



# sustainability matters

Feb/Mar 2015 Vol.8 No.4

VITAL INFORMATION FOR INDUSTRY & GOVERNMENT

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Manufacturers use asset optimisation to extract value



Cover image © iStockphoto.com/MACIEJ NOSKOWSKI

**D**o you want a date? Now I have your attention - no, it's not with me! This is what's happening at the upcoming Water Innovation Forum with 'blind dates' being organised for water innovators to pitch their product to a panel of experts. Five of the best will then go on a 'date' in order to pursue investment or partnerships. Find out more on page 48.

The latest trends and technology related to packaging and its role in sustainability are also discussed in this issue. There is now more emphasis on overall sustainability rather than just end-of-life options for packaging. Find out what the experts are saying on page 6.

As Cara Ryan from Schneider Electric points out in our Leading the way article on page 4, across Australia and the globe, buildings account for up to 40% of energy use. This is an important issue and Cara discusses what solutions are available and how we can create a sustainable future for Australia's buildings.

Also in this issue, Romilly Madew from the Green Building Council of Australia talks about the latest trends in green buildings and sustainable urban development.

Enjoy the read!

**Carolyn Jackson**

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*Cara Ryan is General Manager Client Services, Australia, for the EcoBuildings Division of Schneider Electric. She has been with the company for six years. With 15 years' experience in the Building Efficiency industry, Cara has led the development of service delivery utilising digital and analytics technology to help customers visualise, analyse and optimise their building performance. Cara holds an honours degree in Engineering from Monash University.*

“Using technology and software to gain an understanding of buildings' energy use and identifying how operations can be improved to operate more efficiently is a key consideration.”

# Sustainable future for Australia's buildings

**A**cross Australia and the globe, buildings account for up to 40% of energy use, and I believe they continue to be a prime target for achieving energy efficiency. Many people don't realise that the majority of buildings that will be occupied in 2050 are already built and are up and running today. To drive building sustainability, it is vital that we focus on creating greater efficiencies in our existing buildings throughout 2015 and beyond.

However, the concerns and challenges I often hear from customers fall around an ageing infrastructure and how can they reduce their building's carbon footprint, as well as improve their bottom line.

There are a number of steps that building owners and managers can take to tackle these challenges. Using technology and software to gain an understanding of buildings' energy use and identifying how operations can be improved to operate more efficiently is a key consideration.

Energy and resource dashboards as part of building management systems (BMSs) are an increasingly useful tool in understanding building behaviour. The implementation of these solutions identifies where shortcomings in energy efficiency in day-to-day building operations are occurring.

However, emerging technologies such as big data analytics take it one step further. Data analytics help to understand not only how a building is operating and where there may be inefficiencies, but why. The 'why' emerges through a comprehensive view including snapshots of current operations, outlines of energy trending, alerts through the application of simplistic rules or algorithms, detailed diagnostic reports and more. Through proactively identifying operational problems that would not otherwise be detected, data analytics helps building managers gain a deeper understanding of the why, which in turn leads to more permanent and effective solutions.

Data analytics is one of the most effective tools that building managers can use to improve a facility's efficiencies. By collecting data and effectively

analysing it in buildings, operators can reduce equipment and energy costs by up to 30%.

When building owners and managers gain an in-depth understanding of how buildings operate and the potential problem areas, retrofitting existing systems within a building to make the most effective improvements is a growing trend and something that needs to continue if we are to take advantage of our existing buildings. The refurbishment of current buildings and improving energy management are useful steps in reducing emissions caused by electrical consumption. Inefficient lighting alone can account for 40% of a typical commercial enterprise's electricity consumption, and when combined with other areas such as heating, ventilation and cooling, it can start to seriously drive up energy use and building management costs.

Building analytics data can also be used to further validate and verify improvements or upgrades through retrofitting. Data extracted and analysed from equipment that has been upgraded or improved can easily provide building managers with a clear ROI on investments they've made to their systems and equipment. This data can also be used to help support the business case for future improvements and upgrades to drive additional savings. This assists in the ongoing concerns around improving an ageing infrastructure and utilising the buildings we already have to drive sustainability.

Operating buildings at a high-performing level should be a key focus for building owners and managers this year. Aside from implementing technology and software, it is important to continue to communicate clearly 'green' building targets as well as results in a visual way to occupants, tenants and stakeholders, encouraging them to further drive efficiency in their building through their own actions.

Education and messaging around sustainability, teamed with ongoing assessments on how technology and software solutions are performing, will set building owners and managers on the right path to building a greener future.



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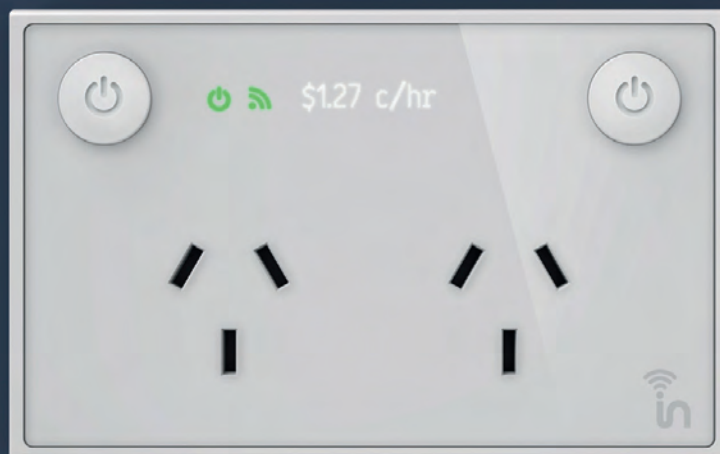
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# Future trends for packaging and its role in sustainability

Packaging has an important role to play in sustainability as it functions to protect and reduce waste of products and raw materials as they move through the supply chains. To achieve this, the packaging must be holistically designed with both the product and its end use in mind so that the overall environmental performance is optimised. The packaging must also be: made from responsibly sourced materials; manufactured using energy-efficient production technologies; recoverable after use; sourced, manufactured, transported and recycled using renewable or efficient sources of energy.



**W**hen considering packaging and its sustainability, the packaging itself can't be considered in isolation. Claude D'Amico, market development manager of Innovia, says sustainability has to apply to the product together with the packaging.

"New products, including their packaging, need to be planned with the full consideration of sustainability, starting with the raw materials, through to the manufacturing and usage efficiency as assessed by life cycle analysis, including the planned recovery of all resources embedded in the unused or waste portions of the product and its packaging," he says.

#### Packaging material and its contribution to sustainability

Within the restricted view of the packaging itself, D'Amico says we are starting to see more emphasis on overall sustainability rather than just end-of-life options for the packaging. "Issues such as renewable resources utilised sustainably and the avoidance of GMO [genetically modified organisms] are gaining prominence," he says.

Packaging materials, such as bioplastics made with a growing percentage of renewable resource, are experiencing a positive growth trend. According to European Bioplastics reports, global bioplastics production capacities are predicted to grow by more than 400% by 2018, with biobased, non-biodegradable plastics - such as biobased PE and biobased PET - gaining the most growth.

Steve Davies, director of corporate communications and public affairs, NatureWorks, says that tremendous strides made in the development of bioplastics and the applications in which they are used is an important macro trend in the 'mainstreaming' of bioplastics. He says: "Once regarded as 'new-to-the-world' materials, bioplastics are now entering their second decade of commercial-scale, world-class production, and with the

'remaking' of some mature plastic types in biobased variants - bio PET, for example - bioplastics and plastics have in a sense converged.

"Bioplastics are increasingly seen simply as plastics with additional environmental and end-of-life attributes. The functional properties and performance of the materials are discussed first and then, as appropriate, the 'bio' properties where they are relevant.

"This is a sea change from where the industry was two or three years ago," says Davies.

D'Amico says: "Materials such as bio-derived PE and PET are growing faster than those that are compostable." He says the 'ideal' combination is biobased and compostable, and there are materials available from Innovia that achieve this rare combination.

D'Amico says what's also on trend is "some sort of sustainability verification, be it origin certification - such as FSC or PEFC chain of custody certification, or other forms - such as measuring and reporting the percentage of renewable carbon content".

"Certifications that include considerations of social issues - such as avoidance of competition with food crops - is also of interest, though these are not as common for annually harvested crops.

"The objective is not sustainable packaging, but sustainable living on earth," says D'Amico.

When asked about how we can ensure that raw materials are responsibly grown, Davies says what is critical is that the supply chain take advantage of credible third-party certification.

"In 2012, for example, Danone in Germany wanted to demonstrate and verify the sustainability of Ingeo feedstock production based on sustainable agricultural practice for its new yoghurt cup slated to replace traditional polystyrene packaging. Danone became the first company to achieve environmental sourcing certification from both the International Sustainability & Carbon Certification (ISCC) Association and the Institute for Agriculture and Trade Policy (IATP)."



## Packaging

D'Amico says: "Invariably, all raw materials need to either be grown sustainably or, if they need to be from a finite resource, it needs to be recycled completely and endlessly. And all this whilst satisfying the nutritional needs of the growing world population.

"In short, ensuring sustainability implies absolutely no waste - not for packaging, not for any other aspect of life's various needs. What we now consider waste of any description needs to be reclassified as input for other necessary processes.

"Are we there yet? No, not by a long shot, but that needs to be our target."

### Re-usability or repurposing

There is not enough being done in the area of re-usability and repurposing of packaging, according to D'Amico. He says: "More needs to be done to minimise the wasting of this valuable resource. Recycling by melting and reshaping is fantastic for rigid containers made of PET or HDPE. Some flexible packaging is suitable for similar treatment via the Red Group initiative, though this more often than not is downcycled into park benches. Not yet up to structural timber replacement.

"Incineration for energy recovery may be an option for plastics and packaging that don't suit the above techniques, and incineration of plastics derived from bio sources is even more attractive as the CO<sub>2</sub> released is from within our time, not fossil CO<sub>2</sub>. Composting of putrefiable waste and food-contaminated packaging is not happening enough, nor is there a prevalence of the very efficient in vessel anaerobic digestion."

Davies says there is a strong trend towards organics diversion from landfill, with legislation changes (such as landfill bans) occurring in some geographies. "This is leading to a strong interest (eg, by restaurants, entertainment and sports venues) in tools such as compostable food serviceware that facilitate and simplify organics diversion," he says.

### Standards and labelling

In the global market today there are many plastics which are claimed to be biodegradable, compostable, oxo-degradable or oxo-biodegradable. But what do these terms mean in reality?



Rowan Williams, president of the Australasian Bioplastics Association, recently discussed this with Professor Ramani Narayan, Michigan State University Distinguished Professor, Department of Chemical Engineering and Materials Science in the United States, a world-renowned expert in the field of bioplastics and plastics generally. An extract from a precis from Professor Narayan's discussion explains: "Claims of degradable, partially biodegradable or eventually biodegradable are not acceptable. It has been shown that these degraded fragments absorb toxins present in the environment, concentrating them and transporting them up the food chain.

"Therefore, verifiable scientifically valid evidence from an approved third-party laboratory is needed to document complete biodegradability in a defined disposal system, in a short time period using the specified international standards."

Davies says there are standards in place in Australia, for example, for industrial composting (AS4736-2006) and home composting (AS 5810-2010), and a verified logo scheme is in place (overseen by the Australasian Bioplastics Association) to ensure that claims cannot be made without proper verification.

"By taking a more stringent approach on weeding out unsubstantiated claims, governmental agencies such as the ACCC (Australian Competition and Consumer Commission) will help raise the overall level of interest in certifications. This would have a positive effect on the brands and improve industry practices overall, and on consumers who depend on these logos and standards to make informed decisions," says Davies.

D'Amico says: "As our appreciation of the value imbedded in our organic waste is realised, we will divert that waste to more efficient and immediate recovery processes such as composting or anaerobic digestion. As the infrastructure for processing organic waste is introduced, so can the introduction of appropriate labelling for packaging begin. It needs to be an instruction, not a symbol, for example: 'Please place this plastic wrap with your compostables in the clearly marked organic waste collection bag'."

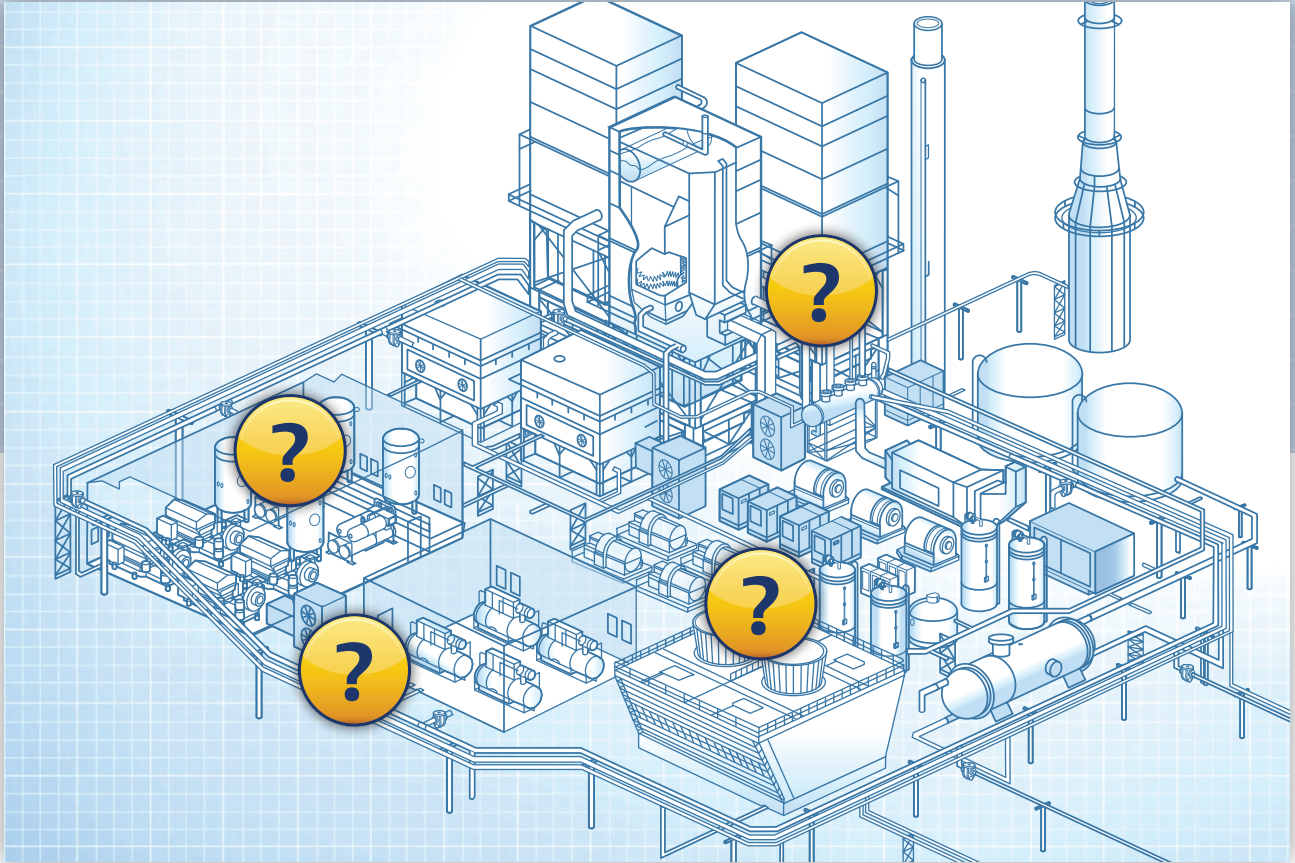
D'Amico also says the design guides in the Australian Packaging Covenant (APC), origin certification such as FSC for wood-based products, ISCC+ for annually harvested crops, fair trade practices, fair produce prices regulations and many other initiatives are all gaining prominence, and collectively they assist with sustainable living on earth.

These are just some of the trends and approaches related to packaging and sustainability. From raw material acquisition to final disposal, applying the principles of sustainability - environmental, economic and social aspects - to the full life cycle of packaging, not just end of life, is clearly an important trend.

*All the latest packaging and processing equipment will be on display at AUSPACK 2015, which is being held from 24-27 March at the Melbourne Convention & Exhibition Centre. The Australian Institute of Packaging (AIP) and the Australian Packaging & Processing Machinery Association (APPM) will also be holding the 2015 National Technical Forums as part of Packaging & Processing Week at the event. For further information, visit [www.auspack.com.au/index.php/packaging-week/](http://www.auspack.com.au/index.php/packaging-week/).*



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## case study



# Building energy intelligence at NICTA



**The Australian Technology Park (ATP) is a business and technology centre intended to serve as an incubator for high-tech start-ups and to bring research and commercial interests together in a symbiotic environment. It comprises five distinct buildings located in a campus-like setting in the suburbs of Sydney.**

**B**uildingIQ was asked to deploy its Predictive Energy Optimization (PEO) model at four of the buildings, beginning with the one occupied by National ICT Australia (NICTA). The 11,202 m<sup>2</sup> NICTA building is five years old and renowned for its energy efficiency.

### The challenge

The central challenge was whether BuildingIQ's PEO platform could make much of a difference to such a well-tuned, high-performing building. The NICTA building has a NABERS score of 5.5 - on a scale that runs from 0 to 6 - and improvements were, at best, likely to be marginal. Although the NICTA staff strongly encouraged a trial run and were extremely receptive to new technology, their expectations for significant energy savings were low.

The client's stated requirements for success were threefold: first, produce

significant energy savings; second, improve the NABERS rating of the NICTA building if possible; and three, support and elevate the government's drive for sustainable development.

### The solution

BuildingIQ began by doing a site assessment for all four buildings, establishing a baseline of historical data, examining individual building management systems (BMSs) and evaluating the ease with which PEO could be integrated for energy optimisation. The team found that the NICTA building had a relatively new Delta BACnet system that would respond well to BuildingIQ's platform.

Working with ATP's facilities staff, the set up for the trial run took only about a week. The extended learning phase - when the model learns the specific thermal dynamics of the building under changing conditions - lasted for about a month and a half. After that, the optimisation

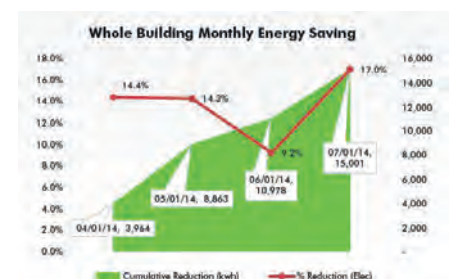
process began. Typically, the savings increase as the model continues to refine the parameters and improve the accuracy of its prediction.

The relationship with the technical staff at NICTA bordered on a strategic alliance, as they have a burning desire to support energy innovation and were rooting for the success of a sophisticated, home-grown technology. BuildingIQ's platform evolved from research carried out over many years at CSIRO - the Commonwealth Scientific and Industrial Research Organisation.

The ATP staff brought the BuildingIQ team together with the four companies responsible for on-site mechanical work and BMS operations. The parties worked collaboratively to ensure success.

### The results

Early results from the NICTA trial run have shown substantial improvement in energy savings. After running for a few weeks, energy savings had reached 17% of total power. ATP staff, vendors and NICTA colleagues were not only surprised at the savings in such a high-performing building but sceptical enough to challenge the results. The transparency of the BuildingIQ system made it a relatively straightforward matter to review the historical baseline, walk through the optimisation process and display the results using charts and graphs. They could see the kWh consumption dropping day by day and were convinced of the efficacy of BuildingIQ's model. Despite the altered temperatures during the optimisation process, the client did not receive one single complaint from tenants.



BuildingIQ  
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# Thermally broken and airtight envelope are key to Low-E and 'Passivhaus' buildings

*LAROS Technologies offers innovative structural thermo-breaking and air-sealing solutions for all types of commercial and residential dwellings, eliminating thermal bridges and related mould damage and minimising energy losses.*

What about buildings that are endlessly comfortable without heating and air-conditioning, virtually maintenance-free, fully solar powered, yet cost no more to construct than a standard building? Low-E buildings achieve just that provided the 'Passivhaus' toolbox for architects is adhered to. This involves a comprehensively airtight (sealed) and seamlessly isothermal (insulated) building envelope. In addition, low-E buildings feature double or triple-glazing with external solar heat-gain control (blinds) and a ventilation system with energy recovery (fresh-air supply).

While low-E buildings maintain the same look and budget like conventional commercial or residential buildings, only the building approach differs slightly. To achieve an esky-like building envelope, the perimeter is air-sealed and thermal bridges are eliminated entirely. This omits dew-point-shifting into wall and ceiling constructions where hidden mould-related damage can occur over time.

Thermo-breaking of structural elements such as concrete slabs, cantilevered balconies and steel roof trusses contemplates the most complex and hence neglected challenge in Australia. LAROS Technologies supplies Schöck's ([www.schoeck.de](http://www.schoeck.de)) entire suite of German-engineered structural thermo-breaking solutions. Most outstanding and easy to apply is the original Isokorb, an insulated steel reinforcement insertion element for cantilevered concrete elements, trusted all over Europe since 1962.

Unique to low-E dwellings is their very slow thermal response to outdoor climate conditions. Thermally broken, insulated and sealed windows are part of the total low-E building envelope approach. LAROS Technologies supplies sophisticated 'Passivhaus' approved curtain-wall solutions from RAICO ([www.raico.de](http://www.raico.de)) and triple-glazed timber windows and doors from Döpfner ([www.doepfner.de](http://www.doepfner.de)).

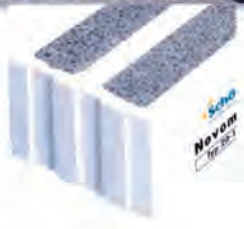
Pro Klima ([www.proclima.com](http://www.proclima.com)) world-leading air-sealing technologies for walls and ceilings complement the above mentioned fenestration solutions perfectly, so do ROMA's ([www.roma.de](http://www.roma.de)) automated architectural blinds. They are external blinds and designed for high-wind situations, successfully protecting low-E dwellings from unwanted sunshine during summer. Adopting the 'Passivhaus' toolbox allows architects to be free of design constraints while achieving extraordinary building performance. Low-E buildings are naturally comfortable and cheap to run. They maintain resale value well into the future.



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- innovative solar power systems for facades & roofs
- structural thermo-breaking of slabs, balconies, etc.





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*Nereda aerobic granules (left) compared to conventional activated sludge (CAS). © Royal HaskoningDHV.*

## Queensland wastewater treatment plant to be upgraded

Aquatec Maxcon has been awarded a design and construct contract to undertake the upgrade of Queensland's Kingaroy wastewater treatment plant (WWTP). The plant will be the first in Australia to use Nereda aerobic granular sludge technology.

Nereda is described as a sustainable biological wastewater treatment technology based on natural ingredients. It treats wastewater with the features of aerobic granular biomass, which are purifying bacteria that create compact granules with good settling properties. The technology is claimed to feature a high treatment capability, low investment and operational costs, a small physical footprint and energy savings of up to 50%.

The plant upgrade to a design population of 12,500 has been awarded by South Burnett Regional Council and supported by \$10 million in funding from the Queensland Government. It will provide the Kingaroy community with water which can be re-used to irrigate sporting grounds in the area and will also significantly improve the quality of effluent released from the plant.

"The project will deliver significant benefits for residents and businesses across Kingaroy, allowing for projected population growth over the next 20 years," said South Burnett Regional Council Mayor Wayne Kratzmann. "The new plant will utilise Australian-first technology to

minimise environmental impacts while delivering high-quality wastewater with reduced operating costs compared to other systems. We're proud to be working with Aquatec Maxcon, which has sought to make use of as many local materials and labour as possible, providing a valuable financial boost to the region."

Nereda technology was invented by the Delft University of Technology in the Netherlands and developed in a public-private partnership between the university, the Dutch Foundation for Applied Water Research (STOWA), Dutch water boards and engineering and consultancy firm Royal HaskoningDHV. Aquatec Maxcon is the firm's Australian Nereda technology partner.

"We look forward to working closely with South Burnett Regional Council in delivering this exciting, innovative project," said Aquatec Maxcon Managing Director Greg Johnston. "The adoption of this first Australian Nereda process in Kingaroy should lead other utilities and councils to take a similar approach to sewage treatment processes. In my view, the Nereda technology will make wastewater treatment more affordable and sustainable."

The upgrade is expected to be completed by September 2016.

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## Motors that meet efficiency standards and levels in Australia and worldwide

The use of energy saving solutions has significant economic and environmental benefits for Australian businesses, including reduced running costs and reduced carbon emissions. Improving the efficiency of equipment is also a key objective globally. That's why SEW-EURODRIVE has extended its DR series of electric motors – made to meet global efficiency standards. Around the world governments are mandating Minimum Energy Performance Standards (MEPS) for motors. In Australia, the government now mandates MEPS through the Greenhouse and Energy Minimum Standards (GEMS) Act 2012 legislation. The act creates a national framework for appliance and equipment energy efficiency. This means electric motors must meet MEPS efficiency levels and must be registered for sale and use before they can be sold in Australia. SEW-EURODRIVE supports the need for efficiency in motors, supplying electric motors that meet and exceed MEPS levels. MOVIGEAR® and DRU offer IE4 Super Premium Efficiency Levels, the DRN and DRP ranges offer IE3 Premium Efficiency Levels and the DRE offers IE2 High Efficiency Levels. To find out more contact an SEW product specialist closest to you on 1300 739 287 or visit <http://energy-saving.sew-eurodrive.com/>.

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We ask Green Building Council of Australia's CEO Romilly Madew questions about the latest trends in green buildings, sustainable urban development and more in the lead-up to the Green Cities 2015 conference, which is being held from 17-19 March 2015 at Melbourne's Grand Hyatt.

# Green cities of the future

What three key technologies, trends or new building methods do you think will potentially provide the most benefit for green cities of the future - in terms of achieving: carbon neutrality, water positivity and zero waste?

There are many advanced technologies - such as building information modelling (BIM), use of 'big data' and sophisticated building management systems - that now give us detailed insights into how to design, build and operate more effective buildings. Our challenge is to apply this technology to the precinct or city scale so that we can model future performance of our cities and make investment decisions accordingly. Ultimately, good design, good technology and good performance must work together to create green cities of the future - and so carbon neutrality,

water positivity and zero waste will be a product of those design, technology and operations initiatives in collaboration.

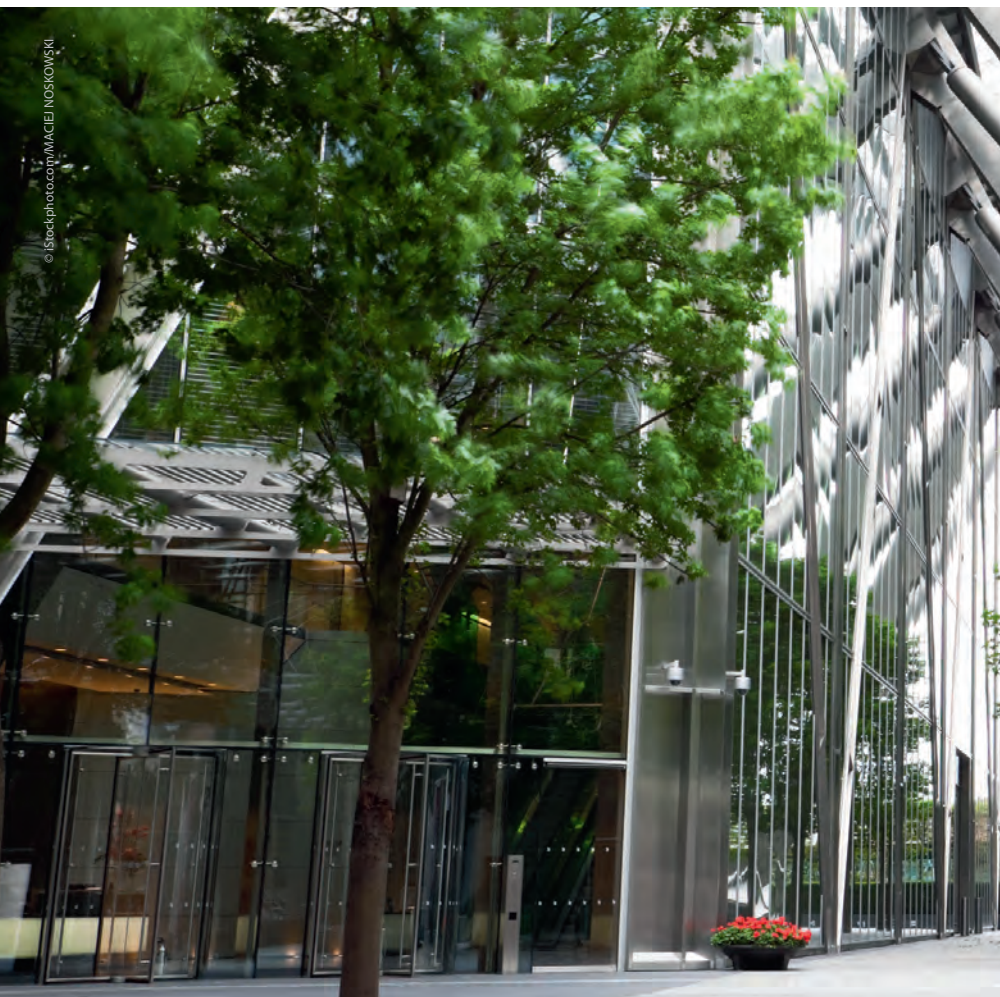
It's all very well having a carbon-neutral, water-positive and zero-waste urban development, but if people don't want to live there, it's not sustainable at all. What are the key elements that must be integrated into urban developments to make them liveable and socially and economically viable?

"First life, then spaces, then buildings: the other way around never works," as acclaimed urban design specialist and architect, Jan Gehl, puts it. This is why the Green Star - Communities rating tool encompasses economic and social sustainability. The 'Liveability' category, for instance, rewards projects that encourage healthy, active communities through parks, playgrounds, cycleways and footpaths, as well as through local food production. The 'Economic Prosperity' category encourages projects to consider proximity to employment and education opportunities, and access to high-speed internet. Strategies for improving housing affordability, developing local skills and enhancing investment in community infrastructure are also encouraged.

What are the advantages and disadvantages of high-density urban development and do you believe this type of development is a sustainable option for Australian cities in terms of meeting the challenges of future population growth?

Undoubtedly, the 20th-century model of city development no longer works in a resource-constrained world. Our cities cannot continue to expand without consequences to our environment and our quality of life. But population growth brings with it great opportunities to enhance the liveability and sustainability of our cities.

At Green Cities 2015, Professor Rob Adams will be leading a discussion about how we reinvent our cities to





make them enduring and extraordinary places for people. He says “intensification”, not “dispersion”, will drive our cities in the 21st century. His model of urban development focuses on more people living along transport corridors. This ‘smart growth’ can help us get more ‘bang for our buck’ out of our current infrastructure and require less spending on future infrastructure. It can also help us create more dynamic, diverse and vibrant cities.

Larry Beasley (widely considered the ‘father of Vancouverism’), another keynote speaker, believes there is great potential and profitability within our existing city footprints - but that each city needs to develop its own indigenous model of growth.

Higher density is not necessarily a bad thing. In fact, the ‘Great Australian Dream’ is evolving. The Grattan Institute’s report, ‘The Housing We’d Choose’, on the housing preferences of residents of Sydney and Melbourne, found that more than half of households would rather live in a multi-unit dwelling in the right location than in a detached house in the wrong location. There isn’t necessarily one ‘sustainable option’, but many solutions to be considered depending on climate, location, environment, economy, population and a range of other key factors.

### Why is transport so important for sustainable urban development and what do you predict will be the winning transport options for the sustainable cities of the future?

We can’t continue to rely on the motor car as our primary source of transport - it’s inefficient and energy-intensive. There will always be a need for cars, but we need to invest more in public transport to enhance both the sustainability and liveability of our cities. People’s ideas around car ownership are already beginning to change - car-pooling and car-sharing schemes like Car Next Door and Uber are growing in popularity as people recognise that there are environmental, economic and social benefits of having less cars on the road.



“

*“First life, then spaces, then buildings: the other way around never works,” as acclaimed urban design specialist and architect, Jan Gehl, puts it.*

”

There are many exciting innovations that will change the way we get around. Kent Larson, director of the Massachusetts Institute of Technology (MIT) Media Lab’s Changing Places group, inspired us at Green Cities 2014 when he shared the work he’s doing on the CityCar, which features a folding chassis to occupy a small footprint when parked, or the GreenWheel - an electric motor that can be adapted to any bicycle and enable older people, or those with physical disabilities, to vary the amount of energy they expend while cycling.

### Do you think renewable energy is an important element for green cities of the future? Why or why not, and if yes, how do you think it can be integrated more effectively in the future?

In a sunny, windy continent like Australia, investment in renewable energy is a no-brainer. Photovoltaics on roofs and wind turbines are increasingly being used on buildings, but we are beginning to see precinct-wide renewable energy systems. I’m inspired by the work of Lend Lease on Barangaroo South, for instance.

Lend Lease is committed to ensuring the entire precinct is carbon neutral, and has installed more than 6000 square metres of solar panels, which covers nearly all of the buildings’ rooftops.

One of the key areas in which we will see massive change is in the storage of energy; there is amazing work going on in battery technology, energy storage initiatives and use of current systems as ‘supply answers’ rather than just ‘demand assets’. Once we can store the renewable energy we produce for use at peak times, and can overcome those massive transmission losses and energy infrastructure costs, the return on investment of renewable energy solutions changes considerably.

### Do you think decentralisation of utilities (water, waste and energy) is important for green cities of the future? Why or why not?

It’s not only vital for green cities, but for resilient cities. When our buildings are carbon or water positive, they are not only putting back into the environment, but they are also more adaptive and resilient to a changing climate.



## Built environment

*In your opinion, what type of government assistance has provided or could provide the most benefit for future green city urban developments?*

We need our governments to commit to meeting best practice benchmarks for sustainable communities. Some of Australia's most significant urban renewal projects, such as Barangaroo South and the Parramatta Square in Sydney, Caloundra South and Ecco Ripley in Queensland, Bowden and Tonsley in Adelaide, and Alkimos Beach and Waterbank in Perth, not to mention the University of Melbourne's Parkland Campus in Melbourne, are applying the Green Star - Communities rating tool to ensure they meet best practice benchmarks for governance, design, environment, liveability, financial prosperity and innovation. We need our

governments to commit to meeting these benchmarks for all new urban development projects.

We also need to work with our governments to encourage them to provide a range of incentives - both financial and non-financial - for projects to 'do better', to go the extra mile, and to aim for higher benchmarks. Financial incentives might include grants, programs and funding opportunities; non-financial incentives often achieve greater market transformation and may include expedited planning procedures for green developments, education, training and skills opportunities, additional floor space ratios for higher-quality buildings, and commitments to own and occupy only certified developments so as to provide more consistent demand to the market.

Green Building Council Australia  
[www.gbca.org.au](http://www.gbca.org.au)



*Romilly Madew is passionate about creating sustainable buildings, communities and cities. Since 2006, Romilly has led the Green Building Council of Australia, and has a global reputation as an influential advocate and change agent. Romilly chairs powerful task groups and steering committees on the built environment, and is Deputy President of the Australian Sustainable Built Environment Council. She is a board member of the World Green Building Council, which is mobilising the global efforts of more than 100 green building councils.*

## case studies

### Asteron Centre earns 5.5 Star energy rating

Wellington's Asteron Centre - the city's largest single office building - has earned a 5.5 Star base building energy rating from NABERSNZ after reducing its base building energy use annually to 46 kWh/m<sup>2</sup>. Crown Building Performance Specification requirements for tenancies they occupy generally vary between 105 and 120 kWh/m<sup>2</sup>.

NABERSNZ is a voluntary tool that measures an organisation's actual energy use against factors such as building occupancy, number of computers and rentable area. Comparing this against other similar buildings and climate conditions provides a rating on a 6-star scale, which the organisation can use to understand, and then improve, its energy performance.

The 49,000 m<sup>2</sup> Asteron Centre is owned by Grant Corleison and Mark Dunajtschik and was designed by Warren and Mahoney, with all engineering consultancy services provided by Aurecon. Its energy savings were achieved with the assistance of Aurecon mechanical engineer Marcus Welby.

"The Asteron Centre was completed in 2010 and had been designed to ensure it was environmentally sustainable," said Welby. "It already had a 5 Green Star office design rating, but the owners felt there was potential to make further savings. We



monitored the building five days a week to look at what changes could be made."

The building has a wide spectrum of energy-saving features, including rainwater harvesting, automatic dimming lighting when sufficient daylight is available, heat recovery chillers, high-performance glazing, hot water preheating from chiller waste heat, chilled beams and heat pump hot water cylinders. These features have made it the second New Zealand building to achieve a NABERSNZ rating of 5.5 stars out of 6, after Wellington's Meridian Building.

"This award is great news for our tenants," said Corleison. "The drastic savings we've achieved ultimately benefit the tenants who pay for their own consumption while we pay for the common areas. The lower we can get the energy consumption, the better it is for landlord and tenant."

Corleison and Dunajtschik are currently developing the Hilton Hotel and Conference Centre opposite Te Papa. Aurecon will be working with the developers on the proposed project.



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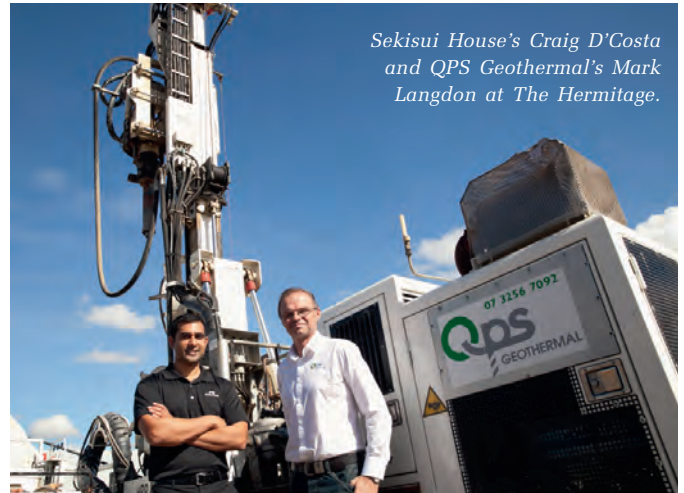
# Geothermal heating and cooling at The Hermitage

Residential property developer Sekisui House has introduced geothermal heating and cooling infrastructure into its 300 ha master-planned community, The Hermitage, in Sydney's south-west. Sekisui House will be the first developer to bring geothermal technology to the housing market in NSW, having already installed it at its Ecco Ripley development in Ipswich, Queensland.

The developer partnered with Brisbane-based QPS Geothermal to implement the geothermal system at The Hermitage. QPS Geothermal Director Mark Langdon explained that it is a simple process by which a geothermal ground loop is installed into the ground at depths of about 80 m and the constant temperature of the Earth is used to cool or absorb the heat. The company's GeoAir system reduces the typical effort and energy load of conventional systems required to reach a similar temperature within the home.

"The system distributes refrigerants into closed ground loops where excess heat is naturally absorbed by the much cooler subsurface temperature," Langdon said. "With the heat taken out, the refrigerant condenses into a liquid and is returned to the internal fan coil to cool the space. Alternatively, in winter, the refrigerant is circulated through the geothermal ground loops and absorbs the heat from the ground. The resulting hot vapour is circulated through the internal fan coil to heat the space."

Langdon said the geothermal technology will offer home owners a minimum of 60% savings on their electricity bills - up to 70% or 80% in more extreme weather. He added that the heat pump operates very quietly at around 51 decibels.



*Sekisui House's Craig D'Costa and QPS Geothermal's Mark Langdon at The Hermitage.*

Sekisui House's corporate global philosophy is to research and incorporate the most efficient and intelligent technologies available in sustainable development. Sekisui House Project Director Craig D'Costa noted, "When we looked at the cost savings and the environmental benefits GeoAir offered, we were confident that this technology would be welcomed by our existing residents and residents to be."

The Hermitage is currently trialling the GeoAir system with a view to making it available to all new homes.

# Cavity pump on agricultural effluent duty



A single progressing cavity pump from NOV Mono has been used to replace a number of centrifugal pumps and improve pumping performance on an agricultural effluent duty in New Zealand. The pump is now transferring animal effluent over considerable distances at Castle Glen Farms in Foxton, on New Zealand's North Island.

The farms had previously been using a number of different centrifugal pumps

to deliver pig, cow and sheep effluent through a 4" diameter pipe over a distance of 3.7 km so that it could be used for irrigation. The pumps were replaced by a Mono Epsilon E1AD, operating at 12 bar and 120 RPM, delivering 35 m<sup>3</sup> of effluent each hour. Epsilon pumps are suitable for this type of application and are designed to allow the use of small-bore pipework when pumping over long distances or with high head requirements.

"Replacing these with a single Mono pump has allowed us to supply several irrigators which are located over the length of the pipework, and still deliver the same pressure and flow rate at every nozzle, while also reducing our energy costs," said Castle Glen's Rob Mather. "We were also able to use our existing power supply and not have to upgrade the transformer to cope with a different power requirement."

The pumps feature Mono's Flexishaft drive shaft connection, which eliminates

wearing components between the drive end and the pumping element. As no lubrication is required, the likelihood of product contamination is eliminated. A low running speed capability reduces wear rates and extends both the pumps' maintenance intervals and overall working life. Available in cast iron or stainless steel, the pumps offer a choice of rotor and stator materials which further extend their versatility.

The pumps can be used for many different types of duty, including domestic, industrial and agricultural effluents, industrial chemicals and detergents, mine dewatering, crude oil and starch slurries. Their smooth progressing cavity action also makes them suitable for handling shear-sensitive substances such as emulsions.

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# Housing development in Victoria receives environmental certification



Donvale's environmentally inspired estate, Mullum Creek, has received the highest possible level of certification under the Urban Development Institute of Australia's (UDIA's) national EnviroDevelopment program.

Located approximately 20 km from Melbourne CBD in the City of Manningham, all homes being built in the 20-hectare estate must achieve a 7.5 star energy-efficiency rating and incorporate rainwater harvesting. Sustainable building practices and materials will be required, and each lot will have a 3D building and vegetation envelope,

ensuring that homes do not encroach on their neighbours' access to sunlight for solar power and passive design purposes. Also, almost 45% of the site has been set aside as council-owned recreation reserve, allowing retention of remnant bushland and habitat for indigenous wildlife.

The UDIA EnviroDevelopment certification program encourages developers to achieve best practice in sustainability initiatives raising the bar at least 20% over and above the minimum standards on a national platform. Performance based and applicable to a diverse range

of developments, the certification covers the broad spectrum of environment and sustainability issues. The elements are: ecosystems, water, energy, waste, materials and community.

Mullum Creek is only the third - and the smallest - development in Victoria to achieve all six elements. Steve Mathews, part owner of the Mullum Creek estate, said: "We are delighted to be honoured with EnviroDevelopment certification across all six elements." He said the certification had reinforced the project's vision to create a sustainable haven where residents could get closer to nature.

"This development in particular highlights the innovation and sustainability credentials of the Victorian development industry and the Mathews' family are to be congratulated on achieving this," said Tony De Domenico, executive officer of the UDIA.

"One of our aims when creating this project was to ensure we preserved much of the local ecosystem, so we have worked hard to incorporate sustainable planning and design initiatives into every step of the development process," said Mathews.

For further information, visit [www.mullumcreek.com.au](http://www.mullumcreek.com.au).

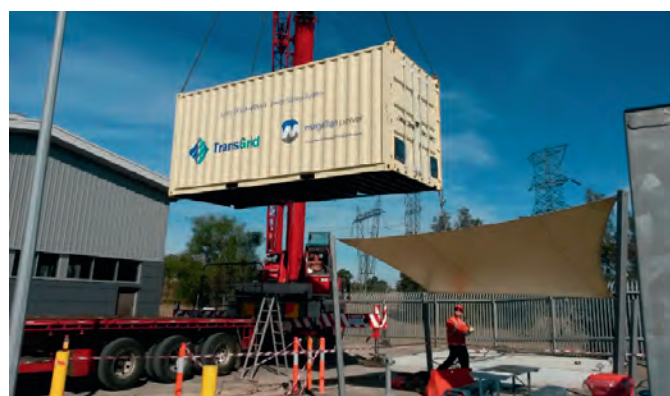
## Energy storage system delivered to TransGrid

Power system manufacturer Magellan Power has delivered an energy storage system to TransGrid, the owner and operator of one of the largest high-voltage transmission networks in Australia.

The demand management system will be used for the utility's iDemand project. The hybrid project, which is in place at TransGrid's Western Sydney (Eastern Creek) site, also includes 99 kW of solar panels and high-efficiency LED lighting.

The Magellan Grid Power Support System utilises 400 kWh lithium polymer batteries, which will store energy during off-peak periods at night and discharge energy to the site during the day. The bidirectional inverter uses rugged IGBT power circuitry with the latest microprocessor hardware and software.

The long cycle life of the LiMnNiCoO<sub>2</sub> battery, combined with the reliability and rugged design of Magellan inverters, makes the energy storage equipment suitable for many applications, including frequency and voltage regulation, peak load management, remote area power systems, solar smoothing and diesel reduction.



The product is one of many large containerised energy storage systems which Magellan has manufactured for Australian utilities. The company also makes residential and commercial versions.

Magellan Power  
[www.magellan-power.com.au](http://www.magellan-power.com.au)



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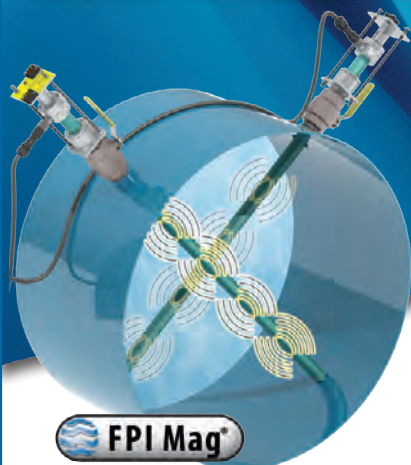






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## case studies

### Kaeser optimises compressed air systems



Kaeser Compressors Australia has assisted Wilson Transformer Company (WTC), a manufacturer of power and distribution transformers, in meeting its increased demand for compressed air. The Victoria-based manufacturer recently undertook a major expansion of its Glen Waverley facility, which included upgrading the compressed air system.

"In planning the expansion of our production facility, it became apparent that our existing compressor station was not going to be able to meet the new compressed air demand," said Alan Veitch, improvement manager for the Power Business Unit at WTC. "The ageing compressed air system was also becoming increasingly inefficient and so costly to operate."

The plant incorporates two main workshop areas, both of which use compressed air to power a number of operations. In particular, the company sought to introduce air skates - equipment powered by compressed air which can move heavy loads on a cushion of air - in order to "lift and manoeuvre the largest transformers into restricted access areas such as the testing bays where the cranes cannot go", said Veitch.

WTC chose to invest in six Kaeser rotary screw compressors: four CSD T models with integrated refrigeration dryers and two CSD(X) T SFC variable speed drive models. The screw compressors are available with drive powers up to 90 kW, producing free air deliveries from 1.07 up to 16.16 m³/min.

At the heart of every CSD(X) T rotary screw compressor lies a low-speed Sigma Profile airend, equipped with flow optimised rotors, which achieves power savings of up to 15% compared with conventional screw airend rotor profiles. In addition, Kaeser rotary screw airends are powered by IE3 drive motors for good performance and reliability.

Combining a rotary screw compressor with a compact integrated refrigeration dryer makes the CSD(X) T units suitable where the user requires an all-in-one solution. The integrated refrigeration dryers in the units provide further energy savings, with a sophisticated control ensuring that the dryers are only active when compressed air actually needs to be dried. Furthermore, by utilising a variable speed drive, the units have been designed to vary the speed of the airend to directly match the flow required by the end user. This saves energy, maximises service life and enhances reliability.

"All of the Kaeser compressors have proven to be efficient and reliable in operation, and we are particularly impressed with their ease of maintenance," Veitch said.

"The main compressor system is now effortlessly powering the new air skates, which together can lift and manoeuvre some 300 tonnes of weight."

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





# SMEs boost recycling of glass and polystyrene

*Dr Mark Jackson, Project Director, A.Prince Consulting Pty Ltd*

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**Small and medium-sized enterprises (SMEs) produce 45% of all business waste sent to NSW landfills and one-on-one support being provided through the NSW EPA's Bin Trim program is helping to boost recycling of problematic materials such as plate glass and expanded polystyrene, known as EPS.**

Incredibly, SMEs in Sydney alone send 1 million tonnes of waste per year to landfill, 70% of which could be re-used or recycled.

Despite increased public acceptance of the need to reduce waste and protect our environment, many SMEs and staff are not taking action. Low-cost collection and re-use systems are accessible for businesses to help reduce the amount of material being sent to landfill.

Common reasons given by SMEs for not taking action are that they: believe their waste is not significant enough to warrant a recycling service; don't have in-house knowledge and expertise to improve systems; believe changes in waste disposal practices will be costly; are unaware of the benefits of improved environmental performance.

A.Prince Consulting (APC) and the NSW EPA are working together as part of the NSW Government's Bin Trim program to help boost the recycling of plate glass and polystyrene from businesses across NSW. These materials do not make up a large part of the business waste stream, but tend to be disposed of rather than recycled by most businesses.

To help businesses consider ways of recycling plate glass, EPS and other common materials such as paper, cardboard, plastics, metals and timber, APC is working in partnership with 70 businesses that are members of the NSW Glass and Glazing Association. We are also working with a further 50 businesses such as furniture and electrical retailers and produce markets that generate a large amount of EPS, which is a low-cost packaging material that can be easily compacted and sent to local companies such as IS Recycling for export and recycling into other polystyrene products.

Results to date show that businesses are very keen to receive support to assist them to recycle better. Common feedback is that while some businesses are paying thousands each year in waste disposal,



## Waste recycling

setting aside time to look at ways to recycle better often drops off as a priority. By working with an expert advisor, many businesses are now installing better recycling systems to divert waste away from landfill, which not only saves money but also helps the environment.

And the results from this program are starting to gain interest from waste and recycling companies wanting to provide better recycling services. Waste assessments done with the NSW Glass and Glazing Association members show that there is in excess of 10,000 tonnes per year of plate and laminated glass that is currently being sent to landfill, of which the majority can be recycled if it is collected separately.

Programs like these can help identify gaps in the resource recovery chain and assist in identifying strategic investment opportunities for the recycling industry.

The NSW Government has just released its new 'Waste Avoidance and Resource Recovery Strategy 2014-2021' and has set a recycling target for businesses of 70% by 2021. By working in partnership with businesses and industry organisations, we are gradually helping businesses manage their waste better while also helping government reach these ambitious recycling targets.

Although business waste recycling currently rests at 57%, to reach the 70% target by 2021, a further 1.1 million tonnes per year needs to be recycled. Our work with the Bin Trim program and with businesses is making progress towards this goal and helping to make recycling standard practice in businesses across NSW.

*APrince Consulting*  
[www.aprince.com.au](http://www.aprince.com.au)



*Dr Mark Jackson is Project Director of A.Prince Consulting Pty Ltd based in Sydney, a national waste and recycling consulting firm*

*working with the NSW Government to roll out the Bin Trim program to help businesses recycle better.*

## case studies

### Yarra Valley Water upgrades sewage treatment plant



Yarra Valley Water is investing \$11 million to improve the sewerage system in Croydon and Chirnside Park, Melbourne, as well as providing recycled water to new developments in the area. This includes \$9 million in upgrades to the Brushy Creek Sewage Treatment Plant and \$2 million for upgrades to local sewerage pipes and several new recycled water pipelines.

"The sewage treatment plant at Brushy Creek treats up to 13 million litres of sewage a day," said Yarra Valley Water

Managing Director Pat McCafferty. "By carrying out plant upgrades and updating the aeration and ultraviolet treatment systems, we can process the sewage more effectively."

McCafferty said the improvements will help to increase the efficiency and reliability of the services provided to customers in the area and continue to protect the environment.

"The new sewerage pipe is upgrading an existing one which has reached the end of its useful life. The pipeline upgrade will help to reduce the likelihood of sewage spills into the environment.

"We are also installing new recycled water pipes, upgrading the recycled water supply to the Range Development and allowing for any future demand as the population grows. Up to 2 million litres of sewage can be treated and converted each day into high-quality Class A standard recycled water. The recycled water is then used by customers in their gardens, toilets and laundries, saving our valuable drinking water supplies."

Construction of the new sewerage and recycled water pipes began in June, with works to be completed between the Brushy Creek Sewage Treatment Plant along the Maroondah Highway and into Dorset Road.

"We are working closely with Maroondah City Council to put traffic management in place so that as little disruption as possible occurs while the work is carried out," said McCafferty. "While some areas of construction will require an open trench to be dug to lay the new pipes, where possible we will use trenchless technology. This means that a hole will be drilled in the ground for the pipe to be pushed through, instead of digging an open trench. This technique generally takes less time to complete and also minimises our disruption to the environment."

Pipeline construction is expected to be completed later this year, subject to weather and favourable ground conditions, with the remaining Brushy Creek Sewage Treatment Plant upgrade works to be completed over the next two years.



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## Grundfos to treat Singapore's wastewater

Pump manufacturer Grundfos has been awarded a S\$1.4 million R&D grant by the Singapore Environment and Water Industry Programme Office (EWI) to develop a novel wastewater filtration technology that can significantly reduce capital investment and operational costs for wastewater treatment.

The project will be led by the Grundfos Water Innovation Centre in Singapore, headed by Dr Gao Xin, with support from Nanyang Technological University's Nanyang Environment & Water Research Institute (NEWRI). It will focus on the industrial treatment of wastewater using a cake filter made from activated sludge - the 'active ingredient' of a biological wastewater treatment plant. The sludge contains a suspension of bacteria that feed on wastewater impurities, thereby cleaning it.

The cake filtration technology utilises the physico-chemical properties of this material to construct good filters on simple supports. Unlike conventional technologies such as ultrafiltration, which require a lot of energy and maintenance during operation, the cake filtration technology requires very little energy as it can operate under the low water pressure generated by gravity.

The method can be outlined in four steps:

1. The cake filter is formed by collecting the activated sludge on a porous support frame.
2. The cake filter is treated to deliver hydraulic properties and remove impurities so as to meet the required effluent-discharge standards.
3. After treatment, the cake filter is now ready to be used to filter secondary effluents from wastewater treatment plants.



4. A backwash will easily remove the used filter to make way for a new cake.

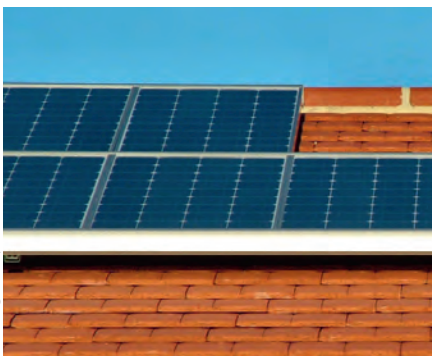
The cake filtration is said to produce superior filtrate quality (compared to traditional techniques) which can be safely discharged into the sea. The effluent discharge standard is comparable to that of membrane filtration while halving the cost of effluent polishing, which is the removal of impurities from secondary effluent. There is further potential to treat the filtrate and recycle it for irrigation or industrial uses.

The technology is expected to fit in with a broad range of solutions for water treatment, wastewater discharge and recycling, with the R&D enabling the development of a suite of wastewater treatment solutions. As explained by Lars Enevoldsen, group vice president of Grundfos Global Research and Technology, "The cake filtration project relies strongly on precise and controlled pumping of water and sludge, and will offer a good study platform on the optimisation of cost and energy use in pumping operations."

Upon successful proof of concept, the grant will fund a pilot demonstration of the technology.

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

## Storage solution to enhance rooftop PV



The Australian Renewable Energy Agency (ARENA) has announced \$445,000 funding for Reposit Power to trial an on-grid solar photovoltaic (PV) energy storage and trading system.

ARENA CEO Ivor Frischknecht said the new technology would allow consumers to gain more value from their rooftop solar PV installations.

"One in five Australian households now use solar power. This substantial rise has made it vital to find solutions to better manage how residential solar systems operate in our electricity grids," Frischknecht said.

"Reposit's GridCredits system can control and store solar energy. This gives consumers access to their own power overnight and at peak times, reducing their demand on the grid.

"It also allows energy to be sold back into the grid by placing bids into the market, turning residential properties into micro power plants.

"Residential electricity storage allows network operators to manage demand more effectively by delivering stored power into the grid at peak times.

"Reposit's technology will also help smooth out the variable delivery of solar

energy, allowing more renewables to be connected to the grid."

Frischknecht said the system would be trialled at homes in the Australian Capital Territory to better understand how it will operate within the network.

"The Australian Energy Market Operator is in discussions with Reposit about the potential to install and operate its product on the National Electricity Market," Frischknecht said. "Reposit is also working on commercialising the technology and conducting market research to better understand the needs of potential customers.

"These important steps will give the technology the best chance of becoming available to Australian consumers and increasing the potential of solar PV to contribute to Australia's electricity supply."

The \$930,000 project is scheduled for completion in July 2015.

## Magnetic materials pump efficiency into electric motors

Researchers from the University of Adelaide are using new magnetic materials to develop energy-saving electrical motors and generators. Their research has been funded through two different Australian Research Council Linkage project grants.

Lead researcher Associate Professor Nesimi Ertugrul, from the university's School of Electrical and Electronic Engineering, noted, "In the developed world, more than 50% of all energy generated is used by electrical motors", a significant portion of which are used to drive water pumps.

"This leaves a lot of room for efficiency gains."

The researchers have used two emerging magnetic materials - soft magnetic composite (SMC) and amorphous magnetic

material (AMM) - and two novel production techniques to form the 'stator' within the electrical motor or generator. The stator is the stationary and magnetic part of a motor surrounding the rotor which turns.

"Currently all commercial motors are made by pressing very thin metal sheets of silicon iron together and then stamping out the shape of the stator from the metal," said Associate Professor Ertugrul. "This process is wasteful of the metal sheeting and also limits the best use of available space for the copper wire needed in motors.

"We've produced new stators using SMC with no need for machining, no scrap metal and improved space utilisation for copper wire for greater power output."

Both production techniques have been successfully developed and tested with



© Devyatkin S/Dollar Photo Club

patented prototypes, showing substantial energy efficiency gains - up to 90% energy efficiency in small motors compared to 60-70% in conventional motors. Using SMC material and working with industry partner Intelligent Electric Motor Solutions (IEMS), the team developed motors that operate at low speed with high power output and with low production costs, suitable for swimming pool and similar pumps.

The researchers are now looking for further investment partners to commercialise the technology.

## Bio-Bus runs on human and food waste



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UK waste recycling company GENeco has launched a bus powered by the treatment of sewage and food waste. The 40-seater Bio-Bus can travel up to 300 km on a full tank of gas - which takes the annual waste of around five people to produce - generated at the Bristol sewage treatment works, run by GENeco, a subsidiary of Wessex Water.

Bristol sewage treatment works treats around 75 million m<sup>3</sup> of sewage waste and 35,000 tonnes of food waste - collected from households, supermarkets and food manufacturers - every year. Through anaerobic digestion, 17 million m<sup>3</sup> of biomethane is generated - the equivalent of meeting the power needs of 8300 homes. Not only does the sustainable, renewable biomethane reduce reliance on fossil fuels, it also produces fewer emissions than traditional diesel engines.

GENeco has now become the first company in the UK to start injecting gas generated from food waste and sewage into the national gas grid network and, at the same time, installed a gas refuelling plant for the bus. The annual waste generated from one busload of passengers would provide enough power for the

bus to travel from one end of the United Kingdom to the other and back again.

Charlotte Morton, the chief executive of the Anaerobic Digestion & Bioresources Association (ADBA), said: "GENeco's Bio-Bus is an excellent demonstration of biomethane's unique benefits, decarbonising areas other renewables can't reach. A home-generated green gas, biomethane is capable of replacing around 10% of the UK's domestic gas needs and is currently the only renewable fuel available for HGVs."

The Bio-Bus has received backing from a number of businesses, including its manufacturer, Scania, as well as Roadgas, CNG Services, Dampney's Agri Environmental, Trant, Grontmij and AIR Decker. Bath Bus Company has said it is extremely pleased to be using the bus for its A4 service from Bath to Bristol Airport via South Bristol.

"The timing of this initiative could not be more appropriate as we approach 2015, when the City of Bristol itself becomes European Green Capital," said Bath Bus Company Engineering Director Collin Field. "With so much attention being directed towards improving air quality generally, the public reaction to the appearance of this bus on a service between a World Heritage City and an airport will further focus on the potential for this particular fuel."

Morton added, "The bus also clearly shows that human poo and our waste food are valuable resources. Food which is unsuitable for human consumption should be separately collected and recycled through anaerobic digestion into green gas and biofertilisers, not wasted in landfill sites or incinerators."

Wessex Water  
www.wessexwater.co.uk



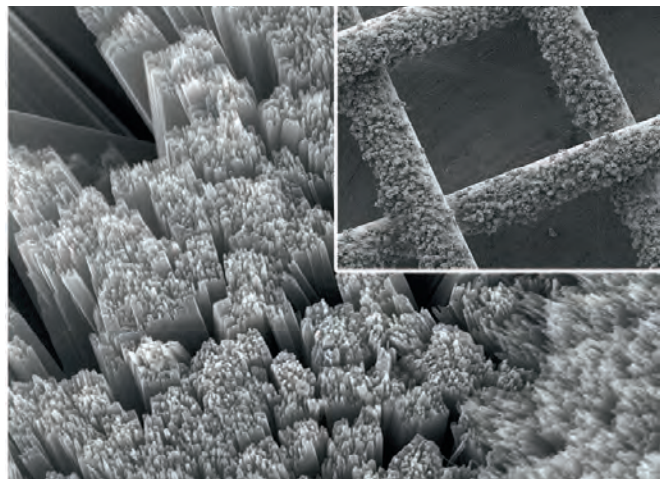
## Solar battery runs on light and air

Scientists from The Ohio State University (OSU) have succeeded in combining a battery and a solar cell into one hybrid device, described as the world's first solar battery. Their study has been published in the journal *Nature Communications*.

Professor Yiying Wu and doctoral student Xiaodi Ren recently invented a high-efficiency, air-powered battery that discharges by chemically reacting potassium with oxygen - a design which won the \$100,000 clean energy prize from the US Department of Energy in 2014. Wu described the invention as a "breathing battery", saying, "It breathes in air when it discharges and breathes out when it charges."

The researchers sought to combine a solar panel with a battery similar to their award-winning effort. The problem was that solar cells are normally made of solid semiconductor panels, which would block air from entering the battery. So doctoral student Mingzhe Yu designed a permeable mesh solar panel from titanium gauze - a flexible fabric on which he grew vertical rods of titanium dioxide. Air passes freely through the gauze while the rods capture sunlight.

Normally, connecting a solar cell to a battery would require the use of four electrodes, but the hybrid design uses only three. During charging, light hits the mesh solar panel and creates electrons. Inside the battery, electrons are involved in the chemical decomposition of lithium peroxide into lithium ions and oxygen. The oxygen is released into the air and the lithium ions are stored in the battery as lithium metal after capturing the electrons. When the battery discharges, it chemically consumes oxygen from the air to re-form the lithium peroxide. An iodide additive in the electrolyte acts as



Scanning electron microscope images show the researchers' solution: nanometre-sized rods of titanium dioxide (larger image) which cover the surface of a piece of titanium gauze (inset). The holes in the gauze are approximately 200 micrometres across, allowing air to enter the battery while the rods gather light.

Image courtesy of Yiying Wu, The Ohio State University.

a 'shuttle' that transports electrons between the battery electrode and the mesh solar panel.

Wu and his students believe their device will not only bring down renewable energy costs by 25%, but it will also improve solar energy efficiency. Typically, only 80% of electrons emerging from a solar cell make it into a battery, due to the loss of electricity that normally occurs when electrons travel between a solar cell and an external battery. With the new design, light is converted to electrons inside the battery, so nearly 100% of the electrons are saved.

The team believes their solar battery's lifetime will be comparable to rechargeable batteries already on the market. They hope to explore ways to enhance its performance with new materials and plan to license the battery to industry.

[www.osu.edu](http://www.osu.edu)

## case studies

### Safe solar project for Queensland firefighters

Firefighters in Queensland wanted to contribute to the fight against climate change but needed a safe energy solution that delivers dependable performance monitoring. Green Energy Electrical had the solution tucked inside a toolbox.

The company's owner, Steven Pilcher, always keeps an Enphase microinverter on hand for clients who want solar energy systems. The device is compact and lightweight, and Pilcher finds that showing it drives home the inherent safety of the product. This was especially useful when completing a 2 kW solar project for the Mapleton Rural Fire Brigade.

The all-volunteer fire brigade represents the front line of defence against Australia's

bushfires. Firefighters use the Mapleton station for meetings, training and to fill their trucks with water, but without paid staff, the building is often unattended.

While the brigade is out running fire prevention programs and community education activities, Enphase collects real-time system performance data and makes it available online to the fire brigade and installer. The microinverters keep the fire station safe by operating at low voltage, eliminating most of the risks present in string inverter systems.

"They take fire out of the equation," said Pilcher. "It's that level of safety - and the monitoring - that get me the jobs." Pilcher recently noticed that the Mapleton

project had stopped reporting performance data. Without having to visit the station, he correctly diagnosed the problem - an unplugged internet cable - and notified fire warden Geoff Noble.

Enphase monitoring not only keeps the fire brigade informed about how its system is operating, it also helps Green Energy Electrical provide efficient system maintenance. The recently announced Enphase Energy Management System will give users even more control over their energy, including the ability to store it for later using the Enphase AC Battery.

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



# Hamilton City Council meets compliance demands with system upgrade

Hamilton City Council is responsible for the operation of the Pukete Wastewater Treatment Plant (WWTP) - Hamilton's only wastewater treatment facility. This plant services a region that has grown rapidly in recent decades to have a population in excess of 150,000. The WWTP is also developing, in its case to improve operational performance and maintain compliance with a changing government regulatory environment.

**L**everaging the FactoryTalk Integrated Production and Performance Suite from Rockwell Automation, Hamilton City Council implemented an upgrade to the supervisory control and data acquisition (SCADA) system at the wastewater treatment plant.

## Meeting compliance and productivity requirements

To comply with New Zealand Ministry of Health regulations, it is the responsibility of water treatment facilities to track, save and provide monthly reports on water production, intake and discharge levels. The standards also require that water treatment plants retain operating data for 10 years.

More than a decade ago, Rockwell Automation provided the council with the software suite for its previous SCADA system. However, the RSVIEW32 system had become outdated over time and inef-

ficient for compliance with modern-day regulatory requirements.

With its previous SCADA system, the council had often recorded data manually before transferring this information into Microsoft Excel spreadsheets for reporting. A faster, more accurate and automated reporting system was needed - and one that could rapidly generate predetermined reports automatically for sharing with authorised groups.

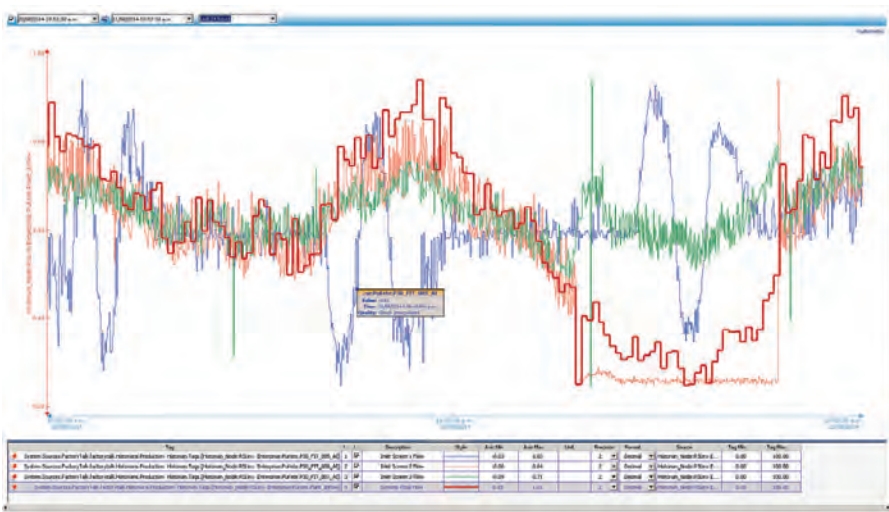
"Our previous system was outdated and we required an upgrade to help simplify the process of complying with current water regulations in New Zealand," said Gary Pitcaithly, automation and electrical manager at Hamilton City Council. "Not only that, but we identified the potential for improving operational efficiencies at the plant by implementing an integrated system that aims to increase productivity and reduce downtime."

A key aim of the upgrade was to deliver a system with the ability to retain

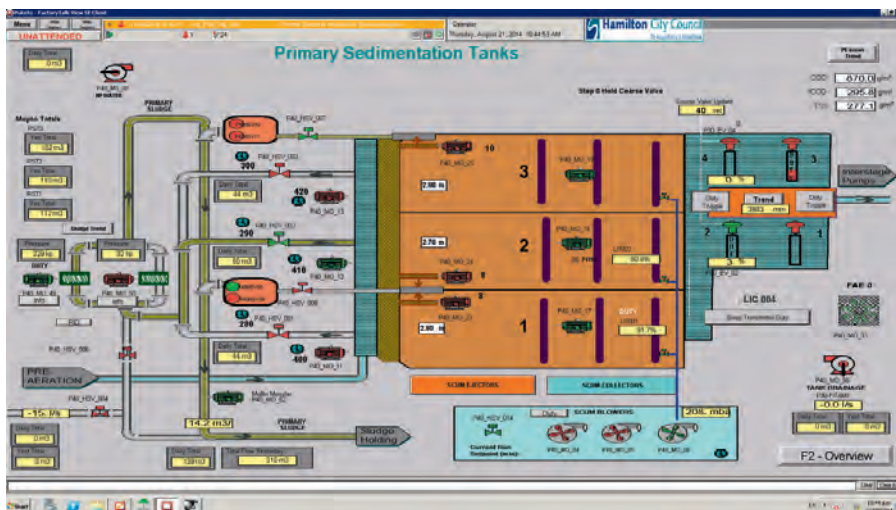




## Wastewater management



FactoryTalk Vantage Point Inlet screen flow comparison.



Wastewater SCADA screen.



10 years of data in a stable and reliable manner. At the same time, the system would need to provide operational efficiencies compared with the previous operating system, while also maintaining a secure environment only accessible by authorised stakeholders. To improve on this process, Hamilton City Council engaged Rockwell Automation to provide the latest versions of the FactoryTalk software suite as the integral element of an upgrade to its system.

According to Prasad Nory, industry manager - South Pacific at Rockwell Automation, "FactoryTalk Historian and FactoryTalk VantagePoint are increasingly becoming standards in the water/wastewater industry - especially with the need for compliance to changing drinking water standards. Also, FactoryTalk Historian ME has been used by some councils in their pump stations to store data locally to take care of communication failures and meet compliance.

"By upgrading to the FactoryTalk suite, the key benefits identified by council included superior reporting for compliance to government regulations; improved system reliability and stability; and reduced risk when contractors are on-site to undertake modifications or further expansions."

The FactoryTalk software suite delivers a real-time exchange of information throughout organisations - a critical element that allows for more informed business decisions, improved responsiveness, increased productivity, reduced costs and ease of compliance with regulations.

Implemented in-house by Pitcaithly, Hamilton City Council upgraded the WWTP's system over six months to include the Factory View (SE), FactoryTalk Historian, FactoryTalk VantagePoint, FactoryTalk AssetCentre and FactoryTalk ViewPoint applications. The Rockwell Automation Customer Support and Maintenance team provided support to the council during the upgrade, particularly for the migration from Historian Classic to FactoryTalk Historian.

The long-term storage and reporting capabilities required to comply with water standards are provided by FactoryTalk Historian and FactoryTalk VantagePoint. Data is stored in the Historian server for the required 10-year retention period and is easily accessed for analysis and reporting purposes.

FactoryTalk VantagePoint is used by the plant to schedule and produce automatically generated reports providing information on periodical water consumption, discharge, intake, water quality and storage levels. FactoryTalk AssetCentre provides improved contractor control, change management and storage capabilities. Most importantly, the plant is now positioned to efficiently comply with water regulations in New Zealand, including the storage of data and records for 10 years.

### Delivering fresh water and a clean environment

The benefits of the Integrated Architecture solution will help the plant supply fresh drinking water and a clean environment to residents of Hamilton for many years to come. According to Pitcaithly, historical and reporting data is now available more quickly and accurately following implementation of the FactoryTalk suite, as the council had envisioned prior to the upgrade.

“The upgrade has delivered greater ease of use of our system throughout the WWTP,” said Pitcaithly. “The new Historian is superior in how it stores data and makes generating information

“

*The system would need to provide operational efficiencies compared with the previous operating system, while also maintaining a secure environment only accessible by authorised stakeholders.*

”

for vital reports a much more efficient task to undertake.

“The VantagePoint software allows us to develop reports at will, whether it is for compliance to water standards or for other needs. These reports can then be published as web-based reports that are available for anyone authorised to view them.”

Another key result of the upgrade has been the flexibility it has added for personnel operating the system at the WWTP.

“The FactoryTalk software suite has enabled our team to be more flexible with their time, as we are now able to edit or update reports as we go,” continued Pitcaithly. “We now simply store our data directly into Historian and the data spreads directly from the PAC (programmable automation controller) to a human interface. This data is incorporated into spreadsheets

for us to interrogate, whether it is on a daily, weekly or monthly basis, to tell us if we’ve had a breach in turbidity or if chlorine levels aren’t what they should be.”

The flexibility extends to the ability of system users to remotely access the software from tablet computers or smartphones. “The team has tablets and smartphones that can basically access FactoryTalk View anywhere in the world - if they are out of the office or on-call, the system can be easily accessed and key changes made,” concluded Pitcaithly.

With the FactoryTalk software suite delivering newfound operational potential for the plant, the council is planning to continue to update and improve its system further in the coming years utilising these capabilities.

Rockwell Automation Australia  
www.rockwellautomation.com.au

## products & services



### Dairy effluent pump

The Mono progressing cavity pump is a high-efficiency dairy effluent pump suitable for agricultural irrigation. The 15 kW pump will deliver the required flow, regardless of what discharge pressure is needed. The pump’s capacity and delivery is such that the user can irrigate crops quickly and efficiently without the risk of over application.

The pump is used to draw effluent from settling ponds and deliver it to irrigation equipment. The effluent passes through a large stone trap filter and

fed spring water, resulting in water which is sufficiently clean for irrigation purposes.

The company’s dairy effluent pumping solutions can eliminate the need for a series of pumps when pumping over long distances or at a high head. The pump has low power requirements when compared to other pumps used for this type of application, and it also reduces electricity operating costs and removes the need for a power-supply upgrade.

The surface-mounted pump is easy, quick and safe to dismantle and clean on site, while its low running speeds help reduce wear and extend both the maintenance intervals and the overall working life. Designed to meet the specific demands of effluent applications, the pump can be used for a wide range of agricultural sludge-handling duties and can be specified to satisfy a full range of pressure requirements.

**Mono Pumps Australia Pty Ltd**  
www.monopumps.com.au





### LED troffer

The Emerald Planet LED troffer offers a minimalist professional look with its white frosted lens and pearl white steel finish.

Using the latest technology, the troffer uses an 'Epstar' LED chip set on a steel heatsink that enables it to run cool, guaranteeing a long lifetime.

The LED troffer comes in 1200 x 300 mm and 600 x 600 mm versions designed to fit directly into an existing drop ceiling or is available with a ceiling-mount kit for surface mounting. With a 120° beam angle, the 6400K LED tube throws a wide, even, natural light. Other colours are available on request.

The product is available in 32 W (2600 lm) and 44 W (3600 lm) and comes with a three-year warranty.

**Emerald Planet Environmental Pty Ltd**

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### Ultrasonic flow meter

The Series UFB Ultrasonic Flow Meter Set uses the transit-time difference for measuring flow rates in pipes non-invasively. The permanent model allows the user to mount the converter on a surface or pipe. The easy-to-use, compact and lightweight design is intended for mechanical devices using homogeneous liquids that contain no air pockets.

The series comes with a sturdy IP65 rating, protecting it from dust and direct water contact. It has 4 to 20 mA and pulse output capabilities.

Two sensors are placed on the exterior of the pipe; each transmits an ultrasonic pulse through the pipe and fluid to the other. The velocity of the liquid flowing through the pipes causes the pulse to accelerate or decelerate. The difference in the transit times of the two pulses is used to calculate the flow rate. The use of transit time allows the flow meter to be unaffected by pressure or temperature changes.

Applications include: treated water; river water; sea water; potable water; demineralised water; glycol/water mix; hydraulic system; diesel oil.

**Dwyer Instruments (Aust) Pty Ltd**

[www.dwyer-inst.com.au](http://www.dwyer-inst.com.au)



### Data acquisition for digital sensors

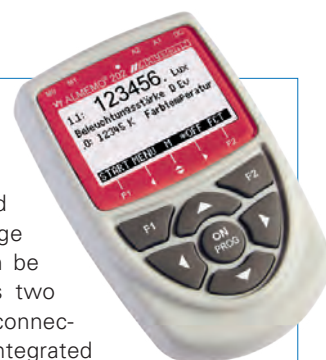
The Almemo 202 is designed to accommodate a wide range of digital sensors. Sensors can be connected at either one of its two measuring inputs using a new connector type incorporating its own integrated analog-to-digital converter (ADC) and serial interface.

With D7 plug technology, the measuring ranges and numbers of sensors are completely independent to the measuring instrument. Each D7 connector gives access to up to 10 display/function channels. This is an advantage when it comes to connecting multifunction sensors. It offers not only temperature and atmospheric pressure compensation but also a wide variety of sensor-specific functions.

The product is a compact, stable measuring instrument suitable for both mobile and stationary applications. Its energy-saving ability ensures long operating times even when not connected to the mains supply. Its brightly illuminated graphics display indicates measured values, peaks, averages and limit values - all in a clear and easy-to-understand format.

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# Rethinking grid-connected PV economics

## Cost parity period

*Dr Glen Johnston, Director, LAROS Technologies*

**Typical analysis of PV system economic viability usually assesses net present value of the PV plant capital expense and running costs in comparison with an alternative investment offering a specified rate of return, or 'discount rate'.**

**G**rid-connected PV plants should be assessed against a different type of competing 'investment' - the grid electricity tariff - as PV plants are a power generation system that are most often considered as a cost mitigation element for the grid they are connected to.

When viewed this way, a different economic model emerges that assesses the period of time it takes for the value returned from a PV system in relation to the energy it has generated equals, or subverts, the grid electricity tariff: the cost parity period.

### Simplified model

The concept of cost parity period is most easily grasped when described with a working example.

Overall, we wish to understand how the PV system value changes together with the cumulative energy it creates, and how the specific energy cost - the 'levelised cost of energy' (LCoE) - changes in this value/energy equation.

Consider the simplified model of PV value and cumulative energy generation over time for an illustrative PV system having the installed parameters shown in Table 1.

Using the design parameters given in Table 1, we can generate a time-series list of how cumulative energy and value creation occurs for such a system, shown in Table 2.

Interpretation of Table 2 proceeds as follows:

- Column 1 shows the yearly progression against which energy and value are calculated (note that 'end of year 0' is just another way of saying 'the beginning of year 1').
- Column 2 shows the annual cumulative energy generation - ie, after the first year, 15,000 kWh of energy will have been generated; after the second year, a total of 30,000 kWh of energy will have been generated by the system, etc.
- Column 3 shows the electricity tariff that will be applicable to energy consumed (or displaced by the PV system). Note the annual increase in the tariff according to the tariff escalation rate.
- Column 4 shows the annual electricity displacement cost saving provided by the PV system.
- Column 5 shows the progressive (reducing) cost of the PV system to the client. For example, at the beginning of year 1, the system 'owes the client' \$30,000, or the full purchase price of



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<b>System size</b>	10 kW
<b>Net system cost</b>	\$30,000
<b>PV energy yield</b>	1500 kWh/kW/year (doesn't include annual PV performance degradation)
<b>Electricity tariff</b>	20c/kWh at time of installation
<b>Electricity tariff escalation rate</b>	6% per year

Table 1. Illustrative PV system parameters used to model energy and value analyses.

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
End of year	Cumulative energy generation (kWh)	Electricity tariff (c/kWh)	Annual cost saving	System cost to client	Cumulative cost rate to client (or levelised cost of energy, c/kWh)
0	0	20	0	\$30,000	$\infty$
1	15,000	20	\$3000	\$27,000	180
2	30,000	21.2	\$3180	\$23,820	79.4
3	45,000	22.5	\$3371	\$20,449	45.4
4	60,000	23.8	\$3573	\$16,876	28.1
5	75,000	25.2	\$3787	\$13,089	17.5
6	90,000	26.8	\$4015	\$9,074	10.1
7	105,000	28.4	\$4256	\$4818	4.6
8	120,000	30.1	\$4511	\$308	0.3
9	135,000	31.9	\$4782	-\$4474	-3.3

Table 2. Variation of energy and value over time for PV system with installed parameters described in Table 1.

the system. However, after year 1 the PV system has paid back \$3000 to the client (in saved electricity tariff), and hence the system now 'owes the client'  $\$30,000 - \$3000 = \$27,000$ . Each year the PV system saves the client an increasing electricity tariff; hence, the net system cost to the client keeps reducing.

- If we look at the ratio of what the system has cost the client to the net energy it has created over the same time interval, we get a levelised cost of energy figure that decreases with time, as shown in Column 6. For example, after year 1, the system has cost the client \$27,000 and created 15,000 kWh of energy; hence the LCoE

is  $\$27,000/15,000 = 180\text{c/kWh}$ . After year 2, the system has cost (or 'still owes') the client \$23,820, for a net energy creation of 30,000 kWh, or an LCoE of 79.4 c/kWh, etc.

If we plot the annual change of both electricity tariff and the LCoE of the PV system (given in Table 2) on the same graph, we get Figure 1.

We see two critical points emerge from Figure 1:

1. The falling LCoE (blue) curve eventually intersects the rising price of electricity (red) curve, at the point of the cost parity period, or CPP. The CPP represents the point at which the cumulative energy created by the PV system has cost the client the same

as if the client had bought the same quantity of electricity from the grid. The LCoE from the PV system only keeps decreasing beyond this point, and the PV system effectively 'beats the grid' with its cost of electricity.

2. The LCoE curve falls further over time, to eventually cross over the LCoE = 0 axis, at which point the PV system has paid back to the client the complete cost of the system, and we understand this to be the typical (simple) payback period of the investment.

For the example shown in Figure 1, we find a payback period of eight years for the system, but a cost parity period of only 4.4 years. This means that after 4.4 years, the client is obtaining electricity for a cheaper price from their PV system than they can buy it from the grid.

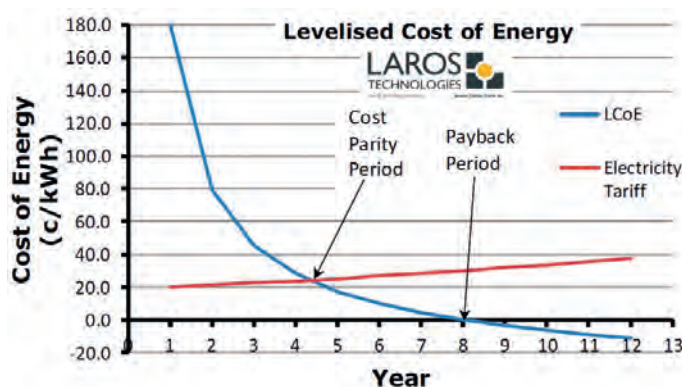


Figure 1. Plot of levelised cost of energy and electricity tariff over time for an example PV system.

## Assumptions

The operating assumptions behind this modelling assume:

- All of the PV electricity is used on-site and displaces electricity cost at the grid tariff.
- Progressive PV module performance degradation (generally  $\sim 0.7\%$ /year) is not included (although this will make only a small difference to the overall outcome).
- Costs of borrowing, maintenance, depreciation and general time-value-



## PV economics

of-money factors - if these parameters are applicable - are not included.

### Further developments

The simple levelised cost of energy analysis applied in the present study can be further refined by replacing the somewhat basic concept of 'what the PV system owes the client' with a more detailed net present value analysis, which would also include allowances for several of the variables noted as omissions in the assumptions.

We can also note that the cost parity period analysis can be applied to off-grid PV systems, although in this case:

1. A figure would have to be allocated to the electricity tariff the system would displace, if the grid were available at the site; and,

2. A figure determined (again by a proper NPV analysis) to add to the notional grid tariff that accounts for all capital costs of getting the grid connected to the site (with a nominal plant lifetime period against which to amortise the capital expenditure).

### Conclusion

Figure 1 shows that the CPP for a grid-connected PV system occurs far earlier than the typical payback period. The CPP represents the point in time at which the cost of energy from the PV system beats the cost of energy from the electricity grid, and only keeps getting cheaper than grid electricity as time progresses.

In this sense, the CPP realises the time when the PV system has demonstrated its true worth, and the client is



in an economically more advantageous position than if they had not installed the PV system.

Laros Technologies  
[www.laros.com.au](http://www.laros.com.au)

## products & services

### Portable gas detector

The RKI Eagle 2 portable gas detector can be rented from TechRentals.

Suitable for the oil and gas, industrial safety, air-quality, hazmat and military sectors, the gas detector provides confined space protection for lower explosive limit (LEL), O<sub>2</sub>, H<sub>2</sub>S and CO. It also incorporates a photoionisation detector (PID) for volatile organic compound (VOC) monitoring.

The unit comes standard with data logging; low-flow pump shut-off and alarm; auto calibration/single gas calibration; and an IrDA communications port. It is

intrinsically safe and CSA approved. Other features include methane elimination for environmental use;

powerful long-life pump up to 38 m range; and an alkaline 18 h or Ni-MH 20 h capability.

**TechRentals**

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### Precious metal and alloy XRF analyser

Non-destructive testing (NDT) of manufactured materials by X-ray fluorescence (XRF) is a crucial tool in many industries. The latest handheld XRF analyser from Olympus,

the Delta Element, is suitable for scrap metal sorting, positive material identification (PMI), alloy QA/QC and precious metals analysis.

The handheld XRF analyser was developed for users who require the speed and ease of operation expected from the Delta Premium, yet do not require the extended element range necessary only for some specialty applications. With its lightweight, handheld design and durable construction, the product features rubber overmoulding to protect the analyser and an ergonomic grip for comfortable operation.

With a powerful X-ray tube and Si-PIN detector, the product provides quick identification, screening and sorting of alloy and precious metals. Its combination of features is suitable for most alloy identification and sorting applications. The powerful tool is simple to operate - users can switch between precious metals and alloy mode at the touch of an onscreen icon.

The device displays measured results and grade identification in seconds. With Olympus' Grade Match Messaging (GMM) feature, the user can assign customised messages to any grade and use real-time or pop-up messages for immediate sorting instructions and improved user efficiency. The Delta Report software then allows for fast and professional reporting and certificate generation of any analysis.

**Olympus Australia Pty Ltd**

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





### Coriolis flow transmitter

Emerson Process Management has introduced the Micro Motion Model 5700, a Coriolis flow transmitter designed to translate measurement data into meaningful insight and instruction.

The product is suitable for a broad range of applications, from liquid and gas custody transfer to simple process control.

Emerson performed usability testing on the product to fully understand user information demands and real-world application requirements. Every feature was designed to reduce the time and expertise needed to install and operate the Coriolis meter.

The device focuses on delivering useable information to provide deep process insight from Micro Motion Coriolis measurement. The result empowers users to leverage rich Coriolis measurement data in order to further understand and improve their operating environments and achieve high levels of productivity.

The unit provides users access to detailed measurement history for troubleshooting or optimising the process. The graphical user interface was designed for intuitive operation, with simplified installation, configuration, maintenance and troubleshooting. The transmitter translates Coriolis measurement data into useful operating insight through robust, time-stamped history files for process and meta health data, and logs for configuration changes and alarms.

The digital signal processing architecture provides fast flow response time, making it optimal for custody transfer proving and short batching applications. The historian feature also improves Micro Motion Smart Meter Verification, which provides measurement of the full meta health without process interruption - improving measurement confidence and easing regulation compliance.

Compatible with new and previously installed Micro Motion ELITE Coriolis sensors, the unit has a field-mount design that is suitable with most hazardous area installation practices and with both integral and remote installation options. It currently includes options for analog, pulse, discrete and Modbus outputs and an analog or HART input.

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

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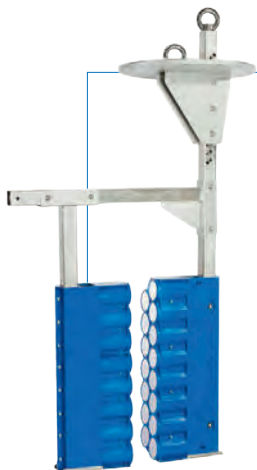


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### Acoustic density interface transmitter

FloLevel Technologies has launched a self-cleaning acoustic density interface transmitter for mining and applications that suffer from build-up issues. The technology accurately measures most liquid/slurry solutions where an interface of up to two densities exists that needs to be monitored continuously.

The level interface transmitter tracks liquid-to-liquid, liquid-to-paste and liquid-to-granular interfaces. It is a high-powered, ultrasonic, self-cleaning transmitter that is not affected by changes in the conductivity and dielectric of the solution. The pulse amplitude causes a phenomenon called rarefaction, which causes cavitation to be produced from the array transducer diaphragms as they pulse. The cavitation bubbles oscillate in front of the diaphragm, which causes implosions that generate high energy levels, removing scale and other build-up problems.

The system is easy to install from the top of the tank and is easy to calibrate. It comes with adjustable 316SS bracket, with flange mounting options and a colour display controller mounted in a stainless steel enclosure. It can measure the density interface, with a maximum control range of 6400 mm, and resolution accuracy options available are 15 and 25 mm. Various output capability options are available, eg, 3 x 4-20 mA, Modbus, ProfiBus, Foundation FieldBus, DeviceNet and Ethernet.

The product is suitable for all mineral slurry applications.

**FloLevel Technologies**

[www.flo-level.com/home.html](http://www.flo-level.com/home.html)

### Compact ultrasonic flow meter



The Model UFM is a clamp-on ultrasonic flow meter which implements the transit-time difference to measure flow rates in pipes non-invasively.

It has a compact and lightweight design featuring an easily installed, all-in-one clamp-on unit. The unit can measure velocity and flow in pipes with outside diameters ranging from 24.89 to 117.35 mm. The screen offers easy-to-read text with a convenient backlight for visual comfort. The model comes with a volume pulse and 4 to 20 mA flow rate output.

Two sensors located in the guide rail are placed on the exterior of the pipe, and each transmits an ultrasonic pulse through the pipe and fluid to the other. The velocity of the liquid flowing through the pipes causes the pulse to accelerate or decelerate. The difference in the transit times of the two pulses is used to calculate the flow rate, and the use of transit time allows the flow meter to be unaffected by pressure or temperature changes.

Applications include flow measurement for heat metering; chilled water metering and monitoring; potable water metering and monitoring; and process water metering and monitoring.

**Dwyer Instruments (Aust) Pty Ltd**

[www.dwyer-inst.com.au](http://www.dwyer-inst.com.au)



### Room controller

The SE8000 Series is a sophisticated

addition to the Schneider Electric portfolio of room controllers. The series can be used to monitor and control heating, ventilation and air conditioning (HVAC) and lighting to ensure the systems are always operating at peak performance. The compact controllers are suitable for use in hotels, corporate offices and high-end retail stores.

With rich, customisable features, the controllers come in elegant style combinations to complement any decor. The touch-screen interface, with multilanguage support, is easy to use and has a discreet occupancy sensor, so the controller is only active when someone is present in the room, saving energy in the process.

The products are simple and quick to install. They have a built-in scalability and easy integration with most building management systems. The controllers can also be activated remotely to allow facility managers to ensure their building is always operating at peak performance.

**Schneider Electric Buildings Australia Pty Ltd**

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



### AC battery

Enphase Energy has announced its Enphase AC Battery, an energy storage solution with a modular, plug-and-play storage device fully integrated with the Enphase Energy Management System.

Based on a distributed architecture, the battery is safe, easy to install and designed for residential and commercial applications. The modular battery provides system owners with the ability to store solar energy for night-time or future use, optimising solar power consumption and giving owners greater energy independence.

The AC battery, equipped with the S-series microinverter, will provide 1.2 kWh of energy storage and 275 W/550 W power-output. The scalable battery can also be monitored and controlled with the Enphase Enlighten software interface.

**Enphase Energy**

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



### Diesel improver and solar pump

The Mantek Road Runner Plus diesel improver together with the Mantek Lubemaster solar pump are claimed to be able to improve the quality of fuel, extend engine life, reduce harmful emissions and save fuel costs for diesel users.

Detergents and dispersants in the diesel improver keep injectors and fuel systems clean, while containing lubricating agents that help protect against component and seal wear. The product can address a broad spectrum of conditions which detract from diesel fuel efficiency. It is claimed to be able to reduce emissions, reduce friction and wear in fuel delivery systems, separate water from fuel, clean injectors and pumps in service, prevent rust and corrosion in tanks and control bacteria growth in both fuel and water phase, within 8 h.

The Lubemaster Solar Pump was developed to automatically and consistently inject Road Runner Plus into diesel during delivery. The pump dispenses an exact amount of diesel fuel improver at the optimal time, using solar power. A small computer controls the quantity of product dispensed and an intelligent onboard modem sends valuable system information via text message to a Mantek service advisor for continued, reliable and accurate maintenance.

The Road Runner Plus together with the Lubemaster Solar Pump enable diesel users, with minimal effort, to ensure contaminants are not present in the system while reducing harmful emissions into the environment.

**NCH Australia**

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The IT industry's share of global CO<sub>2</sub> emissions is estimated to be around 2%, according to market analysts at Gartner. While there has been a focus on making data centres more energy efficient, computer workstations frequently go unexamined despite producing one quarter of these emissions. Thin clients are designed to provide a smaller, cheaper and more energy-efficient desktop computing alternative to traditional PCs.

# Thin clients

## A sustainable alternative to PCs

Marc Doehnert, ANZ Business Development Manager, IGEL Technology

A thin client is basically a small form-factor, solid-state computer optimised for connecting to a data centre or cloud service provider, and is managed centrally by a manufacturer's operating software. With no user-accessible storage on board, thin clients can be cheaper than most PCs. Removing the user-accessible storage from a device also means that there are no moving parts, since there is no need for a fan to cool things down. They therefore run cooler, use less energy and have fewer breakdowns.

### Centralised infrastructures

Nowadays, virtualised applications and desktops centrally provisioned from in-house data centres or outsourced cloud services are replacing locally based programs. Increasingly in Australian companies, applications and desktops are being centrally managed and delivered over an internal network. The benefits can include increased efficiency, data security and cost transparency.

Conventional PCs, often called 'fat clients' since they contain extensive local hardware, don't fit very well into such lean scenarios because, compared to thin clients, they are excessive for these purposes and can tie up too much capital.

In terms of the environment, PCs are also far behind thin clients, according

to a study by the Fraunhofer Institute for Environmental, Safety and Energy Technology in Germany titled 'Thin Clients 2011 - Ecological and Economical Aspects of Virtual Desktops'.

In the study, two live thin-client infrastructures were analysed and compared to PC-based infrastructures used in an equivalent manner. In the first application scenario, the combination of IGEL thin clients and virtual desktops based on VMware View proved to have 47% less of an environmental impact than a similar, PC-based environment. This investigation covers the entire lifecycle of the product - from production through a five-year lifecycle then all the way to its ultimate disposal.

In the second thin-client installation employing the application/desktop virtualisation solutions Citrix XenApp and Citrix XenDesktop, the global-warming potential (GWP) calculated over the entire service lifecycle of three years was 30-63% lower than that of the PC-based control scenario, depending on the type of user involved. The GWP is measured in kilograms of CO<sub>2</sub>e and covers a total of six gases harmful to the environment. A conventional workstation PC for a medium-level user has a GWP of 417 kg CO<sub>2</sub>e. For a thin client, including its share of central server usage and cooling, the GWP ranges from 156 to 277 kg CO<sub>2</sub>e.



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*Conventional PCs, often called ‘fat clients’ since they contain extensive local hardware, don’t fit very well into such lean scenarios because, compared to thin clients, they are excessive for these purposes and can tie up too much capital.*

”

### Operational phase

The climate-relevant advantages of thin-client/VDI solutions are primarily due to lower power consumption in their operational phase. Depending on the application scenario and the type of user, the energy requirements for a thin client, and thus its power costs (including its share of server power and cooling), are 61-77% less than those of a modern, energy-efficient PC. If a thin client is used solely for web browsing as part of a cloud computing solution, these savings can be as high as 88%.

The level of CO<sub>2</sub> emissions is highest during the operational phase. The actual extent depends on two factors: the power consumption of the device and the method used to produce its power. Since the Fraunhofer study was conducted in Germany, the calculations are based on the currently produced German power mix, which releases 575 g of CO<sub>2</sub> per kWh (as of 2010). Based on these figures, a thin client can reduce the emission of greenhouse gases by up to 148 kg each year compared to a PC. According to the International Energy Agency, Australia’s CO<sub>2</sub> per kWh is 841 g, so subsequent savings would be even higher.

### Production, transport and disposal

Manufacturing a thin client requires fewer components than a PC. This not only means less material in general, but also less energy, fewer raw materials, fewer manufacturing supplies and less water pollution.

A thin client generally weighs 2.70 to 2.80 kg depending on the actual user scenario, after its server share has been added. In contrast, a typical workstation PC has a total weight of about 12.75 kg. Since a thin client weighs approximately 78% less and requires 70 to 81% less packaging volume than a PC, it also comes out way ahead during shipment and distribution, especially given the vast geographical size and widely dispersed state capitals of Australia. A standard

overseas shipping container can hold far more thin clients than PCs, and ground transport requires far fewer truckloads. This, in turn, further reduces greenhouse gas emissions.

When both types of end-user devices are ultimately disposed of, the lower amount of materials in thin clients also becomes evident. During recycling, a thin client yields only one third of the electronic scrap (e-waste) left by a PC. In addition, it also yields comparatively small amounts of non-recyclable materials. In research conducted by the TUV Rheinland group in 2006, 76% of the materials used in making thin clients could be recycled. These days, estimates from recyclers themselves indicate that the level of recyclable material has reached 98%.

### Thin client management

A contributing factor to their lower power consumption is that thin clients can be remotely managed. At many locations, PCs are left running continuously (overnight and over the weekend), while thin clients are automatically set into sleep mode over the network during these periods. In energy-saving mode, they only use about 1 W of power. Centralised management of the servers for thin clients also offers potential for automation, another significant environmental saving. For instance, virtual desktops can be dynamically created and deleted as needed, depending on the presence or absence of employees. In this way, centralised IT resources can be made available on an as-needed basis. During periods of low demand, they are automatically switched off.

Thin clients can also be switched off and then back on again as needed, by means of management software that transmits Wake-on-LAN commands. The management software used in the Fraunhofer Institute testing comes standard with all IGEL Universal Desktop devices, allowing smooth, universal remote man-

agement of thin clients in a network. This means that expensive, time-consuming service calls for maintenance and support are no longer necessary. If a thin client happens to fail, a replacement unit can be shipped to the location concerned. Upon its arrival, employees can easily hook up the new device themselves. During the interim period, the employee can move to another thin client workstation from which they can still access the data centre and their personalised workstation environments, with no loss of business continuity.

IGEL’s Universal Device Management software allows legacy devices such as PCs and laptops to operate as a thin client on the same virtualised platform. This gives companies the ability to integrate a deployment of thin clients in stages and minimise the upfront cost.

The sustainability of IT environments greatly depends on their service life. The longer IT devices remain in service, the less e-waste will accumulate and the greater the environmental and economic benefits will be. In general, PCs are usually due for replacement after three or four years, thus requiring relatively frequent investments in new equipment. Thin clients have service lives of six years and even longer, as their hardware has fewer moving parts and is inherently less prone to failure. In addition, thin clients also receive free firmware updates that keep them constantly up to date. With thin clients, investments in new equipment primarily occur in centralised data centres where, due to the nature of IT consolidation and efficiency, they have less of a financial impact.

In conclusion, the evidence is very much in favour of a virtualised environment running thin clients, which offers organisations in Australia lower upfront costs, fewer overheads and a smaller environmental footprint.

IGEL Technology Pty Ltd  
[www.igel.com](http://www.igel.com)





### Micro laser distance sensors

Panasonic has released its latest range of micro laser distance sensors with built-in amplifiers, available in three sensing distances of 30, 50 and 100 mm. They are suited to applications that require highly precise measurements in the order of 1/100 mm and have a precision down to 10  $\mu$ m.

The HG-C series sensors incorporate an optical system with a built-in mirror

which is said to allow for a more compact sensor and higher measurement accuracy compared with equivalent displacement sensors. The sensor not only indicates measured values in mm, but also produces a 0-5 V analog voltage output so that various calculations and logging can be performed when the output is taken into a PLC or control system.

**Control Logic Pty Ltd**

[www.control-logic.com.au](http://www.control-logic.com.au)

### Packings



Packings provide a suitable seal arrangement for use under rough environments, eg, in slurry pumps. The Oz Seals complete standard range of packings provides improved sealing performance, long service life and environmental protection against dirt, slurry, dust, chemicals and high temperatures. These requirements, along with improved working conditions and increased operational safety, are of importance to the sealing of valves, centrifugal pumps and high-pressure plunger pumps.

Across a wide variety of industrial applications, the packings are very durable and economical, providing trouble-free sealing even under demanding conditions. They have been carefully selected to be asbestos free, environmentally friendly and cover a large pH range of 0-14, suitable for acids and alkaline environments.

The packings have the ability to withstand high temperatures from 200 up to 650°C. The majority of applications are covered by a relatively small number of high-performance materials.

**Oz Seals**

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

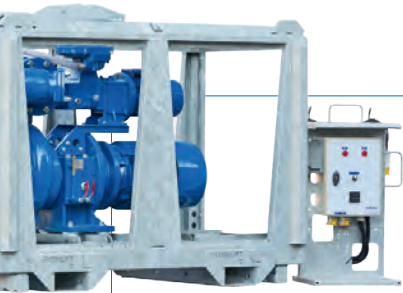
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### Solids handling pumps

BBA Pumps has introduced a line of electrically driven solids handling pumps. The auto-prime pumps, driven by IE2 electric motors, have a capacity of 100 to 6500 m³/h.

In addition to a standard control box and soft starter, the pump sets can be provided with a frequency converter which ensures a maximum control over the pumping process - not just by using the automatic start/stop but also by increasing or decreasing the speed of the electric motor. By using the GPS monitoring functionality, the pump installations can be controlled and operated remotely from a computer screen.

The fully standardised series of pumps ranges from the small 3" pump up to a large 24" pump. They feature large free passage, good NPSH (net positive suction head) and high efficiency. The pumps have been manufactured from compact and modular construction using a norm block assembly. They feature no oil-leaking priming systems or pollutions emitted by diesel engines.

The pumps can be deployed in sewage or dewatering applications, making them suitable for the industrial and rental markets. Because of the lockable sound-attenuated canopy, the pumps are very quiet and can be deployed effectively and safely in densely populated areas without noise emissions and with high resistance to vandalism.

**Diesel Parts & Service P/L**

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



### Power-flued gas room heater

The Stratos from Stiebel Eltron Australia is an energy-efficient, power-flued gas room heater, designed for Class 1 buildings such as freestanding houses and townhouses. Power-flued heaters are sealed units where air for combustion is drawn from outside. The heater must be installed on the inside of an exterior wall to allow the flue to be passed directly through the wall.

The heaters are designed to provide consistent warmth through efficient uniform heating emitted from the base of the system. This is said to minimise stratification of the air and improve overall heating. An in-built humidifier tray can increase comfort levels for those more sensitive to air quality. There are four sizes available in the range with up to a 4.6-star energy efficiency rating.

The combustion chamber of the unit is separated from the air that heats a room and the exhaust gas is blown through the flue to the outside of the building. Isolating the two air flows means there are no harmful fumes inside. The heaters achieve a 6-star indoor emissions rating as per AS4553 confirming zero indoor emissions.

The design is versatile, with the flexibility of wall or floor mounting and an optional, programmable, wireless climate controller. The wireless climate controller can control up to three heaters and can be positioned up to 10 m from the heater. The climate controller has a temperature sensor that overrides the manual thermostat on the heater, so the positioning of the climate controller in colder parts of the room assists in providing greater heating comfort.

**Stiebel Eltron Australia**

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

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## TOC analyser

Hach BioTector TOC analysers are said to provide maximum uptime and reliability due to a self-cleaning oxidation technology that easily handles difficult samples and reduces maintenance. Unlike traditional TOC analysers, the product eliminates build-up issues from salts, particulates, fats, oils and greases that lead to drift and high maintenance.

With continuous monitoring and real-time process control, plant operators can optimise their processes to lower overall plant operating costs. The analyser achieves precise results from both simple and demanding applications.

With two-stage advanced oxidation technology, the analyser handles challenging applications involving fats, oils, greases, salts, sludge and particulates. Its oversized tubing eliminates filtration and sample contamination. Minimal maintenance is required and there is no need for calibration or operator intervention between service intervals.

The product provides cost savings in chemical dosing, waste reduction and optimised processes. Configurations are available for TOC, TOC/TN, and TOC/TN/TP.

**Hach Pacific Pty Ltd**

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



## Volatile organic compound monitor

Suitable for those in the oil and gas, industrial safety, air-quality, hazmat and military sectors, the ppbRAE 3000 is a volatile organic compound (VOC) monitor with data logging functionality. The monitor is available to rent from TechRentals.

RAE Systems' VOC monitor uses a photo-ionisation detector (PID) with a 10.6 eV UV-discharge lamp. The monitor also comes with integrated correction factors for 220 compounds, and humidity compensation with integral humidity and temperature sensors.

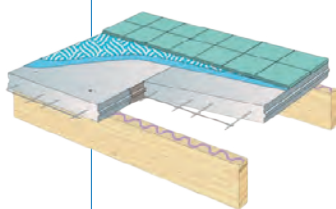
The device features a range from 1 to 10,000 ppm, a 3 s response time, and sensor and lamp auto cleaning. It is also waterproof to IP67.

**TechRentals**

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



## Subflooring



Hebel PowerFloor is high-performance, solid, non-load-bearing subflooring that looks and feels like a concrete floor. The product has several benefits over traditional

flooring materials, including reduced costs and faster construction (up to 50%); insulation; high fire resistance; and reduced foot fall noise and sound transfer between floors.

The combination of strength and thermal and acoustic insulation properties makes the product a suitable base for ceramic tiles, carpet or polished timber boards in first floors and suspended ground floors, as well as decks and balconies. It is environmentally friendly, produced with less than a quarter of the resources and raw materials used in the manufacture of other masonry products.

**Empower Construction**

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

## Timer-based switches

Thermofilm has introduced Envirotouch, a range of timer-based switches that provide simple control of lighting and electrical devices. The four point-of-use models are said to reduce

energy usage and thereby cut power bills and greenhouse gas emissions. Additional features lessen the risk of fire and injury.

The switches include multiple preset countdown timer options or cycles, so with the press of a button the product will automatically turn off the light or appliances after the desired time - either 15, 45, 60 and 120 min. One model allows users to set up daily automatic cycles, which is suitable for heated towel rails, security lighting, TV, radio and pool cleaning systems. A 'turn-off' indicator dims the lights to warn that turn-off will occur in three minutes.

Typical applications include control of indoor and outdoor lights, heaters, bathroom exhaust and room fans, lamps, coffee machines, irons, electric blankets, battery chargers and pumps. Appliances that can be switched off automatically when not in use, such as irons, heaters and fans, have the added benefit of improving their longevity and minimising risk.

The product can be retrofitted to existing switches and sockets or installed in new projects just like standard outlets. The switches are also able to be used with plug-in appliances via a 3-pin socket to provide intelligent control.

**Thermofilm Australia**

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



## Energy-related hardware and software



Control Logic has been appointed as a distributor for CETA commercial and industrial products within Australia.

CETA, a global distributor of energy-related hardware and software products, enables companies to reduce energy-related costs, achieve regulatory compliance and reach green/environmental initiative targets. Extensive metering options will assist with NMI measurement, The National Australian Built Environment Rating System (NABERS), Green Star ratings or National Greenhouse and Energy Reporting (NGER).

The product portfolio covers all aspects of a full-featured energy management system. It ranges from meters and communication devices through to energy management software for seamless integration with the user's existing deployment of energy meters.

Control Logic welcomes the opportunity to quote on users' current or future usage of CETA or energy metering equipment needs.

**Control Logic Pty Ltd**

[www.control-logic.com.au](http://www.control-logic.com.au)



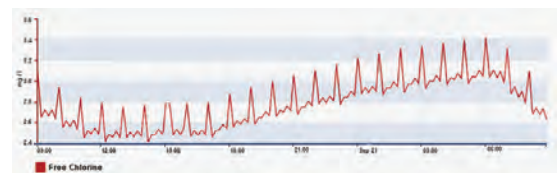
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## Microinverters

The Enphase M215 and M250 microinverters offer fourth-generation microinverter technology optimised for higher-power modules. Both microinverters will operate by sending bidirectional data to the Envoy Communications Gateway, with a recently added Wi-Fi option. The Envoy connects to the Enlighten software platform.

Optimised for high-power solar modules, the M250 microinverter produces 250 W rated AC output power and pairs with modules up to 310 W. The fourth-generation M215 microinverter meanwhile produces 215 W rated AC output power and pairs with modules up to 270 W.

Both products are rated at 95.7% EU efficiency and have been built to withstand harsh environmental conditions. They are IP67 rated and have undergone over one million hours of testing in extreme temperature and humidity environments.



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

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## Intuitive energy solution



The Solamander Hydronic Energy Hub can prioritise renewable energy sources over non-renewable sources to help reduce the energy costs associated with domestic hot water and other heating energy usage in the home.

The key component to the system is a 'hub' or 'loop' where the water flows around in one direction and is diverted to the energy sources (both

renewable and non-renewable), storage facilities (tank and floor) and energy uses. Energy uses include domestic hot water (DHW), pool/spa heating, hydronic radiator heating and hydronic floor heating.

Radiator and floor heating is achieved via direct action, with energy coming directly from a heat pump or gas boiler rather than by indirect energy transfer. This minimises energy losses and, in the case where solar gain is available while heating is demanded, the system uses this energy to preheat the boiler or heat pump.

A designated floor area offers heat storage in a similar way to the buffer water tank. Once the DHW tank is full to its thermal capacity, excess renewable energy is delivered to the buffer floor heating area and stored there for ongoing heating needs.

The system uses special flow-regulating valves that can deliver water at a high, predefined temperature from the solar panels or wet back. As the solar panels heat up, the water flow is increased through the panels, maintaining a constant temperature of 75°C into the system.

The hub controller can be configured to handle a multitude of combinations in order to suit user requirements.

**Devex Systems**

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

## 14 W light bulb

Philips has released a 14 W LED light bulb that provides a similar light output to the company's high-wattage incandescent bulbs. The LEDbulb draws only 14 W of energy and produces 1400 lumens - compared to 1180 lumens from a Philips Softone 100 W incandescent bulb - in residential use.

The LED light bulbs provide up to 80% energy saving compared to incandescent bulbs, with an average lifetime of up to 15,000 h in residential homes. They are also mercury free and fit existing screw or bayonet cap light fittings.

The bulb comes in warm white in both edison screw and bayonet caps, and cool daylight in edison screw.

**Philips Lighting Pty Ltd**

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



## Aeration flow meter

In municipal wastewater plants, the activated sludge treatment method requires the pumping of compressed air into aeration basins where a diffuser system ensures the air is distributed evenly for treatment. Flow meters are typically installed in the system piping to help monitor the air that is released into the basins.

The ST100 flow meter is designed to provide accurate performance over a wide flow range, ease of installation, low maintenance requirements and digital bus communications versatility, including Profibus PA compatibility. Digital bus communications ensure flow meters and other process automation field devices are interoperable and compatible through an industry standard bus, and Profibus PA includes many functions that simplify the handling of field devices.

The meter gives wastewater plant engineers device flexibility while providing accuracy in harsh environments. Profibus PA communication facilitates plant system retrofits through a seamless integration process for new field devices. The meter's insertion-style configuration makes it a simple drop-in replacement where older technology meters were installed previously in wastewater plants. Engineers and technicians can easily manage multiple fluid flow process variables and configure the meter remotely from the safety of the control room.

The user-friendly product stores up to five calibration groups to accommodate broad flow ranges, differing mixtures of the same gas and multiple gases, and obtains up to 1000:1 turndown. An onboard data logger features a removable 2 GB micro-SD memory card capable of storing 21 million readings.

The meter can be calibrated to measure virtually any process gas, including wet gas, mixed gases and dirty gases. Designed for rugged industrial processes and plants, the meter includes service up to 454°C. It is approved for hazardous environments, including the entire instrument, the transmitter and the rugged, NEMA 4X/IP67-rated enclosure.

**AMS Instrumentation & Calibration Pty Ltd**

[www.ams-ic.com.au](http://www.ams-ic.com.au)

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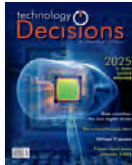


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# Resource centre

Legislation, governance, programs and industry links to help guide your sustainability development.

## Sharing water innovation across industries



The Australian Water Association's Water Innovation Forum provides a platform to share water innovation across the water, construction, food and beverage, and agricultural industries. The event will feature a conference program, exhibition, training workshop and networking opportunities through formal business-matching meetings, social events and pitch sessions.

The conference will feature leading experts on innovative solutions for water-smart cities and agricultural and food manufacturing, disruptive technology, financing the innovation value chain and global water innovation case studies.

### Day 1

Day 1 will feature three sector-themed streams including:

#### *Water smart cities:*

New and cost-saving innovations for smart buildings, sport and recreation areas, manufactured buildings and new housing and industrial estates, and the future challenges faced by the construction sector.

#### *Agriculture and food manufacturing:*

Leading experts from the food and beverage, dairy, meat and agriculture sectors will discuss what innovative solutions are needed to address current and future challenges in these important market segments.

#### *The role of disruptive innovation in customer engagement:*

Overview of some disruptive innovations and their application in the water sector.

### Day 2

Day 2 will consist of two streams including:

#### *Technology commercialisation and adoption training:*

This is a practical session for innovators to engage with

water technology end users, investors and IP advisors through pitch review and advice on funding, IT protection, R&D, tax incentives and export. The training will contribute towards AWA's national accreditation scheme recognising water professionals.

#### *Innovation in the global marketplace:*

Held in the Exhibition Hall, this interactive session has a strong international focus. Hear about successful global innovation initiatives and new solutions being developed and adopted by industry.

Other features of the event include:

- Exhibition of water innovations and technologies including a number of full-scale outdoor exhibits and Country Pavilions.
- Pitch sessions for 20 technology companies to pitch their innovative products to a panel of experts, with five selected to exhibit in the new Innovators Corner at OzWater'15, Australia's largest water conference in May 2015.
- Blind date for lunchtime sessions for innovators to pitch their product to a panel of experts (investors, technology end users), with five selected to go on a 'date' and pursue investment or partnerships.
- Tailored business-matching meetings between exhibitors and delegates.

#### *Details at a glance:*

**What:** AWA Water Innovation Forum

**When:** 18-19 March 2015

**Where:** Royal Randwick Sydney

**Website:** [www.awa.asn.au/innovationforum15/](http://www.awa.asn.au/innovationforum15/)

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# Resource centre

*Legislation, governance, programs and industry links to help guide your sustainability development.*

## What's on at Ozwater this year

Australia has many unique advantages, including our world-class resources, proximity to Asia, a temperate climate and the distinct opportunity of growth industries including agribusiness, mining and tourism. However, for all these industries to prosper they require one vital element - water.

Safe water. Secure water. Sustainable water. Access to water.

Many challenges lie ahead for the water sector in managing water in urban, regional and rural contexts. We need water professionals and organisations to step up and lead innovation, debate and provide technical know-how across the broad scope of water and wastewater management to ensure we harness these opportunities, both domestically and overseas.

Ozwater includes a conference, exhibition, technical tours and networking functions.

The Ozwater'15 conference will once again attract national and international speakers, and delegates, to attain a new wealth of industry knowledge and cultivate strong and applicable ideas to ensure the longevity of our greatest resource. This year's themes include Technology, Operations and Asset Management; Governance, Regulation and Structure; Water for Rural, Remote and Regional Communities; Water for Agriculture, Food and Beverage; Water for Mining, Resources and Energy; The Customer and the Community; and Liveable Cities.

Also, for the first time the event will include a Water Regulators Forum. This forum will bring together Australia's regulators across economic, environmental and health to discuss the need for harmonisation in water regulation for better outcomes for industry and customers.

The exhibition will feature more than 170 exhibitors from international and national companies. The Trade Exhibition



will showcase water products, services and innovations. All session breaks and lunches will be held in the exhibition area, making it easy for interaction.

### Details at a glance

**What:** Ozwater'15

**When:** 12-14 May 2015

**Where:** Adelaide Convention Centre

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

AWA  
[www.awa.asn.au](http://www.awa.asn.au)



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*Clive Ross is Aurecon's head of asset management. He has over 30 years of asset management experience, with an expert understanding of best-practice asset management, operations and maintenance, and engineering, procurement and construction services.*

# Asset optimisation

**M**anufacturers can enhance their success by creating a proactive asset management culture and taking a more sophisticated approach to maintenance that optimises asset performance and value.

Over the past two decades, the world has experienced an unprecedented demand for raw materials products and processed goods. As a result, manufacturing plant, production facilities and many ancillary infrastructure assets have been pushed to limits well beyond their initial design specifications. Our urgency to get more from less has brought many facilities to breaking point. Maintenance of the asset, a cost not directly linked to productivity or revenue generation, is often deferred or worse, ignored.

Organisations will take a range of approaches to asset management, with varying results:

1. Measured and controlled asset debottlenecking exercises and asset efficiency design upgrades through sustainable work capital programs. These programs generally result in engineering standard and legislative compliant designs and production optimised assets that will continue to deliver enhanced production throughputs in future years.
2. Fast-tracking projects that deliver immediate returns and enable the asset owners to capitalise on the demand experienced during these years. While these programs generally comply with the engineering design and legislative requirements, many are not optimised and deliver sub-optimal performance and efficiency.
3. Increased production throughputs via existing assets, reducing access to plant for planned preventive maintenance and managing the higher rate of asset degradation through increasing breakdown maintenance. This short-term action solution results in overloading, higher wear-out rates and component stresses, and increased breakdowns, which ultimately lead to an increased forward maintenance log.

While the development of comprehensive asset life-cycle management plans and strategies may have been considered in tactic 1 above, it is unlikely they were in tactics 2 and 3. The primary consid-

eration at the time would have been to produce as many tonnes of product as soon as physically possible. As a result, the performance of these assets is likely to be sub-optimal.

This operating environment created a culture resulting in an outsourced maintenance cycle, where maintenance is an activity focused on only restoring or maintaining functional capability in plant that has been lost through errors in the engineering, project delivery and operations cycle.

Product price point is vital for manufacturers working in a competitive global market. Strategic asset management enables an organisation to find the optimum level of asset management and maintenance activity to meet their organisational plans. Focusing the appropriate resources on critical assets to perform an optimum level of maintenance work has proved to reduce production costs.

As manufacturers move to a strategy of higher levels of automation to further reduce dependency on labour costs, this focus on intelligently optimising the asset becomes even more important. The solution lies in working to create a proactive culture, which drives asset management improvement plans that guide the engineering, project delivery and operations activities in the plant, process, product and people, to eliminate, prevent and control functional failures and extract greater value from existing investments.

The solution also lies in looking at the facility, its processes and its equipment with a forensic engineering lens, identifying equipment with the highest run-time hours or lowest availability rating, to find the weak point in the production chain. This type of analysis roots out the highest likely causes for breakdowns and production interruptions and eliminates them by implementing improvement plans.

This entire process is even further enhanced if strategic asset management is embedded at the start of a project. If followed from the design stage, this approach incorporates asset reliability and maintainability to eliminate these as a source of breakdowns and production interruptions prior to commissioning future assets. It ensures equipment and processes are designed and selected with their long-term operability and value-adding potential in mind.

“

*Our urgency to get more from less has brought many facilities to breaking point.*

”



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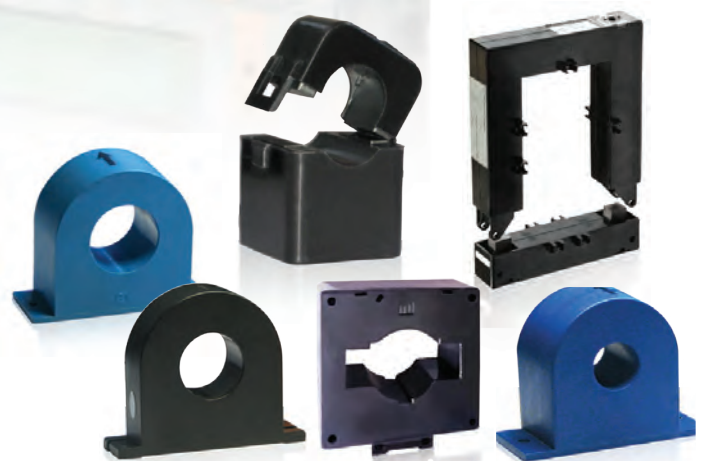
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