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CONTENTS

REGULARS

- 10 Case Studies
- 34 R&D
- 38 Products & services
- 49 Resource centre



06

6
Carpets to customised printers – CEFC finance helps businesses save
Energy Efficient Loan (EEL) program.



16

8
Sustainability strategy – no longer just a 'nice to have'
Changing attitudes towards sustainability strategies.

16
The call for efficiency in the water business
Ways and means to deliver.



23

23
Energy efficiency in the food and beverage industry
Savings potential in modern food production.

31
Greening the house – the Sydney Opera House
Awarded 4 Star Green Star – Performance rating by the GBCA.

39
Container deposit scheme: the state of play
State government plans and preferences for CDS.

42
Controlling Legionella with UV water disinfection
UV water treatment system.

47
Microgrid power for remote Western Australian towns
Maximising the intake of solar power generation in remote locations.

50
Businesses want government to show leadership on sustainability
Call for greater leadership around carbon, waste and water issues.

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WORDS FROM THE EDITOR

There will be lovers and haters of our new Prime Minister, Malcolm Turnbull; however, I believe it is a positive shift. Climate change is not a joking matter and hopefully he will be able to elevate the conversation on this important topic within the federal political landscape and the international stage at the climate change talks in Paris later this year.

Putting politics aside, it is becoming increasingly important for business and industry to become more efficient and productive — not just from a climate change perspective, but also from an economic perspective.

Implementing energy-efficient solutions can not only result in substantial energy savings but, together with clean energy, can also help with the transition to a sustainable economy. New Zealand's Energy Efficiency and Conservation Authority (EECA) has calculated that consumer and business uptake of energy-efficient appliances has resulted in energy savings of over \$96 million in a one-year period — the equivalent of the annual electricity usage of over 130,000 New Zealand homes. In Australia, the Victorian Energy Efficiency Target (VEET) scheme has announced targets for the next five years (2016 to 2020) that aim to deliver 30.2 million tonnes of greenhouse gas emissions savings.

Clean Energy Finance Corporation CEO Oliver Yates said: "By investing in technologies that cut energy use, businesses can benefit from a range of long-term, flow-on effects such as lower maintenance costs, improved workspace and increased production capacity." Read the full story on page 6.

Also, if you're in Melbourne, please visit our stand at the Waste Expo 2015 in October — we will be on stand B15 at the Melbourne Convention and Exhibition Centre from 7 to 8 October 2015. I hope to see you there!

Carolyn Jackson

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Carpets to customised printers –

CEFC finance helps businesses save



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While lighting upgrades are often a first step, we've now helped business with finance for projects as varied as a fruit grader, pumps for irrigators and refrigeration for coolstore operators.

For many it's a lightbulb moment. Businesses across Australia are discovering they can transform their operations by investing in energy-efficient technologies.

Simple changes to machinery or lighting can deliver reductions on business energy bills in the region of 20 to 30%.

Thinking of scale, researcher ClimateWorks has determined that by modernising Australia's energy system, Australia could achieve a doubling of energy productivity in as few as 15 years.

Clean Energy Finance Corporation CEO Oliver Yates says those acting now are making important investments in the future health of their businesses.

"By investing in technologies that cut energy use, businesses can benefit from a range of long-term, flow-on effects such as lower maintenance costs, improved workspace and increased production capacity," Yates said.

"While lighting upgrades are often a first step, we've now helped business with finance for projects as varied as a fruit grader, pumps for irrigators and refrigeration for coolstore operators.

"We're working with major lenders — Commonwealth Bank, NAB and Firstmac — on programs designed to make innovation easier for Australian businesses big and small."

From boilers to boom sprayers

The CEFC and NAB's \$120 million Energy Efficient Bonus is a program of equipment finance designed to help accelerate Australia's switch to greener vehicles as well as help

businesses in regional and rural areas upgrade their industrial and agricultural equipment.

Yates said that since the program was announced in June it had received enquiries about using finance for boom sprayers for irrigators, finance to install a sawdust-fired boiler to heat a glasshouse, finance for energy-efficient vehicles and an upgrade of efficient new machinery for kitchen cabinetry manufacturers.

"A carpet manufacturer is financing a new tufter that can produce nearly double the output of its old machine for similar energy needs," he said.

Simple solutions to state-of-the-art

The CEFC in conjunction with Commonwealth Bank has up to \$200 million available to businesses and not-for-profits accessing the Energy Efficient Loan (EEL) program, which typically provides lends up to \$5 million for energy-saving technologies.

Some projects already financed through the EEL program include:

- a Victorian label producer installing five state-of-the-art printing presses that use less than half the energy of the old ones and operate at twice the speed;
- a Sydney car dealership installing LED lighting and solar to halve its electricity use;
- a Goulburn Valley produce supplier installing new refrigeration, solar PV and a fruit grader to boost its long-term viability in a competitive market;
- a regional abattoir and rendering business using a gas-fired generator to enhance energy supply stability and reduce its grid-electricity use by about a third.

EEL finance can also be used for technologies such as heat exchangers, efficient motors pumps and fans, solar systems and battery storage, compressed air and variable speed drives.

Driving cleaner vehicle investment

The CEFC and Firstmac, a leading non-bank lender, have up to \$50 million available to help accelerate adoption of low emissions and electric vehicles, as well as solar and energy-efficient equipment.

The program of asset finance leases and loans is available for a wide range of commercial activities, manufacturing, logistics, agribusiness, retail and all levels of government as well as schools, hospitals and clubs.

It can be used to install solar panels and inverters, solar thermal for hot water and battery storage. It also includes installation of energy-efficient air-conditioning systems, building control systems, refrigeration and variable speed drives.

The big picture

Yates said the CEFC's involvement in these programs was part of the CEFC's broader activities using a commercial investment approach to overcome market barriers and mobilise investment in clean energy technologies.

Since its inception, the CEFC has committed over \$1.4 billion in finance towards more than \$3.5 billion in projects and about a third of this figure represents investment in energy-efficient technologies.

For further details about any of the CEFC's financing program and projects, visit the CEFC's website at:

www.cleanenergyfinancecorp.com.au.



Oliver Yates, Chief Executive Officer of Clean Energy Finance Corporation, has over 20 years of global experience in corporate advisory, financial structuring, project finance, debt structuring, equity raising and listings, with extensive experience in clean energy. Yates was an executive director at Macquarie Bank for over 10 years, being country head United States of America 1998–2004, co-head Macquarie Capital Private Placements Group 2004–2008 and co-head Macquarie Capital Products Group 2001–2008. Yates holds a Bachelor of Commerce from the University of Melbourne and is a Graduate Member of the Australian Institute of Company Directors (GAICD) with an Advanced Diploma in Mastering the Boardroom.

The sustainability arena has changed significantly over the past decade. *Sustainability Matters* talks to Dr Matthew Bell, EY Oceania Climate Change and Sustainability Leader, about the changing attitudes towards sustainability strategies and what organisations need to be thinking about.



rganisations that once viewed sustainability as a 'nice to have' have now recognised the importance and value of embedding it into their strategy. According to Bell, the introduction of the ASX Corporate Governance Principles, which specify disclosures on environmental, social and sustainability risks, reflects these changing attitudes.

Recommendation 7.4 of the ASX Corporate Governance Principles requires "a listed entity [to] disclose whether it has any material exposure to economic, environmental and social sustainability risks and, if it does, how it manages or intends to manage those risks".

The rules came into play this financial year and although not mandatory, Bell believes they will eventually have the same sort of a ripple effect that was seen when the ASX introduced a similar type of disclosure rule on gender diversity a few years ago. Gender equality still has a fair way to go, but Bell says there is no doubt these disclosure requirements did have an impact, particularly when it came to increasing the number of women on boards and in senior leadership roles in Australian listed companies.

"I think in the past sustainability reporting has kind of been the tail that wags the dog," he said. "We've seen organisations putting a lot of effort into a sustainability report and then going back to put things in place to meet these objectives, targets and goals. That has been useful but I'd like to see that change around. I'd like to see strategy thought through and then reporting the outcome of that. And yes, this is a trend that is happening, and more so in the last 12 months than we have ever seen."

Certainly, carbon-intensive organisations have been targeted as having the most sustainability risk and most likely to be impacted by environmental and social risks. But Bell said: "The reality is, now, all companies need to consider their sustainability context."



Sustainability
strategy – no
longer just a
'nice to have'



Certainly, carbon-intensive organisations have been targeted as having the most sustainability risk and most likely to be impacted by environmental and social risks. But Bell said: "The reality is, now, all companies need to consider their sustainability context."

With such political uncertainty surrounding sustainability issues, Australian companies have had to take it on themselves to determine what's important. "However, we've seen a trend in the last 12 months where organisations aren't fixated on legislation domestically, they are actually thinking more about what legislation our major trading partners have in place or are considering because that might have a more profound impact on their business.

"From most companies' perspective it is kind of irrelevant what we do here in Australia because we are all part of the global supply (or value) chain, so it's really important to look at what our major trading partners do.

"We are seeing a real evolution in the human rights and social impacts space. Organisations are focusing on where the risks are in their supply chain and, rather than moving away from a supply risk, there is an acceptance that there is risk in every supply chain. Organisations need to work out where those risks are and work with their suppliers to make improvements over time."

There is also a renewed drive from investors to understand the value of non-financial risks, and increasingly customers and business partners are expecting it too, said Bell. "This is elevating the conversation about sustainability strategy and disclosure of these risks to senior management and the board. Questions being asked include: Are your disclosures appropriate? And if your disclosures aren't adequate, is that because your strategies aren't adequate?

"EY works with clients to help them determine their sustainability strategies, disclosures and avoid greenwash. We think about the materiality and the context of their disclosure. Unlike the financial term for materiality, in this context, it is more around what's the likelihood of an event occurring and how could it impact the organisation, which stakeholders will be impacted and how much do they care.

"It is not so hard to work through this concept of materiality from a greenwash perspective because it is pretty obvious if someone is disclosing something that actually has no material impact on the organisation.

"I'm all for corporate philanthropy and the general concepts of corporate social responsi-

bility, but that's not really what sustainability is any more. Sustainability is the capacity or the resilience of an organisation to be around for the next 30 years."

Bell says one of the challenging parts in the process is gaining a clear understanding of what stakeholders think will be important to their organisation going forward. "We work with them to make sure their disclosures are in the right context and that they are balanced."

Social media also plays an important part in this process. "It has never been so easy for someone to have a voice," said Bell. "As part of our sustainability reporting work, we carry out social media analytics and sentiment analysis on the company. This can be quite fascinating as it challenges traditional stakeholder engagement processes and can reveal some interesting results.

"From a sustainability lens, what we are saying [to organisations] is, think through what some of the global changes in the future may be and how your business may be affected and are they likely to impact their ability to make returns to shareholders. Then, explain to your stakeholders how you are managing those risks in your company."

At this stage, non-financial ASX disclosure requirements don't have the same level of scrutiny as financial disclosures and they are not audited, but Bell believes that the audit element is going to grow over time. "We have built a team here at EY on that assumption," he said.

"We want to see companies start to position themselves for the longer-term trends so that they are the 'Google of the future'. There are pockets of great activity but also plenty of ground for growth," concluded Bell.

Dr Matthew Bell has recently been appointed as EY Oceania Climate Change and Sustainability Leader. He is a partner at EY Australia with more than 10 years' experience advising on climate change and sustainability. His team provides advice on a wide range of sustainability strategy, climate change, reporting and assurance, carbon, social impact, health, safety and environment opportunities.

EY Australia
www.ey.com

Andzac continues to develop its aeration and mixing technology

After moving into new premises and constructing a new 40,000 L testing tank, Andzac Water Treatment (AWT) is now able to improve efficiency further by 'tuning' the venturis of its aeration technology. AWT is also adding an additional source of air injection into the pre-pump stage, including flash mixing, which will allow the introduction of chemicals to be added into the jet venturi stream.

AWT has also developed a new 1.5 kW, lower cost, smaller unit that will be suitable for applications such as wineries, breweries, local councils, dairy farmers, golf courses and the like, and may enable smaller businesses to take advantage of the ATO's instant asset write-off.

Wait! Don't get rid of that old infrastructure!

AWT was recently commissioned by Goulburn Valley Water to build a custom aerator using its proven technology on an old pontoon platform that had been lying out of action on the side of the lagoon for some time. This was a good way to recycle old equipment that otherwise had no further use. The unit is a 6.8 kW model at the Kyabram WWTP which was installed in July this year.



Further testing

Case study 1: South Gippsland Water (SGW), Wonthaggi wastewater treatment plant.

The chosen lagoon was extremely polluted as it had no screen in place to stop debris infiltrating the main body of water; however, a baffle zone was in place to prevent as

much debris as possible getting through. This baffle zone, which is an extremely high-ragging area, currently uses a 37 kW low speed mechanical (LSM) surface aerator, along with a 12 kW diffuser system.

A 22 kW LSM surface aerator was being used in the main body of water, outside of the baffle zone. The Andzac Aerator was installed in this area to conduct the trial. After the trial period, the conclusion was that the Andzac Aerator was able to maintain the required DO levels at around 2.0 ppm. Also, good to note that once the trial unit was pulled from the pond, the well screen was as clean as it was the day it was installed. The well screen is doing a good job of keeping debris away from the pump intake and thus avoiding breakdowns and downtime. No cleaning whatsoever was required from the operators on-site.

SGW has now purchased its first aerator from AWT to replace the incumbent 22 kW LSM surface aerator. It will be 12 months before tangible data on actual power consumption savings will be available.

AWT has since been asked by SGW to conduct a trial in the high-ragging baffle zone at their Inverloch wastewater treatment plant. AWT is looking forward to this as it also currently has another unit located in a very high ragging environment at Goulburn Valley Water's Mansfield water treatment plant.

Case study 2: Goulburn Valley Water, Mansfield wastewater treatment plant.

Andzac Water Treatment is currently trialling a 2.2 kW aerator at Mansfield WWTP in one of its highly polluted lagoons. The incumbent aerator was a 22 kW LSM model. The Andzac Aerator was installed on 1 July 2015 and has been running trouble-free, maintaining the required DO levels and continuing to operate seamlessly without any blockages or downtime.

Further trials

Further trials are scheduled at a dairy farm and also at a large food manufacturing facility in rural Victoria, which currently operate 16 aerators and face massive power bills each year. Andzac Water Treatment is looking at replacing these power-hungry machines with a number of Andzac Aerators, which will save them money and substantially reduce their carbon emissions. AWT's goal and challenge is to provide a payback time within two years.

Andzac Water Treatment
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Re-usable crate that reduces waste and saves costs

Recent trials by CHEP Australia in the use of re-usable plastic crates as an alternative to cardboard cartons for the banana industry have returned positive results for growers and other members of the supply chain.

Early estimates show a 10 to 15% cost saving, while also reducing damage to the fruit when using crates compared with cartons.

In early 2015, more than 200 crates were used to pack bananas at a trial site in northern NSW, with wholesaler PW Chew managing transport, ripening and distribution. A combination of Lady Finger and Cavendish bananas were used in the trial. Fruit sizes ranged from 15 kg XL, 13 kg XL and 13 kg large.



PW Chew Operations Manager Mark Bradshaw said the ability to cross-stack crates and the greater crate integrity over cartons are huge bonuses for the banana industry.

"The greater stability that is available in cross-stacking has shown to be of great benefit to the integrity of the bananas. By the time they were ripened for retail, the initial trials indicated that there was less rub marking, bruising due to movement and neck damage in comparison to the same fruit packed in cartons from the same district," Bradshaw said.

"Cooling and ripening of the fruit was far more efficient too with the crates as you are not cooling the cardboard as well as the fruit. As a result, airflow, temperature and humidity are more consistent around the ripening room, which means we save nearly a day in ripening."

Pooled solutions provider CHEP Australia has been developing and trialling a re-usable plastic crate in collaboration with the Australian banana industry over the past three years.

The current design features smooth walls and a waved base to minimise damage to bananas, improved ventilation and a footprint to suit Australian pallets with six crates per layer.

The CHEP pooling system also allows for crates to be returned for washing — to an HACCP level if required — giving a hygienic solution for the industry and less overall wastage in cardboard.

CHEP Australia Business Development Manager Nick Jones said, "The trial gave all parties involved an opportunity to learn from each other to find the best packing methodology, supply chain logistics and retail requirements."

"The structural integrity of a plastic crate means that the weight bearing of a stacked pallet is through the crate, not a carton, so it won't compress."

Compression damage to fruit from cartons is a major problem for the industry.

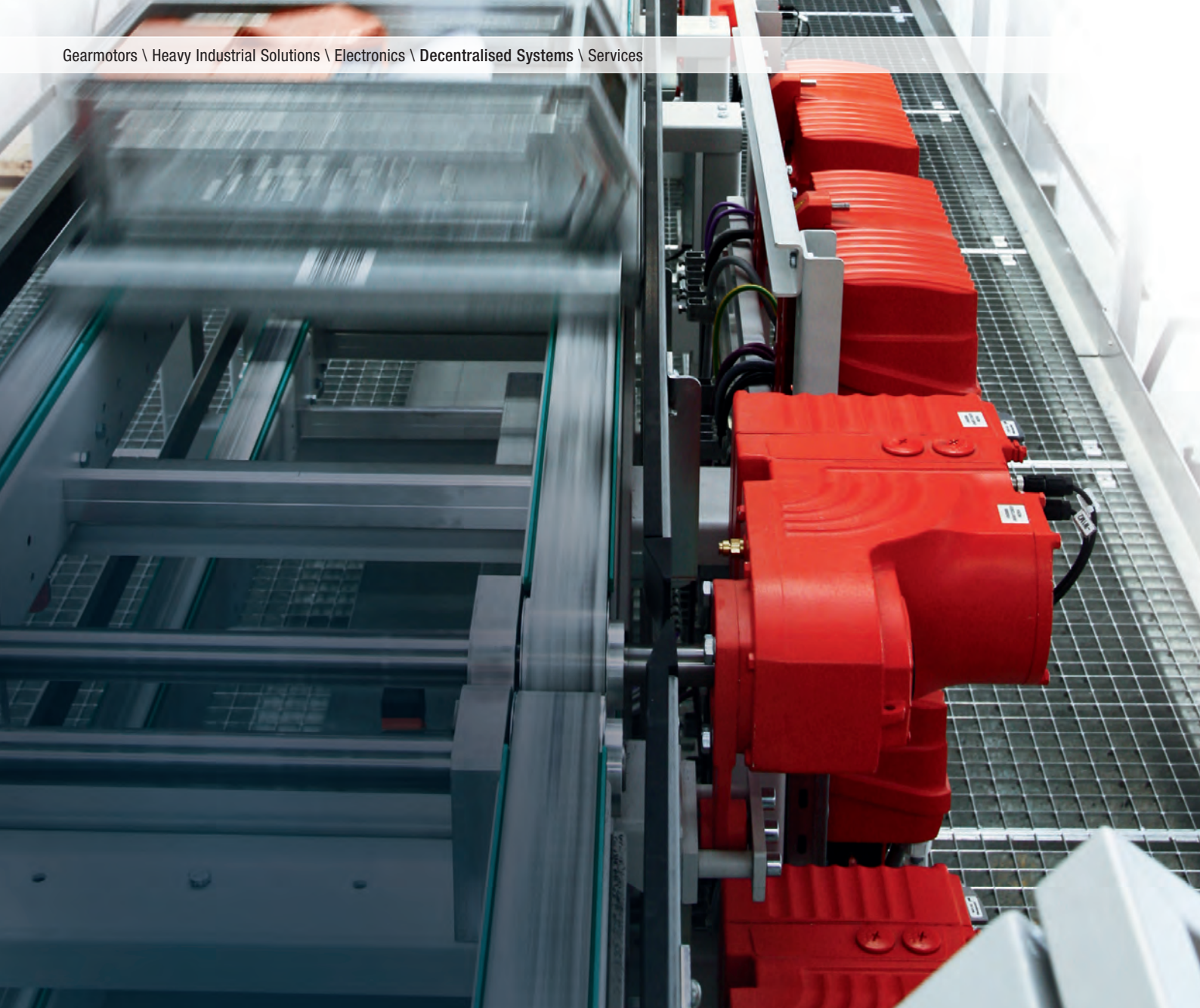
Very early on in the trial, it became evident that the use of a slitted liner would be beneficial. The combination of plastic crates and liner bags allow for gases to flow through the bag, giving a more consistent ripening colour.

"From a ripening perspective we found the crates delivered consistent half-colour ripening to levels between stage three and four, compared with cardboard. One retailer commented that if they could have consistent colour at stage 3.5, then they will be able to increase their rate of sales."

The next phase in the trials of the plastic crates will be to conduct studies in northern Queensland to assess the crate performance over longer distances to the major capital cities.

CHEP Australia
www.chep.com

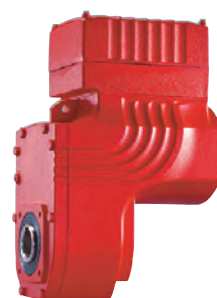




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Increasing solar demand for aged care facilities

On-site power generation through solar is helping aged care facilities reduce a dominant operating expense within their budget. The benefit of long-term savings delivered in an environmentally sustainable way has driven a strong interest from the growing aged care sector.

Australia's aged care facilities are facing unprecedented growth driven from an ageing population and heightened competition to meet the demands of the market. Operators seeking to meet this demand are consistently looking to enhance their facilities in a sustainable and cost-effective way. Solar power can play a key role in meeting the energy demands of an aged care facility, while delivering significant cost savings and enhancing the facility's sustainable profile.

"It is not surprising that an asset that can deliver returns in excess of 20% is attracting strong interest," said the director of Solgen Energy, David Naismith. "The profile of energy consumption within the aged care sector makes a very compelling business case, irrespective of the size of the operator.

"While purchasing outright generally still generates the best returns, financing options under power purchase agreements or leasing mean the system can be installed at zero cost from day one. The savings generated are then used to pay the financing over the term — irrespective, it still ends up cash flow positive for the business."

In 2014, Solgen Energy completed a 100 kW rooftop solar power installation at Loreto Home for the Aged in Townsville. The system integrates seamlessly with an existing backup generator and will produce around 180 MWh of energy throughout the year — enough to run over 30 average households — saving over 189.2 tonnes of emissions in the process. A system such as this will generate a payback equivalent of less than three years and returns of over 30%.



More recently, Solgen Energy was awarded a 100 kW solar power project for SwanCare Group, a provider of residential care facilities. SwanCare Group recently unveiled its plan for 44 new apartments, which are expected to be completed in late 2016. A rooftop solar photovoltaic system is set to reduce the energy consumption and running costs of the entire building. The project is planned for completion at the end of this year.

Solar power thus offers a compelling case for minimising the running costs of both new and existing facilities. These costs savings create opportunities for further service enhancements to the facility and greater returns for investors.

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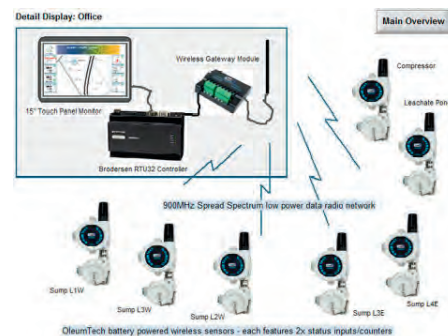
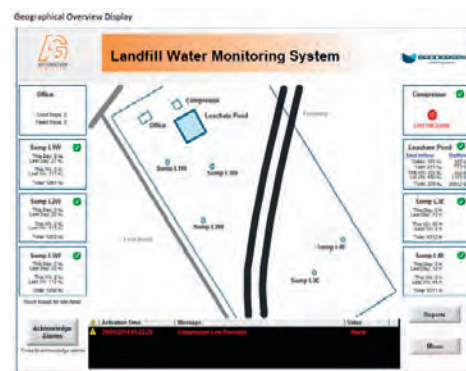
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Remote wireless monitoring of landfill groundwater and leachate

The Rural City of Wangaratta in Victoria owns and operates an EPA-licensed landfill at Bowser, 6 km north of Wangaratta. The Bowser landfill has been operating since the early 1990s, accepting waste from Council's kerbside collection service, transfer stations and commercial waste contractors, and has an estimated remaining life of around 10 years if current practices and waste volumes continue. It is a challenging site as it is divided in two by the Sydney-to-Melbourne four-lane Hume Highway, which was a major reason for the requirement of a wireless system.

Solar-powered pumps extract groundwater on both sides of the highway and transfer it for settling into leachate ponds. A pipe connection has been installed between the leachate ponds and the sewer system to allow for excess leachate to be disposed of more cost effectively after major rain events. This meant that the EPA required data to be logged and reported from the sumps located around both an active landfill and an unused landfill to ensure compliance with the landfill licence.



OleumTech Discreet Wireless DJ1 units transmit the counter inputs via low-power 900 MHz radio links to a OleumTech Wireless DH2 Gateway. The Wireless DH2 Gateway 'stores' this information in Modbus register locations and uses a serial connection to link to a Brodersen RTU32.

The Brodersen RTU32 reads the Modbus registers and displays the required data on a local HMI interface via a 15" touch-screen monitor.

The RTU32 has a logic application running that ensures data is scaled and stored to enable the creation of daily, weekly and monthly reports. The reports are stored in the Brodersen RTU for 10 years and can be viewed via the local HMI interface or retrieved and viewed via the RTU's web server or FTP server.

The RTU32 is connected to the council's corporate WAN, which allows the RTU's email interface to send reports to relevant staff at the start of each week and every month for the previous week or month. Secure remote access is also provided for remote support, allowing changes to the RTU's application logic and set-up to be made remotely.



A decision was made to install a wireless remote monitoring system so that the council did not have to undertake expensive digging works or interrupt the highway. Seven OleumTech Discreet Wireless Transmitters (model SM5010-DJ1) were installed to manage the reporting of flow metering data from the sumps. They are connected to existing flow meters and vacuum pump blowers across the site.

The existing field flow meters provide 'pulse' or 'count' output (ie, one pulse output = X litres of flow) and the



The call for efficiency in the water business

Ways and means to deliver

Rod Naylor, Executive General Manager Growth, Veolia Australia New Zealand, Sydney and Veolia Innovation and Markets Department, Paris

Making sustainable changes that deliver more for less is a challenging task. Substantial, sustainable change primarily focused on improving efficiencies requires a willingness to change the very nature of an organisation: what it does, how it gets done and even who does it.



Taking on such changes requires courage, conviction and long-term commitment. It takes learning and exploration, and it involves an element of risk. If change is successfully adapted, however, the wins could be huge for the organisation and for its customers, who will reap the benefits of receiving an improved and better value-for-money service. In the wake of the global financial crisis and the end of the Australian water industry's investment peak necessitated by the millennium drought, the expectations of customers, regulators and political leaders are increasingly focused on improvements in efficiency. Calls are regularly heard for reductions in water bills and, at the same time, for increased levels of service in terms of enhancing the livability, sustainability and resilience of our urban centres.

Similar pressures exist around the globe, but depending on the local circumstances, the response taken can vary substantially. Ultimately, there are two attitudes of response that organisations and institutions can take:

- Defence of the status quo and doing enough to satisfy criticism; or
- Leadership and commitment to develop new ways to deliver fully on these demands.

Taking the high road is a difficult task, as journeys that require change always are. However, there are three key elements necessary for success:

1. Identification and acceptance of the opportunity to do better.
2. Leadership and organisational behaviour.
3. Opportunities for cooperation outside the utility.

Benchmarking

A common approach to understanding the



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water efficiency

soil types, historical asset management policies and more.

It is also appropriate to consider the definition of efficiency in the context of the environment facing water utilities and the expectations being placed on them. Rather than efficiency meaning lower costs and spending cuts, a more enlightened view considers the call for efficiency as a call for more and less: more in terms of a greater value through the benefits that the urban water industry delivers in the broader context of livable and resilient cities; and less in terms of the cost to achieve them, relative to that value.

For the purpose of this analysis, three key means are addressed in regard to the ability of water utilities to effectively implement improvements in efficiency.

Leadership and commitment

What most strongly determines the approach taken by an organisation is the response of the leadership group. Leaders must balance the safe operation of the utility with its internal and external pressures, as well as its responsibilities in the community, so delivering an agenda that includes improvement and transformation requires courage and commitment throughout the chain of command.

Establishing priorities and responding to imperatives is the role of the leadership group in setting strategy. They must provide direction in how to tackle the implementation and the continuous support for its success. Fundamentally, what is done and how it is done on the ground must change to realise the gains.

Leaders can influence culture by example through their own behaviour. By questioning the way things get done, and inviting staff into that discussion, leaders can create opportunities for people to learn and expand their own influence, creating motivation and the initiative needed for innovation to thrive. Acting transparently and in alignment with a clear purpose, as well as recognising and rewarding such behaviours within the

organisation, helps to legitimise the need for change. In addition, it is critical that the program is managed in a timely manner. There is nothing worse for momentum than an announcement of proposed changes followed by a long period of inaction or, even worse, action with no visible success. Aligning the measurement and management of progress with the organisation's internal processes, and supporting it through targeted communications and cultural support, helps leaders achieve success.

Operational improvements

Scope for operational improvements exists across the entire operation of the utility, on both the cost and revenue sides of the ledger. In fact, the search should consider new activities that might be undertaken and whether all that is done today should be done or might better be done by somebody else.

With ever-evolving technologies and methods across the industry, new opportunities can emerge. The process of innovation and the experience of others, including offers from suppliers and contractors in the market, create endless opportunities. Even if it has the techniques in place in-house for identifying possibilities, no organisation can change everything at once — and not all changes are worth the investment required.

Part of selecting what initiatives to pursue is effective and constant prioritisation and adaptation, taking into account both the benefit to be gained and the difficulty expected in implementation. There are many partners and service providers able and willing to help with these steps.

Benchmarking provides a guide of where efficiency improvements might lie undiscovered, but further work is needed to assess and prioritise the best opportunities for adoption. Advice and experience shared from partners, consultants and peers, as well as customers, regulators, academics and politicians, are valuable sources of insight to be used in that process.

question of efficiency is benchmarking. Benchmarking provides a relative view of efficiency, depending on the comparators or benchmarks selected, and also on the population against which the comparison is made. However, as it cannot address the specific circumstances of the utility directly, it cannot provide a definitive answer of the level of absolute efficiency and, thus, the gap between the ideal and the current state.

Therefore, while benchmarking provides a useful relative analysis of where efficiencies worthy of investment and implementation might be found, further work is required between such an assessment and the quantified implementation of improvements. This may lead to a subsequent analysis of the specific mitigating circumstances of the business, including differences in hydraulics and topography of the service area, customer demographics, source water quality or environmental regulations,

water efficiency

Partnerships and risk transfer

According to the AWA State of the Water Sector Report 2014, 81% of respondents believe there exist more opportunities for public-private partnerships in the water industry. Collaboration outside your organisation provides means to take the continuous process further and more rapidly than through internal developments alone.

The different approaches to private sector participation can be characterised in three ways: as advice (with no risk for the efficiency outcomes for the partner who is paid for recommending actions); collaboration (where risk is shared for efficiency outcomes and both partners earn value based on the results); or service delivery (with extensive transfer of risk for the efficiency outcome to the partner and high certainty for the utility).

In the case of advice-based options, utilities receive recommendations on opportunities and challenges for implementation. Because these kinds of contracts remain outside-in and do not require change, they are easy to participate in for the utility. Management will need to address the findings in some way, but the call to action and the success of implementation are not addressed directly through the work. In the worst instance, such studies might be used against the case for actual action.

At the opposite end of the spectrum, more traditional models of PPP exist. Delegated management and O&M outsourcing, DBO and BOOT projects transfer the responsibility for service provision to the private partner, with varying degrees of risk transfer. In essence, these are effective ways for the utility to lock in the efficiency gains for extended periods. However, the decision to 'hand over the keys'

a challenging prospect for the utility. Alternative models of cooperation and collaboration are becoming increasingly popular. Alliance contracting, where services are delivered by a joint team with full transparency and shared commercial risk, has been popular in Australia for more than a decade. There also exist other forms of contracts with variously contingent payment models, like energy services or ESCO contracts, and performance contracting models like PPS as used in the USA. These models have the advantage of leveraging knowledge and skills through co-creation of value while retaining the existing employees in the delivery of service, making them less challenging to implement.

Case study

Australia has a long history of finding improvements and efficiencies, driven by COAG and productivity reforms as well as through public-private partnerships. While authorities like Sydney Water, SA Water and Coliban Water have taken advantage more than others, there remains potential for more cooperation and improvement.

Historically, BOOT and DBO contracts were favoured and saw substantial risk transfer with large savings for utilities. More recently, alliances have been utilised for capital projects, DBOs and operations and maintenance contracts, although industry opinion seems to have been mixed as to the outcomes of these collaborative projects where they are based on target budgets that are established after being awarded or re-established after a short initial period of operations. This compares to the more certain forms of PPP where prices are locked in for long periods at commencement,



subject only to indexation. There appears to be evidence of a current trend back towards DBOs as well as O&M outsourcing, and the possibility of future capital recycling may lead to further conventional outsourcing contracts with high levels of risk transfer and price and efficiency potential achieved through competitive processes. These more conventional types of partnership can deliver efficiencies with high surety of outcomes.

In 2014, Hunter Water outsourced the operations and maintenance, including asset management, of its 25 water and wastewater plants. The contractor was able to implement an integrated operator/maintainer model, reducing management overheads and improving labour productivity to deliver immediate savings. The project will also implement systemic improvements to asset management systems, which will ultimately serve to improve service levels through reliability gains, and reduce maintenance costs by increasing asset effectiveness and availability.

Hunter Water reports on its website a study finding that it has become 'Australia's Most Affordable Water Utility', stating, "Examples of cost savings by Hunter Water which have been passed onto the customer include ... sourcing a new operator for our treatment plants at a discount of \$23 million."

Conclusion

The mandate for efficiency improvement in water utilities will continue as changing demands, technologies and experiences make opportunities for more efficient service delivery possible and regulators and customers continue the call for better value for money. Two key ways and means are recommended for success in this area: the leadership and commitment of the organisation towards achieving more for less; and a willingness to explore and engage outside the organisation.

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Minimising water treatment plant degradation and chemical spills

For more than half a century, companies have invested billions of dollars into equipment and infrastructure to process wastewater and sewage. Corrosion of this infrastructure — and, in some cases, the subsequent leakage — costs industry over \$1 billion each year.

The main assets that are impacted by corrosion in wastewater treatment plants are the pipelines, storage tanks, clarifier ponds and sewage channels. One method of refurbishing these assets is to carry out surface repairs and then apply protective coatings. These coatings must be strong, flexible and resistant to chemical attack.

Special consideration is required when coating structures in sewage treatment plants, according to Rhino Linings Australasia (RLA) Special Projects Engineer Dennis Baker. Baker explained that one of the more corrosive by-products of sewage is hydrogen sulfide gas, stating, “Hydrogen sulfide reacts with moisture on surfaces in a wastewater plant and bubbles up to form sulfuric acid, which really loves concrete.”

Hydrogen sulfide attacks the cement, copper, iron and silver, which gradually degrades the structure. In the case of a pipeline, this may ultimately result in the collapse of the pipe wall. In addition, the flammable, colourless gas also poses a health risk to workers.

One type of coating from RLA that is suitable for wastewater treatment is spray-applied polyurea and, more recently, pure polyurea. Pure polyureas are formed when a liquid isocyanate is mixed with an amine-based resin solution. Isocyanates are reactive because the double covalent bond attaching the carbon atom to nitrogen and oxygen atoms is easily broken to form single bonds in the more stable tetrahedral configuration around the carbon atom.

RLA pure polyurea comes as a two-part solution that is mixed under high temperature and pressure (3000 psi at 65°C) in a specially designed spray apparatus. When applied, the chemical crosslinking produces a dense but flexible surface. The high density makes the coating almost impervious to abrasion, water and chemicals.

Pure polyurea coatings ‘snap cure’ to form a solid surface in a few seconds and can be walked on without damage in less than a minute. According to Baker, “Unlike all other coatings, pure polyureas are not affected by ambient moisture or temperature.

We can return a facility to service in four hours, with full cure in 24 hours.”

Whereas epoxies and paints form a solid rigid shell, the flexibility of polyurea coatings allows them to move with the expansion and contraction of the underlying structure as temperatures change. It can be sprayed at very high thickness (6000 µm and greater) on a sloping or vertical surface without sagging or running. The surface of an RLA coating is easy to maintain, clean and recoat if necessary.

The chemicals utilised in polyurea and pure polyurea coatings mean that most of the work carried out by RLA applicators, such as Queensland-based Satintouch, is defined as an environmentally relevant activity (ERA) under government legislation. The owner and managing director of Satintouch, Scott Blair, said RLA serves as “a great resource for us, especially for advice as to what can or should be done on a project”.

Satintouch’s teams usually consist of three technicians and a supervisor working on-site, along with an independent QA/QC inspector who oversees projects and ensures all procedures are followed and documentation prepared according to requirements and specifications. This includes the RLA procedures as well as the rules and guidelines of the ERA legislation.

For projects involving heavy traffic and wear, Blair said Satintouch will usually install an indicator layer which is bright red before the final top coat. Once the red layer starts to show through the main coating, it is clear that the structure or surface will need re-covering soon. Recording these wear rates enables better protection planning.

The durability of pure polyurea and polyurea as surface protection means that money can be saved because the structure has a longer repair/replace cycle. “Polyurea coatings are also easy to repair,” Baker said. “The area around a damaged surface can be reactivated using special primers and then covered with a new layer of polyurea.”

RLA’s formulations, combined with innovative substrate preparations, result in good adhesion and a seamless surface over virtually any shaped structure. “Applied correctly, our spray-applied polymer coatings have attachment loads of at least 6 to 10 mPA (750 to 1250 psi),” said Baker. “In most cases, the concrete substrate would give way before the coating peeled off.”

Spray-applied pure polyurea and polyurethane from RLA offer suitable solutions for liquid containment. All coatings developed by the company for the water industry are continually tested to ensure they comply with the latest standards and have been certified safe for applications such as lining potable water storage tanks, marine aquariums, food freezers and grain silos.

The coatings are covered by long guarantees, with water treatment facilities extending to 20 and 25 years’ warranty. Blair also has a personal routine for client follow-up where he contacts as many customers as practical every two years, “just to make sure everything that we installed and coated still meets their requirements and that there have been no failures”, he said.



Technicians applying a coloured pure polyurea coating to hardstands at a chemical processing plant.

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Best practice organics collection in Albury Wodonga

The councils of the Albury Wodonga region have set the best practice benchmark for food and garden waste (FOGO) recycling in Australia, following their recent commencement of combined garden and food collection services for households.

The region has been found to have a contamination rate — a rate of non-food and garden waste placed into the organics bin — of just 0.8%, which is better than all other councils who have introduced similar collection services. Average contamination rates across NSW and the rest of Australia range from 1–14%.

Andrea Baldwin, team leader waste management at Albury City Council, noted that the Albury Wodonga councils “have invested heavily in community engagement and education” surrounding the new service. The councils’ campaign was fronted by *Masterchef* winner Julie Goodwin, who made appearances in TV adverts and print media.



“The results are extremely pleasing and show that local residents have readily accepted this new recycling service,” said Baldwin.

“Given that our three-bin collection system has only been in operation for a short period of time, we’re extremely proud of the local community for playing their part in not only reducing the amount of organic material going to landfill, but ensuring the

contamination rate is exceptionally low. This also ensures a high-quality compost is produced.” The three-bin system for residents is part of Albury Wodonga’s Halve Waste campaign, which has a target of reducing waste to landfill by 50% by 2020.

“Our local residents have seen the benefit of the Halve Waste program and should be proud they have set the benchmark for using the organics recovery bin system,” said Baldwin.

MRA Consulting Group

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Microgrid stabilisation system to boost renewable energy use in Kenya

Power and automation technology company ABB has won an order from Socabelec East Africa to design, supply and install a PowerStore flywheel-based microgrid stabilisation solution for the Marsabit wind farm in northern Kenya. The technology is being developed by ABB’s Microgrid and Renewable Energy Integration team, based in Darwin.

Marsabit sits on the edge of the desert in a windy area of northern Kenya, and is not connected to any national grid for its power needs. Being a remote community of 5000 people served by an isolated microgrid, it requires a secure, stable power supply based on easily available and preferably clean sources, like wind. Today’s electricity supply for the area relies on diesel generators and two 275 kW wind turbines.

ABB’s containerised, 500 kW PowerStore stabilisation system will be integrated into the existing power network and will interface with existing diesel power station controls. This will maximise renewable energy penetration by stabilising the grid connection and utilising any excess wind energy generated. The project is scheduled for completion in 2016. ABB PowerStore is a compact and versatile generator whose primary purpose is to stabilise and protect power systems against fluctuations in frequency



and voltage. The flywheel-based system can inject or absorb power up to its nominal rating and helps to integrate intermittent renewable energy into a grid, so users can operate their hybrid plants in an optimal way. The system has been successfully deployed, often in harsh and remote environments, in locations all around the world.

“Sustainable development of Africa and fostering microgrid solutions are both key focus

areas in ABB’s Next Level strategy, and dedicated 1000-day programs have been constituted for them,” said Claudio Facchin, president, Power Systems division. “Our microgrid technology solutions can significantly boost renewable integration and can play a key role in helping isolated and remote communities to gain access to clean electricity as in this case.”

Kenya plans to quadruple its energy output in the next five years, bringing on board an additional 5000 MW of power capacity with the aim of providing the majority of its approximately 50 million citizens access to electricity by 2020. The country’s renewable energy sector is among the most active in Africa.

ABB Australia Pty Ltd

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Energy efficiency

in the food and beverage industry



Food industry companies are increasingly confronted with the challenges of climate protection and sustainable development. The motto is: more efficiency, less CO₂.

What savings potential can still be achieved in modern food production? 177 times around the world with a mid-sized car — the carbon dioxide emissions of such a journey correspond to the annual potential savings that measurement technology vendor Endress+Hauser has estimated for a single mid-sized company in the meat industry. Energy costs only account for an average 2% of revenues in the food industry. But sustainable solutions to reduce energy consumption are essential for producers if they want to survive in the market over the long term. “Energy efficiency plays a key role in this regard,” said Prof. Dr Antonio Delgado from the University of Erlangen-Nuremberg in Germany.

This scientist sees the food industry in a particular area of conflict because “any measure taken to increase energy efficiency

may neither be detrimental to food quality or food safety” — which, in other words, means many of the measures developed in other industries are not suitable.

Synergy effects in the heating cycle

Delgado sees one way to greater energy efficiency is the use of energetic interactions between the production process and infrastructure. First and foremost, large savings potential results from the synergistic effects between heat generation and refrigeration. How creative companies can become in this regard is demonstrated by Maggi in Singen, Germany. The plant uses the waste heat from the nearby cupola furnace of a foundry. The energy extracted from the exhaust gas is stored in a thermal oil and pumped through a conduit into Maggi's boiler house 200 m away. There, a complex system of heat exchangers and steam boilers ensures that pure steam is

always available for production. 50,000 MWh, about two-thirds of the steam required, generates heat recovery. It is claimed the company thereby saves up to 11,000 tonnes of carbon dioxide annually.

The fact that energy demand can be systematically reduced by intelligently combining existing facilities is also held true at Warsteiner, in Germany. The family brewery invests continuously to increase its efficiency while protecting the environment. The loading hall's ventilation system has recently been upgraded to the latest technology. The ventilation system ducts were improved, the supply air optimised, the control system retooled, ceiling fans were installed and several small heat recovery systems retrofitted. As a result, these measures not only save valuable heating energy and improve air quality in the loading hall, but CO₂ emissions are also lowered by an estimated 1100 tonnes per year as a result.

energy efficiency



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Small cause, big effect

As they take life cycle costs into account, those food manufacturers that are riding the 'green technology wave' are taking a precise look at what they can save, where and how. It is often the little components that, in total, have a major impact on efficiency, as in the case of sparkling wine producer Rotkäppchen. Many sophisticated solutions used in the production process contribute to the efficiency of sparkling wine bottling: dynamic handling units for sealing the bottles, sturdy tabletop chains for bottle transport and efficient motors for the conveyor technology.

50 mechatronic drive units from SEW-EURODRIVE were installed in the bottling line. They already meet Class IE4 energy-efficiency requirements and save up to 50%

of energy compared to conventional drives. The corresponding frequency inverters at Rotkäppchen are housed in a central switch cabinet container. Its waste heat is used in winter to heat a storage area.

Energy flows at a glance

Prior to any measure, the question first arises: where do you start to achieve these kinds of energy savings?

To find out which savings potential lurks where, the actual state must be known. The building blocks for energy optimisation are online — capable measuring devices that continuously record the energy flows for steam, compressed air, heat, cold, electricity, gas, oil and water. A flowmeter optimised for energy circuits is, for example, able to detect leaks in compressed air networks.

This lets you detect critical aggregates or process steps and permanently maintain peak demand within tight tolerances. Energy efficiency as an integral part of the automation — another way to tap savings potential. This proves once again: the greatest potential to conserve resources and reduce costs is the efficient use of the energy already available.

Many other technologies and methods to reduce energy consumption and carbon dioxide emissions were shown at the International Supplier Fair for the Food and Beverage Industry: Anuga FoodTec 2015 in Germany this March. The next conference will be held in Cologne, Germany, from 20–23 March 2018. For further details about the fair, visit www.anugafoodtec.com.

Anuga FoodTec 2015
www.anugafoodtec.com

City of Melbourne recycling food waste

In one of the quintessential laneway cafe districts of the City of Melbourne, 60 local businesses are now diverting tonnes of food waste from landfill using the GaiaRecycle concept from Eco Guardians. The system, which dehydrates inner-city food waste, is set up in the basement of Ross House, near the Degraves Street and Centre Place food and beverage precinct in Melbourne.

Along with the benefits associated with diverting food waste from landfill, the system has also resulted in a reduction of waste bins in the laneways, which has improved access and hygiene, opening up the way for the beautification of an important tourism area. Just as importantly, hundreds of waste-truck journeys per year into and out of the city have been eliminated with further

beneficial impact on GHG emissions. Since being commissioned more than two years ago, the system has dehydrated over 150

tonnes of putrescible food waste that would otherwise have rotted in landfill. The waste has instead been converted into 50 tonnes of nutritious fertiliser, with a net reduction of 98 tonnes of carbon dioxide equivalent emissions. Not stopping there, the nutrient-rich organic fertiliser produced by the system is being deployed by the City of Melbourne Parks & Gardens Department around the

City on flower beds and tree plantings, reducing dependence on chemical fertiliser.

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Sydney buildings to save 30% of energy by 2030



City of Sydney councillors have approved a final version of the Energy Efficiency Master Plan. The plan shows that by 2030, Sydney's building sector could save 31% of its energy use — even with an expected 29% increase in floor space.

In developing the master plan, the City conducted a detailed analysis of energy use and greenhouse gas emissions for the city's buildings. The research has led to a range of actions, including:

- safeguarding energy and emissions savings by maintaining existing core programs and standards;
- improving compliance of building standards and codes;
- providing education and training for planners, property owners, tenants, building managers and assessors;
- improving energy efficiency in buildings through retrofit and tune-up programs;
- making it easier to access finance and incentives for improved energy efficiency;
- developing new energy-efficiency ratings;
- increasing minimum performance of new buildings;
- improving equity by advocating on behalf of low-income households; and
- showing by doing, through best practice for City-owned buildings.

The City has already retrofitted 45 of its properties to reduce greenhouse gas emissions by 29%, generating operational savings of over \$1 million a year. According to Lord Mayor Clover Moore, implementing the Energy Efficiency Master Plan would be another step in the city-wide slashing of carbon emissions.

"The research underpinning our plan shows that while it will cost almost \$400 million to implement measures to increase energy efficiency, the savings in energy use will be more than \$600 million, meaning a net benefit of more than \$200 million by 2030," the Lord Mayor said.

Approval of the master plan comes as state and federal governments step up efforts to increase energy efficiency, with the Council of Australian Governments (COAG) Energy Council currently backing a move to increase Australia's energy productivity by up to 40% by 2030. This decision has been welcomed by Moore, who said the idea of a national energy productivity plan "reflects many aspects of our own plan to make more efficient use of energy".

The master plan's adoption also coincides with international recognition of the City's efforts to improve energy efficiency in buildings. The US-based Carbon Neutral Cities Alliance is giving the City \$60,000 to fund a project to make high-rise apartment blocks energy neutral.

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Remanufacturing requires compressed air

When building its new remanufacturing facility in Adelaide, Liebherr-Australia chose Kaeser equipment to deliver an energy-efficient supply of compressed air on demand.

Since 2004, Liebherr has remanufactured used components from its own construction, handling, maritime and mining equipment. In 2012, Liebherr-Australia began building a remanufacturing and warehousing facility at its Adelaide head office complex. The site required large quantities of compressed air at varying locations across the extensive factory floor.



From the dismantling area to the reassembly area, compressed air would be required to power large torque and rattle guns, grit blasting as well as the painting booth. It was anticipated that the demand for compressed air would vary significantly throughout the working day; Liebherr-Australia therefore required a system that could rapidly scale up or down to match demand in the most energy-efficient manner.

With a number of Liebherr sites worldwide already using Kaeser compressors, Stefan Stübiger, industrial engineering project manager at Liebherr-Australia, called on Kaeser distributor Mobile Compressed Air to design and supply the compressed air system for the new warehouse. The company recommended installing a CSD 125 series rotary screw compressor, a CSD 105 SFC series frequency controlled rotary screw compressor, a BSD 83 series rotary screw compressor and a Kaeser Sigma Air Manager Master Controller.

Every CSD rotary screw compressor incorporates a screw compressor block equipped with Kaeser flow-optimised Sigma Profile rotors. The Kaeser Sigma Profile is said to deliver power savings of up to 15% compared with conventional screw compressor block rotor profiles. All Kaeser rotary screw compressor blocks feature this energy-saving rotor profile and are designed to ensure maximum energy efficiency.

In addition, the CSD 105 SFC rotary screw compressor includes sigma frequency control. Kaeser SFC compressors are able to directly match the required air demand by continuously adjusting the compressor block speed within the given control range. The result is significant reductions in energy consumption. The inclusion of a Sigma Air Manager (SAM) station controller would further allow Liebherr-Australia to enjoy considerable savings. Able to control up to 16 compressors, the SAM controller precisely adjusts the loading and operation of all compressors within the system to achieve optimum station energy efficiency, while its 3D control enables a reduction in air network system pressure.

The Kaeser equipment was installed along with large compressed air distribution manifolds. Designed and manufactured by Mobile Compressed Air, these manifolds provided Liebherr-Australia with the compressed air equivalent of a power board. With seven outlets installed at different points throughout the facility, compressed air would be highly accessible when and where required.

Since the project's completion in December 2014, Liebherr-Australia continues to rely on Mobile Compressed Air for its ongoing compressor and maintenance requirements. Stübiger noted, "The compressed air system is providing us with a reliable source of energy-efficient compressed air and we have since chosen to install Kaeser compressors in four further nationwide warehouses."

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Margaret Court Arena aces LEED Gold certification

Margaret Court Arena has become the first sport and entertainment arena in Australia to receive a LEED Gold certification, following its recent redevelopment. The venue was redesigned and built with a key focus on sustainability, in a project which was overseen by Lend Lease.

The LEED (Leadership in Energy and Environmental Design) rating system, developed by the US Green Building Council (USGBC), recognises buildings, homes and communities that are designed, constructed, maintained and operated for improved environmental and human health performance.

It is said to be the most internationally recognised certification of its kind.

Margaret Court Arena achieved LEED certification for implementing practical and measurable strategies and solutions aimed at achieving high performance in sustainable site development, water savings, energy efficiency, materials selection and more. Key initiatives included:

- energy-efficient lighting and air-conditioning systems;
- an operable roof allowing air-conditioning and lighting systems to be reduced when conditions are favourable;
- re-use of existing structures;
- water-efficient fittings;
- sustainably sourced timber;
- recycling of waste generated in construction;
- a cool roof, which reflects the sun's heat;
- shading overhangs that block summer sun but allow winter sun;
- rainwater-flushed toilets that are connected to the site-wide water harvesting system.

"We're very proud of the fact MCA is the first sport and entertainment arena in Australia to receive this level of LEED certification,"

said Brian Morris, CEO of Melbourne & Olympic Parks. "This is now Melbourne & Olympic Parks' second LEED certification, which demonstrates our commitment to sustainable practices and our intention to make the precinct one of the most sustainable sports and entertainment hubs in the world."

Lend Lease was named Master Builder of the Year (Commercial) at the 2015 Master Builders Association of Victoria's Excellence in Construction Awards for its work on the project. According to Joe Kokai, general manager of Lend Lease's building business in Victoria, "The collaborative spirit and innovative thinking shared among project partners were key drivers that made this outstanding achievement possible. "This achievement provides an excellent endorsement for industry to the push the boundaries and drive continual improvement and accountability in sustainable design, construction, maintenance and operations," Kokai said.

Lendlease

www.lendlease.com

Image credit: Peter Bennetts Photography



Richmond Town Hall revamps with solar

In the midst of an award-winning global sustainability campaign, the City of Yarra added multisized solar systems to the roofs of seven public buildings - including the heritage-listed Richmond Town Hall. The City enlisted Smart Commercial Solar to help bring solar to buildings throughout the municipality, with the latter recruiting microinverter supplier Enphase.



While the majority of the solar systems are small in size, ranging from 1.5 to 15 kW, the Richmond Town Hall showcases a 70 kW system. The Town Hall system proved to be the most challenging to design, as Smart Commercial Solar was tasked with maintaining the building's aesthetic integrity; luckily, the company's choice of Enphase technology saved it from the problems that would have ensued with string inverters. "The hall roof's imperfect nature required us to install panels in irregular locations and orientations that would have been almost impossible

to do with traditional string inverters," said Huon Hoogesteger, CEO and founder of Smart Commercial Solar. "Enphase microinverters were flexible enough for us to arrange the system to fit the roof's available space." Enphase microinverters require less cabling since they convert solar power directly from DC to AC, allowing Smart Commercial Solar to comply easily with building code guidelines. Its modular technology also allows solar panels to be installed in different orientations, maximising its rooftop space and system size.

Enphase's technical team provided on-site support that helped guide Smart Commercial Solar on the best way to accommodate the project's many obstacles. Furthermore, the owners of Richmond Town Hall will now be able to monitor the solar installation in real time using the Enphase MyEnlighten platform, which provides insights on energy production, the health of the system and pre-emptive alerts of any potential issues. "Enphase Energy is delighted to have partnered with Smart Commercial Solar to deliver an outstanding solar energy solution which complies with the strict planning codes associated with improvements for heritage-listed buildings," said Nathan Dunn, Asia-Pacific managing director for Enphase Energy. "We are proud that Enphase technology has contributed to the sustainability and energy efficiency goals of this iconic building while preserving its heritage status."

Enphase Energy

www.enphase.com/au

Bringing off-grid electrification to Myanmar

In order to enable development and economic growth in Myanmar, where 70% of the population has no reliable electricity supply, Schneider Electric is teaming up with local agribusiness firm Golden Key Company (GKC) to bring energy to the country's rural populations.

The partners have undertaken to provide electricity to villagers in Targone, Yoe Gyi and Khalout Thaike in Myanmar's Ayeyarwady region. The project allows solar-powered smart electrical micro grids to be installed in all three villages, keeping 800 households supplied with energy. Each household is equipped with two LED lights, a mobile charging dock or a radio.

Schneider Electric is contributing to the project by supplying equipment, providing technical expertise on several levels and developing local competencies: defining requirements, developing tailored energy solutions and training installers and local entrepreneurs. The company is also developing a solar-water pumping and rice mill solution to extend the benefit of lighting during the night to farming support during the daytime.

Through its energy division, Nay Yaung Ain, GKC is providing 20 employees responsible for installing the scheme, advising villagers on household electrification and maintaining the systems. In the medium term, the company must also support the development of local entrepreneurs to sell battery-charging stations and individual solar lighting kits.

"Thanks to this project, Schneider Electric is providing communities in remote areas of Myanmar with sustainable access



to electricity, said Pascal Reigner, president of Schneider Electric Myanmar. "Problems accessing energy affect millions of habitants, impact people's health, hamper development and compound environmental damage. These rural electrification solutions will help to improve living conditions for these communities."

By implementing off-grid electrification solutions, the partnership between Schneider Electric and Golden Key aims to put reliable, affordable and green energy within reach of many households in Myanmar over the next few years. The project enjoys financial backing from Myanmar's Ministry of Livestock, Fisheries and Rural Development.

Schneider Electric

www.schneider-electric.com

GOT WASTE?

MRA is delighted to announce the appointment of a number of key new staff to its experienced team of waste experts.



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Technical Director



Virginia Brunton
Principal Consultant



David Cocks
Victorian Manager

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Customisable solar power is on the menu

Best known for serving New Zealand's famous green-lipped mussels, The Mussel Pot is a small restaurant with big energy needs. Open daily, The Mussel Pot is highly conscious of its large energy consumption - using 46,821 kWh of energy annually - but had little control over it. The restaurant's owner, Tracy Cacciamani, said, "With the rising cost of electricity, and the fact that we are trying to do our small bit for the environment, we began investigating solar power."

Local PV installer SunPower Solar NZ used flexible microinverter technology from Enphase to customise The Mussel Pot's system based on the building's unusual tin roof. Beneath the tin roof lay a timber layer strong enough to support the system.

"We use Enphase microinverters for their versatility and compatibility with all roof types," said the director of SunPower Solar NZ, Patrick Green. "Safety, monitoring, quicker start-up time, higher production; the Enphase advantages are endless."

After reinforcing the support beams, SunPower Solar NZ installed 40 Trina panels attached to Enphase microinverters separated into rows using three single-phase cables. SunPower Solar NZ decided to leave only small gaps between the rows to maximise the number of panels that would fit on the roof, ensuring optimal

energy production. The Enphase Enlighten monitoring platform offers The Mussel Pot at-a-glance performance data; comparison to production in previous weeks or days; and a system status indicator, which tells the restaurant if the system is performing as expected.

Due to the system's specific design and the restricted access between panels, granular monitoring was essential in order to accurately diagnose and locate issues, if any arise. Enlighten enables remote performance diagnosis that gives The Mussel Pot insight into its solar PV system.

"Our Enphase system has surpassed our expectations in production, and we love getting emails from Enlighten that tell how our system is reducing our carbon footprint," said Cacciamani.

The addition of solar now covers 31% of The Mussel Pot's electricity bill through the production of 14,750 kWh of clean energy per

year. In combination with the included Sunpower Solar NZ energy audit, the system is saving the restaurant a total energy cost of \$6325 annually.

Enphase Energy
www.enphase.com/au



A recycling program for yoghurt pouches

Milk processor Fonterra Brands New Zealand (FBNZ) has partnered with TerraCycle in the launch of a recycling program for yoghurt pouches — a packaging product that would previously have gone to landfill.

As explained by Fonterra Environmental Manager Nic Bishop, the program followed the release of FBNZ's kids' yoghurt, Anchor Uno, in a pouch format that was popular with children but did not allow consumers to recycle the packaging.

"That's why we have partnered with TerraCycle to provide a recycling solution for all yoghurt pouches — that's Anchor Uno pouches or any other yoghurt pouch," Bishop said. "This program also builds on the Anchor Recycling Movement, which is where we develop recycled-product ideas and community partnerships."

The Fonterra Pouch Brigade is a free recycling program that enables New Zealanders to collect their empty yoghurt pouches and send them to TerraCycle. The company will then upcycle the pouches into children's pencil cases or recycled

into new products, such as chairs and park benches. Here's how to recycle with the Fonterra Pouch Brigade:

- Visit <http://terracycle.co.nz/fonterra-pouch> to sign up.
- Create your own recycling bin and place it at your school, kindergarten, community group or at home.
- Collect your yoghurt pouches and, once your recycling bin reaches the 2 kg minimum shipment size, send it for free to TerraCycle.
- TerraCycle will donate 100 TerraCycle points (\$1) for every 1 kg of pouches to a local community group, school or charity of your choice.
- The first 25 brigades that sign up will receive an Anchor Uno voucher. The first 50 will go into the draw to win one of five upcycled products.

TerraCycle New Zealand General Manager Anna Minns said TerraCycle has worked with FBNZ to "provide all of the resources needed to collect, ship and recycle, whether this is DIY collection bins, posters or signage". The resources are available on the TerraCycle website.

Fonterra
www.fonterra.com





Greening the house

– the Sydney Opera House

The Sydney Opera House has been awarded a 4 Star Green Star – Performance rating by the Green Building Council of Australia (GBCA), putting the national icon among a select few World Heritage buildings that have achieved green certification globally.

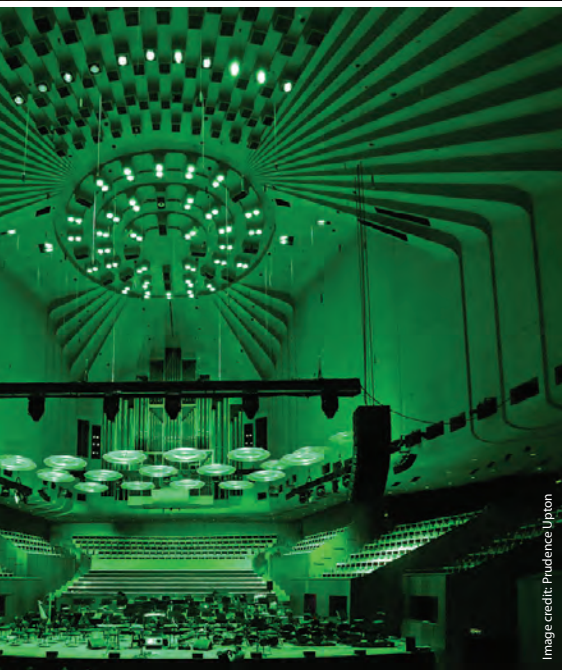


Image credit: Prudence Updon



Image credit: Prudence Updon

The Opera House welcomes more than 8.2 million visitors on site every year and hosts 1800 performances attended by 1.4 million people. It is one of the world's busiest cultural precincts and now one of the first performing arts centres to achieve a 4 Star Green Star rating.

When designing the Opera House more than 40 years ago, Jørn Utzon was inspired by nature and integrated many features now recognised as pioneering sustainable design. A highly innovative seawater cooling system — considered ahead of its time — still powers the Opera House's main heating and air conditioning while an early interpretation of the 'chilled ceiling' design remains in the Drama Theatre today to help control the venue's air temperature. The building was designed to last using durable materials to meet a 250-year lifespan, much more than the 80-year standard of today. And the iconic white shell tiles are self-cleaning, which reduces maintenance.

The 4 Star Green Star – Performance rating announcement was made jointly by NSW Deputy Premier and Minister for the Arts Troy Grant, Sydney Opera House Building Director Greg McTaggart and GBCA Chief Executive Officer Romilly Madew on stage in the Concert Hall — a key venue

in the Opera House's sustainability strategy. From the installation of new energy-efficient technologies in key performance venues to the use of eco-friendly cleaning products and a robust Reconciliation Action Plan, a wide range of both environmental and social sustainability initiatives across three core areas have also contributed to the Opera House's 4 Star rating.

Energy usage has been reduced by more than 10% over the past five years. This has been made possible through a range of lighting-retrofit and lighting-control projects including the award-winning Concert Hall lighting project unveiled last year. The lighting update is expected to reduce electricity consumption substantially, with estimated savings of about \$70,000 a year. Other benefits include: reduced need for staff to work in confined ceiling spaces to replace lights; increased capacity to create specific lighting effects, without the cost of hanging additional lights; and the removal of air-conditioning ducts as the new LED lighting doesn't produce the same amount of heat as the previous lights.

The 4 Star Green Star rating, awarded for 'best practice' in the industry, is an extraordinary achievement for a heritage building. It will also be critical to the Opera House's Decade of Renewal, a sequenced program of works to update the world-renowned performing arts centre.



Seawater cooling system - image credit Filippo Dall'Osso.



Steve Tsouklas - credit Filippo Dall'Osso.

NSW Deputy Premier and Minister for the Arts Troy Grant said: "The Opera House is an icon of Sydney and a symbol of modern Australia so it's vital that it sets the standard. The endorsement of the Opera House by the GBCA sends a clear message that green buildings don't have to be new — even the most recognisable and historic landmarks can earn a place among the most celebrated sustainable buildings in the world."

Romilly Madew, Chief Executive Officer of the Green Building Council of Australia, said: "About 340 million square metres of commercial and public building space in Australia needs upgrading. Despite the operating costs amounting to around \$27 billion a year, the general consensus has been that it's 'too hard' to improve the sustainability of these buildings. The Sydney Opera House has laid down the gauntlet for the property industry with a pragmatic, practical approach which shows even the most iconic, historic and challenging buildings can be high performing, energy efficient and sustainable. If you can green the Opera House, you can green anything."

Other key building, social and environmental sustainability features at the Opera House include:

- Green cleaning: The development of a range of eco-friendly cleaning methods not only maintains the heritage value of

the building but reduces its impact on the environment. This includes bicarbonate soda for cleaning concrete, olive oil for the bronze and ozone-treated water for disinfecting various areas.

- Indoor environmental quality: From theatres and rehearsal rooms to offices, bars and restaurants, different indoor environments are actively managed to ensure user comfort and wellbeing. For example, a temperature of exactly 22.5°C is maintained for the Sydney Symphony Orchestra's musicians to enjoy optimum instrumental performance.
- Building user engagement: A dedicated environmental sustainability manager actively engages staff and performers as well as on-site food and beverage operators and venue hirers in ways they can reduce their environmental impact.
- Operational waste management: There are systems to ensure the Opera House understands and tracks all building waste, with documented processes in place for its recycling and management.
- Monitoring and reporting: Everything from energy performance to water usage, waste management and paper usage is monitored and regularly reported to a range of stakeholders.
- Sustainable transport: The Opera House's proximity to the Circular Quay hub has led to increased public trans-

port usage. A shuttle bus between Circular Quay and the Opera House encourages less mobile patrons to take public transport. For this year's Vivid LIVE festival, fuel-efficient transport was also introduced for artist transfers where possible.

- Social sustainability: The Opera House has a responsibility to make a difference to social as well as environmental sustainability with the aim of benefiting the community now and into the future. This includes the development of its Reconciliation Action Plan — the first by a performing arts centre in Australia — as well as the launch of its Access Strategic Plan (2013–2015), spearheaded by the Opera House's full-time Accessibility Manager.

Greg McTaggart, Sydney Opera House Director of Building, said: "Building on Utzon's own legacy of sustainable design, [the 4 Star Green Star] rating is an important milestone, but it's not the end of our journey. Green Star has provided an initial benchmark, but as part of our Decade of Renewal we will continue to look at ways to improve efficiency and sustainability within the GBCA's framework. We want to ensure that the Opera House is recognised not only as one of the greatest buildings of the 20th century, but of centuries to come."

Green Domes to manage sewer odours

Yarra Valley Water is trialling new technology, called a Green Dome, to help reduce the impact on customers in areas where sewer odours have previously been a problem. It is an alternative to the more traditional vent pipes, which are built into the sewer network to provide ventilation.

“Unfortunately, it is a fact of life that some sewers can occasionally have a degree of odour, creating unpleasant smelling gases,” said Yarra Valley Water Managing Director Pat McCafferty. “While this is not an issue which will affect a majority of our customers, our focus is to provide the best possible service we can with as little impact on the community as possible.”

Most sewer vents in Melbourne are tall, stack-style vents up to 10 m high. They work by dispersing sewer gas a long way above the ground, helping to dilute the odour. Vent stacks work well most of the time, but are not particularly attractive for the community and can be difficult to maintain or repair due to their size. They are also expensive and dangerous to maintain due to their height.

“Through the use of ever-changing and innovative technology, we are now able to use a new solution to an age-old problem,”

McCafferty said. The Green Dome is made from environmentally friendly materials which trap odours escaping from the sewer and absorb them into the carbon-based material. The dome cleans the air prior to releasing the gas, instead of just dispersing it into the air through a traditional vent.



“This technology uses no power and has no moving parts, is completely silent, easy to install and remarkably simple to maintain,” McCafferty said. “As well as being easy and cheap, maintaining a Green Dome is much safer for our staff as it is located at ground level.”

“The colour and size of the dome also help it to blend in with the local environment so that it is less of an eyesore than some of the more traditional alternatives. We try

wherever possible to work with the local community so that our assets are in keeping with the local area.

“The new technology is being trialled in response to feedback from customers, and so far our customers have been happy with the results.”

Yarra Valley Water
www.yvw.com.au

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Diamond-like coatings help save fuel

Researchers from the Fraunhofer Institute for Material and Beam Technology IWS have developed a new method for reducing the friction generated by engine components to almost zero — a breakthrough that could save billions of litres of fuel worldwide every year.

Scientists already know how to coat components with carbon, with Fraunhofer researcher Professor Andreas Leson noting that the material's "low friction and high resistance to wear are the key qualities we exploit in practical applications". But while tetrahedral amorphous carbon (ta-C) coatings are even more resistant to wear than conventional diamond-like coatings, researchers have been unable to produce the material on an industrial scale — until now.

"Unfortunately, you can't just scrape off diamond dust and press it onto the component," said Dr Hans-Joachim Scheibe. "So we had to look for a different method."



Dr Volker Wehnacht, Professor Andreas Leson and Dr Hans-Joachim Scheibe.

The method in question was the development of pulsed laser which generates an arc between an anode and a cathode (the carbon) in a vacuum. The arc is initiated by a laser pulse on the carbon target. This produces plasma consisting of carbon ions, which is deposited as a ta-C coating on the work piece in the vacuum. The system can be connected to existing coating machines.

To run the process on an industrial scale, a pulsed laser is vertically scanned across a rotating graphite cylinder as a means of controlling the arc. The cylinder is converted evenly into plasma thanks to the scanning motion and rotation. To ensure a consistently smooth coating, a magnetic field guides the plasma and filters out any particles of dirt.

The laser arc method can be used to deposit very thick ta-C coatings of up to 20 µm at high coating rates. As explained by team member Dr Volker Wehnacht, "High coating thicknesses are crucial for certain applications — especially in the auto industry, where components are exposed to enormous loads over long periods of time."

Automotive and motorcycle manufacturer BMW is currently working on the industrial-scale implementation of ta-C engine components, such as piston rings and pins, in its various vehicle models. According to BMW representative Dr Franz-Josef Wetzel, the resulting improvement of vehicle performance and acceleration on the road "can mean a double-digit per cent reduction in fuel consumption".

"The coming decade will see the European Union introduce even stricter regulations on CO₂ emissions, so friction reduction would obviously be one of the methods we use to meet the new targets," Dr Wetzel said. "Systematic use of low-friction coatings could save up to 117 billion litres of fuel a year over the next 10 years — equivalent to 290 million tonnes of CO₂ emissions."

Professor Leson, Dr Scheibe and Dr Wehnacht received the 2015 Joseph von Fraunhofer Prize for their development of the laser arc method and the application of ta-C coatings in volume production.

Initiative diverts food waste to nourish depleted soils

After decades of the use of super-phosphates and chicken manure to promote rapid growth of produce and grains, there is a dawning realisation that soils have become depleted, lacking structure and nutrients.

Yarra Valley Farms, a fruit and vegetable wholesaler, and Eco Guardians, which markets a food waste dehydration system, have launched an initiative they are calling enrich360. When food waste has been dehydrated, it becomes nutrient-rich, concentrated organic fertiliser. The enrich360 program ensures that this fertiliser is delivered to the farms that grow the produce distributed by Yarra Valley Farms, not only to enhance fruit



and vegetable quality but also to repair and reinvigorate the soil.

Soil scientists have likened the enrich360 fertiliser to blood and bone products for its high-nitrogen, slow-release profile. Tests have shown that its addition to tired, over-exploited

soil promotes plant growth but, just as importantly, rebuilds the longer-term nutrient levels of the soil in a way that super-phosphates cannot.

Food waste that is not included in a program like enrich360 is most likely to end up in landfill where it rots in conditions that produce methane, a greenhouse gas that is 21 times more damaging than carbon dioxide. It also creates leachate that pollutes watertables and waterways.

Yarra Valley Farms and Eco Guardians have been able to combine their widely differing core skills to establish a sustainability solution that is end-to-end.

Eco Guardians Pty Ltd
www.ecoguardians.com.au

Waste-to-energy facility in WA

Biogass Renewables recently commissioned a large-scale commercial and industrial organics waste-to-energy reference facility for Richgro Garden Products in Jandakot, Western Australia. The site has been designed for 35,000 tons per annum of food waste and can handle up to 50,000 tons per annum, producing over 2 MW of electricity and 2.2 MW in heat.

The plant comprises three key stages — reception, digestion and energy. The reception building receives solid and liquid waste streams from commercial and industrial sectors such as supermarket food waste, market fruit and vegetable waste, abattoir waste, agricultural waste streams and food processing facilities. A preprocessing system de-packages and removes all contamination to give a clean pumpable feedstock for processing onto the digestion process. Anaerobic digestion operates at a mesophilic temperature — circa 36°C — and is a continuous flow digestion process, diet-feeding a small volume into each of the two primary digesters. The process maintains a stable neutral PH, with the digestion phase breaking down fatty acids into methanogens to give methane (CH₄). Biogas captured in the digester gas holders is between 60–65% CH₄ with the rest made up of carbon dioxide (CO₂) and a small amount of hydrogen sulfide (H₂S).

In the third stage, biogas is drafted off from the digester, chilled down to its dewpoint to remove moisture before boosting to a containerised co-generation set producing heat and power via a reciprocating high-efficiency engine. The first unit installed will provide 1.2 MW of power and 1.26 MW of heat, this will service Richgro's entire energy draw on a behind-the-meter basis and export up to 1 MW back into the grid.

Biogass Renewables Pty Ltd

www.biogass.com.au



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PV module recycling partnership

Canadian Solar Australia and Reclaim PV Recycling have pledged to a recycling program for old and damaged solar panels in Australia. As part of the initiative, Canadian Solar will promote the voluntary take-back and recycle program for end-of-life solar panels.

Daniel Ruoss, country manager for Canadian Solar Australia, explained, "During their lifespan, modules may experience damage in various ways, including vandalism or as a result of extreme weather events that exceed the manufacturer's guarantee specifications and warranty. Any such, PV panel needs

to be properly disposed of and the valuable components recycled."

Canadian Solar's PV panels are said to have a guaranteed lifespan of 25 to 30 years, and experience in the field shows that up to 40 years is possible. But even after a serviceable life of decades, the materials of a solar panel have value. Crystalline solar panels are manufactured using few components — predominantly aluminium, glass and silicon — and over 90% of a panel's weight can be recycled. The new partnership is expected to start an efficient recycling system that will greatly decrease the overall environmental footprint of solar modules and build awareness for sustainable waste management in Australia. It will ensure that discarded, unsafe (often counterfeit or poor quality) or damaged panels can be recycled either into another format of solar modules or completely different items.

"Our goal is to achieve the least environmental impact whilst gaining the most valuable yield," said Reclaim PV Recycling Co-Director Clive Fleming. "The example we use is: if you have a dozen eggs in a

carton and two of the eggs are broken, do you discard the entire carton of eggs, or do you remove the good eggs from the carton and use them? At Reclaim, we have developed a unique process of reclaiming efficient cells from damaged solar modules. By removing the good cells, we can reduce the amount of energy needed to effectively recycle solar cells."

Working with a team at Flinders University to develop the best practice for recycling PV modules, Reclaim PV Recycling has developed a scalable model in accordance with projections for end-of-life modules. The company provides a streamlined component recovery system that is said to be accessible for any manufacturer.

Ruoss concluded, "Canadian Solar is very pleased to enter this partnership with Reclaim PV Recycling and hope that many other PV panel manufacturers follow our lead and commit to environmental excellence and sustainability."

Canadian Solar (Australia) Pty Ltd
www.canadiansolar.com/au



Sticky tape could help to develop thinner solar cells

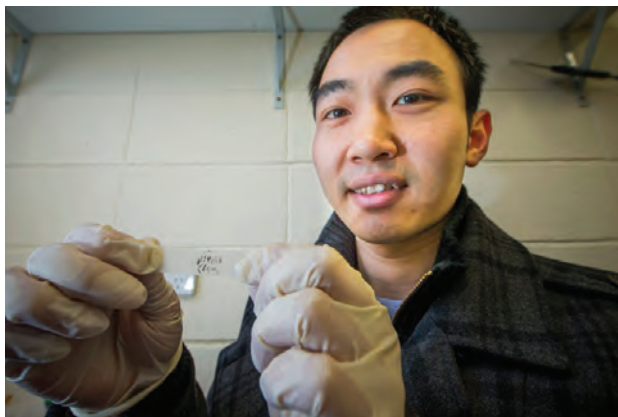
A team led by the Australian National University (ANU) has used sticky tape to create atom-thick layers of phosphorus, called phosphorene, whose properties could open the door to ultrathin and ultralight solar cells and LEDs.

Writing in the journal *Light: Science and Applications*, the scientists explained how they created phosphorene by repeatedly used sticky tape to peel thinner and thinner layers of crystals from the black crystalline form of phosphorus. Phosphorene is a semiconductor, like silicon — which is the basis of current electronics technology — but much lighter and thinner.

Furthermore, the material has light-emission properties that vary widely with the thickness of the layers, which enables much more flexibility for manufacturing. According to lead researcher Dr Yuerui (Larry) Lu, "This property has never been reported before in any other material. "By changing the number of layers we can tightly control the band gap, which determines the material's properties, such as the colour of LED it

would make," continued Dr Lu. "You can see quite clearly under the microscope the different colours of the sample, which tells you how many layers are there."

Dr Lu's team found the optical gap for monolayer phosphorene was 1.75 eV, corresponding to red light of a wavelength of 700 nm. As more layers were added, the optical gap decreased.



Study co-author Jiajie Pei making phosphorene. Image credit: Stuart Hay, ANU.

For instance, for five layers, the optical gap value was 0.8 eV — an infrared wavelength of 1550 nm. For very thick layers, the value was around 0.3 eV — a mid-infrared wavelength of around 3.5 μm .

Additionally, Dr Lu said the behaviour of phosphorene in thin layers is superior to silicon. He explained, "Phosphorene's surface states are minimised, unlike silicon, whose surface states are serious and prevent it being used in such a thin state."

"Because phosphorene is so thin and light, it creates possibilities for making lots of interesting devices, such as LEDs or solar cells."

www.anu.edu.au

Crystal sponges to clean up waste

A research collaboration led by CSIRO has developed sponge-like crystals that clean up contaminants in industrial waste and soil.

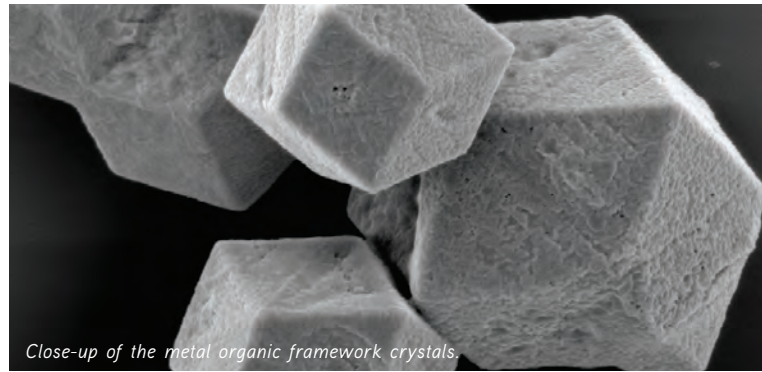
The crystals are made of extremely porous metal organic frameworks (MOFs) and have an internal storage capacity of 7000 m², which is equal to the size of a football oval in a single gram. This means the crystals can filter huge volumes of industrial wastewater, trapping large amounts of contaminants including carcinogenic material and heavy metals.

Producing MOF crystals has traditionally been a lengthy and energy-intensive process, due to the amount of heating and cooling required. But CSIRO's new method is performed at room temperature and has reduced the production time from up to two days down to 15 minutes. It has been published in the journal *Chemistry of Materials*.

"We've estimated that this process could cut the cost to make MOFs by thousands of dollars for Australian manufacturers," said CSIRO research team leader Dr Paolo Falcaro.

"While we've initially used the method to create zinc oxide-based MOFs, it could be applied to a range of different MOFs with applications spanning energy and pharmaceuticals."

CSIRO is now seeking to work with Australian chemical manufacturers to further develop the method and explore turning the crystals into a sustainable industrial waste management product.



Close-up of the metal organic framework crystals.



CSIRO's Dr Paolo Falcaro.

Secured electricity costs off the grid

In late 2014, Mike Bland decided to build his dream home in Foster, near Wilsons Promontory. But the property was located over 1 km from the grid, and his initial contact with the electricity distributor resulted in grid connection quotes over \$50,000.

Bland contacted the local Yingli Solar partner, Gippsland Solar, whose off-grid team designed a tailored solution that is an equivalent of the cost of mains electricity. According to Bland, the decision to go with Gippsland Solar, Yingli Solar and an off-grid system was a "no-brainer".

The system comprises 32 YGE high-efficiency panels (installed on a ground-mounted frame for flexible positioning of the array); a SMA Sunny Island system with automatic generator backup; and a bank of 48 V, 600 Ah gel deep cycle batteries. It was installed in a purpose-built shed with ventilation, and the electricity was then trenched 80 m up to the property.

Now completely off the grid, Bland has secured his ongoing electricity costs — even with constant electricity use and variable South Gippsland weather. Additionally, he is set to achieve annual CO₂ savings of 13 tonnes.

"We are thrilled with our new off-grid solar system," said Bland. "Clean energy and no ongoing costs for connection and supply from the grid. The off-grid system pricing was even cheaper than connecting the mains, and no aerial cables, poles and transformer to put up."

Yingli Green Energy Australia Pty Ltd
www.yinglisolar.com





SOLAR-POWERED BINS

The BigBelly Solar-Powered Rubbish Compactor is about the same size as a standard 120 L rubbish bin but has a patented solar-powered compression technology that increases its capacity five times. This can help to reduce the number of collection trips by 80% and fewer collections can mean savings in fuel and labour/maintenance costs, and reduction in greenhouse gas emissions.

When a unit reaches its capacity, sensors in the unit trigger an internal compactor that flattens the contents. Once the unit is at 85% of its full capacity of 600 L, a wireless system then signals an email or text message to inform the operators that the unit is ready for collection.

Made from recycled materials and powered by the sun, the compactor also works in areas that don't receive direct sunlight. It also has a hopper design that keeps waste contained while deterring pest access and preventing waste overflow and wind-blown litter.

Multiple stream options are available to create customised combination stations; for example, the kiosk unit includes receptacles for collecting plastic bottles, newspapers, glass and other recyclables. Other customised options include: wraps, stickers, side panels, ashtray, security shield or foot pedal.

Suitable for councils, national parks, universities, educational facilities and mining applications, the unit can be purchased under a leasing program.

Solar Bins Australia
www.solarbins.com.au

INFRARED CAMERAS

The Fluke TiS Performance Series Infrared Cameras are said to feature improved resolution to help industrial, HVAC and maintenance professionals analyse equipment health quickly and accurately. They deliver up to 2.5 times more pixels and a 70% improvement in distance-to-spot than the Fluke Ti1xx series cameras, providing better image quality to enhance identification of potential equipment problems in industrial and electrical maintenance, process and building applications.

The models feature large 3.5" screens to help pinpoint issues while still in the field and offer one-touch image access, which eliminates the need to scroll through a menu to view images. Eight models are available — five fixed focus and three manual focus — with resolution up to 260 x 195 pixels.

The rugged infrared cameras are designed to work with Fluke Connect, a system of software and wireless test tools, which allows technicians to wirelessly transmit measurement data from their test tools to their smartphones for secure storage on the Fluke Connect Cloud and team access from the field. Reports can be created and emailed from the jobsite via Fluke Connect, eliminating the need to return to the office to process reports. The Fluke Connect Assets subscription service offers ShareLive video calls that enable teams to share and access infrared inspections on the go and look at trends per piece of equipment over time.

Fluke Australia Pty Ltd
www.fluke.com.au

DUST SAMPLING PUMPS

Casella has launched Apex 2, a range of next-generation personal sampling pumps that provide accurate monitoring of exposure to dust in a variety of industrial workplaces. The pumps are ergonomically designed to ensure better wearer acceptance, while providing performance, functionality, connectivity and simplicity of reporting.



The range includes three separate models: the Apex 2, Apex 2 Plus and Apex 2 Pro. All three models are designed to be unobtrusive to the wearer and the task that they are performing. If a worker removes the pump, this will be registered via a motion sensor that provides data to confirm if the pump has been worn and therefore confirm the validity of the sample.

The Apex 2 Plus and Apex 2 Pro models enable remote monitoring on smartphone and tablets as they both connect with the Casella Airwave app via Bluetooth 4.0 technology. The free app can assess the sampling run without disturbing the wearer of the pump and also enables them to control the pump from the smart device. The app provides near-real-time status updates and allows collected data to be emailed alongside photos and notes for reporting purposes.

Thermo Fisher Scientific
www.thermofisher.com.au

Container deposit scheme:

the state of play

Mike Ritchie, Director,
MRA Consulting Group



The NSW Government announced in February 2015 that it had a preference to introduce a container deposit scheme (CDS). That announcement was endorsed by the Opposition. So what is the state of play beyond NSW?

- The Queensland Government has said it will model its system on the NSW model;
 - The Northern Territory has now introduced its own system after a false start and a legal challenge by the packaging industry (the courts found the original design fell foul of the interstate Mutual Recognition Act);
 - South Australia has had a system for decades, operating well although relatively expensive;
 - The ACT would be likely to follow the lead of NSW in its CDS;
 - The state government of Victoria has rejected proposed state-based systems and the Environment Minister has declared that it is “unconvinced that the way to [increase the beverage container recycling rate] is the container deposit scheme”;
 - The Western Australian Government will not pursue a state-based CDS while a national system is being pursued; and
 - The Tasmanian Government considered implementing a CDS, but after a study suggested it would come at a high cost to consumers, it decided not to proceed.
- So, five out of eight states/territories are seriously considering change.

MRA Consulting completed a study for the Local Government and Shires Association of NSW, which showed that local government and MRFs would be better off under

a CDS (so long as MRF operators could redeem deposits). The reason: even though 83% of eligible containers are redeemed outside of the kerbside system, the 10 c redemption on each container left in the kerbside recycling bin is worth more than the value of the glass, plastic, etc as a raw material. So the value of the recycling bin's contents increases under a CDS and that gain is shared by the industry and councils.

At this time, the NSW Government has not proposed its preferred model for a CDS. The packaging sector has proposed 880 reverse vending machines (RVMs) to be spread across NSW.

That is not very many. So clearly this model is focused on public place recovery of containers (and not as a replacement to kerbside recycling).

It is a very different model to that enunciated by local government and the Boomerang Alliance, which see a full container collection infrastructure built (via RVMs) across the state to replace most of the collection of containers via kerbside recycling.

It is of course possible to sequence both — to start with public place RVMs and gradually increase their abundance. The higher their density, the more they will extract from kerbside bins. The scheme design issues yet to be clarified are:

- Should there be a 10 c deposit at all; why not a donation to charity instead?

- Should all kerbside containers be eligible? (eg, why include 3 L milk HDPE containers — they are rarely littered)
- Should the scheme be mandatory or voluntary?
- Should MRF operators be involved as service providers?

Each of the above is subject to conjecture and debate. What we do know is that the NSW Government has agreed to set up a technical advisory committee to review options. It will spend time consulting with stakeholders before providing recommendations on final design to the NSW government.

This debate has been ongoing for 15 years — far too long in my view. Simply put, we need a system that is cost effective; reduces litter; supports positive action by consumers and community groups; and does not lead to perverse economic outcomes.

It is important to remember that packaging represents just 4% of the waste sent to landfill. A brilliantly run CDS will have a very small impact on waste to landfill. (It is swamped by organic waste, which represents 60% of waste to landfill.)

So is it worth doing? Yes — but as one small step in a much longer journey, of creating a circular economy based on economically sustainable and efficient resource recovery.

MRA Consulting Group
www.mraconsulting.com.au

COAGULATION CONTROL SYSTEM

Chemtrac introduces the Coagulation Control System, utilising the company's Streaming Current Sensor and HydroACT analyser platform.

Models accepting up to three, six or 12 sensors can add any combination of the following: UV254 organics, turbidity, chlorine, pH, ORP and conductivity. The product incorporates all the key measurements needed for optimising coagulation into one analyser.

Kenelec Scientific Pty Ltd
www.kenelec.com.au

PRESSURE TRANSMITTER

The Series IWP pressure transmitter is suitable for pressure measurement in industrial conditions requiring high performance, stability and long service life.

The transmitter delivers a 4–20 mA signal in response to the pressure being measured against its stainless steel diaphragm for process system monitoring and feedback control. Featuring a 4-digit LED display, the product delivers long-term stability and protection in environmentally challenging conditions.

Made of cast aluminium and IP65 rated with an industrial conduit entry enclosure, the high-quality sensor circuitry is able to maintain precise operation under dirty and wet conditions. The series is thus a suitable choice for petroleum, chemical and metallurgical industry applications.

Dwyer Instruments (Aust) Pty Ltd
www.dwyer-inst.com.au



LOW-MAINTENANCE SOLAR TRACKER ACTUATOR

Airstroke actuators from Firestone provide a compact and easy way to continuously orient a solar tracker's payload towards the sun to optimise the amount of energy produced. The rubber and fabric actuators can be used to solve the problem of stationary solar collection panels becoming inefficient as the sun shifts from a 90° angle to the panels.

Inflated or deflated by fixed or mobile compressed air (typically 7 bar), the actuators move photovoltaic systems to minimise an angle of incidence between the incoming sunlight and a photovoltaic array. Alternatively, an actuation alternative uses the expansion and contraction of Freon gas as it is heated and cooled within the actuators to extend and retract them and change the angle of the collection panels.

Since there are no seals sliding against exposed surfaces, the air springs can often survive abrasive and corrosive environments. They are identical in construction to the airbags used in truck and train suspension, so they are very tough. In addition to having no internal rods or seals to wear, unlike conventional metal cylinders, they have the ability to rotate through an angle without a clevis.

The ability to bend with load (and to tolerate high side loadings) means the air springs are easy to install in compact spaces and will perform where rigid alternatives would break or wear. Sizes are available from 80 mm to more than nearly 1000 mm in diameter, in single, double and triple convolutions. No lubrication is required and the lack of seals means lack of friction and jerkiness in operation.

Air Springs Supply Pty Ltd
www.airsprings.com.au



IR GAS DETECTOR

MSA's open-path IR gas detector provides continuous monitoring of combustible gas concentrations at path length of up to 150 m. The product's dual detection range enables sensitivity to both small and large gas leaks.

The detector is performance approved for use in harsh environments (-55°C). Multiple communication outputs (analog, HART, Modbus, AMS support) provide complete status and control capability in the control room.

The product features unitised display for ease of operation and reduced cost. Its automatic gain control compensates for dirty optics, rain and fog.

MSA Australia Pty Ltd
www.msa.net.au

RETURNABLE BINS FOR END-OF-LIFE TYRES



JLW Services has developed returnable bins for the transport of end-of-life tyres. Available in 10.5, 18.5, 25, 38 and 50 m³ sizes, the bins comprise a heavy-duty welded cage that is dropped off at a tyre retailer, transport depot, mine site or council tip.

Usually, a tyre fitter takes old tyres off a vehicle and stores them until collection. They then have to be lifted onto a truck and, when the truck arrives at the recycling plant, taken off one at a time. The bin reduces double handling, as the end-of-life tyres go straight into the bin when they are taken off the vehicle. When the bin is full, it is collected and another bin is dropped off.

The bins can handle around 320 mixed car and four-wheel drive tyres for the 25 m³ version and 600 for the 50 m³ version. The 10.5 m³ version is designed for waste transfer stations and motorcycle shops.

JLW Services Pty Ltd
jlwservices.com.au

LEVEL INDICATOR

Gems Sensors & Controls DipTape level indicators are a simple way to measure the liquid level in storage tanks and IBCs. They are suitable for quick, periodic readouts where power is unavailable or undesirable.

Each level indicator is custom made from a choice of engineered plastics (PVC, PVDF or polypropylene), brass or 316SS, with flanged or threaded tank connections. As with all Gems Sensors & Controls products, OEM customisation is possible.

Unlike traditional dipsticks, the measuring tape never comes in contact with the media, keeping operators and the area around the vessel clean from spillage and drips. This is especially important for slippery, corrosive or potentially toxic liquids. As the tank remains sealed during level measurement, no vapour is released.

The float-driven (mechanical) level indicator requires no power for continuous indication. It can very easily be moved between storage tanks when it comes time to change.

Control Components Pty Ltd
www.controlcomponents.com.au



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Controlling *Legionella* with UV water disinfection

UV-Guard's water treatment systems can disinfect warm and hot water systems, ensuring clean, uncontaminated water. This in turn provides protection against Legionnaires' disease — a debilitating and potentially fatal condition caused by the *Legionella* bacteria, which thrives in warm, moist environments.

T hose with lowered immune systems are at higher risk of contracting the disease, which can be transmitted through hot and warm water systems such as those found in aged care facilities and hospitals. The sources of *Legionella* bacteria in outbreaks of Legionnaires' disease have typically been traced to either large air-conditioning plants or hot water distribution systems that have been incorrectly commissioned or poorly maintained.

UV-Guard Managing Director Richard Vallance explained that low levels of *Legionella* are commonly found in drinking water supplies — and these multiply quickly within warm water infrastructure if there are no disinfection strategies in place.

"Thermostatic mixing valves, commonly used in health care and hospitality industries to provide water to a preset temperature, do not provide microbial control and can, in fact, promote the growth of *Legionella* and other microorganisms," Vallance said.

Each Australian state has different regulations relating to how the *Legionella* risk must be controlled. The good news is that UV water disinfection can be an effective safeguard against *Legionella*, with Vallance

noting, "An established and cost-effective method of *Legionella* control is to install a UV disinfection system on either or both the warm water outlet or return line of the water heater."

UV-Guard's S-Series system is suitable for controlling *Legionella* as it is a robust and dependable UV water disinfection system able to provide recommended UV dose rates at flows of up to 737 L/min, from commercial business installations to hospitals, mining camps and more. Vallance said, "The S-Series, as with all UV-Guard products, is food-grade compliant and accredited by the WaterMark certification scheme, a requirement documented within The Plumbing and Drainage Code Australia.

"This is in comparison to some non-certified products on the market that are being imported from overseas. Customers need to be aware that they are not WaterMarked or regulated and are not in compliance with the Plumbing Code of Australia."

Plumber Andy Murray, from Andy Murray Gas Services in Queensland, came to UV-Guard looking for a solution to an outbreak of *Legionella* at one of his plumbing clients' aged care facilities.

"The facility is housed in a very old building, and I had previously been advised

by another company that the only way to fix the *Legionella* problem was to replumb the whole building, which is almost an impossible task," Murray said.

"I had seen a UV-Guard system installed at another aged care facility I worked with so I called UV-Guard to help us find a solution. We've decided to go down the UV route with this new building and UV-Guard have been a great company to work with."

UV-Guard's water treatment engineers can custom-design a UV water treatment system to specific needs. When it comes to warm water systems, the company can provide lamps, quartz and other spares; complete UV disinfection systems; and water quality sampling, testing and management.

Tips to help reduce the risk of a *Legionella* outbreak:

- Ensure all fittings and thermal mixing valves are maintained to the manufacturer's specifications.
- Establish a regular water quality monitoring program.
- Disinfect potential *Legionella* hot spots, including shower heads and taps.
- Undertake shock disinfection of the complete warm water system.

UV-Guard Australia Pty Ltd
www.uvguard.com.au

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RESIDUAL CHLORINE ANALYSER

Chemtrac's HydroACT 300 Residual Chlorine Analyzer monitors free chlorine, total chlorine, ClO_2 or pH. It is appropriate for compliance reporting following USEPA Method 334.0.

Using a membrane-covered, three-electrode amperometric sensor, Chemtrac's design significantly reduces pH dependency. Because it does not require any reagents or buffers, cost of ownership is low. The product is available with up to three sensor inputs.

Kenelec Scientific Pty Ltd
www.kenelec.com.au

RENEWABLES TRAINING AND CONSULTING

Global Sustainable Energy Solutions (GSES) is a renewable energy engineering, training and consultancy company specialising in photovoltaic solar design, online and face-to-face solar training, the publication of solar books and PV system audits.

With over 25 years of international experience consulting with the renewables industry, the company offers services including 2D system plan drawings; 3D system concept drawings; full system design calculations; and feasibility assessments.

GSES delivers bespoke training with industry experts. It offers CEC-accredited courses, including grid-connected PV systems with battery storage: design and install.

The company has also authored a library of international industry publications, including technical reference books used by tertiary and trade institutions. Its latest book is *Grid-Connected PV Systems Design and Installation* 8th Edition.

Global Sustainable Energy Solutions (GSES)
www.gses.com.au

ENERGY MANAGEMENT SYSTEM

carbonTRACK is an intelligent energy management system and Internet of Things platform that provides energy usage insight and allows consumers to control and switch electrical devices and appliances. This is said to reduce cost, energy use and greenhouse gas emissions.

The system's learning algorithms, wireless device switching, independent communications protocol and demand response capability provide benefits along the entire electricity value chain: for energy consumers, distributors, retailers and generators. It is said to reduce energy consumption by approximately 30%, with payback in less than one year, enabling users to have viability and control over power generation and consumption.

In photovoltaic solar installations, the system provides visibility over gross and granular generation and consumption. Pre-emptive alerts ensure that the PV solar installation is operating efficiently and that solar power generated is used optimally.

The product features a simple and user-friendly interface, available on any device, as well as a dashboard, reporting and live data analytics. Its underlying technology supports a suite of hardware that includes a Class 1 smart meter, solar thermal (hot water) controllers, energy management hardware and home automation devices. The technology-agnostic system connects into other IoT technologies and Zigbee-enabled devices.

The product range has models suitable for residential, commercial and industrial applications. Beyond energy management, it offers solutions in aged care, supply chain and cold storage logistics, transport and home automation.

carbonTRACK
carbontrack.com.au

PROFESSIONAL DATA LOGGER WITH GRAPHICS DISPLAY

The ALMEMO 202 measuring instrument provides a programming menu for end-to-end programming of all the parameters needed for digital ALMEMO D6 and D7 sensors. The digital sensors are designed for a wide variety of measurable variables such as humidity, temperature (infrared) and pressure (gas and liquid). The white, illuminated graphics display ensures that functions and measured values can be viewed in the clearest way possible.

The device is easy and convenient to operate by means of four soft keys and a cursor block. The menu guidance is clearly structured and easy to understand. The sensor display shows the measured values together with all relevant sensor specific functions, eg, temperature compensation and atmospheric pressure compensation.

Measured values, peak values, average values and limit values can all be displayed in an easy-to-understand way in various forms, such as lists or bar charts. Users can even configure their own customised user menus from a range of 50 different parameters to display exactly those parameters required by a particular application.

The compact, handy device can, as an option, be fitted with rubberised impact protection for mobile use. Energy-saving technology ensures long operating times. For stationary applications, a DIN rail mounting is available.

The ALMEMO D7 plug can process up to 10 channels for measured values and function values. This includes new applications, especially for multipurpose sensors (eg, Meteo sensors) and for linking up to complex third-party devices (eg, chemical and power analysers).

Bestech Australia Pty Ltd
www.bestech.com.au





CONDITION MONITORING SYSTEM

Emerson Process Management has introduced the CSI 3000 Machinery Health Monitor, a compact protection system for a wide range of machinery such as pumps, compressors, centrifuges, blowers and generators.

The device delivers protection data in situations where a standard rack-based system simply will not fit or is not a cost-effective approach. Easy assembly and user-friendly, customisable set-up means the product has a short path out of the box to improving availability and ensuring safety of rotating assets.

The unit measures shaft vibration, bearing vibration, position and speed, and generates key signals. It provides the user with alarm outputs for each channel and does not require additional signal converters for shaft vibration and displacement measurements.

Emerson Process Management
www.emersonprocess.com.au

SAMPLE DRAW SYSTEM

Areas of wastewater treatment plants that are subject to flooding, such as wet wells and influent headworks, are suitable for MSA's Tri-Gas sample draw custom system. The system can monitor oxygen, hydrogen sulfide and combustible gases (methane or petroleum vapours).

The sample draw system consists of up to three sensors with Ultima X or X3 Technology digital communications (RTU output) with onboard LEDs and relays to provide local alarms. It is specifically designed for optimum performance in high-moisture environments.

Options include: one or two top-mounted beacons; a combustible IR sensor; a federal, side-mounted horn; a heated enclosure; 4X stainless steel enclosure; and additional common dry contacts. The product is available with discrete 4-20 mA output.

MSA Australia Pty Ltd
www.msa.net.au



POWER METER

Schneider Electric has released the PowerLogic PM8000 series power meter. In accordance with power quality standards IEC 61000-4-30 Class S and IEC 62586, it is suitable for helping to ensure contractual obligations for electrical supply quality.

The product has extensive power quality analysis capabilities, such as EN 50160 compliance, sag/swell detection, waveform capture, disturbance direction detection, trending and forecasting. If a power quality event occurs, the disturbance direction detection feature helps identify the location by determining if it occurred upstream or downstream of the meter, allowing the problem to be corrected faster. Engineered on a compact, modular and flexible platform, the meter has the versatility to perform nearly any metering job at key points throughout a facility. It is compliant with ANSI C12.20 Class 0.2, IEC 62053-22 Class 0.2S (real energy) and IEC 61557-12.

The meter's accuracy and extensive I/O options make it suitable for the unified metering of all WAGES (water, air, gas, electricity and steam) utilities. It is available in both panel-mount and DIN rail-mount form factors and has high-visibility colour displays.

Schneider Electric Industry Business
www.schneider-electric.com



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PROCESS ANALYSER

The Metrohm ICON 4117 process analyser performs photometric absorption measurements in the visible light range. With differential absorbance colorimetry (DAC), the analyser compensates for the colour and turbidity of the sample by measuring both before and after the addition of a colour reagent. The DAC technique can be used to measure aluminium, ammonia, chlorine, chromium, copper, cyanide, hydrazine, iron, manganese, nickel, nitrate, nitrite, phenol, phosphate, silica and zinc.

The photometer module comprises a heated cuvette with 2.4 cm light path and a long-life LED source.

Various parameters can be managed by the software, besides analysis results — low-reagent level alarms, calibration errors and loss of sample are a few examples of alarms that can be logged in the database or sent to a control room for further review by the operator.

Multiple user levels are offered in the software, which are suitable for any operator. Installation is simple — just connect the power, sample and reagent lines and the analyser is fully operational.

MEP Instruments Pty Limited
www.mep.net.au



RFID SAFETY SENSOR

Utilising wear-free RFID technology, the RSS16 safety sensor by Schmersal is designed to overcome the limitations of electromechanical devices.

The product shares its dimensions with the AZ16 electromechanical safety switch. With the addition of Schmersal's RFID technology, it gives users the option of three levels of protection against defeat.

The basic version will accept any actuator of the RSS family. Users can teach an actuator to work with the one device, and teaching can be repeated any number of times with a delay time between teaching cycles. The third and highest level of tamper resistance will only accept the actuator presented at the very first power-up of the device.

Additional benefits include the possibility to approach the device from three sides, providing a high level of flexibility when integrating into the surrounding construction. The safety sensor can be used as a magnetic door stop and latch up to 60 N, allowing the designer to forego the use of a separate stop and latching device. Users can connect up to 31 devices in series monitored by a single safety module all while maintaining CAT4 or PLe.

The product can be used in existing AZ16 applications with the ability to offer increased tamper protection but still keep to a 1:1 replacement.

Control Logic Pty Ltd
www.control-logic.com.au



AERATION BLOWER

The TurboMax Turbo Blower is an aeration blower said to provide savings of 20-40% in energy-intensive processes at wastewater treatment plants. The blower is compact and lightweight, with minimal installation requirements.

The turbo blower includes oil-free lubrication due to the permanent magnet synchronous motor (PMSM) with next-generation, bump-type, airfoil bearings. The fully integrated system includes air cooled up to 112.5 kW and closed-loop liquid cooled from 150 to 600 kW.

The product is rated for 55°C ambient air conditions. It features package noise containment to 75 dBA (free field) with virtually no package vibration. There is no need for SCADA on smaller plants due to the control system; communication with SCADA is enabled using the MODBUS protocol. The blower also features user-friendly PLC control and HMI, and non-proprietary VFD.

Apart from monthly checks and cleaning of filters, the unit requires no attention and no dedicated personnel. Life cycle costs are claimed to be lower compared to conventional blowers and ROI can be achieved in 2-3 years.

Hurl Nu-Way Pty Ltd
www.hnw.com.au



Microgrid power

for remote Western Australian towns

Remote locations such as Marble Bar and Nullagine in Western Australia — towns which are not connected to the grid — would typically rely solely on diesel fuel for their power. Now, a microgrid solution from ABB is enabling the use of multiple energy sources, maximising the intake of solar power generation and minimising diesel fuel generation.

Marble Bar is a town and rock formation in the Pilbara region of north-western Australia. With a population of less than 200 people and a reputation as 'Australia's hottest town', it is a suitable site to host one of the world's first utility-scale, high-penetration solar PV diesel power stations. The adjoining gold-rush town of Nullagine is home to the second station.

ABB, through its Darwin-based team, worked closely with Horizon Power and SunPower Australia to install these new power stations, which are setting benchmarks — at an 85% peak — for isolated hybrid diesel power systems with extremely high renewable energy generation and conversion.

Stable power output

The Marble Bar and Nullagine power stations each consist of four 320 kW diesel generators and a 300 kW solar array. They utilise some 2000 solar modules and a single axis solar tracking system, which follows the path of the sun throughout the day. The ground-mounted systems were the largest solar tracking systems commissioned in Australia at the time.

The hybrid solution includes a photovoltaic and a diesel generation plant as well as integration and control solutions. The microgrid is equipped with ABB's PowerStore kinetic flywheel grid-stabilising technology, which enables high solar energy penetration by injecting or absorbing power very fast in order to stabilise fluctuating power output from the solar power plant. ABB's Microgrid Plus technology will help control the network.

Reduced dependence on fossil fuels

The hybrid microgrid power solution is now supplying both towns with close to 60% of their power through solar generation, saving approximately 400,000 L of diesel fuel and 1100 tonnes of greenhouse gas emissions each year.

The ability to resolve intermittency issues caused by solar and wind generation in weak power systems enables renewable generation to be increasingly used as a primary power source in many remote communities with zero or limited access to diesel or other types of fossil fuels. About 80 similar ABB installations in a wide variety of applications around the world utilise this powerful green technology, showing that freedom from fossil fuels is a real option now and in the future.

ABB Australia Pty Ltd
www.abbaustralia.com.au



1000 V SUBMERSIBLE DEWATERING PUMPS

Tsurumi's 1000 V submersible dewatering pumps offer 11–110 kW of power. The pumps are said to feature advanced design and heavy-duty construction.

The series was specifically designed to withstand the punishing conditions found in mining sites. The three-phase pumps have flows of up to 6500 L/min and maximum head of up to 200 m.

The pumps are loaded with features designed to give mine operators low cost of ownership. The motors feature in-built thermal protection that cuts power on overcurrent or extended dry run conditions. The self-reset activates once the motor has cooled, allowing the pump to automatically restart.

The series includes features that maximise the uptime of the pump. These include an antiwicking cable entry that prevents water from entering the motor if the power lead is damaged or nicked.

A double silicon carbide seal comes with all models. Both seal surfaces are submerged in an oil chamber, away from the pumped liquid. This ensures lubrication and protects against ingress of foreign materials.

The mechanical seal design features a Tsurumi Oil Lifter that increases seal longevity. The lifter ensures both the upper and lower seals are lubricated and cooled, even if the oil level in the chamber is low or if the pump is operating out of level.

Australian Pump Industries Pty Ltd
www.aussiepumps.com.au

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BIOMASS MULTIGAS ANALYSER

Designed as an integral part of current biomass gasification processes, the Model ZPAF analyser will provide continuous analyses of important gases, produced by the biomass processes of fermentation, from a wide range of waste products.

Using the methods of non-dispersive infrared, electrolytic and galvanic measurement principles, the analyser has dual ranges comprising: methane 0 to 20% and 0 to 100%, with a resolution of 0.1% by volume; carbon dioxide 0 to 20% and 0 to 100%, resolution of 0.1% by volume; hydrogen sulfide 0 to 500 ppm and 0 to 2000 ppm, resolution 10 ppm; and oxygen 0 to 10% and 0 to 25%, resolution 0.1% by volume.

The analyser has an array of inclusions to improve overall process system efficiency. These include: automatic zero/span calibration; communication by MODBUS RS485 and 4-20 mA; repeatability $\pm 0.5\%$ FS; and many contact outputs. The analyser is backed by ADT service and spare-part facilities.

Australian Dynamic Technologies Company Pty Ltd
www.austdynatech.com.au

GPS/GPRS TRACK-AND-TRACE MODULE

KCS BV has extended its successful TraceME product line with a module targeted for worldwide mobility in the Internet of Things era.

The latest development of the TraceME GPS/GPRS track-and-trace module will combine the RF location-based positioning solution with the LoRa technology, enabling long-range, battery-friendly communication in a wide variety of M2M applications. Supporting GPRS/SMS and optional 3G, Wi-Fi, Bluetooth LE, ANT/ANT+ and iBeacon provides easy integration with existing wireless networks and mobile apps.

KCS Trade PTY Limited
www.trace.me



Eco Expo Asia celebrates 10 years in October

Eco Expo Asia will gather together industry experts and international brands for the 10th time this year. From 28–31 October at AsiaWorld-Expo, Hong Kong, visitors can expect a showcase of green solutions, industry technologies and eco-friendly products from leading industry players.

The annual event is organised by the Hong Kong Trade Development Council (HKTDC) and Messe Frankfurt (HK), with co-organisation by the Environment Bureau of the Government of the Hong Kong Special Administrative Region (HKSAR). The show last year welcomed 308 exhibitors from 22 countries and regions, and received 10,817 visitors from 89 countries and regions.

“Eco Expo Asia is an exceptional platform which gathers government officials, international enterprises, professional buyers and major stakeholders within the environmental protection business,” said Wong Kam-sing, secretary for the Environment Bureau of the Government of the HKSAR. “It helps promote the green industry as a whole.”

This year’s show will be themed ‘Embracing a Green and Sustainable Future’, in line with the Hong Kong Government’s policies on sustainable use of resources. This concept will be expanded on in special themed days, including ‘Global Green Insights’, ‘Cleaner Production and Waste Management’, ‘Green Building and Energy Efficiency’ and ‘Green Living’.

“The 2015 edition will feature a collection of the latest environmental protection technologies, services and products,” said HKTDC Deputy Executive Director Benjamin Chau. “Air and water quality, energy and energy efficiency, green building solutions and services, green transportation, and waste management and recycling services will be the main product categories of the fair.”

The fair will host a strong line-up of exhibitors, including Green Dynamic, Honest Motors, Life Air, Pentens, REC, Robin Energy, Synergy Group and Volkswagen. Olli Gunst, marketing manager at Enevo Oy in Finland, noted that the fair is helping his company to learn about

the Chinese market as it looks to expand in the Asia-Pacific region. “The scale of the show is massive and there is a lot of potential for our business,” Gunst said. “We have met some good direct customers and there is definitely room for cooperation.”

Both new and returning overseas pavilions are planning to join the fair. Making its first appearance will be the Illinois Pavilion, which will serve as a launch pad for a delegation from the State of Illinois, as well as other US enterprises in the future, to tap the expanding green market in Asia.

“Water plays a significant role in Illinois’ economy,” explained Kitty Leung, managing director at the State of Illinois Far East Office. “Illinois is home to the world’s largest wastewater treatment plant and also has access to the world’s largest freshwater reserve. With our leadership position in the water treatment industry and our state-of-the-art technologies, we are attending Eco Expo Asia this year to cultivate new business partnerships and meet visitors.”

Another debutant will be the Taiwan Pavilion, organised by Taiwan’s Green Trade Promotion Office (GTPO). Ready to take centre stage in Asia’s eco industry, companies from Taiwan will showcase a full range of eco-friendly solutions that represent the pavilion’s theme of ‘Green Trends for Healthy and Sustainable Living’.

Returning pavilions include the Japan Pavilion — organised by the Japan External Trade Organization (JETRO) since 2013 — and the Switzerland Pavilion, which will be demonstrating the kinds of technologies the country will use to cut its greenhouse gas emissions in half by 2030.

What: Eco Expo Asia 2015

When: 28–31 October 2015

Where: AsiaWorld-Expo, Hong Kong

For more information: email ecoexpo@hongkong.messefrankfurt.com or exhibitions@hktcdc.org, or visit www.ecoexpoasia.com.



Assessing the state of energy storage



On behalf of the Australian Renewable Energy Agency (ARENA), AECOM has prepared the Energy Storage Study — a report that assesses the state of energy storage technology today and how the technology may evolve and grow in the future. It also includes recommendations to ARENA for funding and knowledge-sharing priorities. The report acknowledges that reliable, cost-effective storage has a vital role to play in smoothing out energy supply and allowing more renewable energy to enter Australia’s electricity grids. The sector is undergoing rapid growth and we are witnessing significant cost reductions and the development of new business models. Based on the report, ARENA has identified a number of priority areas for further investment in the energy storage sector to overcome barriers and capture the potential of energy storage to support higher penetrations of renewable energy and provide other benefits to the electricity network and consumers.

The report can be accessed at <http://arena.gov.au/resources/>.

Businesses want government to show leadership on sustainability

New Zealand businesses want the government to show greater leadership around carbon, waste and water issues, a University of Waikato study has found.

The report's co-authors, Associate Professor Eva Collins and Professor Juliet Roper from the University's Waikato Management School, say the findings are important for the government as it prepares for climate change talks in Paris later this year.

"The government has said it is worried about what it considers the high cost of agreeing to substantial carbon targets in Paris," said Dr Collins. "What this research tells us is that businesses believe there will be even bigger repercussions if the government makes only minor commitments. There is a risk that weak government action will still incur most of the costs without capturing the potential benefits."

Many businesses are reluctant to invest more in sustainability initiatives until the government steps in to provide long-term regulatory certainty and level the playing field, she said. Lack of government leadership has seen companies stop measuring their carbon footprint or put their carbon strategies on hold.

However, Dr Collins said there is a general consensus that New Zealand's 'clean and green' brand is of critical importance to exports, and this could be jeopardised if environmental problems are not addressed.

"We actually found strong evidence that business is looking for the government to lead the way on sustainability issues through 'smart regulation', because they don't like uncertainty. But individually, they find it hard to justify the cost of environmental gains within the short-term reporting cycle that drives most business decisions — even if it makes good sense in the long term," she said.

The study also shows that 72% of businesses are concerned about New Zealand's water supply and the likelihood of future

droughts and changing rainfall patterns. However, the growing sense of urgency around water hasn't translated into action. Most businesses don't perceive water issues as relevant to their own operations, or feel they cannot individually make a difference. Less than a quarter of businesses have targets to reduce water consumption.

"We live in a country with so many rivers and streams that it's hard to believe water is a finite resource," said Dr Collins.

"Many businesses struggle to understand how water issues will ever impact on their business operations, so it's not a high priority

sustainability practices since 2003. Around 38% of companies now have targets for diverting waste from landfill, compared to 32% in 2010. In addition, 20% of companies now have carbon targets, compared to 16% in 2010.

However, the study's authors say the overall growth in sustainability practices is still far too slow to achieve real change and that could pose serious risks for New Zealand's global reputation.

Other findings from the 2013 National Survey on Sustainability Practices:

- The top motivating drivers for a company to adopt sustainability practices are to preserve



... there is a general consensus that New Zealand's 'clean and green' brand is of critical importance to exports, and this could be jeopardised if environmental problems are not addressed.

for them. But when you look down the value chain, New Zealand exporters rely heavily on water as a raw component in our key export products, such as milk, wine and fruit."

Some businesses felt the solution would be to charge everyone for water, while others said there would be opposition to such a move. Many were looking for the government to show more leadership on water.

The study found an increasing number of companies have adopted environmental

its reputation and brand (cited by 65% of businesses), followed by cost savings (40%) and the views of employees (40%).

- Conversely, the biggest barriers to adopting sustainability practices were cost (cited by 70% of businesses) and lack of management time (47%).

- Businesses that already engage in sustainability practices were often reluctant to talk about it publicly, for fear of being seen as self-promoting or disingenuous.



The 2013 National Survey on Sustainability Practices report findings are based on a survey of 520 business owners, along with in-depth interviews with 24 managing directors, carried out last year. It is the fourth survey carried out as part of a Marsden-funded research project examining New Zealand's sustainability practices over the past decade, from 2003 to 2014. Pictured is co-author of the report Associate Professor Eva Collins of the Waikato Management School and the full survey results are available online at www.management.ac.nz/sustainability/report/2014sustainabilityreport.pdf.



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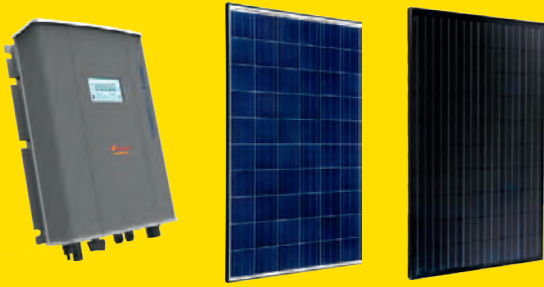
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