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WORDS FROM THE EDITOR

Environmental concerns were again high on the agenda at the annual World Economic Forum, which was held in Davos, Switzerland this January. It was said that inaction from governments across the world has escalated environmental concerns to one of the most dangerous risks to civilisation and prosperity.

With clean power considered crucial for climate change action, French President Emmanuel Macron announced at the forum that France would shut down all coal-fired power stations by 2021 and would make climate action one of five pillars in his plans to reform the economy.

The rise of technologies such as AI and Blockchain was also debated at the forum. Discussions revolved around the implications and security challenges associated with these technologies as well as how they could be utilised to save the planet.

With such advances in technology come opportunities for 'smart cities' that are capable of addressing sustainability by optimising the management of energy, water and waste.

A 2-year trial project in the City of Fremantle WA will demonstrate how the blockchain technology can be used to optimise water resources and manage the demand and supply of renewables. See page 16 for further details.

Also in this issue, we take a look at the rise of the smart cities in Australia, the keys for success and the ethics that must be upheld.

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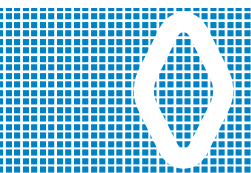


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Ethics-first builds for smart cities

Associate Professor Nick Falkner,
Director, Australian Smart Cities
Consortium, The University of Adelaide





One of the questions I get asked the most is “what is a smart city?” and when you look, there are a very large number of definitions. Last year, the University of Adelaide identified the need for an engagement and research theme that would bring together projects from researchers across the university, in the areas of improved quality of living, better ways of moving from place to place, sustainability and understanding the ways people live together. For us, a smart city is one where we use the best in technology in conjunction with the resources we already have to improve quality of living and drive economic development.

Like any university, we have a wide range of discipline experts who conduct research that has impact well outside of our walls. It’s a natural fit, then, for our consortium to seek engagement with industry, entrepreneurship and all levels of government. This is a trend that we see across the world: how can we work together to make it easier for us to live with each other? While we say “smart cities”, our definition is relatively loose as it’s improving the ways that communities work that underpins all of this work. Unsurprisingly, with a concentration of people, resource scarcity becomes a serious issue and sustainability, whether through improved monitoring, better recycling or identifying what doesn’t need to be changed, is core to much of our work.

We are actively growing beyond the university campus, with allied researchers at

other universities in Australia, and growing collaboration with Smart Cities and Living Labs experts in Europe. Some of the projects we are working on include those that have been funded under the Australian federal government’s \$50 million Smart Cities and Suburbs Program, which addresses better use of urban greenspace, applications to help tourists explore and move around councils more easily, and the secure, sensitive and ethical use of data.

In other projects, we’re working on smarter water systems, to reduce flooding through a variety of technologies, as well as the early detection of pipe failures to save the precious water we already have. Our researchers are developing systems to integrate diverse power supplies into systems that will provide uninterrupted and predictable power, whichever generation source is currently in use. The last I’ll mention as a technology, and certainly not the least, is the work on smart mobility, including driverless vehicles and identifying the impact that autonomous vehicles will have on the urban environment.

One of the advantages of a university is that we can have more freedom to examine some of the philosophical issues arising from the use of technology, even as we deliver solid technical solutions to industry. One of these is the ethical impact and considerations around the level of monitoring that may be required to understand what the residents of the city actually want — or what they do. In the context of the new European General

Data Protection Regulations, all of our big data work will be developed in the shadow of requirements such as “the right to be forgotten” and “don’t collect just in case it might be useful”. For future exports and for international cooperation, it’s essential that we have a good grip on what is required here. At the Australian Smart Cities Consortium, we’re looking at a lot of projects as being ‘ethics-first’ builds; we try to build systems that will not be prone to ethical issues later on. This includes the level of security and attention we give to storing data, as well as collecting it. If we can make a clear statement about who can see your data, through the careful use of encryption, say, then this will give citizens increased confidence to participate and let us improve systems faster. If we build systems that are secure, ethical, fit for purpose and for the benefit of those people whose data we store, then we are far more likely to have happy users. At the Consortium, we have a strong focus on the stewardship model of data; we never own anyone’s data, we only look after it. This helps us to think about how we can build from that to design systems that will work and not lead to regrettable security incidents in later years.

It’s an exciting time for anyone involved in improving living standards and that’s certainly true for the Smart Cities area. A city that has low consumption, high sustainability, a great economic future and that is good to live in? That’s certainly somewhere I’d like to live.



For us, a smart city is one where we use the best in technology in conjunction with the resources we already have to improve quality of living and drive economic development.

To create better cities, we must improve our understanding of their complex and dynamic nature. Prevailing urban practices tend to conceive of cities as complicated machines comprising infrastructure, buildings, transport systems, utility networks, land uses and populations that can be individually managed and controlled. Tinkering with the parts in order to change the whole, however, reflects a misunderstanding as to the true nature of cities.

The stakes for change could not be higher. Based on historical rates, growth in global urbanisation will be largely over in a few decades. How that plays out is of profound consequence to the future of humanity and the planet, but many cities are grossly unprepared for the overwhelming number of environmental, economic and societal challenges associated with this process.

City leaders urgently need to address these challenges, but to do so they must first confront a more fundamental one — recognising the dynamic nature of cities so that they are able to better deal with the problems of cities.

Over the past few years, new insights coming from the study of complex systems have begun to shed light on the nature of cities.

Cities are complex adaptive systems with unique characteristics and dynamics. Cities have a networked and emergent quality, where things are always in a state of flux and where an understanding of the individual parts does not convey an understanding of the whole. This dynamic nature of cities tends to make many of the policy problems that governments are tackling today resistant to simplified analysis and resolution.

If we are to create cities that encourage the full potential of human creativity in a sustainable way, then we need a new approach that draws upon the lessons learned from the emerging science of cities — one that acknowledges and responds to the complex and highly adaptive nature of cities.

'Resilience' is a term that emerged from the field of ecology in the 1970s to describe the capacity of natural ecosystems to maintain or recover functionality in the event of disruption or disturbance.

Resilience in the context of cities refers to the capacity of individuals, communities, institutions, businesses and systems within a city to survive, adapt and grow no matter what kinds of stresses and shocks they experience. Cities begin to lose their resilience

Rethinking future cities

Adam Fennessy, EY Oceania Leader – Future Cities





If we are to create cities that encourage the full potential of human creativity in a sustainable way, then we need a new approach that draws upon the lessons learned from the emerging science of cities...

when the multiple networked and interacting elements do not keep up with growth and change, such as those that deliver energy, mobility and information.

Improving urban resilience involves building redundancy into networks — by adding more and more links so that it becomes harder to disrupt them. This way, if some links break down, others will come into effect. A good practical example of this is a city that incorporates flexibility in travel patterns across its transportation network to account for sudden increases in demand, or failure, in one or more parts of the network.

Principles for future cities

Taking a whole-of-system approach to city planning and management will lead to improved diagnosis of urban problems, enable the development of policies and plans to address them, and improve urban resilience. The following five principles provide a framework for city leaders that acknowledge the complex dynamics that enhance the resilience of cities.

- 1. Maintain diversity:** Systems with many components are more resilient than those with fewer components. In cities, resilience is enhanced through diversity of multiple systems — multiple industries, businesses, transport modes, housing types, ecological species, water sources, energy sources, institutions and social groups.
- 2. Optimise networks:** Networks and connectivity can influence the resilience of systems in a range of ways, safeguarding cities against shocks by enabling recovery or by preventing the impacts from spreading. At the same time, highly connected systems can spread disruption faster, as is the case with highly communicable diseases.
- 3. Foster systems thinking:** Thinking of cities as complex adaptive systems means acknowledging that there are multiple connections occurring at the same time on different levels. This requires city decision-makers to accept unpredict-

ability and uncertainty, and acknowledge that there can be no one-size-fits-all solution to a problem.

- 4. Engage in broad collaboration:** In order to better understand and engage with complex urban issues, decision-makers need to be able to examine the whole city through a systems lens. To do this, comprehensive community perspectives are needed to galvanise ideas about how cities emerge, evolve and are structured.
- 5. Learn through disruption:** Resilience is all about adapting and transforming in response to change. Disruptions and stresses should be seen as opportunities to enhance knowledge and to build a better understanding of the nature of cities. Learning occurs through experimentation and experience — by taking risks, testing out alternative responses to shocks and constantly revising and changing strategies.

Actions for city leaders

When considering these principles, it is essential that city leaders understand their resilience objectives in terms of where resilience efforts should be focused and in response to what. Priorities will range across industries, transport modes, housing types, natural environments, water and energy sources, institutions and social groups.

Because cities are dynamic and their context ever changing, resilience efforts will require ongoing adjustment. This means constantly rethinking, testing and reworking practices and providing flexibility in urban 'solutions'.

Finally, to keep cities functioning optimally, city leaders must increase their understanding of the way in which different social and physical networks relate and evolve. Resilience strategies should focus on maximising social networks and social processes, to keep people at the centre of our future cities.

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Water 4.0 – following the digitisation trend

The provision of affordable quality drinking water is one of the most important tasks of the water sector. To be able to do that, the industry needs continuous innovations in order to maintain the high standards for the future. The latest developments in the fields of drinking water preparation and distribution will be on show at upcoming trade fair IFAT, in Munich.

For some years now, more and more of the innovations presented at IFAT have been related to the key topics of digitalisation, automation and Water 4.0, says Silvia Fritscher, exhibition director of IFAT. This is a trend that is set to further strengthen in 2018.

Analysis sensors as part of the network

“The greatest progress in digitalisation in the drinking water sector is seen currently in the areas of pump controls, measurement technology and drinking water analysis,” said Julia Braune, managing director of the German Water Partnership (GWP), an industry and research network. She continued: “While digital integration of pump controls is already well advanced, there is still much potential in the connecting up of system components using sensors; for example, for analysis. Ever better communication between the various parts of the water production process — for example, springs, waterworks and the drinking water network — can both enhance the security of the supply and also optimise energy and resource efficiency.”

Opportunities from a ‘digital twin’

Even more extensive scope for digitalisation lies in setting up a ‘digital twin’. This is a data model which depicts a machine, a system or even a complex infrastructure with all its information and interdependencies. Christian Ziemer, Siemens AG and head of the GWP Working Group Water 4.0, sets out one possible application in drinking water and wastewater: “With a digital twin we can do real-life simulations, completely without risk, to test various approaches and optimise them.”

Better identification of customer needs

The importance of digital change has been recognised in the field of municipal water supplies — that was a clear finding in a survey of its members conducted by the Verband Kommunalen Unternehmen (VKU — the German association of public utility companies). More than two-thirds of the companies rated digitalisation as of high or very high relevance. And already one in two companies is either planning or implementing a digitalisation strategy.

“Digitalisation underlines the benefit to customers and citizens as a central impetus for change,” pointed out Michael Beckereit,

president of the VKU. He added: “Analysis of large volumes of data means we can recognise more easily what the customers need and better understand the processes. This in turn forms a good basis for developing new and even more suitable products and strategies.”

‘Maturity Model Water Supply 4.0’ in development

In order to give digitalisation support to companies in the water supply sector, the Deutscher Verein des Gas- und Wasserfaches (DVGW — the German Association for Gas and Water) commissioned in autumn the development of a ‘Maturity Model Water Supply 4.0’.

“We hope that this model will give us a valid overview of the current practices in digitalisation in the water sector. Ideally we will be able to derive improvement measures from this and then introduce them in a sensible sequence,” explained Dr Dirk Waider, vice president water at the DVGW.

The IFAT Trade Fair for Water, Sewage, Waste and Raw Materials Management takes place at the Messe München exhibition centre in Munich from 14–18 May 2018.

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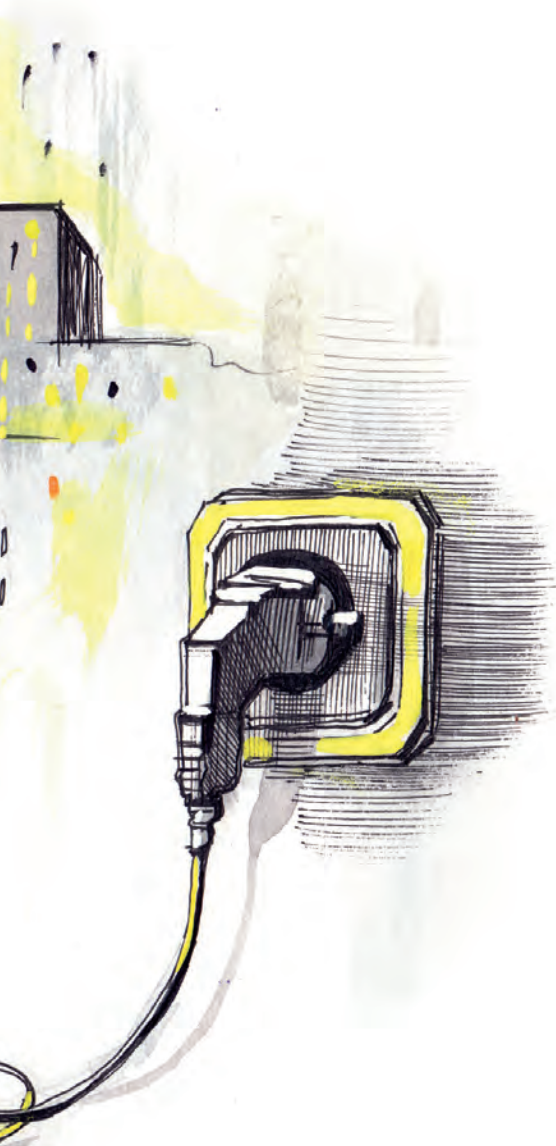


A key to smarter cities

Distributed energy systems

*Ross Thompson**

Urbanisation — along with climate change and demographic change — stands as one of the megatrends of the 21st century.



Cities are under pressure from their growing populations and have to prioritise investing in infrastructure such as buildings, transportation and energy.

It is estimated that by 2030 more than 50% of the world's population will live in cities. By 2025, some 40% of global GDP will be generated from emerging city markets. Cities will also have a huge impact on environments, as they account for the vast majority of global energy demand, water consumption and carbon dioxide emissions.

To prepare for this growth, cities must seek to integrate energy generation, distribution, intelligent buildings and all modes of transport to adopt a more intelligent approach to infrastructure. They need to get more out of their existing facilities as well as ensure they maximise what is built in the future.

Two major trends

There are two major trends that are disrupting the global energy sector, and that are having a significant positive impact on our cities — in Australia and around the world.

The first is an increase in what we could term as distributed energy sources. Our grids are naturally evolving from a predominantly centralised energy system to a more distributed one. To put this into perspective with an example: In 1990, Germany had 1000 power producers that were structured in a unidirectional centralised configuration and today there are in excess of 1.7 million power producers that have a decentralised bidirectional configuration. Consumers of energy are turning into 'prosumers' of energy, meaning that they are producing the energy at the site of where they end up using or consuming the energy.

The paradox of the rise of distributed energy sources is that they are initially a destabilising factor, being costly to apply and bringing the need to integrate operations. But over time they become a stabilising influence, as and when a grid has adapted to its presence with the right mix of technologies.

The second major trend is digitalisation.

Digitalisation is key to the transformation we are witnessing within the energy sector. The grid has to become smarter and more resilient to better balance generation and consumption. The goal is to have a reliable energy supply, reduce our carbon footprint and improve security of supply in a cost-optimised way by using existing network assets to their full potential.

Through digitalisation, the energy sector is currently going through what Amazon has done to the retail industry, what Airbnb did to the hotel industry, what Apple did to the music industry and what Uber did to the taxi industry.

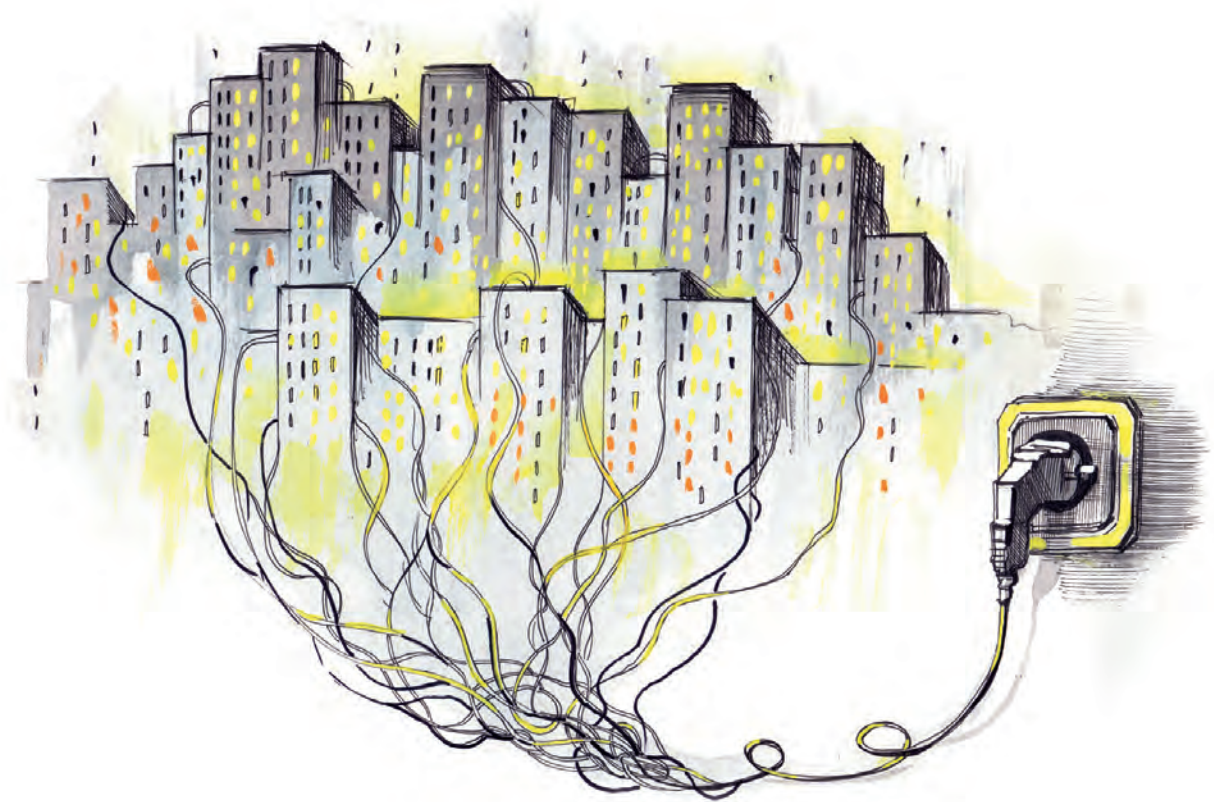
In each of these industries, the cornerstone of the upheaval was opportunity created by existing businesses not being sufficiently customer-centric.

Customers are challenging the status quo, and as a result utilities are being forced to diversify. Entrepreneurs have identified that the sector is ripe for enhancement, and are in the process of commercialising new technology to solve a range of problems.

A stand-out example is New York-based start-up LO3 Energy, which has been working with Siemens to jointly develop microgrids that enable local energy trading based on blockchain technology. One of these microgrids is now operating in the New York borough of Brooklyn, enabling residents to trade solar power with one another. The two companies are also collaborating on a number of Australian projects as well.



Through digitalisation, the energy sector is currently going through what Amazon has done to the retail industry, what Airbnb did to the hotel industry, what Apple did to the music industry and what Uber did to the taxi industry.



Distributed energy systems

The concept of generating energy at or near the point of consumption through the implementation of distributed energy systems has many benefits as it gives users of the generation more control over what they use and how they use it. The overarching themes in this model are futureproofing through increased resilience and giving consumers independence from third parties that users of the energy don't traditionally have any control over.

Furthermore, stored energy reduces peak generation needs and reduces load shifting. It builds reliability of electricity supply, and hydrogen is even starting to play a part in this regard. Small-scale power generation offers a secure supply when a grid may be unreliable, unavailable or expensive.

Siemens has worked with RMIT in Melbourne to develop a distributed energy solution. Three city power substations were

combined to create a high-voltage network, owned and operated by the university. It includes two cogeneration systems stored within a 14-storey building with a cogenerative system taking natural gas, heating and water. This will then provide millions of kilowatt hours of generation per annum, reducing energy costs and lowering the carbon emission of the city campus by a significant amount.

It also allows RMIT to conduct load shedding and manage demand, while providing greater energy security for the campus.

The RMIT Sustainable Urban Precincts Program has been recognised for its innovation, winning the Best 'Smart Energy' Project in the recent National Australian Energy Efficiency Council Awards.

Engines for growth

Cities are the engines for future growth.

In order to attract business investment, cities need to compete against each other just as businesses compete.

One of the most critical competitive advantages that a city has can be found in how it manages its requirements by investing in new technologies that enable assets to become intelligent, to reduce electricity costs, increase resilience against environment and man-made attacks and reduce carbon dioxide emissions.

This in turn provides economic stimulus which will ultimately lead to more and better jobs along with better lifestyles for those who live within the urban environment.

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**Ross Thompson is Head of Siemens' Distributed Energy Systems business. The newly established business brings together Siemens' power and gas, energy management and building technology solutions to create tailored engineered energy supply and demand solutions for all levels of industry and market segments.*

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A future smart cities project in Western Australia that involves academic, infrastructure and technology partners will assess how cities can use blockchain technology and data analytics to integrate distributed energy and water systems.

Smart cities with water and energy efficiencies

The 2-year trial project in the City of Fremantle will involve highly resilient, low-carbon and low-cost systems installed and connected using blockchain technology. A large solar photovoltaic (PV) plant, rooftop solar PV panels, a precinct-sized battery, an electric vehicle charge station and precinct water treatment and capture systems will be orchestrated using blockchain technology and data analytics, and demonstrate the interconnected infrastructure of future smart cities.

Curtin University has responsibility for project management duties and will carry out the research underpinning the project.

Professor Greg Morrison of Curtin University said: "We will develop a smart metering, battery storage and blockchain trading system to allow energy and water efficiencies between critical dispersed infrastructures that would otherwise have required physical co-location."

Power Ledger will develop and maintain all the blockchain applications on the project. Meagan Cojocar, who is an analyst at Power Ledger, said the project will be able to demonstrate how the blockchain technology can

not only work with co-located assets but also assets at another location, such as an off-site solar farm which is planned to be built in South Fremantle, possibly by 2020.

"Blockchain technology can track data from anywhere in the world," said Cojocar. "It therefore creates an effective database that works kind of like Google Docs, in that it's constantly updated and all parties can see that data in real time. So, if someone consumes energy, all the parties

rather than waiting until night when the energy is more expensive.

"The assets will be in a water-energy synergy so they are benefiting each other — just like their own little eco-system."

Murdoch University will provide research support on alternative district water supply and storage schemes that will be used to provide water, capacity and ancillary services to each other and the grid.

Martin Anda, Academic Chair of Environ-



The assets will be in a water-energy synergy so they are benefiting each other — just like their own little eco-system.

in the system can see it, a trade can be made and instantly settled in real time in a virtual marketplace."

"The assets are using a lot of algorithms, not just blockchain technology, as you need an understanding of how you can make the data work for you," said Cojocar. "The data is also going to interface with water assets. So if there's an excess of on-site energy generation, it can be used at the water treatment systems then and there

mental Engineering, said: "This news is very exciting as we now have the opportunity to develop an entirely new precinct-scale urban water system in Fremantle that will harmonise with the innovative Power Ledger Platform.

"I am thrilled with the prospect of commencing research, modelling and designing the novel water distribution infrastructure upgrades at Knutsford, through rainwater capture and wastewater recycling, with the City of Fremantle and the whole team."

Curtin Institute for Computation and Data61 will provide the data analytics required to generate insights from these projects.

Professor Andrew Rohl, Director of the Curtin Institute for Computation, said: "We commend the City of Fremantle and its industry partners for their vision on this project and look forward to assisting them to provide a more sustainable future for their community."

CISCO will be supporting the project as part of its strategic partnership with Curtin University called Innovation Central Perth.

CSIRO and Data61 have the capabilities required to assist in the delivery of this project, including megatrend analysis, risk analysis, statistical forecasting and systems modelling.

"CSIRO's experience collaborating with industry and government to build platforms will ensure the data generated by the project will be utilised by the community, project partners and municipal government," said Glenn Platt, the Research Director of Grids & Energy Efficiency Systems.

LandCorp is taking part in the project to monitor success in order to explore alternative water and energy systems that are connected to smart technology.

Dean Mudford, Chief Operations Officer of LandCorp, said: "We are excited to be part of a shared commitment to explore alternative water and energy systems which are innovative, resource efficient and connected to smart technology. The potential for this level of innovation to be embedded within the next stage of our Knutsford development supports our broader corporate objective to lead by doing. Funding which allows research to explore alternative water and energy systems has the potential to significantly reduce infrastructure development costs for decades to come."

Power Ledger will provide the transactional layer for the renewable assets as well as the ownership model for the community-owned battery.

Dr Gemma Green, co-founder and Chairperson of Power Ledger, said: "Power Ledger is excited to work with a consortium of

innovators and technical experts to grow and develop the platform. We're excited to break ground on this truly novel project that utilises blockchain technology to orchestrate sustainable assets."

Brad Pettitt, Mayor of the City of Fremantle, said: "This collaboration between existing infrastructure, renewable energy and innovative technology fits with our One Planet zero carbon energy target and will help us to secure the ongoing sustainability of essential services for communities that live here."

The 2-year trial project in the City of Fremantle won \$2.57 million in grant funding in November 2017 from the federal government's inaugural Smart Cities and Suburbs Program. \$5.68 million funding will come from project partners including Curtin University, Murdoch University, Curtin Institute of Computation, LandCorp, CSIRO/Data61, CISCO and Power Ledger. The project will also be supported by the Australian Energy Market Operator (AEMO), Western Power and the CRC for Low Carbon Living.

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Barangaroo set to export water

With a projected production of more than 200 million litres annually, the recycled water plant at Barangaroo will be capable of producing more water than it consumes, thereby making the plant an exporter of recycled water.

NSW Minister for Energy and Utilities Don Harwin held out Barangaroo as an example to the rest of the world of what partnerships between the government and the private sector can achieve — in this case building critical infrastructure which reinforces Sydney's reputation as one of the world's leading international cities.

"Lendlease has set a new precedent for water conservation in an urban area creating a positive and lasting legacy for both Barangaroo and the wider CBD," Harwin said.

"This is a critical step to fulfil our ambition to make Barangaroo one of the world's most sustainable urban regeneration precincts.

"The Barangaroo recycled water plant is a brilliant demonstration of the government and the private sector working together — there are now 20 private recycling schemes licensed under the Water Industry Competition Act statewide and I look forward to seeing many more," Harwin said.

Lendlease Property Australia Chief Executive Kylie Rampa said integrating the plant with Barangaroo's low-carbon, waste management and renewable energy strategies was the culmination of seven years' work.

"Today's opening of the Barangaroo South Recycled Water Plant represents a final piece in the puzzle towards us becoming Australia's first water positive precinct," Rampa said.

"Barangaroo's other infrastructure network also includes the district cooling plant, which uses Sydney Harbour water to cool all precinct buildings, 188,500 litres of water tanks across the precinct, 6000 m² of rooftop solar panels and a private power network.

"Once fully operational, the plant will be able to produce up to 200 million litres annually, equal to 70 Olympic-sized swimming

pools and in addition to the 100 million litres of water annually saved by the centralised cooling plant.

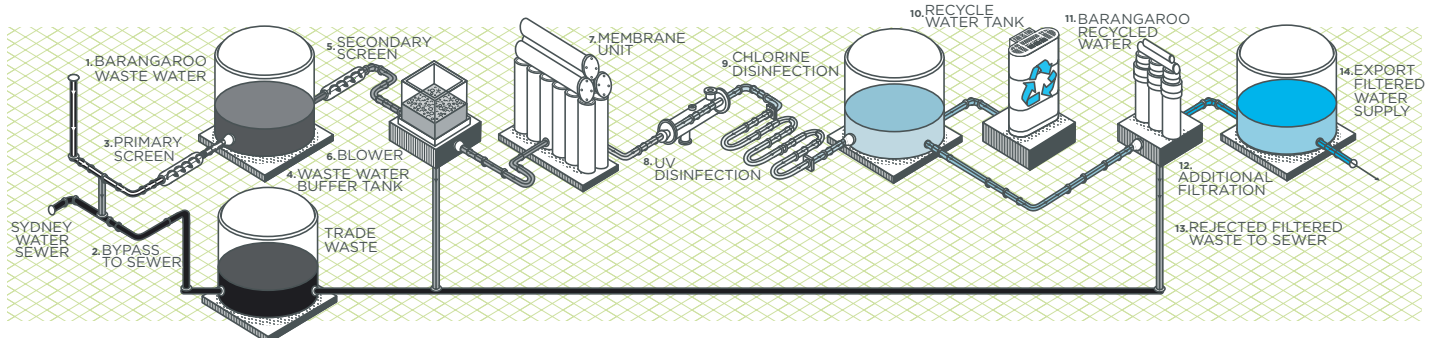
"Opening the water treatment plant also means the most complex and sophisticated part of our efforts to save and re-use water is now in place and puts us in position to export recycled water for use in the Barangaroo neighbourhood.

"Barangaroo will be more than just a great place for people to live, work and relax — it will play an increasing role in helping our neighbours improve their sustainability credentials as well."

Once fully operational, the Barangaroo plant will have the capacity to sewer mine, a process that produces additional recycled water from sewage for use in irrigation and other non-drinking uses.

"Lendlease's ability to work long term on innovations such as our water initiative is part of our approach to solving long-term urban problems like water scarcity, one of Australia's most pressing environmental concerns," Rampa said.

"Our approach helps make our cities the best places."



Barangaroo South recycled water plant. Picture supplied by Lendlease.

Get smart and reduce waste

Following success overseas, smart waste compacting bins and balers that communicate are now saving Australian businesses time, space and money.

With 55 million passengers a year, Amsterdam Airport Schiphol is one of the busiest airports in the world. But it's not just a place where you wait until your next flight takes off, it also has a wide variety of shops and restaurants.

HMSHost operates more than 70 food and beverage venues at the airport and after thorough testing, it chose Orwak TOM Waste Compacting Bins as a solution to efficiently reduce the waste streams from its operations in the terminals.

"We have chosen to use TOM after intensive testing," HMSHost Schiphol Airport Facility Project Manager Patrick van Geerenstein said. "The main reason was to improve our logistics and to reduce the waste flows at the terminals, primarily at locations where we use a lot of disposables."

The bins incorporate Orwak Connect, a modem-based communication service that enables the bin or baler to send a message when they it is full, or if the machine requires maintenance.

comfortable environment for the guests at the airport and HMSHost has installed TOM at many locations at Schiphol and more units are on order.

Another advantage is that less space is required in the back office due to the significant volume reduction — from 6–7 waste bags to only 1 per day. Geerenstein said the use of TOM also frees time for other activities for the operational staff. Furthermore, it contributes to fulfilling HMSHost's and Amsterdam Airport Schiphol's sustainability targets.

The TOM waste compacting bins are not only suitable for airports but also other quick service outlets such as the Liseberg amusement park in Gothenburg, Sweden. The park has a range of rides, games, entertainment on the stage and a beautiful flower park, attracting 3 million visitors per year.

Liseberg Restaurants AB runs all restaurants, snack bars and ice-cream parlours within the park. In preparation for the summer season, it has invested in a new restaurant complex called Bergs Salonger, which seats 360 guests.

Fredrik Löfgren, manager of the fast food division at Liseberg, anticipates up to 4000 visitors per day in peak season in July/August when the restaurant opens 12 hours a day.

To be able to handle the waste from all of these guests efficiently, four TOM units have been strategically located in the sitting area indoors and one on the outdoor terrace.

"The best thing about TOM is the volume reduction that results in less frequent bag switches," said Löfgren. "Before we had to change bags every 30 minutes and now it is sufficient to do it every two hours. That gives our staff more time for other duties and most importantly, when [fewer] bags are hauled through the restaurant, our guests get to enjoy their meals in peace and quiet."

The five units in Bergs Salonger are not the only TOMs at Liseberg. At a different fast food location and in its neighbouring ice-cream parlour, there are another five.

Compared with traditional waste receptacles, TOM reduces the volume of the waste in the full bags on-site, which is a great advantage as there is no need to compact the bags elsewhere afterwards.

The volume reduction is of particular benefit at the other fast food location up on a hill where the space in the waste storage is very limited. Löfgren commented that no baler would fit in the storage and there is no room for voluminous bags of loose waste.

Orwak waste handling solutions are now installed at shopping centres and railway stations around Australia.



Orwak develops solutions for sorting and recycling waste materials that are designed to improve business efficiency, and contribute to a cleaner working and natural environment to provide the best total waste handling economy. The company has a range of products that promotes sorting at source and makes waste management more economical.



Through the Orwak Connect web portal, users can monitor one machine or a fleet of balers and compactors. They can also keep track of how many bales each machine generates for a specific period of time, and email the collector automatically. With Orwak Connect Plus, a built-in scale can also measure the bale weight and report it through the portal.

Naturally, order and cleanliness are essential factors for creating an inviting and

ORWAK Compactors Pty Ltd
www.OrwakCompactors.com.au

Self-primer ideal for sea water at Daydream

A seawater pump was needed at Daydream Island to pump filtered sea water to the Living Reef on the North Side of the Daydream Island Resort. They needed a flow rate of 180 m³/h, and wanted this delivered by both pumps in a dual pump arrangement.

To do this with submersible pumps would have required the construction of a 'wet well' with lifting apparatus, and to do it with standard centrifugal pumps would have meant the construction of a dry well.

Self-priming pumps were considered, because they could be installed relatively inexpensively when compared with the other options. Because of the tropical temperature sea water to be pumped, the materials of construction of the pump needed to be corrosion resistant.

Gorman-Rupp self-priming centrifugal pumps were offered in CD4MCu construction. CD4MCu is a duplex stainless steel that is more corrosion resistant than 316 'marine grade' stainless steel and is quite a bit harder, making it suitable for pumping sand if it gets into the system.



Being self-priming, and more importantly, a 'guaranteed' re-priming pump, the pump assembly was able to be mounted high above the sea water, with only a simple concrete slab needed to mount the pumps, keeping the installation simple.

A 100 mm pump was used for the application, but pumps are available in

sizes from 50 to 250 mm and in materials of construction to suit a wide range of applications. The pump will pass a large solid (to 75 mm diameter), and has a large inspection cover-plate for operators to gain access to the pump internals for maintenance.

Hydro Innovations

www.hydroinnovations.com.au

ABB control system to help France's power grid get smarter



RTE, the electricity transmission system operator of France, is executing a grid modernisation program across its electricity network to ensure reliable power supply to consumers across the country who have an annual power consumption of more than 440 TWh. The company has selected an ABB Ability Network Manager control system to help operators monitor and control the grid more efficiently.

The increasing contribution of renewables to the energy mix requires the grid to become more flexible and interconnected to handle intermittence, balance demand and supply, and ensure stability. This in turn calls for a more intelligent power grid that can handle integration of high levels of wind and solar and maximise the use of renewables to lower environmental impact, while at the same time safeguarding security and quality of power supply.

The ABB Ability Network Manager SCADA/EMS (Supervisory Control and Data Acquisition/Energy Management System) is

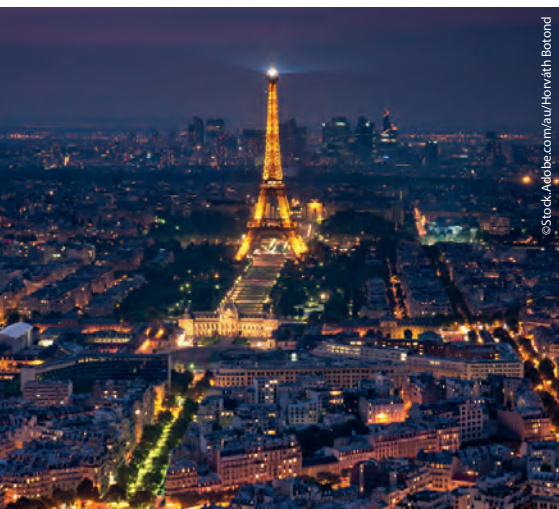
a scalable solution that will help monitor and control the network with thousands of substations to ensure high system reliability across all of France — including Paris, otherwise known as the City of Light. ABB consortium partner Atos Worldgrid will be responsible for the system integration and maintenance of the system.

"Our ABB Ability Network Manager control system will enable RTE to manage and optimise the transmission network across France and help maximise the reliable and efficient delivery of clean power to millions of consumers," said Massimo Danieli, head of ABB's Grid Automation business within the company's Power Grids division.

"Enhancing our digital focus and supporting our customers as a partner of choice for enabling a stronger, smarter and greener grid is a cornerstone of our Next Level strategy."

ABB

www.abb.com





Free solar energy for The Orchards, a new Sydney community

Sekisui House Australia has partnered with utility company Flow Systems to install one of the largest high-rise rooftop solar panel systems in the world across a masterplanned residential community at its new Norwest development, The Orchards — a move that is expected to have the equivalent effect of planting around 15,000 trees per year.

When fully completed by 2024, The Orchards will comprise 1300 luxury apartments set over five stages. It is set to include a two-storey wellness centre with a gymnasium, outdoor lagoon-style pool, community cafe, extensive landscaping and lighting throughout the many orchard-tree-lined pathways that will intersect throughout the precinct, and even an outdoor cinema.

The network of power-conserving applications at The Orchards will give the entire community 1 GWh of free solar power every year for use in common areas, including the outdoor cinema and wellness centre — something not previously offered by any other Australian developer to date, according to the partners. A local energy utility known as The Orchards Energy will meanwhile be implemented, comprising state-of-the-art monitoring systems and a bundled energy offer that will allow residents to save up to 35% a year on their utility costs.

Sekisui House Marketing and Operations Manager Paul Wainwright said the developer is proud to offer future residents of its Norwest community some peace of mind in terms of their future energy costs. Flow Systems founder Terry Leckie added



that The Orchards' bundled energy solution will provide a result people expect from energy utilities.

"Customers want to see new products and services that use renewable energy generation like local solar and similar, more efficient technologies to pass on meaningful savings to them," Leckie said.

Wainwright said future residents of The Orchards will now have an answer to the issue of increasing energy bills with a solution that will benefit not just owner-occupiers, but also investors and their tenants.

"In real terms, not only will the cost of living become markedly better for residents of The Orchards, but their property values will also benefit, with the obvious bonus of energy savings to this degree having a knock-on effect that results in lower community levies and strata costs," he said.

Wainwright said the choice to partner with Flow Systems was an easy one. He noted, "In the Hills District, it is very difficult to overlook the range of amenity The Orchards has to offer and now, the level of ongoing energy savings that will ensure these lifestyle extras for residents are not reflected in strata costs.

"We are excited about what can be achieved for the exciting community that we are growing at Norwest — one that will offer even further convenience by way of the much-awaited Sydney North West Metro, currently under construction just 500 m from The Orchards.

"Sustainability is at the heart of all that Sekisui House creates."

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Waste-to-energy plant in Queensland

Waste-to-energy company Anergy has announced the completion of its high-temperature pyrolysis (HTP) plant at Yarwun, near Gladstone, Queensland.

Carried out in collaboration with Southern Oil Refining (SOR), the project is situated at their Northern Oil Refinery (NOR) and was part funded by the Queensland state government. Anergy's HTP plant is an integral part of SOR's AU\$16m Advanced Biofuels Pilot Plant program, hailed as a "game changer" for the renewable energy market in Australia using home-grown technology. The plant processes waste biomass and hydrocarbon material as feedstock and to produce bio crude oil, which is then refined and converted at NOR into renewable fuel products.

SOR predicts that its facility at Yarwun will produce one million litres of renewably derived fuel within three years, for use in field trials with the Australian Defence Force, heavy road transport operators, the aviation sector and the US Navy's Great Green Fleet initiative.

Anergy Process Engineer David Forster commented, "Our equipment and design allows for high-temperature operations with first-in-class thermal efficiency. Our tightly integrated design is scalable across 30 to 3000 kg/h, yet in many cases occupies the space of just a few shipping containers. Although a pilot, the plant at NOR is of commercial scale and far from the 'lab-bench' technology usually seen in this industry. This project is the first of its kind to use this technology, across this variety of feedstocks and at this scale."

The HTP plant heats feedstock — either solid or liquid material — to temperatures as high as 900°C in an oxygen-free environment, where the material undergoes pyrolysis. The feed material separates into a solid biochar product and a gas stream called syngas. At NOR, the syngas is subsequently processed in a multistage condensing system to recover pyrolysis oil from the syngas, to then be re-refined into renewable fuel at NOR. The plant itself is compact — comprising a 40' feeding container, two multilevel skids and product conveyors — minimising space while optimising accessibility and operability.

Ben Tabulo from Southern Oil said: "At Southern Oil, we aim to drive innovation in the sustainable fuel space, and our partnership with Anergy achieves exactly that. We are excited about the prospect of working with such an innovative technology, and we value the fact that they are a domestic Australian company. I am confident that the relationship will prove fruitful in both business and scientific innovation, leading to a better future for all."

Anergy Ltd

www.greenanergy.com





Management of radioactive waste



A new technology partnership between ANSTO and Swedish company Quintus Technologies will play a crucial role in treating waste arising from nuclear medicine production at Australia's nuclear agency.

The Australian technology will be based in the soon-to-be-built Synroc radioactive waste treatment facility (SyMo), which is part of the \$168 million ANSTO Nuclear Medicine (ANM) project.

The ANM Project will take Australia from producing predominantly domestic medicine supplies of Molybdenum-99 (Mo-99) to being capable of delivering around 25% of global needs. Mo-99 is the precursor of Technetium-99m, used in 80% of diagnostic nuclear medicine procedures worldwide, including for heart, lung and muscular skeletal conditions, as well as a variety of cancers.

As part of the announcement, ANSTO has engaged Quintus Technologies to provide a robust Hot Isostatic Press (HIP) capable of operating in a nuclear environment.

The Synroc waste treatment plant is an exciting Australian innovation that could dramatically reduce the volume of waste compared to other methods.

The plant will deliver a permanent, safe and economical way of managing waste from the past, current and future manufacture of nuclear medicines.

The technology is core to reprocessing radioactive liquid waste resulting from nuclear medicine production and transforming it into a durable compact solid suitable for storage and final disposal.

Using the technology, waste and additives are sealed inside a metal canister, the material is heated and densifies, forming a solid material and reducing its volume.

ANSTO Technical Director Gerry Triani said HIP will set the benchmark for treatment

of radioactive waste that results from nuclear medicine production.

"The Synroc waste treatment facility will ensure we can increase our medicine production whilst appropriately treating the waste," said Triani.

"While it will only be used for ANSTO's waste, the facility will also serve as a demonstration plant for scientists from countries with much larger nuclear programs, who have already expressed keen interest.

"The HIP technology is an important part of the Synroc waste treatment facility and will create a compact solid, which is safe, suitable for interim storage at ANSTO and the National Radioactive Waste Management Facility and eventually permanent disposal at an Australian facility.

"Nuclear medicine production from ANSTO's ANM plant will start early next year [2018]; however, the waste generated will not be ready for treatment for another three years, at which point the SyMo waste treatment facility will be operational, with the new technology in action.

"Construction of the Synroc waste treatment facility is due to commence next year [2018], and will have the capacity to produce around 300 cans of solid wasteform product per year.

"Each product can will have a volume of approximately 15 L and will weigh around 50 kg."

Jan Söderström, CEO of Quintus Technologies, said he was delighted that Quintus Technologies was chosen.

"Quintus Technologies has for several years worked with the nuclear industry in the development of waste handling in the US and Europe. We are honoured to have been selected by ANSTO to deliver this specialised HIP system. It proves our commitment to deliver reliable HIP systems to this highly demanding industry sector," said Söderström.

ANSTO
www.ansto.gov.au



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Bribie Island sludge management facility gets an upgrade

Hydroflux Huber recently completed an upgrade of the Bribie Island sewage treatment plant's entire sludge management facility. A key part of the upgrade involved installing HUBER Q-PRESS Rotary Screw Presses to replace the old belt press technology.

The HUBER Q-PRESS Rotary Screw Press is a sludge dewatering system using for mechanically dewatering sludge produced from wastewater treatment. Suitable for use on municipal and industrial sludge streams, it includes the following features:

- A screw drive rotating the auger at 0.2–1 rpm.
- A sludge feed connection.
- A filtrate discharge connection.
- An auger with increasing shaft diameter and decreasing gap between flights.
- A screen basket with different spacing.
- A sludge cake discharge chute.
- Pneumatic cylinders for maintaining a continuously adjustable pressure of the discharge cone.

The volume between basket, shaft and flights continuously decreases, and the pressure thus increases, as the sludge is moved through the basket. The auger pushes the increasingly thicker sludge towards the annular clearance, defined by a circular opening and an adjustable discharge cone therein. The cone is pressed against the opening by pneumatic cylinders, thus maintaining a defined sludge pressure at the discharge end. A brush on the flights cleans the rotating screen from the inside and a motorised rotating spray bar backwashes it periodically from the outside.

Cake is discharged through the cone and filtrate collects within the main case and is discharged via gravity to the filtrate outlet flange. The feed to the Q-PRESS can be run under slight pressure (up to 500 mBar), which provides additional dewatering capability. The feed pump is to be provided with a VSD. In addition, the screw speed can be automatically adjusted based on the inlet pressure.

At Bribie Island, Hydroflux Huber managed the process, mechanical, electrical and civil design as well as the site installation works, site testing, performance testing and training. The upgrade also included ancillary services such as the control system and SCADA integration, polyelectrolyte batching and dosing, and solids transfer.

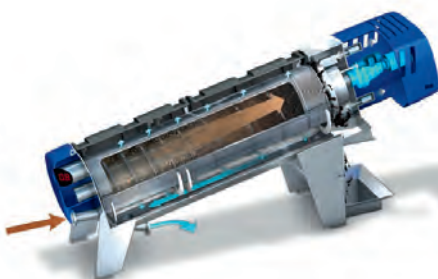
Luis Bastos, director of Hydroflux Huber, said there were a number of reasons why HUBER screw presses were chosen for the upgrade of the sewage treatment plant.

"First, disposing of sludge is expensive in terms of transport so reducing the amount of sludge helps drive down costs," he said.

"Second, HUBER technology is very slow speed — the average is 0.5 rpm — so it is very low in energy demand and, because



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of the low screw speed, it is high in operational reliability with virtually no maintenance.

"Third, it sits within a compact and fully enclosed system so it is WHS-compliant.

"Fourth, it has very low operational costs and it requires minimal operator attention."

Performance testing demonstrated significantly higher performance than the existing belt press, with cake solids in excess of 18% dry solids. The capture rate was consistently 95% or better, as Hydroflux Huber equipment is sized to achieve high capture without the need for secondary filtration. This was achieved even though the feed solids was generally only between 6000 and 8000 mg/L.

"While there are over 1200 of these unique sludge dewatering machines being used in many applications worldwide. The installation at Bribie Island is the latest in Australia, which is evidence of their outstanding performance in local conditions," said John Koumoukelis, director of global business development at Hydroflux.

"The latest generation of these screw presses — the HUBER Q-PRESS — is proving very popular in both the Australian and international markets. This is because not only does it reduce sludge volumes and disposal costs by up to 80%, but also because it is more efficient and can be operated at even higher solids throughputs than older technologies such as belt presses.

"Our customers are choosing these over centrifuges because of their performance — with the lowest energy demand compared with centrifuges, we spin at 0.5 rpm compared with 3000 rpm of centrifuges — and significantly less maintenance compared with centrifuges.

"When you add in the fact of complete stainless steel fabrication, it is little wonder that in our view these are the best screw presses in the Australian market."

Hydroflux Industrial Pty Ltd
www.hydrofluxhuber.com.au

MAKING EMPTY TANKS A THING OF THE PAST

REMOTE MONITORING OF TANK-FILLING LEVELS

AVIA Osterwalder St. Gallen AG operates more than 120 filling stations in eastern Switzerland. The company also sells and distributes motor vehicle and other fuels to corporate and private customers.

For many years, AVIA Osterwalder St. Gallen AG has deployed the EasyOil® system to offer their customers a practical method for remote monitoring of filling levels in oil and gasoline tanks. To assist with the recent relaunch of the EasyOil® system, AVIA Osterwalder St. Gallen AG called on the measurement technology expertise offered by KELLER.

Using a GSM modem to transmit data via mobile telephone network, EasyOil® is a measurement system used by AVIA Osterwalder St. Gallen AG that offers remote monitoring of the filling levels in the oil and gasoline tank. The contracting customers are alerted via SMS if the tank filling levels fall below a defined limit. This system provides huge advantages to the customers as the filling level data can be downloaded anywhere and at any time, which enables customers to plan their purchase efficiently.

For the EasyOil® system to work effectively, the sensor technology has to be able to measure filling levels as well as adaptable with the GSM transmission module. With extensive applications in water management sectors, the KELLER pressure probes are technically feasible to be integrated in the EasyOil® technology as the pressure at specified point in the tank is directly proportional to the filling levels. For AVIA Osterwalder, KELLER developed a GSM-3 variant model to integrate the existing pressure transmitter and SMS communication module.

Cutting-edge technology, intrinsically safe and high-temperature resistance in EX areas

The GSM-3 comprises the modem itself and as many as three pressure transmitters with voltage output of 0.5 to 4.5 V. The circuit also contains three built-in safety barriers, which makes it intrinsically safe to transfer the electrical signals to gas stations.



The safety barrier limits the electrical power produced by the measurement system within the area subjected to explosive hazards (EX area). The complete package also includes a level sensor cable to transmit the measurement signals from the tank to the GSM-3 located outside of the EX area.

The 26 Y Ei-series level sensors are intrinsically safe for application in EX-area. The sensors are developed based on the piezoresistive silicon measuring cell, invented and patented by Keller's CEO and founder, Hannes W. Keller, at the end of the 1960s. The filling level is detected based on the change in resistance in the piezoresistive element caused by liquid pressure. This produces the electrical voltage that is used as the measurement indicator. This sensor is also able to electronically compensate for temperature error, due to ambient or tank condition.



One-stop expertise

Thanks to KELLER's extensive experience and its highly mature product range, the company can now produce the pressure transmitters for the EasyOil® system with an excellent cost-to-benefit ratio. These products guarantee long-service lifetimes, even in an aggressive environment, such as gasoline. This is due to their robust stainless-steel housing (IP68 protection), and stainless-steel diaphragm to protect the silicon measuring cell against the fluid.

AVIA Osterwalder St. Gallen AG now purchases either the conventional 26Y level sensor or the intrinsically safe, 26 Y EI-series from KELLER, together with the GSM-3 transmission unit and sensor cable. The final system assembly and installations at the customers' premises and software configurations are managed by AVIA Osterwalder themselves. Overall, the project receives positive response.

Bestech, the sensor technology and teaching equipment specialists, is the partner and distributors of KELLER's technology in Australia. The application engineers at Bestech are highly trained with specific product knowledge and have demonstrated the capability of KELLER's products in numerous applications.

Bestech Australia Pty Ltd
www.bestech.com.au

BESTECH
Sensors & Teaching Equipment

Odour management in landfills



Odour management has always been an underlying challenge when it comes to waste management activities such as landfills. Emission of unpleasant odours is a natural and inevitable result of both biological and chemical processes from the decomposition of waste.

A

lthough not all odours derive from biological processes — such as those derived from inorganic chemicals — the majority of odours come from aerobic and anaerobic decomposition that all organic waste undergoes when landfilled or composted.

In the past, unpleasant odours have always been a widely accepted result of industrial activities. However, the modern age has driven a need for change. Not only has the general public's acceptance of unpleasant odours decreased, the regulations attached to odour management in landfills have become more stringent with EPA compliance requirements becoming compulsory to meet.

Further, the expansion of Australia's habitable communities has led to a closer proximity between residential areas and landfills causing the tolerance levels for odours in landfills to deteriorate significantly.

With the aim to manage odours in landfills, companies such as OdourPro can design and install odour treatment and management systems to tackle the issue. According to Mark Forbes from OdourPro, the need to provide "ongoing monitoring, maintenance, telemetry and chemical supply services" plays a critical role in managing odour in landfills by treating the source of the odour problem rather than masking it.

In order to determine the appropriate odour management and mitigation measures, it is critical that the origin of the odour is correctly identified, which is why consultation with professional odour management companies is important.

Forbes suggests that in order to address odour management issues in landfills, the relevant approaches are "large area atmospheric misting and vapour generation, as well as topical surface treatment in an overlaying blanket over odorous materials".

"These technologies not only aid in compliance with EPA enforced boundary odour limits but also reduce resident odour complaints."

Products such as misting systems act as odour neutralisers with an odour removal estimation of 90 to 100%. These misting systems can be portable for the convenience of the user. Other recommended products include vapour systems, which are airborne odour controllers that act as active deodorisers destroying unpleasant odour particles.

Alternatively, a landfill site can maximise its odour control by using a surface odour control aimed to reduce biochemical oxygen and chemical oxygen demand levels. This type of odour control focuses on relieving volatile organic compounds and hydrogen sulfide, which then stops the production of other odorous by-products. Surface odour controls are designed to be effective, long-lasting, safe and non-toxic, and reduce both clean-up times and costs.

OdourPro

www.odourpro.com.au

CONCRETE LIGHTING, FURNITURE AND OBJECTS

Experimental design studio Bentu is a manufacturer of contemporary concrete lighting, furniture and objects. With a clear focus on simple forms, the company blends environmental consciousness with good design.

Crafted from recycled concrete and ceramic gathered from construction and demolition sites and factories in China, Bentu's products show how material waste can be given a second life outside of landfill. Products include the Qie Pendant light, crafted from recycled concrete and bamboo, the concrete and steel Ding Table and the sleek, cylindrical Bang Pendant lights.

The company has also launched its Ceramics Made collection of speckled, terrazzo-style furniture and lighting made from recycled materials. Among these are the geometric Shadow wall tiles, which are crafted from concrete and ceramic waste.

Remodern
remodern.com.au



DC POWER SUPPLIES

Magna-Power Electronics designs and manufactures robust programmable DC power supplies ranging from 1.25 to over 2000 kW. The products are suitable for feeding power to national laboratories, universities, defence, utilities and a wide range of industrial sites.

Applications for the DC power supplies include aiding in the manufacture of electric vehicles, simulating solar arrays for the development of inverters, steering magnets for particle accelerators, powering radar systems, driving traction controllers for locomotive development and cutting-edge energy research at universities.

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3D technology for wastewater treatment plant design

China's 12th Five-Year Plan (FYP) (2011–2015) allocated 20% more funds for municipal wastewater treatment projects to address pollution caused by rapid urbanisation and inadequate sewage disposal. The initiative put pressure on leading design institutes to keep up with demand.

EPC contractor Zhongnan Engineering Corporation (POWERCHINA Zhongnan) in China responded by adopting a new methodology to improve overall efficiency for the 20,000 m³/d Qingzhen Vocational Education West Urban District sewage treatment plant project.

GEOPAK's 3D modelling capabilities to develop plans, profiles and cross-sections took 60% less time than previous methods. More importantly, the selected scheme minimised land use, reduced water head loss, saved energy and facilitated maintenance – saving the client CNY 11.2 million.

AECOsim Building Designer's parametric modelling capabilities enabled the team to explore alternative building geometries. The 3D plant design environment in OpenPlant allowed multidiscipline modelling of piping, HVAC and electrical. And the integrated modelling of the physical and electrical

and clash detection with Bentley Navigator quickly revealed collision points and rapidly resolved issues.

"Based on Bentley's standardised design, the clash detection of the system can help us find out more than 100 clash points quickly, with a design error rate decreased by 90%. The design period was reduced to two months from three months, increasing the design efficiency," said Yin Xiaowei, chief engineer, Qingzhen Vocational Education West Urban District Sewage Treatment Plant.

Handing over the digitised 3D information models upon project completion provided a multiview display and 3D roaming video of the plant that became an indispensable management capability during operations and maintenance. By integrating project design, construction and operations, POWERCHINA Zhongnan drove efficiencies across the life cycle of the sewage treatment plant, to the benefit of the client and customers served.

The standardised design system implemented for the Qingzhen Vocational Education West Urban District sewage treatment plant achieved the goal of reducing design time by 35% and design costs by 30%. The collaborative environment also reduced errors by 90%, which

shortened communications with construction contractors and reduced rework. Overall, the project saved the client CNY 300,000.

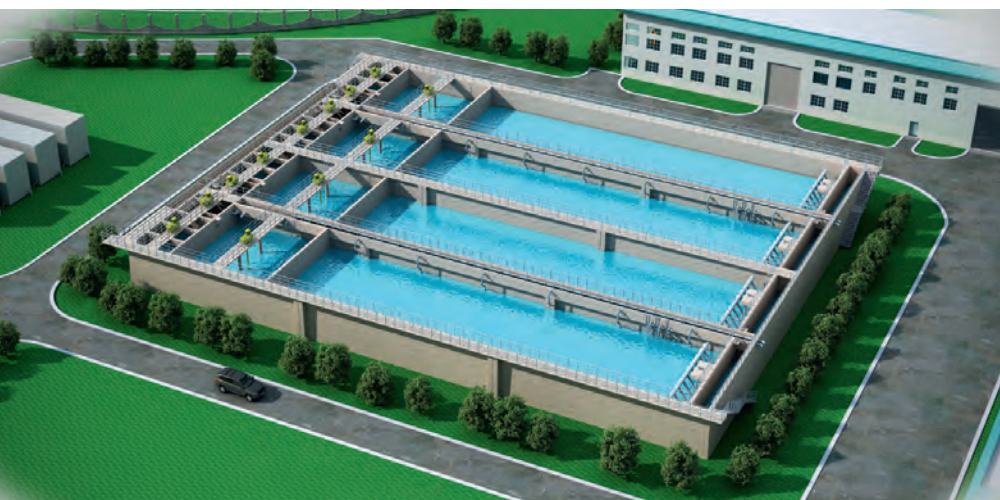
The efficient system required 60% less labour input than prior plants, enabling virtual operations that could save roughly CNY 800,000 per year. The automation also

lowered the risk of human error, reduced management risk and heightened safety.

With a capacity of 20,000 m³/d, Qingzhen Vocational Education West Urban District's new tertiary treatment plant protects the downstream water that supplies the 4.5 million people of Guiyang City.

This project now serves as the model for POWERCHINA Zhongnan's subsequent work on 13 other water projects representing 1.3 million m³/d in capacity, serving nearly 47 million people and totalling an investment of CNY 6.4 billion.

Bentley Systems Pty Ltd
www.bentley.com



Above: The project team developed optimal solutions using Bentley's 3D design applications, which reduced inaccuracies in the prepared project designs by 90%.

Right: OpenPlant's 3D plant design environment enabled multi-discipline modeling of piping, HVAC and electrical.



The company adopted a portfolio of Bentley products that would create a standardised 3D environment for optimising and integrating project design, construction and operations. ProjectWise was implemented as the collaboration platform to enhance communication and coordination among the 10 design disciplines as well as the parties involved in construction and operations. The platform pushed a standardised user workspace and provided a common data environment (CDE) that became the single source for project information.

The project team developed solutions for modularisation and standardisation using Bentley software including AECOsim Building Designer, GEOPAK, OpenPlant and Bentley Substation. Each application produced benefits; for example, using

designs in Bentley Substation reduced errors and omissions. Together, the interoperable software accelerated design review and produced an intelligent plant model that could be used throughout the plant life cycle.

Information mobility through all phases enhanced project participation and reduced time-consuming face-to-face meetings. Project data was published to i-models, which were accessible from desktop, laptop and mobile devices, while maintaining all the original attributes. The 3D information models and visualisations simplified communications among the design disciplines as well as with other project participants. Coordination review

SOLAR VARIABLE SPEED DRIVE

The Zener ECODRIVE 8000 is a solar variable speed drive with a built-in maximum power point tracking (MPPT) controller to achieve maximum power from the solar array under all conditions. The product also includes Zener's sophisticated motor control algorithm, designed to achieve high motor energy efficiency.

The variable speed drive is versatile, offering flexibility for system integrators or OEMs with its internal logic functions, programmable I/O and ability to communicate with other equipment. It can operate standalone solar or as a hybrid (or blended system) using an auxiliary supply. The auxiliary supply may be single-phase (240 V or 480 V SWER) or three-phase from a generator or mains grid.

Features include: robust powder-coated IP66 steel enclosures or stainless steel enclosure for more demanding environments; automatic operation without additional controls or PLC; constant flow or variable flow/pressure control; soft start and stop to eliminate water hammer; comprehensive and customised pump system protection; application menus for simple set-up; and a remote monitoring capability.

The product is said to reduce inrush currents and energy requirements. A 50°C temperature rating is available.

Zener Electric Pty Ltd
www.zener.net



SINGLE- AND THREE-PHASE INVERTERS FOR LARGE PV SYSTEMS

SolarEdge Technologies is expanding its residential offering for large PV systems, announcing higher production from its range of single-phase inverters and a line of three-phase inverters.

The company now warrants additional PV capacity of up to 5 kWp beyond the inverter maximum sizing ratio. This is claimed to enable maximum battery charging even when the inverter is operating at full capacity to support the house loads.

Its line of three-phase inverters allows the installation of an individual SolarEdge inverter for residencies connected to a three-phase grid.

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Award-winning warehouse reduces energy use by over 50%



Toll Group has been recognised at the National Energy Efficiency Awards 2017, taking out the award for Best Industrial Energy Efficiency Project for its recently upgraded Toll-Nike facility.

Based in Melbourne, the Toll-Nike facility provides specialised warehousing, picking and dispatch solutions capable of handling more than 27,000 stock keeping units (SKUs) and two million units of stock. NuGreen Solutions was recruited to upgrade the 18,000 m² warehouse as part of Toll's Smarter Green program.

Completed in 2017, the upgrade featured the installation of energy-efficient lighting systems designed by NuGreen and powered by LED technology suited to Nike's warehousing needs, with 1300 light fittings to high-efficiency LEDs. Motion sensors have also been added to limit power usage to occupied areas.

It also included the rewiring and re-programming of the warehouse's 2.5 km conveyor system, optimising it to operate in relation to product volumes and eliminating unnecessary movement.

Other features of the upgrade include translucent roof sheeting, to maximise day-

light so warehouse lighting can be switched off when ambient light is sufficient; and roof insulation, to assist with temperature control.

"We see environmental sustainability as our corporate responsibility and we're committed to reducing our environmental footprint," said Toll Sustainability and Energy Manager Mark Jones. "Through Toll's Smarter Green program we are introducing smarter, more sustainable solutions across all of our operations."

The upgrade has led to immediate and significant energy savings, with Jones claiming, "In the first three months after the upgrades were completed, the site's power consumption has reduced by 54% compared to the same time last year. These are savings we're proudly passing directly on to our customer."

"The change to LED lighting in our warehouse has been a great initiative and a real win-win situation," added Nike Pacific Outbound Manager Ian Black. "We have reduced our carbon footprint and our electricity costs while improving the quality of our lighting.

We commend Toll for sourcing an effective, efficient solution and driving the result."

Jones said that plans to have the facility certified carbon neutral are now underway, noting, "As part of the certification process, Toll will look to have the facility certified under the National Carbon Offsets Scheme and rated by the Green Building Councils Green Star rating system. We're also keen to replicate the success of this project at other Toll-Nike locations in future.

"Technology has advanced significantly since Toll and Nike embarked on our supply chain partnership almost 20 years ago," he continued. "We've been working closely with Nike to introduce Smarter Green innovations and this award is a welcome tribute to our lean journey."

Hosted by the Energy Efficiency Council (EEC), the sixth National Energy Efficiency Awards were announced at the National Energy Efficiency Conference 2017 Gala Dinner in November. Aside from the warehouse upgrade, the following awardees were recognised:

- **Best Innovation in Energy Efficiency 2017:** MATRXXX — an intelligent LED lighting platform designed by Vivid Industrial for the industrial and commercial markets.
- **Best Energy Savings Program 2017:** The Victorian Government's Victorian Energy Upgrades.
- **Best Commercial Building Energy Efficiency Project 2017:** Enhancing energy efficiency at the MCG — a project delivered by Melbourne Cricket Club and Siemens.
- **Leading Energy User 2017:** Unity Water.
- **Best Residential Energy Efficiency Project 2017:** Switch Your Thinking — a local government energy efficiency program working with the community to find innovative solutions to electricity problems.
- **Best 'Smart' Energy Project 2017:** RMIT University's Sustainable Urban Precincts Program — a \$128m commitment to reduce emissions associated with university operations (25% by 2020) while also delivering a step-change in asset management practices and end-user experience.
- **Young Energy Efficiency Professional 2017:** Jason Harrison.
- **Energy Efficiency Champion 2017:** Alan Pears.

Off-grid solar solution for water disinfection

Logan City Council has combined emerging solar power and a Tesla Powerpack to deliver a solution for water disinfection in the city's new reservoir.

As explained by City of Logan Mayor Luke Smith, the 20 ML Round Mountain Reservoir was brought into service in 2014 to provide drinking water for residents in Flagstone, Yarrabilba, North Maclean, Spring Mountain and Woodhill.

"This is set to be one of the fastest growing areas in South-East Queensland over the next two decades, but with that growth comes the issue of building assets larger than are needed right now," Mayor Smith said.

"We were concerned until demand increases, water stored in the network may age and not stay at the highest possible quality. We decided there was a need for a dedicated water chlorination station at the reservoir.

"The reservoir site is not connected to mains power or accessible via a sealed road, so an innovative approach was required to maintain water quality from the reservoir."

Mayor Smith said a number of options were investigated, with a solar-powered electrochlorination facility confirmed as the preferred technology. The project was delivered by Logan Water Infrastructure Alliance, while battery and solar provider CSR Bradford was engaged to supply and install the system.

The Tesla-supported micro-power grid and electrochlorinator will provide around-the-clock solar power to help maintain local



drinking water quality 24 hours a day. The project has already delivered the Logan City Council a capital cost saving of \$1.9 million and operational cost savings valued at almost \$50,000 per year. Up to 200,000 people are expected to benefit from the solution by the time the region is fully developed.

CSR Bradford Business Manager Ashleigh O'Brien said the project is the first off-grid commercial solar and battery system in Australia powered by the Tesla Powerpack, and showcases the growing potential for Australian assets to achieve energy security through solar and battery technology.

"The project involved the Bradford team working with Tesla to design and install a solar PV and commercial battery solution which

will work harmoniously in response to the site's real-time energy requirements, and its success signals further potential to roll this technology out across the country," she said.

"The electrochlorinator is powered by 323 solar panels and a 95 kWh capacity Tesla Powerpack that will help provide water quality 24 hours a day.

"With commercial power prices soaring and home owners increasingly struggling to pay their bills, CSR Bradford stands ready to demonstrate how improvements in battery technology and solar can empower asset owners, bring down prices and safeguard them against the risk of shortages in the electricity market."

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Total Facilities 2018

Future tech, next-generation BioT and AI, emerging digital trends, automated efficiencies, the latest energy-saving initiatives in the built environment and state-of-the-art ergonomics will be on show at Total Facilities 2018, to be held from 18–19 April at the Melbourne Convention & Exhibition Centre.

Featuring an impressive line-up of speakers, partners and exhibitors, the event will bring together professionals and innovative businesses over two days, with a focus on exploring strategies to optimise facility and workplace performance and improve the places in which we work and live.

Renowned experts, academics and thought leaders will share practical insight into the industry's top challenges and opportunities. Attendees can also expect to see exciting innovations and product launches that will help facilities managers save and better manage time, money and resources.

More than 150 brands, including Dyson, Schindler Lifts Australia, ASSA ABLOY Entrance Systems and CMS Electracom, will unveil the latest facilities management



products and services on the exhibition floor. Highlights include: Metra's new mobile app for remote and mobile management of electronic lockers; Method Recycling's line of certified compostable bin liners; and Hochiki's FIREscape — an extra-low-voltage intelligent LED emergency lighting system.

Hygiene company Initial is meanwhile sponsoring the annual Best Bathroom Fa-

cility competition, which will be searching the nation for the finest facility in design, innovation and technology.

What: Total Facilities 2018

When: 18–19 April 2018

Where: Melbourne Convention & Exhibition Centre

Web: <https://totalfacilities.com.au>

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Smart Energy 2018

Smart Energy Conference & Exhibition 2018 (Smart Energy 2018) will take place at the International Convention Centre Sydney on Tuesday, 10 and Wednesday, 11 April 2018.

The industry event for solar, energy storage and energy management industries will feature over 100 expert speakers in three conference streams and over 130 sponsors and exhibitors.

The conference streams include:

- Applied energy storage
- Smart energy solutions
- Installer professional development

What: Smart Energy 2018

Where: International Convention Centre Sydney

When: 10–11 April 2018

Web: www.smartenergyexpo.org.au

Australian Waste to Energy Forum 2018

The Australian Waste to Energy Forum aims to provide a platform for all interested parties to discuss the development of a waste to energy industry within Australia.

Government, industry and individuals will be able to learn, network and discuss issues in an open forum with like-minded and interested companies and individuals.

The forum will provide a platform for all interested parties to discuss the development of a waste to energy industry within Australia utilising best practice techniques from around the world.

What: Australian Waste to Energy Forum 2018

When: 20–22 February 2018

Where: Mercure Ballarat Hotel and Convention Centre

Web: www.aien.com.au/wteforum

WIOA – Water Industry Operations Conference and Exhibitions 2018

NSW

What: 12th WIOA NSW Water Industry Operations Conference and Exhibition
When: 11 and 12 April 2018
Where: Tamworth Regional Entertainment and Conference Centre (TRECC)
Web: For more information or to register go to:
<http://wioaconferences.org.au/nsw/>

Queensland

What: 43rd WIOA Queensland Water Industry Operations Conference and Exhibition
When: 6 and 7 June 2018
Where: Logan Metro Sports Centre
Web: For more information or to register go to:
<http://wioaconferences.org.au/qld/>

Victoria

What: 81st WIOA Victorian Water Industry Operations Conference and Exhibition
When: 5 and 6 September 2018
Where: Bendigo Exhibition Centre
Web: For more information or to register go to:
<http://wioaconferences.org.au/vic/>



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

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

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China forces government's hand on waste policy

China, as reported by the ABC, has recently changed its legislation to ban the import of 24 different categories of foreign waste.

Industry has signalled to government for a long time that relying on the export markets for recyclables was dangerous and now we find ourselves, with the change in China's legislation, walking towards this inevitability.

"Whilst stockpiling is a legitimate business practice, we know that the community is not happy with simply stockpiling recyclable materials, they rightly want this material to be used in making other products in Australia — reducing reliance on natural material," said Gayle Sloan, WMAA CEO.

Australia needs to act now to ensure that the circular economy is real, which means consumers, industry, government and generators of waste starting to work together and think a bit differently to use recycled material in as many products as possible that we make here.

"It is not enough that products we purchase in Australia are capable of being recycled, we need to ensure that they are also made from recycled material," said Sloan. "In this way we can create real demand for commodities like those that households put in their yellow bins.

"This is simply too important an issue for the Federal Environment and Energy Minister, Josh Frydenberg, to continue to repeat his mantra 'it is up to the states', this is one that the federal government actually needs to 'step up to the plate on'," said Sloan.

At all levels of government, including national, we need to put policies in place that support the development of sustainable secondary markets for recycled materials.

"The best first step would be sustainable procurement being introduced nationally by



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Australia needs to act now to ensure that the circular economy is real...

all, allowing government to actually walk the talk and model these behaviours," said Sloan.

The added benefit of moving to a circular economy is increased job creation. Studies have found that for every job involved in landfilling 10,000 tonnes of waste, over four can be created through recycling. Investment in new recycling infrastructure creates construction jobs and economic activity that provides a real boost to local economies.

While the change in China's legislation can be seen as a short-term "crisis", in reality the change to a circular economy will not only bring long-term employment, through green-collar manufacturing, but also sustainable economic growth.

"We have seen the change that programs like *War on Waste* have had on supermarkets; let's get the changes we need to ensure that packagers are using recycled products

as an input in all they do — but we cannot do this without the support of government," said Sloan.

Container deposit schemes are being introduced nationally, and while this is a great way to collect containers for recycling, the key is that the recycled product made in Australia is used by the beverage companies that participate in this scheme and take it back and use it in their packaging. Only then we will be circular and fix some of these issues.

WMAA and the industry have had semi-circular conversation with the industry, generators and the community — all of whom want to see a change to a circular economy as quickly as possible, as we all see the benefits. Hopefully China will force the government's hand to join us at the table and close the loop.

Waste Management Association of Australia
www.wmaa.asn.au



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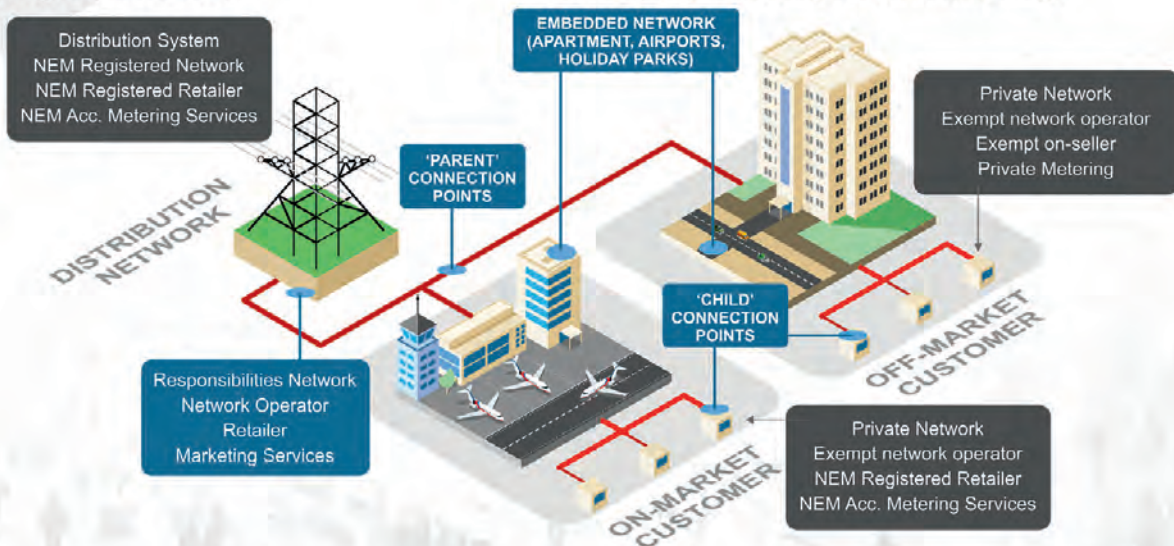
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