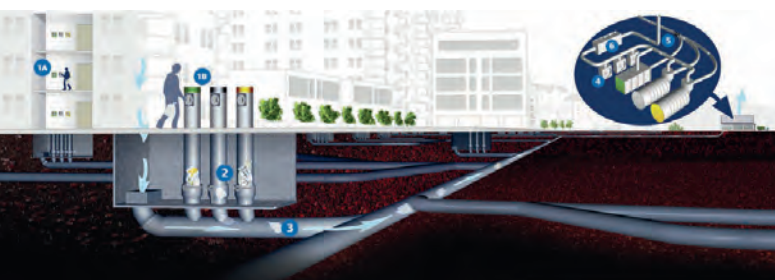
will be reduced. As well as making our city heart more attractive, this technology has a track record of increasing recycling rates, so our natural environment will benefit too."

Envac is one of many smart city innovations being implemented in Maroochydore. Other technologies will include smart lighting, real-time traffic management systems and high-speed fibre connections. The waste system will cost \$20 million, 50% of which will be fully recovered from occupants of the development over the life of the system and 50% by the developer.

John Knaggs, CEO at SunCentral Maroochydore, which will oversee the design and delivery of the new city centre, added: "Automated underground waste collection is just one of the ways in which the new Maroochydore CBD will be one of the smartest cities in Australia. Envac's technology can be installed because we are building on an undeveloped, greenfield site within an existing urban area — and that has many other benefits. For instance, we are also building a high-speed, fibre-optic network into the city's very foundations, which will enable us to provide 'smart' signage, free Wi-Fi hotspots, real-time transport information, movement sensors and smart lighting. Our city centre will be an exciting place to live, work and visit while setting a new standard for urban design in Australia."

Envac Asia's Regional President Chun Yong Ha concluded: "Our systems are becoming increasingly popular across the Asia-Pacific region and we are delighted the Maroochydore CBD will be our first Australian customer. The Sunshine Coast is a beautiful part of Australia and our system will help it stay that way by increasing recycling as well as cutting emissions, and reducing safety risks associated with manual garbage collection."

Envac Australia Pty Ltd  
[www.envac.com.au](http://www.envac.com.au)



## MICROINVERTER AND AC BATTERY

Enphase Energy's smart grid-ready S-Series Microinverter and AC Battery have been certified as compliant to the AS/NZS 4777.2:2015 grid connection standard.

They are fully compliant to AS/NZS 4777.2:2015 when installed with the Envoy-S Metered +DRM Communication Gateway. These products have also been listed as approved equipment by the Clean Energy Council in Australia.

AS/NZS 4777.2:2015 replaces AS/NZS 4777.2:2005 and AS/NZS 4777.3:2005, which expire on 9 October 2016. The standard provides a framework for advanced grid functions and demand response features that enable intelligent distributed energy resources such as the Enphase S-Series Microinverter and AC Battery to contribute to the smooth functioning of the electrical grid and allow greater adoption of renewable resources.

Enphase Energy  
[www.enphase.com/au](http://www.enphase.com/au)

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## FLOW SWITCH/MONITOR

Designed for industrial processes, manufacturing operations, pumps, compressed air, gas compressors and HVAC systems requiring flow assurance and alarming, the compact SIL 2 compliant FS10i Flow Switch/Monitor from Fluid Components International (FCI) features good performance and operation.

Wherever detection and user warning of a flow rate that is either too high, too low or a no-flow condition is required, the flow switch/monitor can be used. In air, gases, water or other liquids, the flow-sensing instrument can be used for repeatable and fast-responding flow trip point or alarm warning within seconds.

The product features air/gas sensitivity and a setpoint range from 0.076 to 122 MPS, or from 0.003 to 0.15 MPS for water or liquids. It is suitable for use in fluid temperatures from -40 to 212°C and at pressures up to 138 bar, with applications including cooling water and fluids, leak detection, lubricant flow assurance, ventilation verification, chemical injection assurance, nitrogen purge verifications and compressor leak detection.

The device comes with a 1 A relay output for alarm/trip point setting, instead of an open collector, and a 4–20 mA analog output for trending and monitoring. Trip points can be set as high or low and can be adjusted with hysteresis and/or time delay settings. The 4–20 mA output is rangeable by the user in the field installation.

Developed with FCI's no-moving-parts thermal dispersion sensing technology, the flow switch/monitor is temperature compensated for dynamic plant and process operating conditions. It is constructed of all wetted parts and manufactured with 316L stainless steel and Hastelloy C22 thermowells for years of service with virtually no maintenance.

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

## INTELLIGENT ENERGY MANAGEMENT SOFTWARE

InfoSyte, an energy management software solution from NHP, has been tailored for the Australian and New Zealand markets.

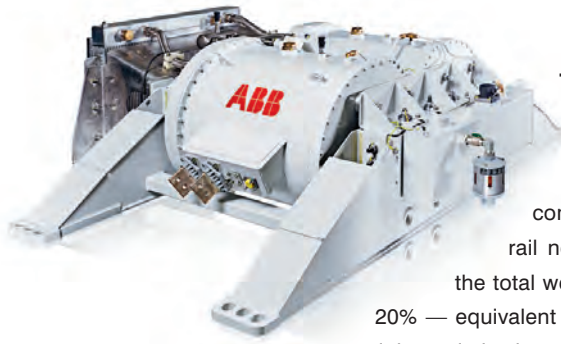
The powerful cloud-hosted energy management platform has the ability to integrate with energy, water and gas measuring devices along with other facility systems such as building management systems (BMS) and heating, ventilation and air-conditioning (HVAC) systems. It offers a comprehensive range of features, such as in-built reporting (including NABERS reporting), analysis and trending functionality, fault detection and diagnosis, and configurable user dashboards.

Responding to the growing challenge and need to interpret collected data for real-world application use, the platform enables the visualisation of data to provide an engaging and intuitive user interface — all in real time. Users will gain valuable insight into their facility operations, empowering them to identify process improvement opportunities and effective management of energy consumption.

NHP Electrical Engineering Products Pty Ltd  
[www.nhp.com.au](http://www.nhp.com.au)



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## TRACTION TRANSFORMER

ABB's Effilight traction transformer is designed to reduce the weight of onboard components and ensure more energy-efficient rail networks. The product can potentially reduce the total weight of a train's traction component by up to 20% — equivalent to the weight of around 20 passengers. This weight optimisation can help train carriages attain the maximum load per wheel set and reduces wear.

Traction transformers feed power at safe voltages to essential train functions like traction, lighting, heating and ventilation, passenger information, brakes, signalling and communication. Traditionally made of iron and copper, these transformers are among the heavier components on a train. They use oil for insulation and cooling, but this contributes to a significant proportion of the transformer's total weight.

The Effilight transformer uses a high-technology cell design that reduces the amount of oil needed by up to 70%, without compromising functionality. The technology enables weight reduction and energy savings for train manufacturers and rail operators. With the weight savings achieved through the innovative design, higher quantities of energy-efficient materials like copper can be used in the transformer, resulting in reduced energy losses by up to 50% compared with standard solutions of similar weight. This helps optimise energy consumption and total cost of ownership.

ABB Australia Pty Ltd  
[www.abbaustralia.com.au](http://www.abbaustralia.com.au)

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## DIGITAL PANEL METERS

Bestech Australia has introduced a series of digital panel meters with rotation, speed and flow rate measurements. The WPMZ series addresses issues such as complicated operation and displays that are hard to read.

The meters feature a 2.4" TFT full-colour LCD display which allows simultaneous display of two channels. A user-friendly settings menu makes it easy to select between display values, bar graphs and trend graphs for quick analysis.

The series consists of two separate meters, the WPMZ-5 and WPMZ-6. Both units feature an input frequency range from 10 MHz to 500 kHz for single-channel input and up to 250 kHz for two-channel input. A response speed of 25 ms ensures smooth operation and fast feedback.

The WPMZ-5 provides rotation and speed measurements and can be connected to a number of sensors including magnetic speed sensors, photoelectronic sensors, slit sensors and rotary encoders. An example application would be the control of rotation in a delivery roll and pull roll conveyor belt system by measuring rotation speed.

The WPMZ-6 provides instantaneous and integrated flow rate measurements with a maximum sampling rate of 100 times/s for analog inputs. An example application would be to stabilise the mixing process by monitoring the difference of flow rate between two different liquids.

Bestech Australia Pty Ltd  
[www.bestech.com.au](http://www.bestech.com.au)



## RESIDENTIAL BATTERY STORAGE SYSTEMS

LG Chem has announced its next-generation residential battery storage system. The system has been completely redesigned both internally and externally, leaving a recently developed battery cell as the centrepiece.

The company now offers low-voltage (48 V) and high-voltage (400 V) variations in order to meet energy requirements of photovoltaic systems users in Australia and New Zealand. The RESU models come with the capacities to generate from 3.3 to 9.8 kWh in the low-voltage and 7 to 9.8 kWh in the high-voltage variation. With a battery from the series, users can save on energy costs by utilising solar-generated power in the evenings.

The storage series includes two high-voltage battery systems, RESU7H and RESU10H, along with the low-voltage battery systems RESU3.3, RESU6.5 and RESU10. The high-voltage models provide a variety of inverters that consumers can select in order to convert solar DC into usable AC.

With the expansion kit RESU Plus, it is possible to combine two models within the low-voltage class together. The range of capacity thus moves in the low-voltage range from 3.3 to 19.6 kWh. All models are available in silver and champagne gold.

The models are available in an IP55-certified, waterproof casing, making them suitable for installation and configuration outside the house.

LG Chem Energy  
Solution Company  
[www.lgesspartner.com](http://www.lgesspartner.com)

## THERMAL MASS BOARD

Knauf Australia has launched Comfortboard to the Australian market, providing architects, designers and specifiers with a thin, lightweight thermal mass lining featuring the ease of installation that comes with a standard plasterboard product. It allows for a space-saving efficiency of 5–8%, effectively increasing the value per square metre.

The technology in the board reduces the reliance on mechanical heating and cooling. Projects that are constructed using the thermal mass lining will be able to better meet sustainable requirements from the perspective of building management and maintenance. The temperature-control attributes of the product last for the life of the board.

The board, which incorporates Micronal phase-change materials (PCM), helps to increase comfort and reduce energy costs by smoothing out temperature extremes in a room. The PCM in the board is made up of microscopic acrylic polymer balls filled with paraffin wax. As a room heats up, the paraffin wax absorbs the heat and turns to a liquid, storing the heat inside the board. When the temperature drops again the paraffin wax solidifies and releases the heat back into the room, helping to maintain a comfortable temperature of around 23°C.

The product has been designed to be installed in the same way as a standard plasterboard product. By removing the need for any changes or additional steps in the construction process, the lightweight building material can be quickly installed like any other wall lining. Unlike traditional bricks, it can even be installed in ceilings, further adding to the effectiveness of a temperature-sensitive design.

Knauf Australia  
[www.knaufplasterboard.com.au](http://www.knaufplasterboard.com.au)



## DIN-RAIL MOUNT POWER SUPPLY

The Puls CP10 series is a 240 W, one-phase, DIN-rail mount power supply with a width of just 39 mm. It is available in 12, 24 and 48 V versions.

Built to within various applications, the power is available over a wide temperature range from -25 to 60°C. Additionally, there are power reserves of 20% included, which may even be used continuously at temperatures up to 45°C.

Control Logic Pty Ltd  
[www.control-logic.com.au](http://www.control-logic.com.au)



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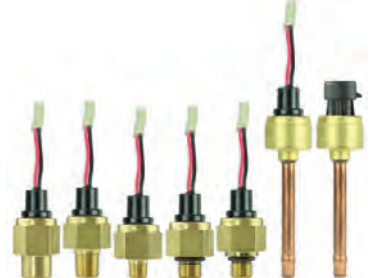


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## HEAVY-DUTY PRESSURE TRANSDUCERS

Honeywell has expanded its line of pressure monitoring sensors designed to minimise the total cost of pressure management for HVAC and refrigeration systems. The PX3 series heavy-duty pressure transducers convert pressure into an analog electrical signal.

The sensors feature a brass housing and can support multiple configurations to help end users minimise implementation and production costs. They feature low-current consumption to help reduce system energy costs, while also enhancing product life when used in battery-driven systems.

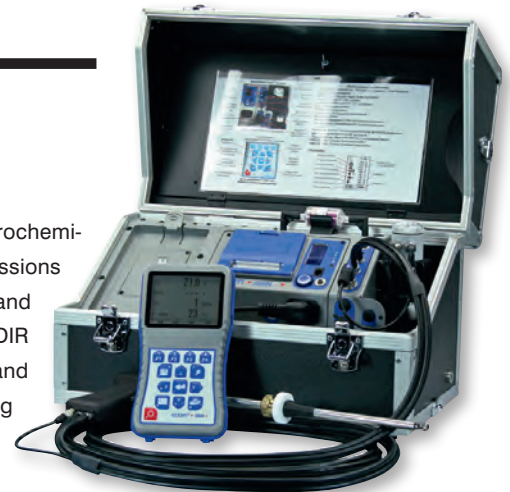
The pressure transducers are compatible with many next-generation, low global-warming potential (GWP) refrigerants, including Honeywell's Solstice N40. The line expands the sensors' pressure range to 1 to 50 bar (15 to 700 psi).

The series also offers: freeze-thaw resistance to frost, which is commonly found in refrigeration systems; high electromagnetic compatibility (EMC) radiated immunity to operate consistently in the presence of wireless signals, radiofrequency communication and electrical devices; shock and vibration tolerance; a wide operating temperature range; and durable design, with a high surge immunity at  $\pm 1000$  V line to ground per IEC 61000-4-5.

Honeywell Process Solutions  
[www.honeywellprocess.com](http://www.honeywellprocess.com)

## EMISSIONS ANALYSER

The J2KN series analyser utilises electrochemical sensors to measure exhaust emissions — most commonly O<sub>2</sub>, CO, NO, NO<sub>2</sub> and SO<sub>2</sub> gases — and has an available NDIR bench for measuring CO<sub>2</sub>, high CO and CH<sub>4</sub>. The robust filtering system, along with the Peltier gas cooler and 9 V highflow pump, ensures a clean sample and high flow rate, which is necessary for accuracy and repeatability.



The sensors are monitored, which compensates for temperature changes in even harsh testing environments, and the CO sensor has a dedicated fresh air pump that is activated if a maximum concentration limit is exceeded (usually 4000 ppm). The robust sample conditioning features, high-speed flow rate and sensor monitoring ensure high performance for the ecom-J2KNpro.

The product is fully loaded with sensor options and features, which allow it to be used in many different applications. These applications include emission testing on stationary engines, generators, compressors, boilers, burners, turbines, heating equipment, pumps, diesel engines, mining equipment (to control DPM), construction equipment, laboratory combustion equipment, alternative fuels research and more.

The analyser is also used for fuel efficiency testing, combustion tuning, maintenance checks and emissions compliance reporting. The types of fuel burnt that can be tested on the J2KN series include natural gas, oil, diesel, coal, wood, biomass, butane, propane, biodiesel and other alternative fuels. Gasoline emissions may be tested with the ecom-J2KNpro industrial, but this requires the NDIR bench (for CO).

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



# Let it go, let it go... in the right bin, please

When considering the likelihood of recycling versus waste going to landfill, is plastic, paper or compostable food packaging better for the environment? Taronga Zoo recently posed this question to Edge Environment and the resulting life-cycle assessment (LCA) yielded surprising results.

**E**arlier this year, Australian news outlets burst a bubble: our fondness for takeaway coffee has become an environmental burden.

Imagine the collective whine across the nation: "Not the coffee, too!"

It seems like everything these days is bad for the environment, right? Plastics kill fish, pesticides kill bees, cosmetics and cookies kill orangutans, cars, planes and trucks are stinking up the environment and our health... even our sporty fleece jackets, when washed, shed tonnes and tonnes of tiny particles that are ending up in the oceans doing goodness knows what.

Some people might say that no matter what we do, we're always going to be in the wrong, so we might as well do whatever we want and blissfully wash our hands of caring.

The other way to look at it is that the reason why everything these days seems to be a problem is because we care and because we bother. Since Rachel Carson's *Silent Spring* awakened a collective environmental consciousness in the 1960s, we've

become more aware and involved in detecting and preventing environmental damage.

## But back to coffee

It is estimated that Australians use 1 billion disposable coffee cups each year. 1 billion cups are used once and then become waste. The same problem extends to all kinds of food and beverage containers: it's not only about coffee, but also tacos, fish and chips, sandwiches, sushi, ice-cream... Hence, the magnitude of the problem is much bigger than 1 billion cups. It isn't known for sure what happens to that waste, but it's estimated that 90% ends up in landfill. This statistic has led entire countries to ban plastic food containers, and some cities and communities want to ban bottled water, too.

What's the alternative, then? One proposed alternative is compostable packaging, such as biopolymers and bamboo. The premise is convenient: they're made from plants, which sequester CO<sub>2</sub>, and after using them we can throw them in a worm farm

*continued over >>*

## life-cycle assessment

or bury them in our yard and after a while they just turn into soil nutrition.

### Does this solve our problem?

This is the question Taronga Zoo asked Edge Environment.

Taronga switched to serving food and beverages in compostable packaging at their events, such as the Twilight concerts. However, they've had trouble getting people to separate the waste. At the end of the day, when everybody's rushing to the ferry, the stubbies and the compostable sushi tray mingle in the same bin.

Edge used LCA and its sustainable procurement expertise to provide Taronga with the best solution. LCA allowed the company to compare, from cradle to grave, the environmental impact of compostable packaging versus plastic and paper packaging.

### The result

It may surprise some that if all the waste ends up in landfill, plastic packaging is preferable to paper or compostable — as organic products, the latter release methane when decomposing

slowly and without oxygen, resulting in a higher carbon footprint.

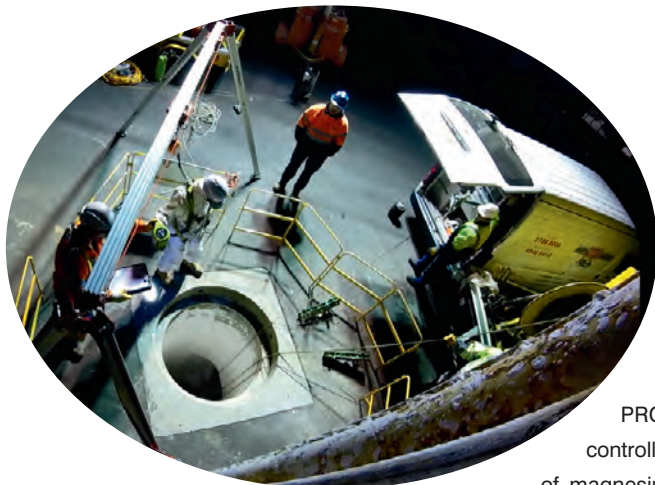
But the picture changes completely when the packaging waste is separated at source. Paper becomes a better alternative if at least 46% of paper packaging gets recycled. For compostable packaging to be the more environmentally friendly alternative in comparison to plastic, at least 75% of the compostable packaging needs to be composted rather than landfilled.

### So what can Taronga Zoo do?

Edge's recommendation, for Taronga and any organisation with similar dilemmas, starts with establishing procurement guidelines that are science based. This will ensure that supply chain decisions are guided towards minimal-impact operations, not only for material purchases but also waste management services.

Simultaneously, Taronga should use its position as a conservation organisation to educate visitors and stakeholders about the relevance of minding our waste.

Edge Environment Pty Ltd  
[www.edgeenvironment.com.au](http://www.edgeenvironment.com.au)



### CORROSION PROTECTION FOR MANHOLES

PROTECTA-Mag is a concentrated, controlled-viscosity, stabilised suspension of magnesium hydroxide. It prevents corrosion by raising manhole surface pH, thus inhibiting the formation of acid-producing bacteria (eg, *Thiobacillus concretus*).

The product contains special ingredients to allow it to adhere to concrete surfaces and set into a durable film. It is hydrated from Calix reactive magnesium oxide, imparting good neutralisation capability due to the high surface area. Spraying is carried out without stopping flow of the sewer.

The overspray of product entering the sewer flows is complementary and beneficial for any downstream sewage treatment plant (STP) and odour control. Magnesium hydroxide is non-hazardous and non-dangerous, thus preventing occupational exposure to toxic or harmful chemicals. According to the company, initial monitoring results indicate that a sacrificial magnesium hydroxide coating continues to protect the integrity of concrete sewer pipes in spite of continuous sewer flow for more than three years; for manholes, the protection can last more than five years.

Calix Limited  
[www.calix.com.au](http://www.calix.com.au)



### VALVE ACTUATOR

Rotork has introduced the IQ19 — a non-intrusive, intelligent, electric actuator with an optimised combination of valve stem diameter acceptance and torque output to facilitate the automation of valves and penstocks typically found in the water and effluent treatment industries.

The actuator combines a stem acceptance of up to 51 mm diameter with torque output up to 135 Nm and output speeds up to 72 rpm. The combination meets the operating requirements of large numbers of penstocks, sluice gates and gate valves.

The actuator incorporates a range of functionality and asset management features, including data logging capabilities. It features the IQ double-sealed IP66/IP68 watertight and temporarily submersible enclosure, which permanently protects internal electrics from the ambient environment — even during site wiring with the terminal housing cover removed.

Rotork Australia  
[www.rotork.com](http://www.rotork.com)



## Waste management facility for winery



Queensland-based winery Sirromet takes just as much care with its waste management and impact on the environment as it does with its wine production, recently relocating and installing a new \$700,000 waste treatment facility on its Mount Cotton property. The fully computerised waste treatment facility has taken 15 months to install and has the capacity to process 50,000 L of waste per day, with a holding capacity of 350,000 L.

“Everyday waste management, such as placing rubbish into the waste bins and rates for sewage and water usage, all comes at a cost,” said chief winemaker and project manager Adam Chapman.

“At Sirromet, we want to put money into developing new waste and eco strategies to enhance the environment and at the same time reducing our annual costs for waste removal.”

Chapman said the new waste treatment facility pours 58,000 L/year of old sludge onto drying beds which are designed to evaporate 85% to atmosphere, with the balance sent to Sirromet’s worm farm.

“Our wastewater plant treats and re-uses approximately 7.6 million litres of water a year and we use this recycled water to water the plants and vines on the property,” he said. “Our worm farm not only treats the carbon-based waste from the dry sludge, but our worms also take care of 150 tonnes of skins and stems from the winery annually.” Along with compressing and reselling 40 kg bales of plastic up to

40 times a year and recycling approximately 250,000 glass bottles a year, the winery has 800 solar panels spanning two buildings, generating 200 kW of solar power — enough to run 50 households.

In addition, Sirromet utilises a cogeneration system in the winery fridge plant, circulating approximately 30,000 L of 55°C hot water back into the feed of the gas water boilers, saving over \$100,000 a year. The winery has also adopted

temperature-saving designs with double concrete thickness flooring to prevent warmth increase from the earth through the floor, as well as air tunnels on the storage building allowing any heat to be sucked out of the roof space before entering into the storage facility.

Chapman concluded that Sirromet is no ordinary winery or production facility.

“We are constantly redeveloping our processes and are looking to the future to ensure we remain as sustainable and accountable to the environment as we possibly can,” he said.

“Looking to the future of wine production, we are beginning to adopt life-cycle analysis (LCA), which is popular in the United Kingdom and is gaining awareness in Australia. By developing carbon labelling we will be able to show consumers what Sirromet is doing not only to help save the environment, but to show the full life cycle of a bottle of wine’s production and also express in grams per litre the carbon dioxide equivalents.”





## LOW-PRESSURE SCREW BLOWERS

Kaeser Compressors' energy-saving, low-pressure screw blowers are now available in three sizes. Featuring an integrated Sigma 2 Controller, optimum performance is ensured at all times and helps provide a dependable supply of compressed air.

The DBS, EBS and FBS series screw blowers are said to be up to 35% more efficient compared to conventional rotary blowers. The rotors are uncoated so users can be assured that their efficiency remains intact even after years of use. The data provided for the effective total energy consumption and usable flow capacity corresponds precisely to the machines' actual performance.

For optimal performance, the Sigma Control 2 controller provides continuous and comprehensive monitoring and allows straightforward connection of each machine to a communications network. 'Traffic light' LED indicators show operational status at a glance. Along with plain text display, 30 selectable languages and soft-touch keys with icons, the controller offers fully automated monitoring and control.

Where multiple blowers are being used, additional optimisation can be achieved by incorporating the Sigma Air Manager 4.0 (SAM 4.0) master controller. Due to its high level of data integration and multiple interface options, it can be easily integrated into advanced production, building and energy management systems, as well as Industry 4.0 environments.

The screw blowers deliver flow rates from 6 to 67 m<sup>3</sup>/min with a pressure differential up to 1.1 bar and drive powers ranging from 22 to 110 kW. Sectors such as the food and beverage, pharmaceutical, chemical, pulp and paper, textile and construction materials industries, along with applications such as wastewater treatment, pneumatic conveying systems and power generation, can benefit from the screw blower technology.

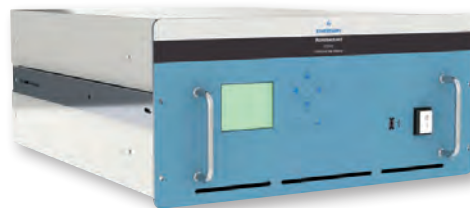
Kaeser Compressors Australia  
[www.kaeser.com.au](http://www.kaeser.com.au)

## WIRELESS SENSOR NETWORK

Structural health monitoring systems are used to detect damage in buildings, bridges, ships and aircraft. These systems consist of a device that collects and stores vibration measurements from a small number of sensors, which monitor structural response to ambient vibration (wind, passing vehicles) or forced excitation. Wireless sensor networks are a natural candidate for structural health monitoring systems, as they simplify deployment of instrumentation caused by power and wiring constraints. This can cause significant set-up delays and limit the number and location of sensors.

The BeanAir wireless sensor network (WSN) enables real-time monitoring of performance and environment. An integrated system allows BeanGateway (data collecting via Ethernet or Modbus)/BeanDevice (wireless sensors including accelerometers, inclinometers and temperature, humidity and light sensors) to operate without an internal battery. The use of WSNs on oil and gas platforms focuses on monitoring the production process to either prevent or detect health and safety issues or to optimise and increase production. The wireless can be used to monitor remote pipelines, corrosion, equipment condition, real-time reservoir status and so on.

Bestech Australia Pty Ltd  
[www.bestech.com.au](http://www.bestech.com.au)



## CONTINUOUS GAS ANALYSER

In response to the need for an easy-to-use process gas analysis and emissions monitoring system, Emerson has released

the Rosemount CT5400 continuous gas analyser.

Combining tuneable diode laser (TDL) and quantum cascade laser (QCL) technologies within the same analyser, the product uses a 'laser chirp' to provide near-instant high-resolution spectroscopy to detect and identify a range of molecules in both the near and mid-infrared range of spectroscopic light, with an enhanced dynamic range from sub ppm to percent levels. The modular and scalable design of the device can incorporate up to six high-resolution laser modules and can detect, measure and monitor up to 12 critical components simultaneously, eliminating the need for multiple analysers and sample handling systems.

The rack-mount analyser is designed for process applications, DeNOX/SCR, ammonium nitrate precursors, continuous emissions monitoring systems (CEMS) and continuous ambient monitoring systems (CAMS). Sharing many of the same measurement principles as the Rosemount CT5100 analyser, it is a suitable alternative for plants with an existing shelter or safe area application.

By using the chirp methodology, the laser-based gas analyser has a quick response time and makes continuous measurements. Sub-second measurements give operators the ability to make adjustments to their processes and avoid upsets. The measurement is direct, or 'first principle', unlike traditional technologies where the measurements are inferred. This eliminates the need for frequent calibration, saving engineer time and reducing running costs.

Emerson Automation Solutions  
[www.emersonprocess.com.au](http://www.emersonprocess.com.au)

## FLUORESCENCE-BASED OIL ALARM SYSTEM



The OPTIMARE SpillWatch! non-contact oil-on-surface detector provides users with a timely alert enabling countermeasures to stop or limit spillage, therefore reducing the cost for remediation and clean-up and limiting damage to the environment. The sensor technology is based on fluorescence excitation and detection. Its innovative optical set-up and all-solid-state optoelectronic components ensure high sensitivity and allow low-maintenance operation. The system automatically filters out ambient conditions (eg, sunlight), providing detection under all light, weather and surface conditions.

The device is designed and manufactured for deployment in harsh and rugged environments, such as pipelines, power plants, harbours and desalination plants. It is IP66 rated in a weatherproof stainless steel housing.

Automated Control Pty Ltd  
[www.automatedcontrol.com.au](http://www.automatedcontrol.com.au)

## CONTROLLER SERIES

The Modicon M171 controller series is at the centre of Schneider Electric's offering for HVAC and pumping applications, focused on building automation. The series includes the Modicon M171 Optimised and Modicon M171 Performance.

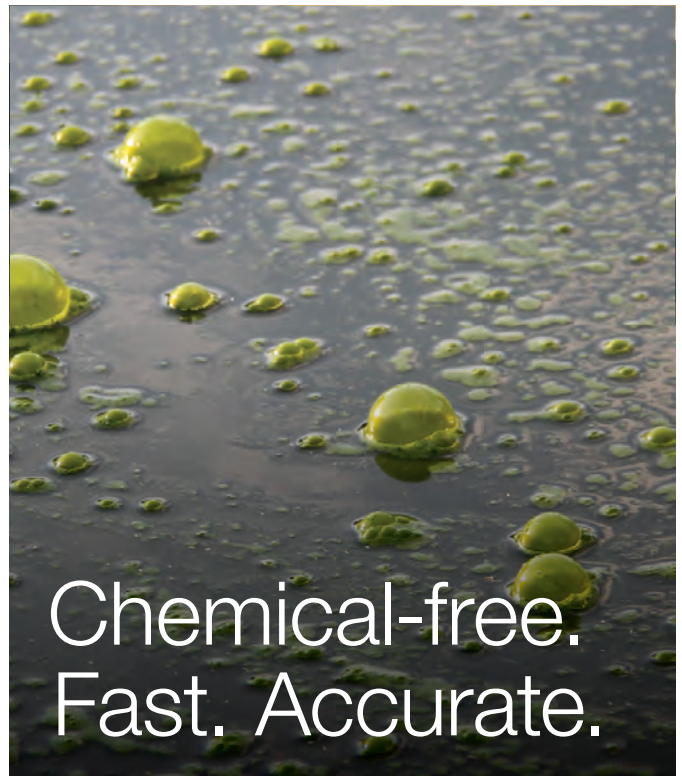
The controller can be either DIN rail or wall mounted and is equipped with up to 27 integrated inputs and outputs. Additional controllers can also be networked.

The product is supported by ready-to-use architectures and application function blocks (AFB) which can be managed in just one intuitive software environment. The AFBs reduce energy consumption and help to improve system efficiency.

The controller includes Modbus SL and RS485/RS232 interfaces as part of the standard configuration. These allow the product to connect to a wide range of automation and instrument components, as well as providing access to the internet for remote reporting and retrieval of system data. The Performance class can be integrated into BMS architectures. This is achieved by docking appropriate communication modules onto the controller. Depending on the version, they can provide web visualisation and remote download functions. The Optimised class offers a streamlined unit, free of superfluous and extra functionalities, for users who want to develop simple to moderately complex solutions without requirements for BMS architecture integration. A Modbus SL or LAN expansion bus interface is integrated into the controller to allow set-up of a simple communication network.

An assortment of components is available for both controllers: thermostats equipped with a display for wall mounting; temperature, humidity and pressure sensors in various designs; and electronic expansion valve drivers.

Schneider Electric  
[www.schneider-electric.com.au](http://www.schneider-electric.com.au)



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SCIENTIFIC

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## BUILDING MANAGEMENT SYSTEM

Honeywell has released its upgraded building management system, Enterprise Buildings Integrator (EBI). EBI R500 leverages the connectivity of today's buildings to help make them strategic assets to organisations.

The building management system facilitates the integration of systems relating to security, comfort, life safety and energy control, among other functions. It gives users a single point of access and consistent view of information and resources through a seamless 'integration of things' that enhances a user's ability to monitor, manage and protect a facility, campus or multisite operation.

Performance improvements have increased point capacity by 200%, helping increase overall building connectivity while reducing IT costs with fewer EBI servers required. Facility managers can gain more granular levels of building data such as room temperatures, humidity levels, air quality, access control points and video surveillance feeds. EBI features a mobile application that provides facility managers with greater situational awareness of building performance and operations. Facility managers can receive push notifications to their smartphones and tablet devices on possible building system and equipment issues before system failures or disruptions to the organisation's operation.

The mobile app allows for remote access to and management of building systems and data. Additionally, EBI is cloud enabled and can connect with a range of Honeywell cloud services, some of which analyse facility data and facilitate decisions on improving building performance and reducing energy costs.

The product is compatible with the latest Microsoft Windows operating system and Windows 2012 server. It communicates with open protocols like BACNet, OPC and LonWorks, which helps users integrate with third-party software and hardware and benefit from the scalability and flexibility that come with an interoperable architecture.

Honeywell Building Solutions  
[www.honeywell.com](http://www.honeywell.com)



## GROUND CONTROL POINTS FOR DRONE SURVEYING

Propeller Aero has announced the launch of AeroPoints — smart ground control points that makes it easy for anyone to capture survey-accurate mapping using drones. The technology provides a simple solution to one of the major roadblocks to widespread commercial drone adoption: accuracy.

Typical ground control requires establishing precise geolocation position using surveying equipment, and then securing a visible ground marker exactly on the pre-marked GPS point. AeroPoints are portable ground control markers, visible from the air and capable of quickly capturing their own position down to 2 cm accuracy.

AeroPoints work with any camera or drone and integrate seamlessly with a cloud-based data platform and processing engine. To use the ground control points, simply lay them down, fly the drone and then pick them up again. They'll automatically connect to a wireless or mobile hotspot when back in range to upload captured positional data.

The ground control points make capturing data easy for companies across the industrial sector, including mining, construction, quarries and landfills. Solar powered, durable and weather resistant, they don't require any on-site connection.

Propeller Aero  
[www.propelleraero.com](http://www.propelleraero.com)



## ENERGY STORAGE SYSTEM

SolarEdge Technologies is extending its StorEdge energy storage solution, which supports increased self-consumption and grid independence.

The product is being expanded to include AC coupling, extended power and capacity, and connection to three-phase SolarEdge inverters. These additional configurations, such as double battery installations, allow for the unit to be tailored to meet the specific energy requirements of home owners.

Now with expanded battery compatibility, the product supports Tesla's home battery, the Powerwall, and the LG Chem's RESU10H battery and RESU7H batteries. In addition, SolarEdge continues to develop alliances across the PV value chain to enhance its storage offering.

SolarEdge Technologies Inc.  
[www.solaredge.com](http://www.solaredge.com)



## POWER FACTOR CONTROLLERS

For the automatic switching of capacitor banks to achieve target power factor, NHP has released the RL8 and RG8 power factor controllers. With an intuitive, easy-to-use interface, the series offers plug-and-play accessory modules providing flexibility to meet any application requirement with options from master/slave configurations to contactor or dynamic switching of capacitor banks.

Features include IP65 front protection, network measurement values including harmonic measurement, step status information and defined alarms. Communication modules are available as plug and play for RS485 or Ethernet MODBUS connectivity for both RL8 and RG8 controllers.

RL8 controller features include: eight relay outputs expandable to 14 steps; voltage and current THD up to 15th harmonic; two expandable slots; and a built-in temperature sensor. The controller will soon feature on PFCW, PFCE and PFCP power factor correction systems.

RG8 controller features include: eight relay outputs expandable to 16 steps; voltage and current THD up to 31st harmonic; eight configurable user alarms; four expandable slots; dynamic switching via thyristor control module (NPFCEXP1001); programmable I/O functions; a built-in temperature sensor; and master/slave functionality.

NHP Electrical Engineering Products Pty Ltd  
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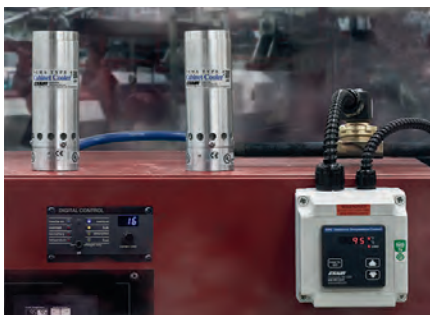
## ELECTRONIC TEMPERATURE CONTROL FOR ELECTRICAL ENCLOSURES

EXAIR's digital ETC (Electronic Temperature Control) is now available for the company's Dual Cabinet Cooler Systems installed on large or high-heat load enclosures. An ETC Dual Cabinet Cooler System will keep electrical enclosures cool while minimising compressed air use. Systems produce -7°C air to eliminate high-temperature malfunctions and protect sensitive electronics from harsh environments. They are available in cooling capacities up to 5600 BTUH.

The ETC accurately maintains a constant temperature in the electrical enclosure that is slightly under the maximum rating of the electronics. It permits just enough cooling for the electronics without going so cold as to waste compressed air. A digital LED readout displays the temperature of the electrical enclosure, then displays the user temperature setting when pressing the 'push to set' button. When that setting is exceeded, the Cabinet Cooler System is activated.

The product is suitable for NEMA 4, 4X and 12 environments and works with the UL-listed Dual Cabinet Cooler Systems, which are available with cooling capacities of 4000, 4800 and 5600 BTUH. The systems include an automatic drain filter separator to keep moisture in the compressed air out of the enclosure. The ETC is offered for 120 or 240 VAC and all products are CE compliant.

Compressed Air Australia Pty Ltd  
[www.caasafety.com.au](http://www.caasafety.com.au)



## WASTE-TO-ENERGY MATERIALS HANDLING TECHNOLOGIES

A broad range of lifting and materials handling technologies specifically designed for waste-to-energy (WTE) and biomass applications is being introduced to Australasia by Konecranes. The technologies — including unmanned full automation, remote operation stations, remote monitoring and maintenance reporting products — are focused on applications such as biomass, refuse and ash/slag. The company's WTE cranes can be equipped with Global Technical Support connection, remote monitoring and a computer interface capable of semi or fully unmanned automation or a remote for manual handling. They also have a range of features and benefits to maximise production and minimise running costs.

The waste handling cranes are meanwhile designed with smart features, which manage critical crane functions to reduce structural stress, increase efficiency and prolong equipment life. Sway control minimises load sway from bridge and trolley motions, reducing collisions between the bucket and the pit walls or hopper and preventing equipment damage. It increases operator confidence, reduces training time and allows the crane to operate to its full potential.

Konecranes Australia  
[www.konecranes.com.au](http://www.konecranes.com.au)



## CONTROL SYSTEM FOR GAS DETECTION

The GasGuard 100 Control System provides an easy user interface, intelligent architecture and innovative functionality.

The system offers a scalable, high-performance data acquisition/data logging platform. Users can form a complete gas detection solution by equipping the systems' fully integrated measurement, display and recording platforms with MSA's line of transmitters and sensors.

Open Ethernet connectivity with web-based configuration and data monitoring functions lets the controller handle many monitoring and historical logging functions. Real-time trends can be viewed from the user's PC web browser without specialised software.

Data monitoring and reporting functions allow for customised reports and layout configurations for viewing trending analysis and more. The email alert feature allows users to view continuous plant status updates when they can't be physically present.

The product's flexible, modular architecture manages one to six measurement modules on the backplane. Each GasGuard 100 Controller serves as a measurement node, avoiding long, dense sensor leads throughout machines or processes.

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



## A PV system for a Spanish cereal producer

Fronius and Victron Energy have partnered on a project involving cereal producer CETOSA (Cereals Torremorell SA), based in Algerri in the Spanish province of Lleida — a remote region where an unrestricted power supply cannot always be guaranteed. Many consumers in such regions rely solely on energy produced by diesel generators; however, these generators are expensive to maintain and have high emission levels.

In order to optimise the cost-effectiveness of its business and ensure a continuous power supply for production operations, CETOSA opted for solar power produced by its own photovoltaic (PV) system. The company turned to solar technology from Fronius and Dutch energy specialist Victron Energy to benefit from their expertise in efficient solar systems.

“The aim of this project was to upgrade CETOSA’s 82 kW photovoltaic system,” said Francisco Heredia, technical advisor at Fronius Spain. Three Fronius Symo inverters were installed for this purpose and the energy generator was connected directly to the microgrid — a regional, self-contained power distribution network.

“Our inverters have a special set-up for this purpose, with various functions to ensure stable microgrid operation,” added Heredia.

In order to store the electricity generated and so provide a continuous power supply, Fronius made its inverters compatible with technology from Victron Energy, a supplier of energy solutions for grid-independent systems and solar-powered systems. Six Victron Quattro inverter chargers and four Victron BlueSolar charge controllers in CETOSA’s system ensure the agricultural business is able to store surplus energy that can be used as and when it is needed.

The technology from Fronius and Victron Energy also offers advantages in terms of failsafe operation. Most of the time, the output of the inverter is controlled without communication.

“Here, the frequency droop characteristic of the inverter charger and the inverter ensure optimum power



©Fronius International GmbH



©Fronius International GmbH

setpoints,” said David Hanek, product manager at Fronius. “But should the load be less than the maximum capacity of the PV generator, and if the batteries are already full, automatic power reduction will be required.”

In addition to the frequency droop characteristic, voltage-dependent power reduction and reactive power regulation functions can also be activated. A back-up generator provides another layer of safety.

CETOSA also benefits from effective system monitoring: the operator can use the Victron Remote Monitoring Portal (VRM) to view live values, while the Fronius Solar web online portal provides a comprehensive range of display and analysis functions for

all PV system data. The Colour Control Display (CCGX) from Victron acts as a data aggregator between the Fronius Datamanager and the Victron inverter/charger.

The technology means the cereal producer is supplied with energy independently of the public grid and is now in the position to power its operations using primarily solar energy. “Not only is this considerably more cost-effective, it is also much better for the environment,” said Matthijs Vader, managing director at Victron Energy.

**Fronius Australia Pty Ltd**  
[www.fronius.com.au](http://www.fronius.com.au)

## Total Facilities 2017



Darling Harbour's new International Convention Centre Sydney (ICC Sydney) will transform into a facilities hub this March as the nation's FM minds converge at Total Facilities 2017.

Total Facilities will be a hotbed of innovation and thinking for professionals concerned

with the built environment, with industry-leading figures coming together to present solutions and strategies for optimising the efficiency, sustainability and productivity of Australia's facilities and workplaces. Visitors will see the latest technological advances to drive FM and business performance in a

showcase of facility products and services featured by more than 150 leading brands.

"The future of FM is focused on business productivity and Total Facilities 2017 will present solutions and strategies for not only improving building and asset performance but business performance too," said Total Facilities Event Manager Andrew Lawson. "It's also technology enabled and the event will represent the cutting edge of today's emerging technologies, which will optimise efficiency for our visitors."

Running alongside the exhibition, a line-up of renowned speakers and thought leaders will be providing bold perspectives and latest thinking on FM and workplace strategies in the Total Facilities free education seminar program. Speakers for the program will be announced in early February.

Visitor and exhibitor registrations are open now.

**What:** Total Facilities 2017  
**When:** 29-30 March 2017  
**Where:** ICC Sydney, Darling Harbour  
**Web:** [www.totalfacilities.com.au](http://www.totalfacilities.com.au)

## Ozwater 2017

The Australian Water Association's Ozwater international water conference and trade exhibition is returning to Sydney in 2017. At the new state-of-the-art venue in Sydney, the AWA will welcome thousands of water professionals working across industries relating to water, including decision and policy makers, scientists and researchers from across Australia and internationally.

The trade exhibition will feature a large display of the latest water industry science, innovation, technology, products and services for all water professionals and associated industries. An 'Innovation Stream' will also be featured, which has been added this year to provide enhanced exhibitor interactions.

The conference is designed to bring together the 'who's who' in water to discuss the important topics facing the water industry and provide a platform to exchange strategies and ideas in a public forum. Platform presentations, interactive workshops, panel sessions and posters will all be included. The preliminary program for the conference features topics such as: what's next for livability?; using sustainable development goals; local recycled water; and the decarbonisation of the water sector.



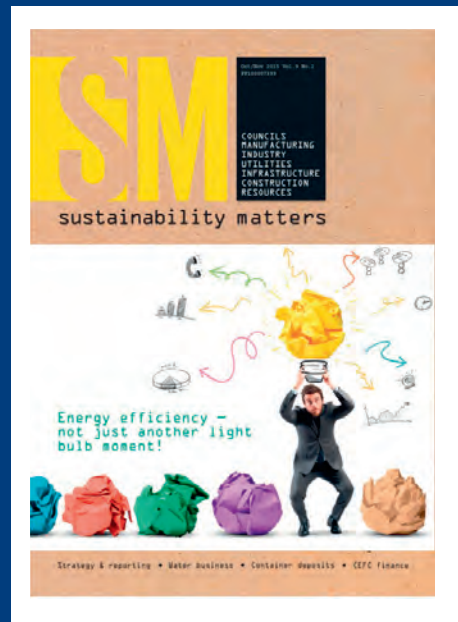
Conference themes this year include: water contribution to communities of the future; innovation in operations and asset management; changes in governance, policy regulation and structure; customers and community; managing change, people and organisation in the water sector; water for rural, remote and regional areas; and public health.

**What:** Ozwater 2017  
**When:** 16-18 May 2017  
**Where:** International Convention Centre, Sydney  
**Web:** [www.ozwater.org](http://www.ozwater.org)

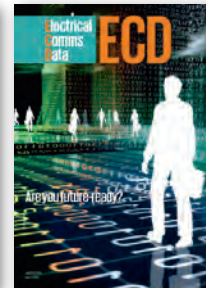
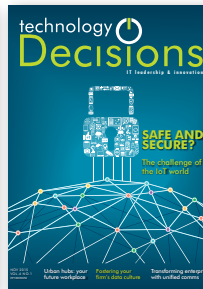


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## Rooftop rainwater harvested for urban food production

Rooftop rainwater is being diverted to large-scale urban food production at a sustainable housing project at Cape Paterson in Victoria called The Cape. The rainwater harvesting system is designed to harvest around 3 million litres of clean rainwater annually for use in food production, while the urban garden at the housing project will produce an estimated \$140,000 of food per annum for the residents.

The Cape, when complete, will include 220 home sites, a cafe, a conference centre, wetlands, fitness stations, restored habitat areas, electric vehicle charge stations and kilometres of walking paths, overlooking some of the best surf and swimming beaches in Australia. It will also feature 5000 m of garden and a 2000 m<sup>2</sup> orchard, including a range of fruit trees, poultry, shade trees, seating, composting facilities, a greenhouse for seed raising and a viewing deck overlooking the garden and coast.

The garden includes an innovative rainwater harvesting system that collects surplus rainwater from Stage 1 homes at The Cape — which are connected to a pipe network that flows by gravity to the community garden — and is collected in a 230,000-litre water tank. The water is then plumbed from the main tank to raised ‘wicking’ garden beds.

These innovative ergonomic gardens sit 500 mm high, eliminating bending for gardeners, and hold a reservoir of water in their base which ‘wicks up’ by capillary action through the soil profile. Food plants reach down for the water stored in the beds, instead of traditional top watering of the garden beds. The result is ultra-efficient gardening that has reduced watering and weeding requirements to a fraction of conventional food gardens.

“This rainwater-to-food system shows how we can harvest clean rainwater from the hundreds of thousands of rooftop gardens around Australia and divert it into highly efficient community food production, while reducing the amount of stormwater going into our drains and waterways and reducing food bills for residents,” said The Cape



Director Brendan Condon. “It is a huge win-win utilising precious rainwater that has historically gone down the drain.”

The rainwater harvesting system and the first stage of the community garden is already producing large volumes of organic produce, including lettuces, tomatoes, beetroots, capsicums, snow peas, beans, zucchinis, broccoli, chillies, coriander, sunflowers, oregano, parsley, kale, spring onions, rocket and guavas, and around eight varieties of citrus including mandarins, oranges, lemons and limes.

“Our garden was planted only nine weeks ago and is already produced a large stream of produce, and we are donating some of

the produce to the Community Meal, a great initiative run by the Bass Coast Anglican Parish, which feeds around 120 people on a Monday night at the Wonthaggi Church Hall,” said Condon.

“The garden is designed for the busy modern lifestyle of our residents by providing maximum food for minimum effort and, combined with the sustainable energy-efficient homes, shows how housing estates can contribute to good health, exercise, friendships and food security for householders, and reduce food bills and cost of living. We hope in future to see these types of gardens in all housing estates.”



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