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APR/MAY 2021

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WORDS FROM THE EDITOR

A recent international study has highlighted plastic pollution as one of the most important environmental issues of our time. It has found that billions of tonnes of plastic discarded into the oceans and on land are being broken down into microplastics and then thrown back into the air.

According to Dr Mark Browne from UNSW Sydney's School of Biological, Earth and Environmental Sciences, microplastics from sewage, wind and stormwater contaminated by synthetic fibres are contaminating our shores. To combat the problems of microplastic, he has developed the Benign by Design program which works with industry and government to determine how to reduce emissions of toxic debris from consumer products such as clothing, packaging and exfoliants.

The Australian Government also released its National Plastics Plan 2021 in March, proposing a range of initiatives to fight plastic waste by reducing plastic packaging, improving recycling and recycled content uptake, and even implementing plastic-free beaches. Another part of the plan is to work with the textile and whitegoods sectors on an industry-led phase-in of microfibre filters on washing machines by July 2030.

In other news, Urban Utilities and Veolia have unveiled a full-scale sidestream plant that uses anammox bacteria to treat wastewater. The anammox bugs are claimed to not only make the whole treatment process cheaper and more environmentally friendly, they are also more efficient. Read more on page 8.

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connecting industry

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Circularity – a crucial part of product development

The World Bank predicts that global annual waste generation will have reached 3.4 billion tonnes by 2050. That's almost a 75% increase on the 2 billion tonnes we generate today. Building a circular economy will play a crucial role in reducing this forecast. Here, Mats W Lundberg, head of sustainability at global engineering group Sandvik, looks at why circularity needs to be considered from the initial design process, otherwise it's already too late.

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> **Redesigning products for sustainability is one of the advised actions in the World Economic Forum's recent report, 'Net-Zero Challenge: The supply chain opportunity'.**

Product life cycles traditionally follow a linear economy, where materials are transformed into products that are then used and thrown away in a 'take-make-waste' approach. This is unsustainable.

The primary principle of a circular economy is keeping assets in use to create a responsible way of using resources at the same time as reducing waste. Circularity is crucial in closing the loop of product life cycles.

A key component of this is keeping products in use for as long as possible, such as by sharing, maintaining, reusing and remanufacturing the product. The preferred end-of-life strategy is recycling, which is perhaps the most common circular economy approach adopted.

Time to act

Manufacturers should take steps to reduce waste in line with goal 12 of the United Nation's Sustainable Development Goals, which is "responsible consumption and production". In addition, a 2020 survey by IBM found that over seven in ten consumers say it's either moderately or very important that brands are sustainable, environmentally responsible and/or support recycling.

The circular economy is applicable for all products, no matter how large or small. For example, a mobile phone is a relatively small piece of technology but can produce a high amount of waste. The average person replaces their phone every two years, which can amount to as many as 35 phones in a lifetime.

Producing a single phone can require over 900 litres of water, and scientists have warned that many vital earth elements are becoming increasingly scarce due to the rate at which phones are manufactured and thrown away. This exemplifies how all products can require a large amount of materials, energy and equipment to manufacture, and are therefore part of a bigger chain of use and waste.

Conscious design

This wider chain of consumption must be taken into consideration when designing a new product. Addressing 'leakage points', where materials and energy escape out of the circular system, will maximise recovery of resources and help close the loop.

Redesigning products for sustainability is one of the advised actions in the World Economic Forum's recent report, 'Net-Zero Challenge: The supply chain opportunity'. The action recommends design choices that reduce waste, improve recyclability and increase the share of input recycled materials.

Sandvik incorporates a number of these practices in working towards its goal of achieving 90% circularity by 2030. For example, metalliferous waste and other by-products from its sites are reused or recycled to the greatest extent possible. In addition, around 82% of its stainless steel and special alloys are based on steel scrap or secondary raw material (as we call it).

Circularity is also practised by Sandvik in its rebuild solutions for the mining industry. Traditionally, an exhausted piece of mining equipment would be discarded, but Sandvik offers a more sustainable alternative through its machine refurbishment service. These rebuild solutions have been estimated to extend the life of machines by as much as seven years, while at a fraction of the materials and cost required for a new machine.

The company not only considers circularity in its products and services, but also in its packaging. Its Package Selector Application (PSA), which is planned to go live in the second half of 2021, uses an artificial intelligence (AI) algorithm that can analyse the product to select optimised packaging. By using the smallest packaging possible, material waste is reduced and energy can be saved during transportation.

Recycling is key

As well as designing out waste, manufacturers should consider what will happen to the product at the end of its use. Recycling can be encouraged through buy-back schemes, where the original equipment manufacturer (OEM) buys back the product from the consumer and recycles it. For example, Sandvik and its strategic business partner Stamicarbon offer a buy-back program for recycling high-alloy steel.

When customers in the urea fertiliser industry need to replace old equipment at their plants, Stamicarbon decommissions the heat exchangers with the precious alloys and Sandvik uses the recycled material in the production of new stainless steels. The equipment is replaced quickly and easily to avoid disruption to production. Every part of the value chain benefits from this model.

Sandvik deploys another buy-back scheme at its Wolfram site where used cemented-carbide tools are converted back into basic raw materials. Making new tools from the recycled solid carbide requires 70% less energy than producing with virgin raw materials. The process retrieves a high amount of tungsten, which is a scarce and finite material with reserves of only around 100 years of consumption left.

It's undeniable that the current rate of waste generation in the world is unsustainable, and more needs to be done to prevent materials going to landfill. Manufacturers have the power to create real change by making the circular economy a key consideration in product design, therefore helping to keep valuable materials in use and preserve resources.

Mats W Lundberg, head of sustainability at global engineering group Sandvik. The company is committed to using engineering and innovation to drive sustainable business by keeping products and materials in use. Today, 18 of Sandvik's production units report 100% waste recovery, and Sandvik is ranked among the top 10% of environmental performers in its industry globally by the Dow Jones Sustainability Index (DJSI).

Bugs tackle sewage at Qld plant

In an exciting milestone for the waste industry, Urban Utilities and Veolia have unveiled a full-scale sidestream plant that uses anammox bacteria to treat wastewater.

Reported to be the first of its kind in the Asia–Pacific region, the treatment facility at Queensland's Urban Utilities' Luggage Point Resource Recovery Centre uses Anita Mox technology to naturally remove ammonium and nitrogen from sewage via anammox, or anaerobic ammonium oxidation.

Organic nutrients like ammonium and nitrogen must be removed from sewage to protect the quality of waterways to avoid toxic algal blooms in the environment. Traditional sewage treatment processes produce a by-product called centrate, which is rich in nitrogen and ammonium and needs to be returned to the head of the plant for further treatment.

Urban Utilities Process Engineer Justin Todhunter said anammox bugs not only make the whole treatment process cheaper and more environmentally friendly, they are also more efficient.

"Using the sidestream plant, the anammox bugs naturally remove the ammonium and nitrogen, requiring less energy for aeration and eliminating the need to add carbon," he said. "By using less energy and chemicals, the anammox creates a more efficient treatment process.

"The process will save around $500,000 per year in operational costs and boost capacity at the Luggage Point plant, which treats around 60% of Bris-

> By using less energy and chemicals, the anammox creates a more efficient treatment process.

Urban Utilities Process Engineer Justin Todhunter holding a jar filled with anammox bugs.

bane's sewage — the equivalent of around 50 Olympic swimming pools — every day."

Urban Utilities has spent 10 years researching and farming the slow-growing anammox bugs at the Luggage Point Innovation Centre to have enough to use in the sidestream plant. Todhunter said the most exciting part of the milestone is that the completion of the plant means other wastewater utilities in Australia can have instant access to anammox bugs if they're looking to implement the same innovative technology.

"We've finally grown enough bugs to introduce them into the treatment process and start reaping the benefits, as they're very efficient at removing ammonium and nitrogen from sewage," he said.

"The increased efficiency means Urban Utilities' Luggage Point plant will have more capacity to cater for Queensland's population growth."

Veolia Water Technologies' General Manager for Projects, Michelle Moroney, said farming the anammox was one of the most time-consuming parts of the process.

"Due to biosecurity laws, you can't import anammox bugs into Australia so it's taken a long time to grow them for this project," she said. "The plant will operate as a biofarm, which means other wastewater utilities can have instant access to seeded carriers if they're interested in using the technology."

Moroney said the bugs grow on special disc-shaped carriers in the AnitaMox process, which is one of the other reasons the technology is unique.

"The carriers provide a home for the biofilm to grow on and they're a critical part of the process," she said. "Around 500 m^3 of carriers were craned into the sidestream tanks at Luggage Point."

Urban Utilities was able to retrofit existing unused aeration tanks at Luggage Point Resource Recovery Centre for the sidestream plant, which reduced the capital investment.

Bacteria lend a hand to separate water and oil

A type of biofilm made by bacteria could become a useful tool in cleaning contaminated water.

Researchers from North Carolina State University (NC State) have discovered that certain bacteria make a slimy but tough biofilm for protection and motility — and it can also be used to separate water and oil.

The researchers used the material produced by the bacteria *Gluconacetobacter hansenii* as a filter to separate water from an oil mixture, with results published in the journal *Langmuir*.

"It's really remarkable to think that these little bugs can make this stuff that is so perfect in many ways," said Lucian Lucia, the study's corresponding author and an Associate Professor of Forest Biomaterials And Chemistry at NC State.

The biofilm the bacteria make and release into their environment is made of cellulose — the same material that gives plants a sturdy structure in their cell walls. However, when bacteria make cellulose, it has a tightly packed, crystalline structure.

"It's one of the purest, if not the purest, forms of cellulose out there," Assoc Prof Lucia said. "It's very well structured. It's very water-loving, and it's got a very high crystallinity, so it packs very beautifully. Once you strip out the bacteria, you have this amazingly tough material that has a real robustness, or toughness."

The researchers explained that the bacteria make the film to protect themselves.

"If you leave something like an unwashed dish out, it can turn all slimy and gross — that's a biofilm," said study co-author Wendy Krause, Associate Professor of Textile Engineering, Chemistry And Science at NC State. "Different bacteria make different biofilms. The bacterial film that we're studying is made of cellulose. The bacteria are making it because they live on it and in it. They're making their home."

In the experiment, researchers used the bacteria as factories of cellulose nanofibres, then removed the bacteria and their non-cellulose residue. Finally, the researchers used the cellulose membrane to see if it could separate water from a solution containing oil and water, finding that the material was sturdy and effective at removing water.

"The oil doesn't want to go through the membrane; it has a repulsive effect to it," Assoc Prof Lucia said. "It's super fat-hating."

"If the oil and water were highly mixed, it doesn't matter," Assoc Prof Krause added. "You could put an immersion blender into the solution, and the membrane will still separate the water and oil."

The researchers see a variety of potential applications for the material, such as to recover water from an oily mixture, eg, to clean water contaminated with a textile dye or for environmental remediation. In future work, the researchers want to explore how they can tailor the membrane by chemically modifying it for certain applications.

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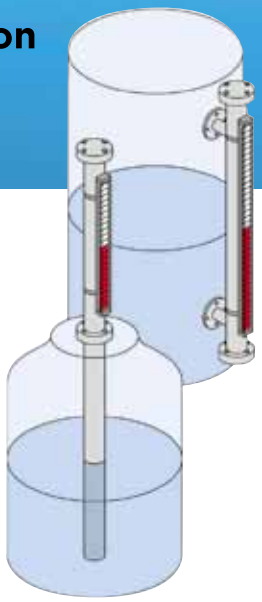

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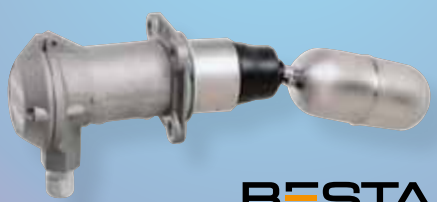

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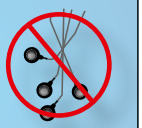

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National Plastics Plan tackles problematic plastic

The Australian Government has released its National Plastics Plan 2021, proposing a wide range of APCO-led initiatives to fight plastic waste by reducing plastic packaging, and improving recycling and recycled content uptake in the Australian marketplace. The multi-pronged approach includes plastic-free beaches, new labelling guidelines, eliminating expanded polystyrene consumer packaging fill and food and beverage containers, and greater consistency in kerbside bin collections.

The Australasian Recycling Label (ARL) was recognised as a key consumer recycling education tool, with the government committing to work with industry to apply the ARL on at least 80% of supermarket products by December 2023. The ARL will also be rolled out on business-to-business packaging.

The National Plastics Plan highlights APCO's Recycled Content Pledge Project, which will see major brands publicly commit to transitioning a percentage of their packaging from virgin to recycled material. The project will help to drive the critical market demand for recycled materials that will enable Australia to meet the 2025 National Packaging Targets and help to stimulate major investment in packaging manufacturing and recycling processes for the future.

Australia's 2025 National Packaging Targets were another key feature of the approach to tackling plastics, particularly the phasing out of all problematic and unnecessary single-use plastic packaging by 2025. Under the new plan, Australia will phase out expanded polystyrene (EPS) from loose packaging fill and moulded packaging in consumer packaging, EPS consumer food and beverage containers, and PVC packaging labels.

APCO CEO Brooke Donnelly said, "One year on since the 2020 National Plastics Summit in Canberra, it's fantastic to see how much progress has already been delivered on the plastic packaging issue. Australia has a huge task ahead of us to meet the 2025 National Packaging Targets and, in particular, ensure 70% of our plastic packaging is recycled for future use. However, as today's new National Plastic Plan demonstrates, there is a rich program of work being rolled out by APCO, our members, and our partners in government and the community that will get the job done and deliver a new and sustainable approach to plastic here in Australia."

The Waste Management and Resource Recovery Association of Australia (WMRR) says the highly anticipated National Plastics Plan is not just a step in the right direction, it is also the furthest the federal government has ever gone in driving a closed-loop supply chain.

"WMRR congratulates the federal government for its leadership in this significant issue — plastic waste," WMRR CEO Gayle Sloan said. "This is the first time the federal government has stepped into the material space and it is encouraging that they are leading conversations which are starting to shift towards focusing on production and design, both of which are absolutely key to creating a true circular economy.

"This plan represents an opportunity for all Australian jurisdictions to work together on harmonised initiatives that will give Australia the best chance of working with the community to meet our national targets and aspirations, and there are interesting elements in the plan such as plastic-free beaches. The Australian community is one in its ambition to reduce the use of unnecessary plastics and having national cooperation and consistency will drive this agenda forward, ideally eliminating confusion," Sloan added.

"The penny has certainly dropped in many areas and we look forward to continued engagement with the government on how all stakeholders — manufacturers, the waste and resource recovery industry, governments, consumers and more — can come to the table to create a true circular economy across all material streams and not just a successful closed-loop model.

"These high-level actions announced today are positive and welcome, but this is just the start of the journey; the details that will help us meet our goals and targets will need to be ironed out and our essential industry looks forward to working with all levels of government and other supply chain stakeholders as we strive ahead in our quest to build a sustainable Australia," Sloan said.

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FLUID CONTROL SYSTEMS

BANK-MOUNTED WASTEWATER AND LAGOON AERATOR

Surface and submersible aerators are a traditional method of wastewater aeration, but there is now available a bank mounted water aerator — Venturi Aerator.

The Venturi Aeration system is located on the banks of lagoons or outside tanks, not in or on lagoons. Operators can access equipment for maintenance without the need for cranes, boats or floating walkways. This improved safety also comes with a decrease in maintenance costs.

The system can produce up to and exceeding 1.86 kg 0_2 per kWh, depending on the pump selected and whether the pump is on a suction lift. Hydro Innovations, distributor of the Venturi Aerators, uses Gorman-Rupp self-priming centrifugal pumps which can produce hydraulic efficiencies up to 88%.

The aerators have no moving parts, so only the pump requires maintenance. And because pumps are easily accessed, clearance adjustments only take minutes and oil changes are simple, maintenance costs for these systems is claimed to be much lower than any other aeration system.

The systems can be expected to deliver mixing and DO transfer for up to and in many cases exceeding 25 years because of the robustness of the construction and the ease of access to allow operators to keep the equipment in peak condition.

The splasher-type aerators splash/spray water into the air as a function of how they operate. Windy days can cause aerosol size droplets to be carried by the wind and transmit bacteria to unwanted places. An aerator on the other hand can 'inject' oxygen saturated water below the surface to eliminate these risks.

An aerator and pump are not inexpensive when compared to some surface aeration systems, but the infrastructure and installation costs are generally much lower. All that is required is a concrete plinth for the pump to be affixed to, and some piping and supports.

The aerator can also be used as a vehicle for transferring pure oxygen into bodies of water. By using oxygen generators or liquid oxygen tankers with vaporisers, the aerators can transport up to four times their usual volumes. This could be ideal for systems effected by seasonal conditions, where units can be used in their usual way during the low periods and then 'super-charged'.

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EVS Water Designer is a comprehensive process design tool for water and wastewater treatment plants with more than 900 registered users, and more than 2500 plants designed.

Product features include a drag-and-drop interface built for collaboration on plant design, with pre-populated assumptions for common designs. Scenarios can be up and running in less than 24 h.

The web-based interface provides collaborative change control, audit trail and the ability for multiple team members to work on the same design simultaneously, significantly speeding up design times. The product is reported to reduce design times by up to 70%.

The platform provides a vast number of best practice, literature-supported industrial and biological treatment models, with over 50 different process units covering over 60 different parameters.

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Saving retired renewables from waste streams

Australia has the highest proportion of household photovoltaic (PV) systems in the world, with more than 21% of homes possessing a solar energy system. It is estimated that more than 100,000 tonnes of solar panels will enter Australia's waste stream by 2035.

Solar panels have an average lifespan of 25 years, delivering a good return for decades after their cost is recovered, but industry experts are starting to ask what will happen to all these solar panels when they need replacing.

Professor Peter Majewski is leading research at the University of South Australia's Future Industries Institute (FII) to help establish a lifetime stewardship scheme for Australia's PV industry.

"We have time to plan for this and ensure the processes are in place, but we have to start acting now, as the right practices may take some time to implement," Professor Majewski said.

"There are good stewardship programs in place for products such as paint and tyres in Australia, and we would like to see a similar system in place for solar, where the disposal process is pre-planned as an integral part of the product lifecycle."

While retired solar panels are relatively safe and stable, they are classified as e-waste, meaning they cannot be put into landfill in Victoria. With similar bans likely to follow in other states, the need for alternative solutions is clear.

A major challenge facing the solar industry is the low recycle value of PV panels, coupled with the high energy requirements of current collection and recycling processes. Professor Majewski explained that investment is needed to establish a waste management scheme and improve the technology available.

"Regulation around collection and recycling targets will be important to drive the process initially, but developing the best disposal techniques is essential, and this may even influence manufacturing techniques and what goes into the panels to start with."

A similar disposal problem exists in relation to wind turbine blades, which are large and notoriously difficult to recycle.

"These blades are the size of an airliner wing, and they have been built to withstand hurricane-force winds, so they are a big challenge when they get to the end of their life. As with solar panels, that disposal challenge requires planning and preparation, but approached the right way it doesn't have to be an insurmountable problem, and we are beginning to look at strategies for how to deal with these blades as they come offline."

ELEKTRA: THE REMOTE PUMP-MANAGEMENT SOLUTION FOR WATER-TREATMENT APPLICATIONS

Operators working in modern water and wastewater treatment sites face the dual challenges of properly processing water to the appropriate local or national standards while simultaneously minimizing environmental impact.

This means that, for chemical-dosing processes as varied as flocculation and desalination, innovative technological solutions are usually required to achieve the delicate balance between performance and sustainability.

One of the major global players in this area is SEKO, a renowned designer and manufacturer of chemical dosing pumps and control systems that constantly pushes the envelope to facilitate demanding processes within the water and wastewater-treatment sectors.

One of SEKO's latest innovations is the Elektra digital pump controller, which allows operators to unlock multiple benefits including precise digital dosing, process optimization and cost control — setting a new standard in operational efficiency.

Elektra combines a built-in Wi-Fi hub, the latest Internet of Things (IoT) technology and SEKO's unique SekoWeb portal to connect operators to their dosing pumps at any time, no matter where they are in the world, via PC, laptop or smart device.

By accessing their pump equipment via SekoWeb, the operator can view live and historical data on demand relating to parameters such as flow rate and pressure, using the information to make immediate parameter adjustments — from any location.

SekoWeb offers a single online platform from which users can manage their entire installed base of SEKO devices, and because all compatible systems exchange information with the same server, users can browse related data and modify programmes or parameters through the portal.

With the power to make instant changes that improve efficiency, optimize chemical consumption and reduce environmental impact, this 24/7 connectivity makes Elektra an invaluable tool for operators working from home or for those responsible for multiple sites.

This is especially true as we approach a post-COVID future, where home working is expected to remain as prevalent as it has become over the last 12 months. With Elektra at the heart of their chemical dosing system, managers can spend less time on the move, helping to increase their productivity while significantly reducing travel and accommodation costs — yielding both financial and environmental benefits.

Meanwhile, Elektra's scheduled reporting means the right data gets to the right people, with graphical visualizations allowing for quick interpretation and comparison of information to allow informed decisions to be made swiftly.

The ability to manage equipment with such flexibility unlocks key benefits including precise digital dosing, process optimization and cost control for applications as varied as agricultural, potable and wastewater treatment. Meanwhile, alarm reporting means that faults can be identified early and maintenance arranged in advance, helping to minimize costly unplanned downtime and productivity losses which in turn improves operational efficiency.

The Elektra unit itself offers multiple operating modes including manual, batch, analogue, timed and pulse, while the system enables dosing at up to 60,000 ppm (parts per million) and manages flow rates as high as 1,000 l/h — with parameters accessed and controlled locally via an intuitive multi-language programming interface.

Installation and use is facilitated by flexible mounting options, while the system's colour-coded display signifies the current operating function for a universal solution accessible by all.

Elektra is currently available for use with Spring series of motor-driven dosing pumps, with compatibility planned for devices across the SEKO range going forward as part of the company's strategy of constant product evolution. SekoWeb is available both online and as a smartphone app, compatible with iPhone and Android devices.

For more information on Elektra, SekoWeb and the entire SEKO water-treatment range, visit www.seko.com.

SEKO UK
www.seko.com

Solar-powered gin production makes a sustainable G&T

Gin producer Four Pillars is progressing towards a greener future with the installation of a 65.88 kW rooftop solar system at its Healesville distillery.

Designed by Cherry Energy Solutions, the system is expected to save the business $12,800 each year and reduce its emissions by 1600 t CO_2e over the life of the project — the equivalent of powering 185 homes for a year.

The system was financed through an Environmental Upgrade Agreement, a form of government-enabled finance for upgrade works that improve a building's environmental performance. The Four Pillars project is the seventh Environmental Upgrade Agreement in the Yarra Ranges Council, with funding provided by the Sustainable Australia Fund.

"It's an absolute 'win-win' for the businesses that have jumped on board," Mayor of Yarra Ranges Council Cr Fiona McAllister said.

Sustainable Australia Fund CEO Scott Bocskay said the finance is hugely beneficial for businesses, as it covers 100% of the cost for energy-efficiency upgrades without requiring any upfront capital.

Four Pillars was established in 2013 by co-founders Cameron McKenzie, Matt Jones and Stuart Gregor.

"It puts cash back in the pockets of the business owners. With terms of up to 20 years and low interest rates, the repayments are so low that the business is often making money from their upgrades from the very first year," Bocskay said.

"Environmental Upgrade Finance just makes so much sense for local business. They get to cut their carbon emissions without having to outlay any costs whatsoever, and they even improve the value of their building."

Four Pillars was established in 2013 by co-founders Cameron McKenzie, Matt Jones and Stuart Gregor. What started with a single copper still has now grown to become a household name, with the company winning International Gin Producer of the Year for two years running.

McKenzie said the new solar system isn't just about the cost savings.

"Environmentally it's 100% the right thing to do and we get great feedback from customers who walk through the door," McKenzie said.

McKenzie said the process of financing and installing the new solar system was easy, transparent and rewarding. But the team aren't content to stop there — Four Pillars is currently planning a $6 million expansion, designed by sustainable design firm Breathe Architecture. The distillery plans to incorporate more solar power and other waste-reduction initiatives in the new gin hub.

"If there's an option anywhere in the business to be more sustainable, we'll always try," he said. "This goes for power, water, waste, recycling. We can always improve in these areas, so when it's made very easy like our solar system, it becomes a no-brainer."

Sustainable Australia Fund
sustainableaustraliafund.com.au/

Regional NSW ripe for local EV manufacturing hub

NSW Minister for Roads and Transport Andrew Constance recently launched Western Sydney's first electric-powered bus in Leppington, marking a key step in the government's promise to transition the state's full fleet by 2030.

However, with 8000 buses to be replaced statewide, Western Sydney Regional Organisation of Councils (WSROC) President Barry Calvert said the transition is an opportunity for the government to invest in locally manufactured vehicles, by establishing a regional manufacturing hub.

"The drive toward an electric vehicle transport future is underway, and the NSW transition goal is striking out in the right direction. However, establishing a local manufacturing hub needs an accelerated vision of resourcing and investment.

"An accelerated vision for local manufacture would provide an enormous boost to a regional centre such as Lithgow. The birthplace of Australia's iron and steel industry, Lithgow has a proud manufacturing lineage, impacted by industry shifts in recent years. It is a city of skilled and capable workers, ready for new opportunities," Calvert said.

Lithgow City Council General Manager Craig Butler said Lithgow's workforce is primed for new opportunity, with an economy already in transition from energy production.

"Lithgow is slated for new renewable energy infrastructure, but concern exists about the small numbers of jobs they offer. A manufacturing hub for electric-powered buses in the city would be a masterstroke for the NSW Government to lead, bringing real vision to transitioning regional futures — including the much-needed jobs that come with a shift to renewables — as well as building confidence in our national capabilities."

Calvert added that the government's target to transition the state's full fleet of 8000 buses by 2030 will need significant investment.

"While the Minister has reiterated this goal, currently these buses are being made partly overseas and partly locally. An investment in local manufacturing capability by the NSW Government would be timely and strategic. A regional hub, connected to Western Sydney's increasing growth, will accelerate the delivery of EV transition goals and give a powerful boost to regional jobs and the NSW economy."

Abattoir improves energy efficiency of wastewater management

Cedar Meats is a progressive and contemporary meat exporter in Victoria, with a continual improvement philosophy. The company needed to upgrade its DAF (dissolved air floatation) system due to aged and decommissioned components at the site. The research was conducted on the best available technologies — Cedar Meats' driving force of continual improvement meant looking beyond what had worked previously and investigating how its existing system could be not only repurposed but significantly improved.

Cedar Meats wanted a fully functional, more energy-efficient system that could deliver low running costs for the life of the DAF unit.

The 'conventional' DAF system consists of a number of components:

1. A centrifugal pump that pulls clean effluent from the DAF tank and feeds it into a pressurised air saturation vessel.
2. A compressor that also feeds compressed air into the same vessel and the air saturates into the effluent water under pressure. The water is then fed back into the bottom of the DAF tank where the air comes out of solution (because of the lower pressure) to form tiny microbubbles, which attach to fats and grease in the system and float it to the top of the tank where it is scraped away. The pressure vessel requires regular certification for safety purposes.
3. A control system to combine air and water requirements.

Assessing the sustainable options

The Chief Engineer at Cedar Meats, Yogesh Mistry, started investigating the options available for an innovative and sustainable solution. The elimination of intricate and delicate control systems was on his wish list for the ideal solution. Additionally, a system that did not need ongoing Worksafe certification for pressure vessels was another requirement he was trying to incorporate into the new system. Mistry contacted Hydro Innovations to find out more information about the EDUR DAF pump.

Consideration was given not only to the purchase price of the new system but also the lifetime maintenance and running costs were examined.

The combined maintenance of the DAF pump, compressor and pressure vessel were costly, and finding a way to reduce the energy consumption of both pump and compressor was researched. Capital costs and running costs are not cheap for the standard or traditionally used DAF systems.

The solution

EDUR, a German Pump manufacturer since 1927, has developed a multi-stage multiphase pump capable of handling a gas/water mixture, making it suitable as a DAF pump.

The efficient and smart pump solution draws clean effluent from the DAF tank, and at the same time, draws in atmospheric air on the suction side of the pump. The pump sheers and mixes the air with the water, and under pressure from the multi-stage pump, air saturates into the effluent water. The water is then pumped into the bottom of the tank, where the air comes out of solution, as in conventional systems. No compressor or air saturation pressure vessel is required.

Mistry was impressed with the simplicity of the system and promptly arranged the purchase of an EDUR DAF pump. He has been pleased with the positive results, which include:

- a higher rate of solids removed;
- less power used (reducing power costs);
- less complicated controls.

Mistry has a low-maintenance future ahead for this system.

The EDUR multiphase range of pumps is available with flow rates from 0.5 L/s through to 15 L/s to enable them to handle a wide range of DAF plant in-flows. Pumps are constructed of either C.I./Bz/SS, Nodular Cast Iron, all-bronze, all stainless steel or all Super-Duplex stainless steel construction, so may be used to handle a variety of liquids. Air, oxygen, carbon dioxide and ozone gases can be introduced into the suction line and transported and used to mix or disperse the gases.

The advantages of the EDUR DAF pump over conventional DAF systems can be summarised as follows:

- Reduction in system components.
- Smaller footprint.
- Reduced energy consumption.
- Reduced maintenance costs.
- Reduced noise levels.
- Improved WHS.
- Simplified system operation.
- Optimum microbubble size for perfect rising speed.

Cedar Meats had an old air saturation vessel onsite, so rather than becoming landfill, the air saturation vessel was upcycled to become part of the solution line for the new system. Because it was no longer being used as a pressure vessel, it no longer requires certification.

Hydro Innovations
www.hydroinnovations.com.au

Holiday park upgrades sewage treatment plant to meet growth

Boosts in guest numbers during peak holiday periods meant that NSW's Ballina Beach Village holiday park needed to upgrade its sewage and wastewater treatment system. The team at Ballina Beach Village wanted a long-term, environmentally sustainable solution.

Built in 2006, the original plant had an estimated capacity of 150 persons, with allowance for short-term peaks of up to 200 persons. By 2020, significant tourism growth meant Ballina Beach Village expected to service up to 500 guests. The increased growth put enormous strain on the original system, prompting the tourist park to urgently upgrade the existing sewage treatment plant.

Aerofloat was engaged by Ballina Beach Village to design a sustainable sewage treatment plant solution that would meet its increased growth.

Known for innovative design, Aerofloat's engineers developed a system that adapted to the infrastructure at the Ballina site. The design included additional equipment and upgrades to the existing facilities to minimise capital expenditure and alleviate the need for an entirely new treatment system. A new 46,000 L aerobic/anoxic balance tank and electrical control system with remote-monitoring capabilities was installed, in addition to modifications to the existing facilities.

The fast-tracked project ensured that the Ballina Beach Village sewage treatment plant was operating smoothly before the next peak holiday period.

"Aerofloat's unique sewage treatment plant design and after-sales service has allowed us to meet our growing capacity needs and ensure a low-maintenance, long-term solution," Ballina Beach Village owner Rob Woods said.

Aerofloat General Manager Michael Anderson said that the upgrade has significantly increased capacity while ensuring optimal plant performance.

"Ballina Beach Village is located in one of the most beautiful parts of the world. We wanted to ensure that we met the client's environmental responsibility to that environment. Aerofloat's design made use of the existing structures to ensure a small environmental footprint whilst ensuring a long-term, sustainable solution," he said.

The upgraded plant has produced significantly improved effluent compared to the original system, whilst ensuring a sustainable solution for many years to come.

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

WWTP with environmental benefits

A prize-winning wastewater treatment plant (WWTP) project in Logan, Queensland, has transformed the surrounding area into an environmental wetland wildlife sanctuary and community recreational asset.

The $116.7 million Cedar Grove Environmental Centre project features what is reported to be the state's first WWTP to benefit the environment through membrane bioreactor technology and constructed wetlands to achieve record-low nutrient levels and offset remaining nutrients through catchment restoration.

The project has won numerous awards, including the Australian Water Association (AWA) Queensland's Infrastructure Project Innovation Award.

A key component of the WWTP is CST Wastewater Solutions' horizontal in-channel rotary drum screening technology, designed as the vital first step in processes to curtail environmental spills, maintenance and associated OH&S issues in WWTPs.

CST Wastewater Solutions Managing Director Michael Bambridge said the Cedar Grove project has transformed a sewage treatment plant from a type of development attracting community concern to one that has become an outstanding community asset.

"Efficient headworks are vital to all the downstream purification and recycling process stages in a wastewater treatment plant, regardless of the location and input. Unless solids are efficiently separated out from wastewater at the start of the purification process, you are inviting trouble into the system — and this can cost operators dearly in terms of downtime, environmental risk and clean-up costs and OH&S hazards for the teams involved," Bambridge said.

"We have designed and built our low-maintenance, quality stainless steel technology to provide the simplest but most efficient technology available, proven on multiple MBR plants to perform outstandingly well in the diverse separation tasks of inlet headworks.

"The system is built to be versatile, flexible and robust, because these tasks vary not only from place to place, but day-to-day and week-to-week as loads on the system change."

CST Wastewater Solutions
www.cstwastewater.com

WATER ANALYSIS SYSTEM

Excessively high iron concentration in water can cause long-term sedimentation of iron particles in pipes and valves, thereby leading to a reddish discolouration of water for the end user. Sensor cube MS06 helps to determine the iron content via flow injection analysis (FIA). This allows users to quickly detect excessive iron values in their process water, monitor the load status of filters and react accordingly. Like all sensor cubes, the iron sensor can be easily integrated into a Bürkert online analysis system — eg, the control cabinet solution Type 8906.

With the control cabinet solution Type 8906, users can carry out maintenance, control and error diagnosis at one location — without having to cover long distances and employ a laboratory. The robust control cabinet protects sensors and other components against contact, dirt and water to IP65 degree of protection.

Its other advantages include: customised, application-specific sensors; automatic cleaning and calibration units; compact dimensions; and lockable on request.

Burkert Fluid Control Systems
www.burkert.com.au

Soft plastics cement Wyndham City's active transport strategy

An innovative concrete mix incorporating soft plastic has been used to build a footpath in Werribee, Victoria. The 310 m footpath along Parker Street comprises Polyrok, a mix of recycled plastic bags and soft plastic packaging that is created using plastic-to-cement binding technology.

Image courtesy of Wyndham City

Wyndham City Climate Futures and Environment portfolio holder Robert Szatkowski said the new footpath has saved approximately one million pieces of soft plastic from going to landfill.

"Council is always looking for new ways to deliver our capital works program in an environmentally sustainable manner," Szatkowski said. "Soft plastics have traditionally been among the hardest items to recycle, and Polyrok is an innovative and practical way to reuse these products.

"As well as being sustainable, this new footpath aligns with the Wyndham Active Transport Strategy, a 10-year plan to connect the missing links in our walking and cycling paths that make journeys on foot, bike, scooter, wheelchair and the like harder than they need to be."

Szatkowski said Wyndham City would be spending $2.2 million on new and upgraded footpaths and shared paths over 2020/21, as part of the strategy. He said the Polyrok trial is another example of the council using environmentally sustainable materials to build and maintain Wyndham assets while reducing wastage.

"Last year, Council was a finalist in the Premier's Sustainability Awards for a collaboration with Swinburne University to produce a footpath at Geddes Crescent Park in Hoppers Crossing using recycled plastic and glass," Szatkowski said.

"If we could use recyclables in most of our footpaths and roads, as we aim to eventually, we could save thousands of tonnes of plastic and other materials from being sent to landfill each year."

Replas

www.replas.com.au

Moyne Shire Council's glass recycling: one year on, going strong

Victoria's Moyne Shire Council was one of Australia's first councils to introduce a glass-only bin collection system, introducing a fourth kerbside bin in September 2019.

Eight community groups were engaged to work with the council to hand deliver more than 6000 glass-only, purple-lidded bins — adding to the existing collection service that includes recycling, FOGO (food organics, garden organics) and landfill/general waste. Glass-only bins are collected monthly, recycling and FOGO fortnightly, and landfill is collected weekly.

Glass from the kerbside collection service has been recycled and used in the making of local roads including Toolong North Road, Walsh Road and Dickson Street, Warrnambool.

Moyne Shire Mayor Cr Daniel Meade said the move has significantly reduced the amount of glass going to landfill.

"Glass accounted for about 40% of recyclables in Council's kerbside collection. Now, one year on we have collected over 570 tonnes of glass — that's more than two million glass bottles," Cr Meade said.

Community groups such as The Koroit Cricket Club, Nirranda Football Netball Club and Grassmere Primary School Parent and Friends received $5 for every bin delivered, creating a new fundraising stream for the clubs and groups.

Community engagement and education was integral to the successful rollout of the scheme. A branded Better4Moyne campaign was launched to engage and educate the community about the new four-bin kerbside collection service.

Cr Meade said that as an early adopter of glass separation, Moyne Shire Council was playing an important leadership role.

"We have seen a behavioural shift in residents, even during the pandemic. People have been able to come on board with the four-bin service putting the right things in each bin and we are so proud of the residents of Moyne," he said.

One year on, glass-only bins are now an entrenched part of the four-bin waste collection system.

"The four-bin system is a great example of Council's forward-thinking approach to waste management and a great way to reduce the impact on the environment. We hope other municipalities can learn from our experiences and ultimately follow suit."

Educating the next generation on the good, bad and ugly side of plastics

On 22 March — World Water Day — 20 schools across NSW and Victoria commenced the Plastic Oceans Australasia (POA) Schools Program, sponsored by Veolia Australia and New Zealand.

Each school will engage in a 12-month learning experience, gaining a better understanding of the impact of plastic pollution on marine and freshwater environments. The students will be empowered to create solutions, whilst learning about recycling and other innovations that exist already.

POA and Veolia are partnering to deliver the program as part of their aligned missions to increase education around recycling, waste management and building a circular economy. Under this partnership, Veolia will fund 20 schools to undertake the full program, which includes surveys, presentations, guest speakers and a practical experience at a Veolia facility.

Ricki Hersburgh, POA Executive Director, was pleased to kick off the program for the first school in NSW with an incursion from a waste expert. "The POA education program uses science to educate students on the impact of plastics on our waterways and oceans, but it also uses fun activities that cater plastic-reduction initiatives to each school — making it student-led to drive behaviour change in their communities.

"The nationally recognised education program was created over seven years and uses science to inform students about the impact of plastic in waterways, oceans and the natural environment," said Hersburgh.

Richard Kirkman, Veolia's CEO and Managing Director, also commented on the partnership: "Empowering children to better understand the challenges and benefits of plastic, whilst creating solutions for the future, aligns to Veolia's ambition of ecological transformation.

"We are looking forward to seeing what comes from this valuable educational program for the 20 schools we are sponsoring."

POA and Veolia proudly celebrated World Water Day by commencing their education program, which will raise awareness about plastic entering our waterways and oceans and what can be done to challenge this.

Plastic Oceans Australasia and Veolia launched their partnership in 2020 and will work on delivering the Schools educational program, an employee awareness program for Veolia staff, and the translation of an educational movie into a local Yolngu Matha language, Gupapuyngu, to be shared with the community.

Veolia Australia and New Zealand
www.veolia.com.au

Pig poo powers biogas plant

German plant builder WELTEC BIOPOWER has collaborated with Finnish partner Doranova to complete a biogas plant near Turku in south-western Finland, a region characterised by livestock farms. The 250 kW plant — belonging to a group of three pig farmers — runs entirely on liquid manure.

Environmental policy in Finland is increasingly based on sustainable nutrient recycling, with agriculture playing an important role in regions with intensive animal husbandry. While manure and slurry might be regarded as waste in other parts of the world, the Fins rely on the advantages of the so-called black gold. Fertilisation with this organic substance improves the structure of soil and increases carbon storage in the ground. Moreover, an upstream biogas process delivers climate-neutral energy and ensures better plant availability of the fertiliser.

The farm structure and location of the Finnish pig farmers present an ideal setting for the anaerobic digestion project. Currently, about 40,000 t of pig manure is available as input material for the stainless steel digester, which has a capacity of 4903 m³.

The heat generated by the 250 kW CHP unit is used to preheat the liquid manure, which is first buffered in an upstream slurry pit. To minimise the loss of heat in the harsh Finnish winter, WELTEC equipped the digester cladding with an extra-thick insulation layer. This will result in a more efficient digestion process.

The fully automated operation culminates in the separation of the digestate. By compressing the nutrients, the transportability is increased and this helps to balance any regional nutrient surpluses and reduce the entry of these nutrients in the Baltic Sea and other bodies of water.

Study to assess local advanced recycling industry

A collaboration between technology developer Licella, recycler iQ Renew, Coles, polymer manufacturer LyondellBasell and Nestlé marks a major step towards a circular economy for soft plastic packaging, with the announcement of a joint feasibility study to determine the technical, economic and environmental benefits of a local advanced recycling industry.

The study will stake out potential sites in Victoria for an advanced recycling facility using innovative Australian technology called Cat-HTR (Catalytic Hydrothermal Reactor) — a form of hydrothermal liquefaction technology developed by Licella.

Advanced recycling offers new life to soft plastic by turning it back into oil. This oil can be used to produce new soft plastic food packaging, such as flexible packaging used for confectionery, bread bags, cereal liners and biscuit wrappers, and to protect fresh produce.

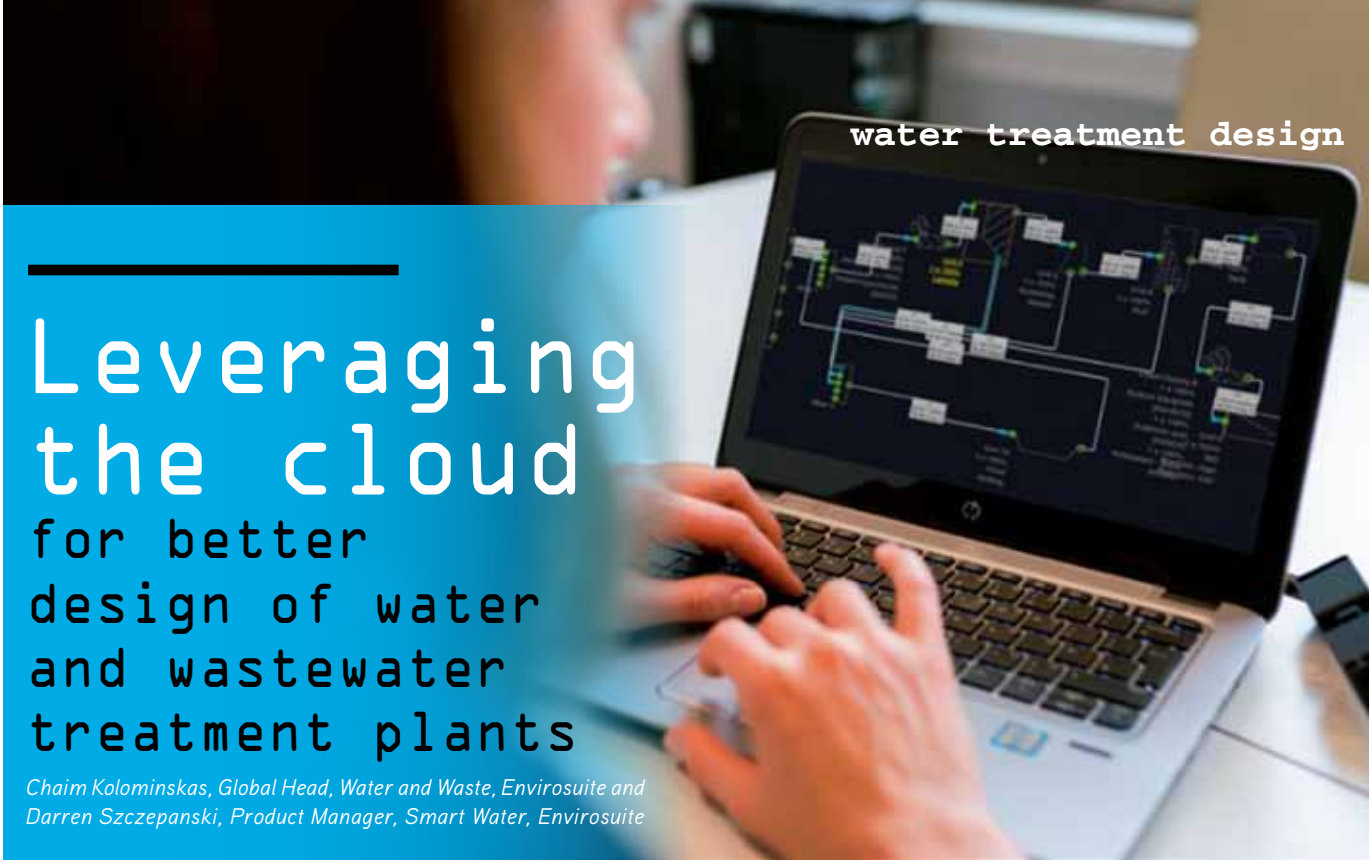
With the National Packaging Targets requiring industry to use an average of 50% recycled content in packaging by 2025, the demand for recycled content, especially food-grade plastic, is expected to grow significantly. Without local supply, brands will be forced to source packaging from overseas.

Licella CEO Dr Len Humphreys explained that advanced recycling in Australia can give food brands access to the food-grade recycled packaging they want, while giving Victoria an opportunity to lead the nation in creating a circular economy for plastics.

"We believe advanced or chemical recycling has an important place in the future circular economy for plastic, creating greater value and less emissions than waste to energy," Dr Humphreys said.

iQ Renew CEO Danial Gallagher further explained that advanced recycling would significantly increase the amount of plastic that can be recycled in Australia.

"Advanced recycling complements existing mechanical recycling, as it can process plastics that are difficult to recover mechanically, such as soft plastics, multi-layer packaging and plastic that has been degraded by repeated mechanical recycling," he said.



Leveraging the cloud

for better design of water and wastewater treatment plants

Chaim Kolominskas, Global Head, Water and Waste, Envirosuite and Darren Szczepanski, Product Manager, Smart Water, Envirosuite

For many years, the availability of integrated design and process simulation packages has not serviced industrial, reuse and drinking water plant designs as well as it has for biological treatment plants. Many engineers and designers still rely on manual, repetitive spreadsheet-based processes. When available, design packages are based on mathematical simulation products that have been repurposed from other industries, can be difficult to learn and are often designed for desktop PCs that are limited in terms of processing power, data storage and tools for collaboration. Emerging technologies for industrial water treatment and drinking water are often not covered at all.

Cloud-based products have the potential to deliver significant innovations to treatment plant design packages by leveraging on-demand increases in processing power and storage as well as the ability to work simultaneously on designs, work remotely and integrate workflow and audit trail capabilities that are critical in delivering effective designs.

Identifying the opportunity in drinking water and industrial water treatment design, Envirosuite, with a long history of delivering complex modelling solutions through cloud-based platforms, recently integrated an emerging and innovative technology in the process design market into its EVS Water Portfolio through an acquisition of AqMB, an emerging provider of design and digital twin solutions for the water industry.

"We recognised that there was a real need for better products in the industrial and drinking water design space," Envirosuite Global Head for Water and Waste Chaim Kolominskas said. "AqMB had embedded strong and deep technical knowledge in a product that serviced a clear gap in the market for engineers and designers of water and wastewater treatment plants, and Envirosuite has demonstrated success in delivering complex environmental modelling solutions that leverage the power of cloud computing around the world. We look forward to delivering this product to engineers and designers around the world over the coming years."

Cloud-based technology has allowed:

- More rapid integration of emerging models for water and wastewater treatment. Plant Designer covers nearly all current drinking water and industrial water treatment technologies and has recently integrated key treatment models for biological treatment. It is unique to see such broad coverage of treatment processes in the one product.
- The ability to simulate many models simultaneously. This has led to an innovative capability of 'automated optimisation' where 1000s of model scenarios are generated before the best fit for target performance is recommended. This leads to significant savings in design times.
- Easier integration and export of engineering deliverables such as equipment sizing, lifecycle costs, material and energy balances and stream properties leading to further design savings.
- Simultaneous design, review and audit trail capabilities facilitating much easier remote working and true collaborative process design.

Importantly, the cloud also makes integration of these deterministic models much easier into broader digital twin applications with the ability to process large volumes of real-time information, and couple with powerful data science and machine learning capabilities to deliver real-time and predictive management to water and wastewater treatment plants once they have been built.

"The cloud allows us to integrate deterministic models and machine learning approaches, which significantly improves forecast accuracy and speeds up implementation time compared to machine learning only approaches," Product Founder Darren Szczepanski said. "Having a deterministic model baseline also ensures that the model doesn't drift, giving our customers better confidence in the recommendations for optimisation.

"Having spent 20 years in the water sector, we recognised the caution that the water industry has for artificial intelligence only approaches and wanted to make sure that our products are always grounded in strong, leading science, and we think we've struck the right balance with this approach. The emergence of cloud computing has made that all possible."

EnviroSuite Pty Ltd

www.envirosuite.com

Using microalgae to make clean hydrogen

An international research team has used microalgae to produce hydrogen and methane with a significantly reduced carbon footprint.

The researchers, from Monash University's Department of Chemical Engineering, the IITB-Monash Research Academy Mumbai and The Indian Institute of Technology's Department of Chemical Engineering, used reactive flash volatilisation (RFV) gasification technology on microalgae to produce hydrogen — a process reported to reduce greenhouse gas emissions by 36% compared with steam reforming of methane gas, which is the current best practice for hydrogen production.

RFV is a gasification process that uses oxygen and steam that converts biomass or fossil fuel-based carbon materials into gases. Published in the *Journal of Cleaner Production*, the researchers performed the RFV of microalgae using temperatures ranging from 550–650˚C using steam as the gasifying agent. This meant the dewatering or drying of microalgae wasn't required and significantly reduced energy consumption.

It is estimated that if additional renewable energy processes such as hydro-electricity were integrated with the researchers' hydrogen production process, carbon emissions could drop by as much as 87%.

Microalgae production does not currently meet commercial demand; however, microalgae cultivation for energy applications could provide additional revenue streams for rural communities, potentially making them self-sufficient, the researchers say.

"Hydrogen and methane are clean sources of fuel and green chemical synthesis only if they are produced from renewable resources. At present, 96% of hydrogen and all methane is produced using non-renewable resources," research co-author Associate Professor Akshat Tanksale, from Monash University, said.

"Microalgae as a feedstock is attractive due to its high carbon dioxide fixation efficiency, growth rate, photosynthetic efficiency, ability to grow in brackish water — like rivers and lakes — and the ability to cultivate it on land not suitable for agriculture.

"Water and renewable electricity integration with microalgae harvesting can bring down the costs and increase the sustainability of hydrogen production from this process."

Dr Yogendra Shastri from the Department of Chemical Engineering at IITB-Monash Research Academy Mumbai said climate change concerns have led to an increasing push for cleaner energy options, and microalgae could be a potential candidate to produce renewable fuel.

"Hydrogen is acknowledged as clean fuel since it doesn't lead to the emission of greenhouse gases when used. However, the production of hydrogen also needs to be sustainable," Dr Shastri said.

"Biodiesel production from microalgae is limited due to low lipid extraction efficiency — less than 20% — and the high cost of microalgae harvesting and drying.

"Furthermore, microalgae-based hydrogen and methane production haven't yet been commercialised due to expensive pre-treatment, such as harvesting, drying and lipid extraction; low carbon conversion efficiency; and tar accumulation."

Using India-based JSW Steel (the funding agency for this research) as a case study for their source of CO_2 for microalgae cultivation, the research team estimated just under 12,800 kg/h of microalgae would be available for hydrogen production at a rate of 1240 kg/h.

While the costs to develop infrastructure to cultivate microalgae and then refine it into hydrogen and methane are expensive, the overall return on investment in the long term could make hydrogen and methane cost-effective and environmentally friendly fuel sources.

"Assuming a market price of $10/kg for hydrogen compressed to 700 bar pressure, the payback period for hydrogen production was 3.78 years with nearly 25% investment return. Moreover, the life cycle climate change impact was 7.56 kg of carbon dioxide for every kilogram of hydrogen produced," Dr Pratik Gholkar, research student at IITB-Monash Research Academy Mumbai, said.

"This is an exciting look into the resources and technology available to the world in our quest to reduce the use of fossil fuels and drastically cut the amount of carbon emissions."

Pollution-eating pavers improve air quality

So-called 'pollution-eating' pavers with the ability to significantly improve surrounding air quality have arrived on the Australian market.

The extraordinary technology was developed by Italian concrete company Senini, which was looking to create a self-cleaning concrete product to protect buildings and masonry pavements from the ravages of pollution, mould and lichen.

The manufacturers discovered that the self-cleaning EcoTop pavers displayed remarkable pollution-eating properties as a surprising by-product. Mixing the hi-tech cement — now branded as TxActive — with titanium dioxide accelerated a breakdown of pollutants when exposed to sunlight or UV rays. The pavers generate a photocatalytic process that replicates the way trees naturally exchange noxious pollutant gases and carbon dioxide from the atmosphere, turning them into pure oxygen.

According to Senini AP (Asia Pacific) CEO David Autengruber, paving an area of 1000 m^2 with EcoTop pavers is equivalent to planting 80 deciduous trees with the same air-cleaning impact on the environment.

"It sounds hard to believe, but worldwide experience and testing has shown over and over again that it really does work and significantly reduces air pollution," he said. "Given the enormous health impacts of air pollution, this photocatalytic reaction of the pavers and its benefits should be really exciting news for the Australian construction industry."

Autengruber said European and American authorities found that the EcoTop range of pavers reduced pollution in treated areas by 20–70%, dependent on the amount of sunlight they were exposed to.

"Another benefit of the pavers, particularly for the Australian market, is that through surface 'hemispherical emissivity', they also significantly reduce heat absorption, having great solar reflective values. Typical stone pavers can reach 50–60˚ on the surface, during a hot Australian day, whereas the EcoTop pavers will keep surface temperatures down to around 30˚ in the same conditions," he said. "That's a huge benefit given our sometimes unrelentingly hot climate.

"I really believe this 'climate neutral' technology and its benefits are just too good for the Australian construction and infrastructure sectors to ignore any longer."

MyTown Microgrid:

establishing a community model for sustainable energy

A microgrid feasibility project in Heyfield, Victoria, is combining smart technologies with intensive local engagement to design a more sustainable and equitable local energy model.

The MyTown Microgrid will see the community, leading researchers and Australian businesses working together to find the best way for the town to access cleaner, more affordable and more reliable energy. Hundreds of households, and dozens of businesses and local schools, will contribute to the three-year study via energy audits, real-time monitoring and control, data sharing and analytics, public displays and teacher-led online activities for students.

Local energy systems such as microgrids are being explored by communities as part of the transition to a distributed and digital renewable energy future. The aim is to match energy supply and demand within a defined area, such as a town or a campus, seeking benefits including lower energy costs as well as cleaner and more reliable energy supplies for residents and businesses.

The project is being led by the Heyfield Community Resource Centre (HCRC), Wattwatchers Digital Energy and the University of Technology Sydney (UTS), with $1.8 million in funding from the Commonwealth's Regional and Remote Communities Reliability Fund and additional financial support from the Victorian Government's Latrobe Valley Authority (LVA).

This is not the first time that Heyfield has put itself on the map when it comes to community-led action for cleaner energy and carbon reduction, having drawn national attention a decade ago with its Sustainable Smart Town 'Flags' program, which won recognition from the United Nations Association of Australia in 2012.

"We have a fantastic community that really cares about each other and wants the best for their children and grandchildren," Julie Bryer from the HCRC said. "This project will make a really big difference and helps build on the sustainability initiatives that we've been running here over the last decade."

A science and technology-based approach

MyTown Microgrid combines a community-led approach with the latest Internet-of-Things (IoT) technology and data science techniques. Hundreds of energy IoT devices will be offered to residents, schools and businesses in the town, in tandem with deep-dive audits to profile how Heyfield uses electricity.

Wattwatchers Program Manager Tim McCoy has noted strong demand from the community to participate in the data collection phase of the trial.

"We've seen really strong interest from members of the Heyfield community to engage in the project and their energy future by installing devices in their homes or businesses. The state-of-the-art Wattwatchers devices will gather real-time energy use and generation to help form a bigger picture of Heyfield's energy needs," he said.

The project seeks to create the tools and resources to make it easier and faster for other communities around Australia to replicate and understand whether a microgrid makes sense for them, including assessing alternative local energy solution models.

Research lead Dr Scott Dwyer, from UTS's Institute for Sustainable Futures, said there are many options for communities looking to more sustainable ways of sourcing their energy.

"Navigating a path through these can be extremely challenging for towns like Heyfield. What technologies and partners should they choose? What business model is right for them? How can you ensure the benefits are equitably shared within the community? Faster and easier ways for understanding, designing and implementing microgrid technologies are needed for interested communities, and this project will take us a step closer to achieving this."

OPTIMISE AND AUTOMATE YOUR WATER NETWORK — ANYWHERE, ANYTIME

Maximise data transparency with Netilion Water Network Insights

The water industry has undergone enormous changes in the past 20 years. To ensure plants and networks kept running safely, a large team of operations staff was the norm to carry out such time-consuming tasks as manual measurements.

Today we are mainly able to operate assets remotely, which is a boon to productivity, accuracy and efficiency. However, many areas are still unable to retrieve valuable data from their remote assets. This may include the monitoring of flow volume, water quality, level and pressure, amongst others.

Planning and implementing large-scale remote monitoring solutions isn't simple, and there are many aspects to consider at every layer. At the first layer, sensors must be accurate and low maintenance. Communications to upper layers where data management and analytics are present should be secure, reliable and able to handle large distances between network locations. At the top layer, the data analytics system must crunch vast volumes of data, define patterns, perform forecasts and eventually make decisions. Finding a single system provider with expertise in all of these layers is rare.

Endress+Hauser has developed an innovative, cloud-based monitoring solution for the comprehensive optimisation of water networks. Netilion Water Network Insights (NWNI) connects all levels of a water network and offers tailor-made solutions from a single source. These include everything from field instruments, components for data transfer, data archiving and data evaluation, and forecasting functions. NWNI provides complete data transparency enabling network operators to make informed decisions and improve operational efficiency.

Decentralised processes monitored remotely and securely

NWNI enables users to have complete access to all measurement data gathered in a water or wastewater network. By transferring to the cloud, data can be accessed at all times and locations — whether you're in a control room, on a laptop or even a smartphone. Be it water volume, pressure, level or analytical parameters, the powerful web-based visualisation available with NWNI gives the user complete transparency. In case of failures or if limit values are exceeded, early warnings can be configured and automatically sent via email or SMS. NWNI offers a range of freely customisable charts, tables and reporting options to understand your data. By incorporating additional data sources such as weather, it is also possible to create trend analyses and forecasts. For example, using run-off behaviour during heavy rainfall to predict water demand and expected availability. We work with our customers to ensure that valuable data is transferred securely with high-level encryption features.

NWNI for drinking water networks — ensuring water quantity and quality

Water network distributors carry great responsibility. They must ensure that drinking water is distributed in sufficient quantity and quality for local households, trade and industry — whereby both peak times and average daily demand must be reliably covered. This often requires time-consuming maintenance of remote infrastructure. With NWNI, you can reduce the frequency of routine checkup tours by providing remote access to essential process variables, e.g. water quantity, quality and pressure. This reduces operating costs and increases safety for both the public and network operators, who are no longer required to travel to remote sites as often.

NWNI for wastewater networks — maintaining environment compliance

Municipal, industrial or commercial wastewater is often contaminated. Wastewater treatment plants provide a sufficient level of treatment before discharge into the environment. Strict pollution guidelines must be met prior to release to ensure downstream environments are not polluted. This generally involves the monitoring of inflow, effluent and water quality. In addition, these parameters can be remotely monitored in wastewater networks to identify illegal pollution events or initiate early warnings to downstream treatment plants. For all of these options, NWNI can provide monitoring solutions to maintain round-the-clock access to field data.

Increased sensor reliability with remote verification

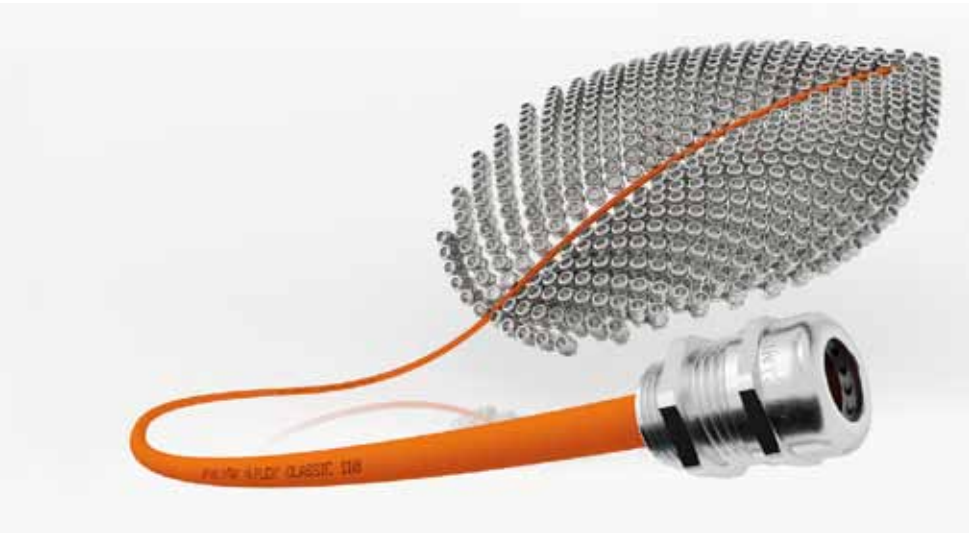
The success of any remote monitoring solution hinges on the reliability of data — accurate readings are required to make informed decisions. For custody transfer applications within district metered areas (DMAs), the slightest inaccuracies in flow measurement can cause massive shortfalls in annual billing — both for suppliers and consumers. Re-calibration of flowmeters in an online process isn't realistic due to the huge costs involved. Alternatively, flowmeter verification is commonly used to verify meter functionality, though this normally requires a site visit. With Heartbeat Technology, online verification can be performed at the push of a button, enabling compliance without interrupting the process. Combining Heartbeat Technology with NWNI, we can view verification results remotely and securely store them for future reference.

Whether in densely populated or remote regions, NWNI ensures full transparency in water and wastewater networks around the clock, allowing you to make informed decisions to improve the efficiency of your network operations.

FIND OUT MORE: https://eh.digital/waternetworks_au

Endress+Hauser Australia Pty Ltd
www.au.endress.com

Endress+Hauser



LEAD-FREE CABLE GLANDS

LAPP's lead-free brass cable glands are designed to help ensure manufacturers, machine builders, and production automation engineers and operators achieve compliance with current and forthcoming global sustainability requirements. The offering of cable glands in a lead-free brass version is in response to increasing restrictions on lead use.

Initially, the most popular LAPP cable glands will be available in the lead-free version, with first products including the SKINTOP MS-M and MS-SC-M models, as well as the counter nut SKINDICHT SM-M SKINTOP MS-M, which is used in a wide range of applications in machine and plant construction, measurement, control and regulation technology, and where there are tough demands in terms of mechanical and chemical stability. The SKINTOP MS-SC-M EMC cable gland, with highly conductive, flexible EMC contact spring, has a low-resistance screen contact for EMC-compliant earthing of the braided shield. All of these versions are available in metric sizes M12 to M63. Further product groups are gradually being supplemented with lead-free versions.

LAPP laboratory and external testing institutions have confirmed that the properties of the latest products are comparable with the current versions. This applies to the mechanical properties, corrosion resistance and EMC properties. The lead-free versions also comply with protection class IP68.

LAPP Australia Pty Ltd
lappaustralia.com.au

PRESET FLUID REGULATOR

In applications where health standards are rigorous, the use of lead-free materials is an increasing priority. The Protect-Air EcoReg preset fluid regulator is made of the synthetic material Grivory GV-5 FWA and high-quality stainless steel, making it suitable for applications in areas such as drinking water, the food industry and medical industry. Grivory GV-5 FWA conforms to the DIN 50930-6 / FDA/EU drinking water directives and is FDA certified.

Drinking water is considered the most vital element for life next to air/oxygen. Since there is no alternative to this finite resource, protecting and securing the standard and quality of drinking water is a top priority for engineers, planners and technicians as well as system operators.

The EcoReg fluid regulator is an independent diaphragm pressure regulator that can be installed in all fluid systems. It ensures a constant and precise output pressure independent from the input pressure. The pressure value is factory set and cannot be changed, ensuring that no-one can manipulate the specified pressure.

Particularly important for liquid dosing machinery, the EcoReg inline fluid regulator can protect all downstream installations, devices and components by ensuring the correct operating pressure and preventing expensive loss of production.

Compressed Air Australia Pty Ltd
www.caasafety.com.au

Six Green Stars for La Trobe sports stadium

The Green Building Council of Australia (GBCA) has awarded La Trobe University's new sports stadium a '6 Star Green Star Design and As Built' rating for sustainable building practice. The stadium is reported to be Australia's first sports building to achieve such an accolade.

The stadium — built as part of stage 2 of La Trobe's Sports Park development — is a key component of the university's plan to transform its Melbourne Campus in Bundoora into a University City of the Future.

The stadium features include:

- 1104 470 W solar photovoltaic panels on the roof, capable of generating about 724,000 kWh power each year. This is enough to meet the entire stadium's electrical demand with a surplus that will also provide renewable energy to the rest of the campus for net positive operation.
- Structural design that significantly reduces embodied carbon (the greenhouse gas emissions generated upfront to construct the building), with a 15% reduction demonstrated due to the structural efficiency of the court design.
- The percentage of accredited, sustainable building products — including furniture, flooring and ceiling panels — exceeds the GBCA's criteria, achieving innovation points.
- Water-efficient fixtures and controls with rainwater capture and reuse.
- Native landscaping, natural ventilation, local procurement, water-sensitive urban design, an integrated waste management plan, green groundskeeping operations and a white roof that reflects the sun to reduce the urban heat island effect.

Professor Russell Hoye, La Trobe Dean School of Allied Health Human Services and Sport, said the state-of-the-art stadium had transformed students' experiences and was a valuable community asset predicted to have more than 10,000 visitors a week.

"The La Trobe Sports Park is now home to 26 sports clubs, the Northern Football Netball League, Softball Australia and Softball Victoria, and planning is underway to become home base for the Matildas, Football Victoria and Rugby Victoria," Professor Hoye said.

"We're very proud of the fact that we've been able to create this incredible facility while remaining true to La Trobe's values of being sustainable, protecting our environment and aiming to achieve net zero carbon emissions by 2029."

Professor Hoye thanked partners for their contribution to the complex: Banyule City Council; architect Warren & Mahoney; builder ADCO; project manager TSA Management; ESD consultant Arup and service designers Stantec.

Completed in January 2020, the facility includes an indoor stadium with six multipurpose highball courts, a teaching and research building with world-class sport science and analytics research laboratories, and office space for commercial tenants.

More about Green Star

Green Star is an internationally recognised sustainability rating system for the built environment. There are different Green Star rating tools, and the 'Design and As Built' rating guides the sustainable design and construction of schools, offices, universities, industrial facilities, public buildings, retail centres and hospitals.

All newly constructed buildings at La Trobe are certified at a minimum rating of 5 Star Green Star under the GBCA's building rating system.

TSA accredited by Australian Government

©stock.adobe.com/au/Kirill Gorlov

Tyre Stewardship Australia's National Tyre Product Stewardship Scheme (TPSS) has been recognised as best practice product stewardship by the federal government as part of the Product Stewardship Centre of Excellence. The accreditation was further bolstered by significant funding to increase resource recovery associated with the off-the-road sector and expanding the TPSS to include conveyor belts.

TSA CEO Lina Goodman warmly welcomed the announcement by The Hon Sussan Ley MP, Minister for the Environment, saying it would provide confidence to consumers and industry that the scheme's positive environmental and human health outcomes had been independently verified.

"We're really pleased to have been given the Australian Government's stamp of approval for the scheme under the new Recycling and Waste Reduction legislation. It will help drive stronger procurement policies so more Australians view the waste we create as the valuable resource it is."

Australia generates the equivalent of 56 million end-of-life passenger tyres (EOLT) annually. While 72% is re-used, recycled or upcycled, 28% of the volume is still disposed to landfill, buried or stockpiled.

"TSA's mission is to deliver against circular economy principles, ensuring the lifecycle of tyres is maximised, the residual waste product is valuable and the entire supply chain works cohesively to contribute to better sustainable outcomes," Goodman continued.

"Through its initiative, TSA has committed more than $6 million nationally to find innovative ways to manage the used tyres generated in Australia for greater productive outcomes.

"Our Foreign End Market (FEM) verification program is the only global platform aimed at verifying that Australian-generated end-of-life tyres are not causing environmental or social harm at their final destination.

"But while there is an incredible amount of goodwill, the government's accreditation will allow us to do more to address the issue of what I call 'free riders' — those organisations currently selling tyres into the Australian market, but not taking responsibility for them.

"This accreditation will help TSA expedite the markets, funding and solutions associated with EOLT."

Tyre Stewardship Australia Limited
www.tyrestewardship.org.au

Design that turns peanut waste into packaging

The Australian Institute of Packaging (AIP) entered seven Monash student teams into the global WorldStar Student Awards. Of the seven submissions all were recognised with one team winning a Silver in the Sustainable Packaging Design category.

The winning silver team of Caterina Palma, Sherlyn Marvella and Tamanna Kibrea were from the New Frontiers Program at Monash Food Innovation (MFI). They partnered with energy ball food company Camel and developed a sustainable packaging from peanut shells/hulls — a major by-product in its peanut manufacturing process. This by-product, or waste, traditionally headed straight to landfill or was burnt, adding to atmospheric CO_2.

Using 30% peanut husks in the production of fibreboard food packaging, the students saw this as a means of valorising food waste and aligning the compostable packaging with the food, which is organic, vegan, no added sugar or preservatives.

"We are very pleased to receive the silver award for sustainability. To have our concept judged and recognised on the global stage makes all of our hard work and ambitions for packaging in the future worth it," Palma said.

"This award means that new innovative sustainable product packaging is being recognised now. We are excited to see our peanut by-product fibreboard concept potentially being introduced and used in the future of sustainable packaging."

The MFI program sees SMEs partnered with a dedicated student team for 10–12 weeks working on a business challenge in food, beverages, market analysis, new product development and packaging. Over the duration of the program participants learn MFI innovation methodologies to explore value propositions, markets, knowledge mapping, product mapping and ideation to provide leading innovative solutions for their partnered SME.

MFI's Design Manager, Adam Norris, said the program helps students to partner with industry to develop real-world outcomes outside of their studies, and propels them into employment.

"Through the Australian Institute of Packaging (AIP) and the WorldStar Student Awards, our students have a unique opportunity to have their industry partnered work displayed and recognised on a global platform."

8-star townhouse development in Melbourne

A disused bus repair shed has been transformed into a medium-density 8-star townhouse development located on Wurundjeri Country adjacent to the bushy parklands of Merri Creek, Northcote Place in Melbourne, Victoria.

The 12,000-square-site has 74 townhouses designed to achieve an overall NatHERs rating of 8 stars and landscaping featuring 80% indigenous species and designed as habitat for local fauna and flora to complement local regeneration initiatives. Shared public/private spaces are integral to the design, with the development featuring a community garden, widespread street furniture and a central mews for pedestrians and cyclists.

Northcote Place was born of an unusually close collaboration between Metro, Akas Landscape Architecture, SDC (Sustainable Development Consultants) and ClarkeHopkinsClarke Architects, a carbon-neutral practice and one of Australia's largest architectural BCorp.

Metro General Manager David Steele said the project was designed pre-pandemic but delivers the kind of environmentally and socially connected 20-minute neighbourhood that Melburnians, in particular, have called for since experiencing the COVID-19 lockdowns.

"Eight stars is a tangible measure of energy efficiency that's resonating with Northcote buyers because they're ESD-focused," Steele said.

SDC Director Ben De Waard said he knows of no other 8-star townhouse developments in Australia at this scale offering such holistic sustainability. "What's a first here is the scale and the number of different sustainability elements Northcote Place brings together," De Waard said.

The development's sustainability elements include: high energy ratings, rainwater tanks connected to both toilets and laundries, a community vegetable garden, an electric-only option for people to be gas-free and the townhouses are ready for solar car charging battery storage.

Northcote Place townhouses have sliding doors at the bottom or top of the staircase at each level, which act as an airlock that stabilises air movement and increases comfort, and this element has helped to push the project's overall energy rating from 7 to 8 stars.

ClarkeHopkinsClarke Multi-Residential Associate Janice Tan said other key design features include triple- and double-glazed thermally broken windows carefully placed for maximum effect.

"We've also used robust materials with high ESD values, north-facing living areas, cross ventilation, large eaves, ceiling fans in all bedrooms and living areas, solar power, rainwater tanks, large terraces, gardens and shared outdoor spaces designed as habitat, not decoration," she said.

Landscape design by Akas has used an 80% indigenous plant palette and meshed that in with 10% natives, 10% exotics and local rock to reflect the local ecology and invite native fauna and flora into the site.

ClarkeHopkinsClarke Partner Toby Lauchlan said Northcote Place is conceived as habitat not just for flora and fauna but for residents and neighbours. "We've designed these homes, gardens and shared spaces as a micro community that reflects local values, connects local ecology and bike paths, gets better with age and creates an exemplar of contemporary community design."

ClarkeHopkinsClarke Architects
www.chc.com.au

SMART PRESSURE-SENSING TECHNOLOGY FOR REDUCING WATER LOSSES

Many countries around the world are suffering from droughts that have lasted for several years. One would think that in such situations especially people would use water resources wisely, if for no other reason than a sense of self-preservation.

The fact is, however, that as much as 60% of the water supply in major cities like Cairo, Nairobi and Mexico City was lost to pipeline leakages in 2010. While the losses in European countries range from less than 10% to 25%, it still represents a major waste to the energy and environment. Locally, non-revenue water losses in the past five years average approximately 10% of the utilities' input, according to the report published by the Bureau of Meteorology. It can only be hoped that these numbers have declined in light of recent efforts to improve the situation.

Most of the losses are due to outdated water distribution networks. Water losses generally occur when burst pipes go undetected or when cracks form in pipes, although leaky taps are also a frequent cause. This constant dripping in numerous households is hard to identify, and the losses tend to become apparent only after comparisons are made between water supply figures and the water consumption data registered by meters. Local governments often have no other choice but to pay the cost differences or pass them on to consumers. Even in a small water distribution network, a loss reduction of just a few per cent can lead to savings of tens of thousands of dollars. It is therefore advised to invest in intelligent measurement technology, without which it is virtually impossible to detect water losses at an early stage.

One company that offers such measurement technology is i2O, which links together sensor heads from KELLER to create smart network solutions. Here, pressure transmitters provide accurate measurements for relevant points in the pipeline network. The network management system sends the processed data in predefined intervals to various nodes, which then forward the data to a control centre. The control centre analyses the data, identifies anomalies and then looks for the causes. Control parameters can be adjusted remotely if necessary. Teams of technicians only have to be sent out if defective components need to be repaired.

Due to the success with this application, KELLER formed a partnership with i2O to develop a new range of i2O pressure loggers. The new loggers needed to have a very compact design and to be highly accurate and easy to install and remove. A transmitter that met the same requirements was therefore also needed, which is why i2O got in touch with KELLER right from the beginning.

The KELLER 20D OEM pressure transmitter was able to meet key requirements here: the digitisation of the measurement values is managed by a microchip integrated directly into the pressure sensor. The logger can read out the pressure values directly from the transmitter via the I²C bus interface. There's no need for an additional electronic circuit, which saves a lot of space.

The pressure connection was equipped with an additional quick-release coupling especially for the i2O application, and the housing was also made more compact. Specialised calibration by KELLER was required in order to achieve the high-accuracy measurement, which was to reduce the total error band as compared to the standard product from 0.5% to 0.2% full scale.

Bestech represents KELLER products in Oceania. We have worked with numerous organisations to offer accurate, reliable and affordable smart pressure measurement technology. Those who utilise these smart solutions can therefore quickly repair damages in a targeted manner while simultaneously conserving a valuable resource — and saving a substantial amount of money in the process.

Bestech Australia Pty Ltd
www.bestech.com.au

BESTECH
Sensors & Teaching Equipment

Is it time to refocus
the industrial energy auditing process?

Nathan Rogers, Sustainability Leader at Lycopodium Process Industries

Energy auditors are entrusted to provide recommendations towards efficient energy use, upgrades and alternatives, but too often have a blind spot when it comes to auditing the industrial processes on which manufacturing plants rely.

Conversely, industrial plant operators seek efficiency gains to get the most out of their facilities and operations, but it's impossible to expect that they are fully acquainted with cutting-edge energy efficiency developments to make appropriate recommendations/changes.

These overlapping limitations point to arguably the largest currently untapped opportunities for energy efficiency and energy management improvements in industry. Operational and technical complexities within industrial/manufacturing facilities are, by their nature, not well serviced by the majority of energy engineers when conducting audits. Allowing an external consultant into a process plant to recommend changes requires a level of trust be placed in the auditor's abilities and the majority of consultants who are experienced energy auditors are not sufficiently technically capable of providing a meaningful assessment of the main processes that such companies are operating. This trust-versus-capability conundrum for plant operators means that there are still vast opportunities for the right consultant to gain access to some of these more complex facilities and help improve energy management.

I still remember my first job as a graduate process engineer, when an engineer with 10 years' experience (all at this particular company) mentioned to me he only had recently gained the trust of the operations team to make changes to the process. This doesn't bode well for a completely unknown auditor to even get access in the first place.

Take this example from a recent webinar I attended for operations and engineering managers on the benefit of energy efficiency for industrial facilities. One attendee from a manufacturing company raised the issue of being unable to find the right technically capable consultant. They shared an experience of engaging an energy auditor onsite a decade ago, who recommended little more than to change the lights. This experience meant the manager was hesitant to request another audit, unable to see the value, particularly as the team felt it already had a good understanding of the site, the opportunities and the economic circumstances better than any consultant could.

There are undoubtedly technically capable energy auditors — albeit not necessarily easy to find — who are able to provide a meaningful energy audit of an entire facility. Unfortunately, bringing together client and consultant and having the right framework for them to collaborate effectively is the issue. Having a more rigorous certification process developed to help industry identify which consultant is the best candidate technically for their site is one solution. There are already some short courses and a special subsection of the AS3598:2014 Energy Auditing standard available, but these do not take the place of an experienced process engineer's unique understanding and skills when assessing plant upgrade technical requirements.

Generally, the experienced engineer onsite, or a trusted engineer from an engineering consultancy with more traditional process engineering roots, would be asked to conduct process optimisation work. Unfortunately, this approach does not include the very important tie-ins and knowledge of the broader energy efficiency and energy management industry that exists outside the bubble of a single specific site. The answer lies in finding a consultancy able to incorporate process industry technical know-how with energy management industry experience, though such a crossover is a rarity.

This full-service approach can provide further improvements in process optimisation, production nameplate capacity, water, raw material use and pollution/carbon emissions/waste product mitigation opportunities, all of which invariably flow from attacking the main process itself rather than only assessing auxiliary services and built environment. The combination of these improvements adding multiple economic benefits also improves the chances of energy improvement projects being successfully implemented, as the business case improves with every resource-saving opportunity.

Is it time for a more rigorous look into the opportunities and barriers to action that the more complex industrial facilities face when commissioning an energy audit? The answer is invariably yes. The solution might just be getting the right people in the room with the right mix of skills and experience.

Lycopodium Process Industries Pty Ltd

www.lycopodiumprocess.com.au

SUSTAINABLE COMPRESSED AIR GENERATION IS KEY TO INDUSTRY FUTURE

With a large percentage of Australian manufacturing, processing and engineering industries relying on compressed air to power their production and pressure tool lines, yesterday's conventional air compressors simply use too much energy input to meet demand.

Compressed air operators need to look to new compressor technologies that can maintain or increase demand output whilst lowering the input energy costs. In most cases the savings can more than pay for the capital investment in new machinery over a relatively short time. Power consumption is a significant cost throughout the life of a compressor; therefore, it is important to consider the life cycle cost of a compressed air system when evaluating productivity improvements.

Kaishan Australia, as a member of the global Kaishan group, are at the leading edge of the latest air compressor technologies that have revolutionised the energy input/air power output ratios well in favour of industry sustainability for years to come.

PMV rotary screw compressors

The newest world-class initiative is Kaishan's Permanent Magnet, Variable Frequency (PMV) technology that combines integrated systemic optimisation of the compressor unit with an advanced permanent magnet motor, SKY airend and rapid response, variable speed drive. This results in the smaller, permanent magnet, synchronous torque motor needing far less energy input to drive a highly engineered, efficient compressor whilst generating greater output than equivalent conventional compressors.

Rare Earth Technology gives the permanent magnet motor superior energy efficiency compared to conventional induction motors. PM synchronous torque motors provide faster acceleration and deceleration, a great advantage in compressor applications as they can rapidly vary output to match application demands.

The integral Variable Speed Control means the compressor only operates at the level of immediate demand, reducing both input energy needs, machine wear and tear and maintenance requirements. These highly advanced air compressors deliver world-class efficiency and performance in a heavy-duty unit that ensures superior durability and reliability. Innovative design and precision engineering integrates the latest compressed air technologies to achieve energy standards exceeding international expectations.

Advanced 2-stage rotary screw compressors

Kaishan 2-Stage Industrial Rotary Screw Air Compressors provide the latest cutting-edge technology to provide the operating power for major industries around the world. With capacities from 18.5 to 400 kW, krsp 2-Stage air compressors are designed and engineered to provide maximum air output, whilst saving on input energy bills. Combined with variable speed control, savings of more than 50% over conventional compressors can be achieved.

A reflection of the proven reliability and performance of these robust machines is the offering of Kaishan's unique lifetime warranty* on the airends in their complete range of krsp rotary screw compressors.

Advanced Energy Saving Technology is also built into the company's range of compact compressors for small industry and workshop applications including Tank Mounted Rotary Screw and Scroll 'Orbital Technology' models.

Kaishan Australia Pty Ltd
kaishan.com.au

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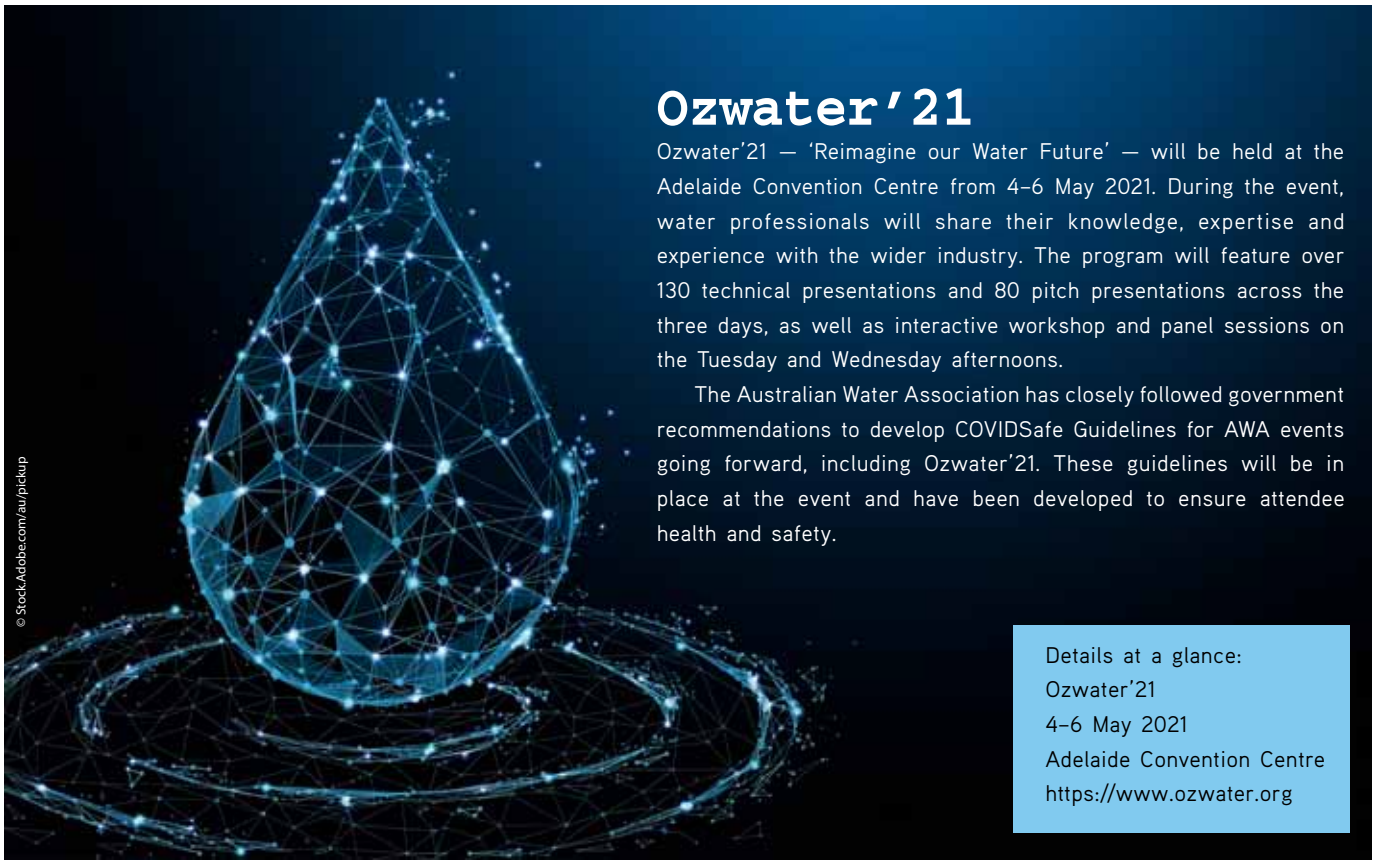

Ozwater'21

Ozwater'21 — 'Reimagine our Water Future' — will be held at the Adelaide Convention Centre from 4–6 May 2021. During the event, water professionals will share their knowledge, expertise and experience with the wider industry. The program will feature over 130 technical presentations and 80 pitch presentations across the three days, as well as interactive workshop and panel sessions on the Tuesday and Wednesday afternoons.

The Australian Water Association has closely followed government recommendations to develop COVIDSafe Guidelines for AWA events going forward, including Ozwater'21. These guidelines will be in place at the event and have been developed to ensure attendee health and safety.

Details at a glance:
Ozwater'21
4–6 May 2021
Adelaide Convention Centre
https://www.ozwater.org

Coming to terms with sustainability

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Net zero, carbon neutral, carbon negative and positive – what do they mean exactly?

When it comes to sustainability terms and climate change, there are numerous 'buzzwords' and phrases used to describe organisations or buildings that are energy efficient and use renewable energy sources to reduce or eliminate emissions. The most popular sustainability term is of course 'net zero emissions', which has been widely popularised since the Paris Agreement in 2015 where many governments have formalised their commitment to achieve net zero emissions by 2050.

There are, however, many other terms used that are related to net zero but mean something else entirely different. This has led to much confusion to those not familiar with all the nuanced variations and concepts. In this article, we have compiled definitions and meanings of some of the most commonly used sustainability terms.

Sustainability terms and their meanings

Net zero emissions

Net zero emissions refers to achieving an overall balance between greenhouse gas emissions produced and greenhouse gas emissions taken out of the atmosphere. Think of it like a set of scales: producing greenhouse gas emissions tips the scales, and we want to get those scales back into balance with no new greenhouse gas being added to the atmosphere in any given year. Eventually, we will probably need to tip them the other way to repair past harm.

Net zero describes the point in time where humans stop adding to the burden of climate-heating gases in the atmosphere.

The concept of net zero emissions is akin to 'climate neutrality'.

Low carbon

Low carbon means an organisation/building is highly energy efficient and partially powered from on-site and/or off-site renewable energy sources.

Low carbon is often used to describe an economy, organisation or building whose power needs are derived not primarily from carbon-intensive sources such as fossil fuels but from 'cleaner' or less carbon-intensive energy sources, such as wind, solar and hydroelectric power. Other forms of clean energy include, for example, wave power and geothermal, which are technically feasible but less common than wind or solar. Biofuels can play a role, but they may be viewed as fuel substitutes rather than a clean technology.

Net zero carbon

On the other hand, an organisation/building that is highly energy efficient and fully powered from renewable energy sources may be considered a 'net zero carbon organisation/building'.

Zero carbon

Zero carbon — also known as carbon zero — means that zero carbon emissions are being produced from a product/service, for example, zero-carbon electricity could be provided by a 100% renewable energy supplier. This term describes an activity where no carbon was produced in the first place.

Net zero energy building

A net zero-energy building (NZEB), a building with zero net energy consumption, meaning the total amount of energy used by the building on an annual basis is equal to the amount of renewable energy created on the site. Net zero energy building is often interchangeable with net zero carbon building, zero energy building (ZEB) and net zero building (NZB).

Zero energy campus/portfolio/community

An energy-efficient campus /portfolio/community where, on a source energy basis, the actual annual delivered energy is less than or equal to the on-site renewable exported energy.

Net zero carbon emissions vs net zero GHG emissions

Net zero GHG emissions can be confused with net zero carbon emissions, but when accurately used, net zero GHG emissions means all greenhouse gas emissions decline to zero, as opposed to just carbon dioxide. This is the same concept as net zero carbon emissions but conveys a net zero emissions target for CO_2 and all non-CO_2 gases.

Carbon neutral/carbon neutrality

Carbon neutral is a term used to describe the state of an entity (such as a company, service, product or event), where the carbon emissions caused by them have been balanced out by funding an equivalent amount of carbon savings elsewhere in the world. This is often achieved through funding climate-beneficial projects to make up for the greenhouse gases they emit. Such outside projects used as mitigation for greenhouse gas emissions are commonly called "offsets", since they're used to offset the emissions of the person or company who buys them.

Carbon neutral vs net zero emissions

As previously mentioned, carbon neutrality is akin to net zero emissions. While carbon neutrality is considered a synonym for net zero carbon emissions, one key difference, however, is carbon neutrality can be achieved at the domestic level with offsets from other jurisdictions, while net zero emissions does not have the same connotation (though theoretically could be met via offsets).

Carbon negative

The reduction of an entity's carbon footprint to less than neutral, so that the entity has a net effect of removing carbon dioxide from the atmosphere rather than adding it. Becoming carbon negative requires a company, sector or country to remove more CO_2 from the atmosphere than it emits — see also Carbon positive.

Climate positive

Carbon negative and climate positive are interchangeable terms: climate positive means that an activity goes beyond achieving net zero carbon emissions to actually create an environmental benefit by removing additional carbon dioxide from the atmosphere.

The benefit of climate positive initiatives is the spillover benefits they create for other people, companies, or localities that may not have the means or initiative to reduce their own carbon footprints. Ideally, carbon neutrality will become the eventual standard across the board, climate positive initiatives can, in the meantime, help pick up some of the slack.

Carbon positive

A carbon positive building takes this a step further, producing more energy than it needs and feeding that energy back into the grid.

Carbon positive moves beyond carbon zero by making additional 'positive' or 'net export' contributions by producing more energy on site than the building requires and feeding it back to the grid. Carbon positive projects can make significant contributions by helping to address the carbon intensity and damaging impacts of past building practices and lifestyles, and by offsetting situations where carbon zero buildings are not possible.

Carbon positive is mainly a marketing term, and understandably confusing because it is sometimes how organisations describe 'carbon negative' and 'climate positive'. Carbon negative sounds bad even though it's the most altruistic of all sustainability concepts and terms.

Which sustainability term/concept and target should you focus on?

Each of the above terms describe a stage along the sustainability journey. The answer to the question — 'out of all the sustainability concepts described above, which one should I focus my efforts on?' — varies depending on where you are now and what your priorities are in the short, medium and long term.

The short-term target may be to achieve low carbon at first; and then the medium-term target may be to achieve net zero energy or even carbon neutral status — and then a longer-term strategy may be to work towards achieving net zero emissions or carbon positive.

Governments have placed a significant emphasis on achieving net zero emissions by 2050 — which is about achieving a balance of naturally occurring greenhouse gases vs GHG caused by human and industrial activity. But we can't stop there — there needs to be movement beyond net zero, which ultimately means achieving carbon positive or climate positive outcomes across the board.

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Build energy efficiency into our recovery plans

Gareth O'Reilly, President, Pacific, of Schneider Electric.

After suppressing COVID-19, Australia faces two crucial challenges — the need to revive a crippled economy and the battle to confront climate change. Some may paint this as an either/or choice — it need not be if we identify stimulus measures which help cut CO_2 emissions.

The climate debate in Australia is mired in divisiveness, even within our major political parties, with little sign of consensus around energy sources and pricing carbon. But there are initiatives we can take today to dramatically cut impact emissions and boost economic recovery.

The answer stands around us in the buildings where we live and work, buildings which produce more than a quarter of Australia's emissions and provide our biggest opportunity to counter climate change. Many offices, factories and homes are energy inefficient, but available technology, incentives and new regulations could cut their emissions significantly.

At Schneider Electric we know how energy use can be more efficient. Every day we help companies be more efficient and more sustainable with digital solutions, including connected products, edge controls, services software and AI.

We undertook an energy upgrade at the MCG in 2017, cutting its energy use by a quarter — enough to power 1872 houses a year. At Singapore's Marina Bay Sands Hotel, a digitally controlled and connected energy system has reduced its carbon footprint by a third.

Energy usage can be reduced in most office buildings by around 30%. The opportunities to cut power use, and bills, in homes are even greater.

Today, digital sensors are embedded in what was once regarded as 'dumb' equipment, such as machinery, appliances and heating systems. Advanced analysis enables them to operate much more efficiently.

The federal and state governments' COAG Energy Council already has a plan for zero emissions buildings for Australia. We need to expand and accelerate the implementation of proposed changes to the National Construction Code, including energy standards and star ratings for all buildings and homes. For commercial buildings alone, policies identified by the Council could reduce greenhouse gas emissions by the equivalent of 87.5 metric tons of carbon by 2050.

The existing rating system for office buildings, NABERS — which can measure energy efficiency and carbon emissions — should be expanded and applied across at least three new sectors, such as retail, industrial and school buildings, and be in place for all buildings by 2022.

Minimum energy efficiency standards should be required for new buildings and an energy performance audit needed for all property transactions. These measures will provide incentives for builders and building owners to invest in making buildings more energy efficient.

Let's implement the COAG proposals for residential buildings, including energy efficiency requirements for renovations, a national framework for energy efficiency disclosure and expanding the home rating system to be a 'whole-of-home' rating tool. An energy rating should be required before any home is sold or leased.

Government should support businesses and households with grants or incentives to reduce their energy consumption. Construction stimulus projects should be required to meet minimum energy efficiency standards. And a program to subsidise energy retrofits of existing buildings would provide an immediate boost to the construction sector.

If we make these calls with an eye towards surviving our next looming crisis, we can accelerate out of COVID-19 with a more sustainable economy and a base to overcome climate change.

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With a global strategic interest in supporting the expansion of sustainable energy generation and improved energy efficiency, Schneider Electric will play an important role in transforming how organic waste is managed and increasing access to Renewable Natural Gas (RNG).

By harnessing Ecostruxure technology, Connected Assets, Edge Control and SCADA and Analytics architecture Utilitas will be enabled to increase the speed to market, release Opex efficiencies and drive digital twin enablement.

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