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WORDS from the EDITOR

There have been many product stewardship schemes introduced in Australia over the year. Some have been mandatory while others voluntary, but the basic goal of them all is to ensure the producer of the goods has an extended responsibility to minimise the impact of their product on the environment for its full life cycle.

This can involve improving the product design as well as ensuring users know how to recycle the product and making sure the resources are reused. Examples include the Tyre Stewardship Australia, which has created markets for tyre-derived products, and the B-cycle battery collection network, which recovers and recycles used handheld batteries while also raising public awareness on battery safety and disposal options.

With waste streams for electric vehicle batteries predicted to grow to almost 30,000 tonnes by 2030 and 1.6 million tonnes by 2050, there are now calls for extended responsibilities for EV batteries producers. We look at the research being done by the Battery Stewardship Council (BSC) in this area.

It has also been estimated that Australia will generate 145,000 tonnes of waste from photovoltaic (PV) panels by 2030. While researchers are working on designs to extend the useful life of PV modules, there are also calls for a product stewardship scheme for PVs as well.

In this issue you'll find out more about all these issues plus how Australia's packaging will soon be subject to strict new government rules aimed at boosting a circular economy.

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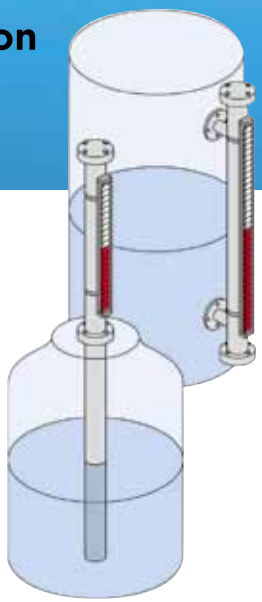

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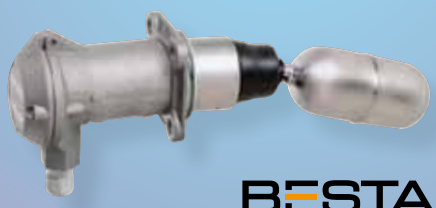

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What's the key to unlocking Australia's green energy superpower?

Sarah FitzGerald, GHD's Global Program Lead – Future Energy

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There is no singular, simple solution to ease Australia's transition to renewable energy. As we journey towards net zero emissions by 2050, difficult trade-offs need to be made, and tough conversations need to take place if we are going to achieve this goal.

One significant barrier we face is the groundswell of community opposition to the projects that will enable Australia to become a green energy superpower. GHD recently published SHOCKED — one of the largest global opinion research studies undertaken among energy sector leaders — and found 65% of Australian leaders believe community opposition is one of the biggest obstacles to new project approvals.

For Australia to achieve net zero by 2050, and benefit from the opportunities that the transition to green energy offers, we need to do better and do more to improve community understanding and acceptance. This will require authentic, honest conversations around the realities of building more resilient systems that can weather shocks, including discussion of the scale of the transition and the costs involved.

The role of government is key. Public awareness campaigns must spell out the challenges, opportunities and trade-offs at a community level that are necessary to build a clean, resilient energy system. These campaigns will require skilled communicators to drive a collective understanding of any negative local impacts with the real and meaningful benefits that communities will gain, now and for generations to come.

The energy sector itself also has a key role to play, with 74% of energy leaders believing the sector needs to get better at educating local communities on the need to transition. When proposing new projects, companies must make time to meet the communities they will be operating in, listen to their concerns and co-design solutions that are acceptable to them.

To gain social and community acceptance of the energy transition, we can:

- Increase public awareness and education of clean energy and sustainable practices, whether through public awareness campaigns or integration of energy transition topics in educational curricula.
- Engage communities in decision-making processes by embedding them in the permitting process to generate awareness with meaningful and authentic engagement approaches.
- Encourage community-based energy solutions through financial incentives, such as grants, loans and tax credits, to encourage local investment in clean energy and energy efficiency projects.
- Address local concerns while mitigating environmental and social impacts through transparent impact assessments and processes that foster trust among the community.

By championing collaboration among stakeholders and empowering local communities through education, participation and transparent systems and processes, we can build a robust foundation for a successful and inclusive energy transition.

Sarah FitzGerald

Circular economy for packaging

Australia's packaging will soon be subject to strict new government rules aimed at boosting a circular economy, thanks to agreement at a national meeting of environment ministers in June this year.

While voluntary targets and design guidelines to reduce the impact of packaging have been in place for some time and many companies have been doing great work, there are still three million tonnes of packaging sent to landfill each year, so the government needed to do more.

The ministers have now agreed to mandatory packaging design standards and targets — including for recycled content and to address the use of harmful chemicals in food packaging.

The rules will be designed to help make sure packaging waste is minimised in the first place, and where packaging is used it is designed to be recovered, reused, recycled or reprocessed.

Minister for the Environment and Water Tanya Plibersek said: "Even large companies like Nestlé, Unilever and Coca-Cola have told me they want to see regulation to help the world reach a circular economy."

Making the rules mandatory will put the onus on the companies responsible for producing packaging to take responsibility for their waste.

Dr Anya Phelan, Senior Lecturer in Entrepreneurship at Griffith Business School, Griffith University, said the announcement was a significant step in the right direction to tackle plastic pollution.

"Mandating producer responsibility and making industry responsible for the packaging they place on the market sets a remarkable precedent as it is the first of its kind in Australia, demonstrating the government's commitment to addressing the pressing issue of waste and boosting recycling efforts," Phelan said.

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Jennifer Macklin, Senior Researcher at Monash Sustainable Development Institute's BehaviourWorks Australia, said achieving any broad-scale shifts in established practice through voluntary change is challenging.

"Australia's packaging industry has implemented many valuable changes under the Packaging Covenant, including developing a new Framework of Packaging Sustainability, implementing an industry-wide system to assess and improve the recyclability of packaging, implementing an on-pack recyclability label, developing an action plan to phase out PFAS, supporting research around reusable packaging and compostable food packaging.

"However, the barriers to system transformations such as required for packaging are substantial, and many are external to individual businesses and industries. These include safety regulation, the need to preserve food and reduce food waste, differences in recycling eligibility rules across and within Australia's states and territories and entrenched consumer preferences and habits. Overcoming such systemic barriers takes significant time, effort and coordination.

"Regulation and mandatory requirements have been shown to be effective in speeding up such transitions, by ensuring, for example, that expectations are clear, all players are working towards the same outcomes and free riding is limited. Minimum design standards and extended producer responsibility are both utilised internationally, including in the UK and Europe, and it is a great sign to see Australia is now beginning to adopt such approaches in our transition to a circular economy.

"Nonetheless, care will be needed to ensure the regulations and their timing are appropriate to the context and don't leave the entirety of responsibility of overcoming the system barriers on any one industry. Particularly, it will be critical to ensure that such regulations are accompanied by other policy support that addresses the major challenges facing the industry. This should include, for example, a timeline for introducing mandatory minimum recycled content targets in federal and state government procurement in line with the announced design standards, which will increase the 'demand side' on the equation in line with these new 'supply side' requirements."

The Australian Council of Recycling (ACOR) has welcomed the commitment made by Australia's Environment Ministers to support a circular economy for packaging.

"We applaud Australia's environment ministers for their decision to regulate packaging design, with the aim of achieving important targets for reuse, recyclability and recycled content," said Suzanne Toumbourou, CEO of ACOR. "A stronger regulatory framework, which promotes circular design and ensures robust end markets for recycled materials, is essential for a sustainable recycling system."

Currently, the recycling sector contributes almost $19 billion in economic value and sustains over 90,000 jobs, surpassing Australia's economic growth rate by over 1.5 times in the past year.

"The recycling sector is an integral link in the circular supply chain. We look forward to collaborating across industries and with governments to achieve and exceed the National Packaging Targets, while also fostering great economic benefits for Australia," Toumbourou said.

Shoalhaven City Council installs remediation technology

EPOC Enviro's containerised Surface Active Foam Fractionation (SAFF) PFAS remediation technology has been installed by Shoalhaven City Council for the first time in Australia.

The council commenced remediation of target PFAS contaminants from landfill leachate waters at the West Nowra Recycling and Waste facility in March 2023 and forms the cornerstone of Shoalhaven's onsite recycling and circular economy programs.

The technology treats between 200 and 240 m^3 of leachate per day, achieving removal to the LOR for Australian regulatory target PFAS contaminants PFOS, PFOA and PFHxS, as well as PFHpA.

Pete Murphy, EPOC Enviro Managing Director, said the SAFF technology has remediated PFAS from more than 24 locations in Europe, the UK and the USA.

The SAFF engineered solution was created to permanently remove PFAS contaminants from the environment. The technology uses the air/water interface of rising air bubbles to remove PFAS contaminants from water. It then concentrates separated PFAS molecules, creating a compact PFAS concentrate ready for destruction.

At the site, it works to permanently remove target PFAS contaminants from water that has been pumped from the landfill leachate pond. The water is then put through a secondary treatment and used to wash glass at the council's glass processing plant, before being returned to the pond for continuous remediation.

Glass from the plant is used in a variety of applications including road base materials, asphalt, concrete, pipe bedding, drainage material, sand blasting and green ceramics.

"With any new technology there's an element of risk, but we did our homework, we looked at what's out there in the marketplace and we identified the benefits of the SAFF system over others. While we're only a short while into this project, we're already amazed at the output," said Shoalhaven City Council's Waste Operations Coordinator, Peter Windley.

Landfill sites around the world are primary sources of PFAS contamination as they represent the final resting place for PFAS-containing products. These products typically have waterproof, non-stick and stain-resistant properties, such as packaging, mattresses, carpets and furniture.

SAFF can manage the landfill leachate environment, including waters with complex contaminants and suspended solids, as well as metals and high TOC and DOC. It can also remove surface-active chemistries including some pharmaceuticals, surfactants and industrial contaminants. Using no consumables and producing only PFAS hyper-concentrate as a waste stream, the technology is housed in a shipping container for plug-and-play commissioning, requires minimal power to operate and is capable of autonomous operation.

In 2019, the first commercial prototype of SAFF was installed at Army Aviation Centre, Oakey. This plant continues to operate, having remediated over 140 million litres of water. The containerised form of the technology, which has been installed at Shoalhaven, was first used to remove PFAS from landfill leachate in Sweden in 2021.

Shoalhaven uses other recycling initiatives such as enhanced recycling of kerbside collections, landfill gas upgrades and solar generation to create a zero footprint, exploration of circular economy solutions for plastics and textiles, and the production of ceramic tiles from waste products.

"We applaud Shoalhaven for their commitment to sustainability, development of cutting-edge technologies and circular economy solutions. One of their goals is to recycle the contents of red and yellow kerbside bins to achieve above 90% landfill diversion by the end of this year, and this is something that we should all get behind," Murphy said.

EPOC Enviro

epocenviro.com

Technology used to optimise the waste-to-energy process

Emerson's control technology and software is being deployed at HaloSep's plant for optimisation, research and technology (PORT) to manage a chemical separation process that recovers salt, metals and minerals from fly ash.

There are over 2600 waste-to-energy plants worldwide, with a disposal capacity of approximately 460 million tonnes of municipal waste annually. About 2–5% of the incinerated waste becomes flue gas residue known as fly ash, a hazardous material containing contaminants such as heavy metals, chlorides and sulfates. Tonnes of fly ash are currently transported to landfills by truck, rail or sea, which is both costly and unsustainable.

HaloSep, a subsidiary of the Stena Metall Group, provides an on-plant solution that can be built locally at a waste-to-energy plant or placed at sites where fly ash from smaller plants is consolidated, thus eliminating long-range transportation costs and emissions. Staffan Svensson, HaloSep President, said fly ash has varying properties requiring different separation processes.

"Our PORT plant will analyse fly ash samples from around the world, test specific separation processes and demonstrate circular economy benefits to potential customers," Svensson said. "Emerson's technology and expert advice on implementing automation throughout the plant has played a vital role in optimising these processes, which, when deployed, will help increase the sustainability of the waste-to-energy industry."

Emerson designed and implemented its DeltaV distributed control system, a scalable control system architecture, at the PORT facility, working closely with HaloSep to develop separation sequences to recycle fly ash with variable compositions. The DeltaV Live software provides human–machine interfaces for operators, with key performance indicator-led dashboards providing intuitive reporting and management and supporting optimised decision-making and operational performance.

Nathan Pettus, President of Emerson's Process Systems and Solutions business, said the company is committed to helping customers in industries such as plastics, waste-to-energy and lithium-ion battery manufacturing to meet demand for minimising environmental impact.

"Emerson's technologies and expertise are designed to handle the complexity of HaloSep's recycling process," he said.

Emerson Automation Solutions
www.emerson.com/au/automation

Investing to reduce construction and demolition waste and boost Australia's circular economy

The challenge of Australia's growing construction and demolition (C&D) waste stream is being addressed at a multimillion-dollar flagship facility in Queensland. Operated by Rino Recycling, the facility will showcase how Australia's waste can be transformed into new products, cutting emissions and strengthening the circular economy.

The $89 million Rino Recycling plant, located in Pinkenba near the Brisbane Airport, is expected to deliver 55,363 tonnes of $CO_{2\text{-}e}$ abatement annually — equivalent to removing around 12,000 cars from the road each year.

Backed by a $75 million debt finance commitment from Australia's 'green bank', the Clean Energy Finance Corporation (CEFC), the facility is designed to provide a substantial boost to Australia's recycling sector while also expanding onshore recycling capabilities.

Brisbane aims to implement a comprehensive sustainability strategy to achieve a climate-positive Olympic Games[1], with developers looking for ways to handle the waste that is being generated from expansion.

According to Australia's 2022 National Waste Report, 29 million tonnes of waste came from the construction and demolition sector last year, amounting to 38% of all waste generated in Australia, with much of it sent to landfill.

Less than a third of all C&D waste in the world is recovered and reused. The CEFC is helping to alleviate the growing waste stream, with CEFC lifetime commitments

"Backed by a $75 million debt finance commitment from Australia's 'green bank', the Clean Energy Finance Corporation (CEFC), the facility is designed to provide a substantial boost to Australia's recycling sector while also expanding onshore recycling capabilities.

to the waste, recycling and bioenergy sectors during the past decade to more than $560 million.

CEFC Industrials Lead Mac Irvine said, "As we look to deliver a net zero emissions economy by 2050, we need to cut emissions wherever they occur, from the way we build to the way we recycle. This facility demonstrates how to unlock the untapped value of what is considered 'waste' to deliver a more sustainable low-emissions built environment."

With the Rino Recycling facility able to process more than one million tonnes of concrete, excavation and skip bin waste per year, it will help address the under-developed C&D recycling sector using leading global recycling technology by Turmec from Ireland and CDE from Northern Ireland.

The technology means the plant can more effectively separate products to produce materials for use as road bases, aggregates and in landscaping products, displacing the use of virgin materials and creating the potential for further emissions savings.

Irvine notes that the CEFC has a particular focus on large-scale projects which use clean energy technologies and increasingly work with companies that focus on turning urban and industrial waste into new energy sources and valuable products, creating an important revenue stream while also reducing landfill gas emissions. Australia's waste sector requires significant new investment in infrastructure and equipment as we transition to a low emissions circular economy.

"The CEFC has provided finance to deliver on a range of programs to improve recycling outcomes across Australia. As an experienced investor in the bioenergy, recycling and energy-from-waste sectors, we see immediate and important investment opportunities in recycling and resource recovery, drawing on proven technologies with the potential to deliver long-term economic and environmental benefits. The Rino facility will preserve a number of its finite resources by recycling existing material," Irvine added.

"The new plant offers a solution to the challenges of C&D waste in South East Queensland while also supporting the long-term circular economy. This is an important example of how we can value materials that would otherwise be discarded, contributing to a more resilient and sustainable supply chain."

1. Brisbane City, IOC Future Host Commission Questionnaire Response, May 2021. p8.

Clean Energy Finance Corporation

www.cleanenergyfinancecorp.com.au

Time to step up PV recycling in Australia

In the next decade, dealing with redundant solar panels or photovoltaic (PV) modules could be a major waste issue for Australia if no action is taken soon. UNSW Sydney solar experts say we need bespoke technology designed to recycle important elements inside solar panels.

Solar power is one of the country's leading renewable energy sources, with rooftop solar PV installed in more than 3.3 million homes. Approximately 90% of these systems might end up in landfill when they need to be replaced, with an International Energy Agency report estimating that Australia will generate 145,000 tonnes of waste from PV panels by 2030.

Most solar panels have been designed for a lifespan of 25–30 years, so those installed more than 15 years ago will be approaching their end-of-life.

UNSW solar expert Richard Corkish, from the Australian Centre for Advanced Photovoltaics, based at UNSW Sydney's School of Photovoltaics and Renewable Energy Engineering, said the principles of 'Reduce, Reuse and Recycle' should be applied to the end-of-life management of all PV modules.

PV researchers are trying to lengthen the life of the modules by making them more resilient to the environment, mostly moisture and oxygen.

"The goal is to extend the life, so they last up to 50 years, which means we won't need to make nearly as many in the future. If we suddenly need to ramp up manufacturing, we'll find there are some materials, including silver and aluminium, that will be at risk of being in low supply," Corkish said.

Up to 95% of the materials used to make a solar panel can be recycled, such as silicon, aluminium frames and silver. The most common process of doing so in Australia results in the panels being put through a shredding machine and broken into smaller pieces, which are then down-cycled into other products.

Rong Deng, Research Fellow from the UNSW School of Photovoltaics and Renewable Energy Engineering, said the biggest problem with the current process is the inability to extract the rare metals while keeping costs down.

"To be reused, solar panels components need to be carefully separated to avoid contamination with other materials. Manufacturers will only reuse materials that have a high purity – which is difficult to achieve," said Deng.

"The current process is a temporary solution. It's great if all panels are recycled because we want to avoid it ending up in landfill. But if we think ahead, the materials

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we're using right now are not always going to be readily available later.

"The silver embedded inside the cells is highly sought-after because of its value in pure form. However, the challenge we face is how we do that cheaply and without adding to our carbon footprint.

"But if continue down the path of using non-specialised technology to recycle PV modules, then we'll still continue to end up with parts that are contaminated with other materials, which is not a sustainable solution," Deng said.

The costs

Disposal and management of PV modules varies between states and territories, with only Victoria banning solar panels from landfill. Under a new proposed recycling expansion program, this will also be the case in Queensland in the next decade.

The cost of recycling is between $10 and $20 per panel, plus any freight or removal fees. This may be a deterrent to recycling in states that do not have a policy on recycling the panels.

Product stewardship approach

"The Australian Government have signalled potentially adding PV modules to the Product Stewardship Scheme. Similar schemes are already in place for other goods such as car tyres and plastic bottles," Deng said.

A Product Steward Scheme is an approach which involves taking responsibility for the full life cycle of a product. It promotes and supports the principles of circular economy and schemes can be voluntary, made mandatory by government or done in partnership with industry.

"There needs to a system in place where costs are recouped from the industry so that cost imposed on new modules can pay for the recycling of the old ones," Corkish said.

The future

Newer PV models allow homeowners to track and compare energy output through an online system or mobile app, but homes are prematurely upgrading systems well before they need to.

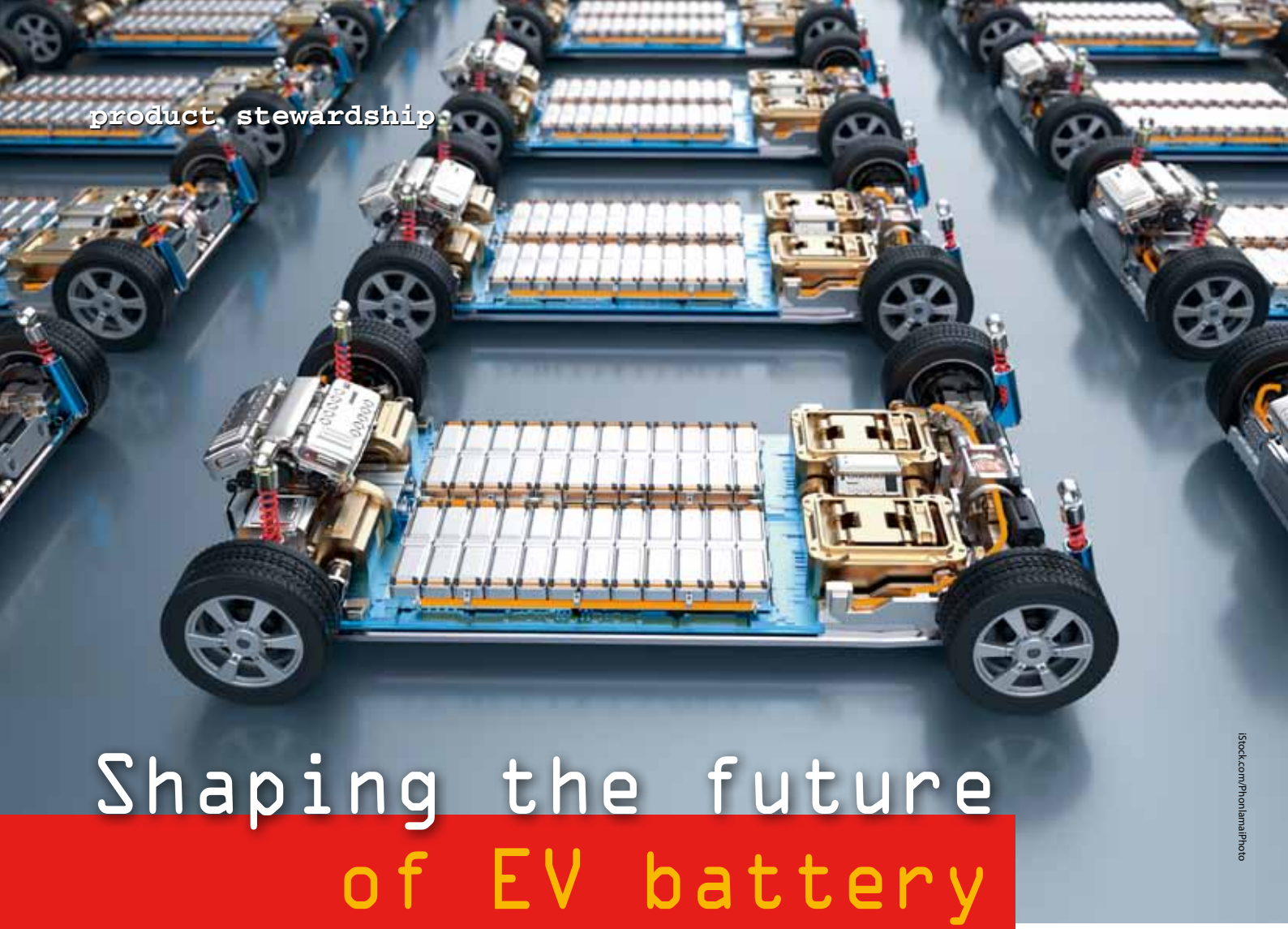
"Whilst there's huge potential for reuse of PV modules, the lack of affordable testing to ensure the panels still meet electrical safety standards means many make their way to landfill," Corkish said.

Deng recognises that recycling of PV modules in Australia is still in its infancy. She said there's a lot to learn from European countries who are far ahead in addressing the problem.

Early adopters of small-scale rooftop PV systems, such as Germany and Netherlands, have been acting with much more urgency in terms of finding viable technologies to recycle older PV panels, which are coming up to their end-of-life phase.

"In Australia, we're still waiting for the waste bomb that is predicted when all these PV modules come to the end-of-life, so there's less incentive for local companies to invest in the technology.

"At some point, there will not be enough landfill to dispose of PV modules — nor will there be enough resources to build them. So, it's imperative we find a sustainable solution to recycle them now," Deng said.



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Shaping the future of EV battery stewardship

Preliminary research findings released by the Battery Stewardship Council (BSC) showed the number of used electric vehicle (EV) batteries entering the waste stream will grow to almost 30,000 tonnes by 2030 and 1.6 million tonnes by 2050.

Battery stewardship is a crucial element of the drive to increase uptake of EVs in Australia, as outlined in the recent National Electric Vehicle Strategy. It is essential that work to explore and establish the infrastructure needed to recover resources and avoid the health issue of stockpiling and fires begins now, while in its infancy.

BSC CEO Libby Chaplin called for investment in EV battery stewardship and recycling infrastructure, saying it is "immediately needed" for the industry to avoid costly future solutions and avoid missing out on the financial opportunities offered by the recycling of used batteries.

"The EV industry is facing a golden opportunity to take the lead in designing a scheme that is cost effective, fit for purpose and avoids the mistakes and costly fall-out of inaction as seen recently by the solar panel industry by prioritising the discussion of end-of-life processes today," Chaplin said.

John Curtin Distinguished Professor Peter Newman, from Curtin University's Sustainability Policy Institute, said, "We need some serious regulation on lithium-ion batteries so we don't end up being the world's worst recyclers as we are with most things. In the near term, regulations must begin immediately on e-scooters as their batteries are very poor quality and a real fire risk."

He added that Australia can, however, be optimistic about EV technology. The Tesla Model S is 10 years old and its batteries still work at 70% efficiency.

"We are in the early days of how much will need to be recycled, and WA should continue to lead the Lithium Valley industries of the future, with growing WA companies dealing with battery manufacture and recycling," Newman said.

The federal government commissioned the BSC to drive industry consultation around the development of EV battery stewardship and has called on the EV industry to contribute to a discussion paper, delivered in collaboration with the Federal Chamber of Automotive Industries (FCAI) and the Motor Trades Association of Australia (MTAA).

BSC is seeking to support the EV industry to create a solution for EV batteries that works for the entire supply chain and lives up to green credentials.

We look forward to hearing more after the result of their discussion paper have been reviewed.

PREPARING THE NEXT GEN OF ENVIRONMENTAL SPECIALISTS

Ashleigh Maierhofer

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Sustainability is a key driver of economic policy, and while the word is often used casually in conversation, it involves numerous stakeholders all interacting and influencing each other and policy. There is a need for specialists across business, government and the community in the field of environmental management to help navigate these relationships and protect the environment, with strong job growth forecasted over the next decade.

At the University of Newcastle, the Master of Environmental Management and Sustainability aims to develop these specialists. The program is one of few nationally that incorporates sustainability theory and practice in environmental management tuition.

"The program has a very good reputation with alumni and current students, scoring highly on student satisfaction of teaching," said program convenor, Geoff MacFarlane.

"It is also accredited by the United Nations in teaching sustainable development goals in the curriculum."

The core courses are certified by both the United Nations Institute for Training and Research (UNITAR) and Newcastle's International Training Centre for Authorities and Leaders (CIFAL), the only CIFAL centre in Australia and Asia Pacific region. These courses ensure graduates have been taught best practice skills that can be immediately applied to their career.

"The career destinations of graduates are diverse, with many entering government roles at the local, state and federal level in sustainability and environmental management," MacFarlane said.

For alumnus and recent graduate Mitchell, after completing a Bachelor of Environmental Science and Management at the University of Newcastle, he wanted to take the next step in his studies with a Master of Environmental Management and Sustainability.

"I wanted to upskill and grow my theoretical knowledge in the environmental field while gaining industry experience and connections. I knew obtaining a master's degree would be highly valuable to employers too," said Mitchell.

Students can tailor their learning with the option to study two of three specialty areas: business management, natural resource management and spatial science. Suitable for people from a range of backgrounds and experience, the degree caters for both suitably qualified graduates from related fields and mid-career professionals wishing to gain postgraduate qualifications in the field. There are study pathways from 80 units to 160 units depending on your level of experience. Students can study at a time that suits with the program offered 100% online with multiple intakes per year.

For Mitchell, there were a multitude of benefits in completing the program.

"[They] include meeting industry professionals and lecturers, learning how to apply my theoretical knowledge to solve real-world problems, gaining access to a world-class library to study, and meeting a range of people with different backgrounds and professions that helped shape my own professional journey," Mitchell said.

Current student Tambalyn benefitted from the structure of the degree and online component.

"For someone who works full-time and often remotely, it was perfect. Much of the course material has been relevant to my current career and has helped my overall career progression," Tambalyn said.

Current student Mia was drawn to enrol in the program by the shorter length and projected strong job demand.

"I wanted to learn more about issues that are important to me, without studying another three-year undergraduate degree."

There is also a shorter Graduate Certificate in Environmental Management and Sustainability, a 40-unit 100% online program that provides core knowledge and is designed to provide credit into the Master's program, allowing students to complete two degrees in less time.

Applications are now open. Visit newcastle.edu.au/enviro-sustainability for more information.

THE UNIVERSITY OF NEWCASTLE AUSTRALIA

University of Newcastle
www.newcastle.edu.au

Queensland abattoir installs Ragazzini hose pump

A Queensland abattoir was seeking a solution for its DAF tank sludge and scum transfer, having previously used submersible pumps and double diaphragm pumps with limited success. A pump specialist from Hydro Innovations recommended the Ragazzini peristaltic (hose) pump for the application.

Ragazzini hose pumps are positive displacement pumps that use a set of rollers to compress an elastomeric tube that pushes the fluid contained within it. No mechanical moving parts are in contact with the fluid being pumped and there are no valves or seals to ever replace. The casing of the pumps does not need to be filled with lubricating fluid because they use rollers and not 'shoes'.

The abattoir needed to transfer up to 10 m^3/h of the sludge, so Hydro Innovations recommended the Ragazzini Ms3 peristaltic pump with fully cast casting, cast iron rotor and cast iron rollers.

To meet the duty, the pump needed to run at the slow speed of 26 rpm to meet the duty, so it is expected to have a very long service life. It is also fitted as standard with a leak detector that instantly detects a damaged hose, stops the pump and sends a warning signal. Pumps are mounted on stainless steel base frames and are supplied with 316SS ports.

An operator at the plant said the pump was easy to install and works well with little maintenance.

Since installing the pump, the abattoir has rolled it out to other branches around the country.

Ragazzini pumps are available in sizes ranging from 10 mm ports up to 150 mm, with flows from 0.2 L/h up to 180 m^3/h, with pressures to 15 bar. Various pump hose materials allow pumps to move abrasive fluids, corrosive fluids, fats, oils, along with FDA approved hoses for foods and pharmaceutical products.

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www.hydroinnovations.com.au

Upgrade underway for SA water treatment plant

Work is underway at SA Water's Port Lincoln Wastewater Treatment Plant as part of the utility's $400,000 investment to enhance sewage treatment and the plant's overall performance.

To improve the efficiency of the biological process that breaks down nutrients in sewage, the floating aerators in one of the plant's treatment basins and seals located along the basin will be rehabilitated.

Chris Young, SA Water General Manager of Operations, said the floating aerators distribute a constant supply of oxygen to help microorganisms remove the nutrients. This is vital to recycling sewerage and helping create sustainable sources of recycled water.

Used water and sewage undergo a series of processes when they come into the plant, including treating the sewage and separating solid organic material from water. The aerators push oxygen into the sewage, giving the naturally occurring bugs a push to break down the organic material and remove all nutrients.

"The process is a living, breathing beast and we need to keep it performing at an optimal level to maximise our recycled water supply. Replacing the aerators every five years ensures we're looking after our busy bugs," Young said.

The recycled water is used by local council to irrigate ovals and parks across town.

"While the basin is empty, we'll also give it a thorough clean and inspect other equipment that's usually not visible, with

the project expected to take around eight weeks to complete," Young said.

The plant was built in 1994 and currently supplies around 100 million litres of recycled water each year.

The works are not expected to impact local customers' sewer services and measures have been put in place to manage any temporary increases in sewer odour from the plant.

"We expect this to be a low likelihood, but do however encourage the community to be our 'sleuths' and get in touch if they notice any change," Young said.

SA Water
www.sawater.com.au

Biodegradable bags for mushroom farming

Dr Nasim Amiralian from University of Queensland's Australian Institute for Bioengineering and Nanotechnology (AIBN) is collaborating with Queensland producer Scenic Rim Mushrooms to reduce the company's reliance on plastic 'grow bags'.

The 12-month project is developing a biodegradable alternative for the mushroom grow bags that not only provides optimum growing conditions but also breaks down in soil.


Photo via AIBN

Dr Nasim Amiralian.

Amiralian said existing biodegradable plastics made from corn starch, potato starch or even mycelium — the vegetative part of mushrooms — are often brittle and lack long-term integrity.

"But using fibres from agricultural waste like sugarcane is an affordable, high-quality and sustainable way to ensure plastic grow bags can withstand high temperatures and humidity," she said.

Scenic Rim Mushrooms founder Matthew Davis said the company's farming methods were all sustainable, except for the use of plastics.

"The fungiculture industry has traditionally had to use plastics for mass commercial production, but this project gives us hope," Davis said.

"It's a problem that needs to be fixed for us to become completely cyclic mushroom growers, and proceed to large-volume commercial cultivation."

Amiralian said the grow bag project could lay the groundwork for the technology to be applied across agriculture, manufacturing, pulping and packaging.

"Ultimately we'd like to see the product we develop translated to the global fungiculture and packaging markets," she said.

The project has been funded with the help of a $30,000 Industry Kickstarter grant from the UQ Agri-Food Innovation Alliance, supported by the Australian Government Department of Education, Skills and Employment under the Strategic University Reform (SURF).

Breaking the Plastic Habit program awarded

Brookfield Properties has been awarded a CitySwitch Award in recognition of its Breaking the Plastic Habit program in Australia. The business has eliminated more than 2.7 million single-use plastics from its national portfolio of managed office buildings and precincts.

According to Danny De Sousa, Vice President | Sustainability and Innovation, Australia consumes over a million tonnes of single-use plastics every year that degrade into harmful microplastics.

The Breaking the Plastic Habit program is designed to take affirmative action internally while creating an environment of awareness to assist people in reducing reliance on single-use plastics. It helps set a benchmark for commercial tenants, developers, retailers and consumers.

CitySwitch Award, presented by Sydney Lord Mayor Clover Moore, recognises outcomes from the partnership of tenants, building managers and owners, with collaboration key to driving net zero buildings.

To ensure the success of Breaking the Plastic Habit, Brookfield Properties first analysed single-use plastic sources within its own office supply chains to understand and minimise the problem.

Before developing partnerships with Plastic Free July and Plastic Oceans Australasia to help build its awareness program, the company cut a swathe within its own office chain of commercial buildings and precincts.

Mathew Chandler, Senior Vice President | Marketing and Communications, Brookfield Properties, said starting small helped the company identify quick wins.

"We removed dozens of sources of single-use plastic products from our staff kitchens, such as condiments, food wraps and breakfast spreads, and replaced them with single-use, plastic-free alternatives. Our sustainability and operations teams took lessons learned from those first steps to then target the supply chains of our commercial property portfolios, replacing everything from bin liners, umbrella bags, plastic-coated stickers and posters, and bathroom amenities," Chandler said.

Brookfield Properties teamed up with Plastic Oceans Australasia to pilot its EPIC waste solution program at Brookfield Place Sydney, encouraging the building's tenants to understand, analyse and strategise against the sources of single-use plastics in their office waste.

Many nationwide initiatives have come from Breaking the Plastic Habit, including:

- partnering with Containers for Change to collect plastic bottles that couldn't be avoided
- the installation of water refill stations to encourage the reuse of drink containers
- art collaborations and activations to shine a light on the harm caused by single-use plastics
- volunteering opportunities to assist in beach clean-ups
- ongoing awareness programs being deployed across digital and physical channels to Brookfield Properties' tenant customers.

Breaking the Plastic Habit was also highly commended in WA's WasteSorted 2022 awards.

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Fungi could consume hard-to-recycle plastic

Polypropylene is a common plastic that is used for a wide variety of products from packaging and toys to furnishing and fashion, accounting for about 28% of the world's plastic waste. Only 1% of it is recycled.

Researchers at the University of Sydney have discovered a potential solution to the problem, with two common strains of fungi used to successfully biodegrade polypropylene in a laboratory experiment. The study was published in *npj: Materials Degradation*.

Typically found in soil and plants, *Aspergillus terreus and Engyodontium album* were able to break down polypropylene after it had been pre-treated with either UV light or heat, reducing the plastic by 21% over 30 days of incubation, and by 25–27% over 90 days.

"Polypropylene is a common plastic used to make a huge variety of everyday products like food containers, coat hangers and cling film, but it only has a recycling rate of only 1%, meaning it is overrepresented in plastic waste and pollution globally," said the study's lead author, PhD student Amira Farzana Samat.

The researchers hope their method could reduce the amount of plastic polluting the environment and lead to a greater understanding of how plastic pollution might biodegrade naturally under certain conditions.

It has been estimated that 109 million tonnes of plastic pollution are in the world's rivers and 30 million tonnes in the world's oceans.

Polypropylene is so infrequently recycled because of its short life as a packaging material and because it is often contaminated by other materials and plastics, necessitating new recycling methods that have minimal environmental impact.

Samat's PhD supervisor, Ali Abbas from the School of Chemical and Molecular Engineering and Chief Circular Engineer at Circular Australia, said, "Despite the massive scale of plastic production and consumption, there has been very little attention paid to plastics degradation under environmental conditions, and our understanding of how plastics can be degraded is limited."

According to Abbas, a question the research has raised is which naturally occurring conditions can fast-track plastic degradation? The researchers aim to further explore the role of biological processes offered by fungi and other microorganisms.

Dee Carter, an expert in mycology — the study of fungi — in the School of Life and Environmental Sciences and co-author of the study, said, "Fungi are incredibly versatile and are known to be able to break down pretty much all substrates. This superpower is due to their production of powerful enzymes, which are excreted and used to break down substrates into simpler molecules that the fungal cells can then absorb."

Fungi have evolved to break down woody materials. This can be repurposed to attack other substrates, which is why fungi tends to grow on various man-made materials.

"Recent studies suggest some fungi may even degrade some of the 'forever chemicals' like PFAS, but the process is slow and not yet well understood. There is also evidence that the amount of plastic accumulated in the ocean is less than what might be expected based on production and disposal levels, and there is speculation that some of this 'missing' plastic may have been degraded by marine fungi," Carter said.

Polypropylene in various forms was initially treated with one of three separate methods: ultraviolet light, heat and Fenton's reagent — an acidic solution of hydrogen peroxide and ferrous iron often used to oxidise contaminants.

In a petri dish, the fungi were applied separately as single cultures to treated polypropylene. The validity of the biodeterioration was then confirmed through microscopy techniques. While the research didn't evaluate how the plastic was degraded by the fungi or whether it was metabolised, the researchers hope to conduct further research to determine the type of biochemical processes taking place.

The researchers will explore enhancing the overall efficiency in degrading polypropylene before seeking investment to scale the technology and develop a small-scale pilot prototype for commercialisation.


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Taronga Zoos now 100% renewable

Taronga Zoo and Taronga Western Plains Zoo have become the first zoos in NSW to be powered by 100% renewable electricity.

The switch means the equipment used by the Wildlife Hospitals teams to treat injured wildlife, the pump that reuses water for seal enrichment and the heat lamps that primates like to bask in are all powered by renewable electricity. Clean energy is a step towards helping secure a future for all animals.

This switch to renewable energy will prevent approximately 7000 tonnes CO_2 from being released into the atmosphere. This is the weight equivalent of about 300 humpback whales.

Cameron Kerr, Taronga Conservation Society Australia CEO, said climate change is a key threat to Australia's unique flora and fauna, and wildlife across the globe.

"As a conservation organisation, we are dedicated to safeguarding our planet and securing a future for wildlife. Intrinsic within that is a commitment to act with leadership in environmental sustainability and climate change action, and this is a significant milestone in our sustainability journey," Kerr said.

Taronga's target was to be 100% renewable before 2030, a target which was achieved seven years earlier.

By switching to Red Energy as its electricity provider, Taronga is supporting clean electricity generation from a solar farm that is local, on Wiradjuri Country near Taronga Western Plains Zoo in Dubbo. This directly supports the transition to clean energy in NSW.

Rachel Friend, Red Energy's General Manager, Marketing & Sales, said Red Energy has supported Taronga since 2019 as a Principal Partner and sponsor of the Taronga Seals for the Wild Presentation. The company hopes that this partnership will encourage families to think about their own choices and protecting the environment.

"Taronga is an example of how organisations and businesses can live their values, contributing to our economic strength and protecting the environment as they do it," Friend added.

This step is the latest action in Taronga's sustainability journey. Taronga has installed over 500 kW of solar panels across both zoos and conducted energy audits with the view to implement further efficiencies and savings. The company has also implemented policies for low-emissions buildings, increased its usage of donated produce and agricultural by-products for animal feed and reduced landfill emissions through recycling.

Bridget Corcoran, Taronga Conservation Society's Sustainability Manager, said environmental leadership is one of the six priorities in Taronga's strategic plan.

"Switching to renewable electricity or GreenPower is one of the most impactful ways that businesses and individuals can contribute to reducing greenhouse gas emissions and therefore help to address the climate crisis. I'm so proud that we've been able to model this at Taronga and I hope that we can encourage others to make a change for the wild," Corcoran added.

In addition to these sustainability commitments, Taronga is delivering projects to protect climate-affected wildlife, including two new platypus facilities at Sydney and Dubbo and two wildlife hospitals that will allow Taronga's veterinary team to rescue, rehabilitate and understand more about these animals.

For more information about Taronga's sustainability journey, head to taronga.org.au.

Phillip Island powered up by PICESS battery

A Phillip Island battery that can power 8000 homes and secure energy supply for the tourist hot spot during peak periods has been switched on.

Minister for Energy and Resources Lily D'Ambrosio MP and AusNet CEO Tony Narvaez have officially opened the $10 million Phillip Island Community Energy Storage System (PICESS).

Phillip Island is a popular holiday destination and hosts a MotoGP race, attracting many people to the Island. The battery will replace diesel generators previously used to provide back-up power to the region over summer, helping stabilise electricity supply on the island.

"The population of Phillip Island more than quadruples over summer, which puts a strain on the local electricity network and, at times, leads to power dropping out. This battery, which in time will be powered by renewable energy, will help solve this issue," Narvaez said.

The Hitachi 5 MW/10 MWh lithium-ion phosphate battery energy system has the capacity to power more than 8000 homes for 2 hours or 700 homes for a day. It is located in a 38 x 34 m fenced high-voltage compound and is connected to the electricity grid via underground cables.

Michael Whelan from Bass Coast Shire Council said the battery is "a key piece in the jigsaw for Phillip Island and for that net zero target".

"It takes away the need for the diesel generators that we saw during the MotoGP. That's really fundamentally important," Whelan said.

The project created 25 local jobs during construction and will provide residents of the island with new energy job opportunities.

Totally Renewable Phillip Island (TRPI) and the Energy Innovation Cooperative (El Coop) worked with AusNet, Mondo and the Bass Coast Shire Council to deliver the battery.

D'Ambrosio labelled this as a "tangible example" of communities coming together with authorities and businesses to deliver a project.

"This project is the first of its kind on Phillip Island and it has helped us build a greater understanding of how batteries fit into the broader energy transition from coal-generated electricity to renewables," Narvaez said.

The PICESS project will go towards meeting Victoria's strong renewable energy targets, which will see 50% of electricity come from renewables by 2030 and net zero emissions by 2050.

AusNet

www.ausnetservices.com.au

StyroCycle expanded polystyrene recycling scheme launches

Households and small businesses in Australia now have an option to dispose of expanded polystyrene packaging waste to be recycled.

A recycling scheme called StyroCycle has been launched as an initiative of Expanded Polystyrene Australia (EPSA), run by EPSA members who are manufacturers of expanded polystyrene. It will enable clean expanded polystyrene to be recycled and used to manufacture new products like building insulation.

Members of the industry who are committed to the National Recycling Targets designed this idea while seeking an accessible solution for recycling expanded polystyrene, given there are no council or government-backed kerbside schemes to recycle this type of waste.

StyroCycle bin at Foamex.

Image: Supplied.

Simon Pickett, EPSA President, said EPSA is committed to reducing the amount of expanded polystyrene waste in landfill by increasing awareness and strengthening community partnerships.

"At StyroCycle, we aim to operate an effective and efficient circular economy. Expanded polystyrene is 100% recyclable and can be recycled repeatedly," Pickett said.

EPSA will establish collection facilities at EPS manufacturing points, local councils and other businesses across Australia. It will also offer a free drop-off service for large quantities of clean expanded polystyrene.

Through this, it will create products for sustainable building by collecting, compressing and reusing EPS.

"This closed loop system will benefit our natural resources, minimise waste, lower CO_2 emissions and water use," Pickett said.

Manufacturers such as Foamex and Polyfoam have been recycling EPS for decades and have invested in machinery and processes to do so. The machines combine the functions of crushing, compacting, and pelletising into one step, reducing manual labour.

StyroCycle will focus specifically on the polystyrene packaging that is generated within a household or small business, like electrical appliance packaging. An advantage of the scheme is that waste will not be transported elsewhere and warehoused, stored for long periods or exported. Typically, it will be dealt with quickly as bins are filled and emptied daily.

All non-contaminated EPS can be recycled, including:

- Packaging for small and large appliances (like big screen TVs, dishwashers & oven packaging)
- White polystyrene fruit and vegetable boxes (clean boxes only — all organic material and labels must be removed before recycling)
- Uncontaminated (mud and concrete-free) expanded polystyrene (EPS) from building & construction sites
- Bean bag beans.

StyroCycle currently has two manufacturers with four sites up and running in Victoria and South Australia. The scheme expects an additional eight sites across Victoria, NSW, South Australia, Queensland and Tasmania by 2024.

It is also working with other organisations that have the potential to become drop-off points like councils, retailers, waste transfer stations and small businesses with high volume EPS waste like furniture and electrical importers.

Clean polystyrene can be dropped off at the following StyroCycle premises:

- Polyfoam 11 Brooklyn Avenue Dandenong VIC 3175 T: 03 9794 8320.
- Foamex Group (Head Office) — 31-33 Gatwick Rd, Bayswater North VIC T: 03 8739 5800.
- Foamex North — 17-21 Freight Drive, Somerton VIC T: 03 9308 0045.
- Foamex West — 430 Barry Rd, Coolaroo VIC T: 03 9302 1022 from 1 July 2021.
- Foamex South Australia — 15 Peachey Rd, Edinburgh North SA T: 08 8349 9919.

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AWRE 2023 Exhibitor List

ACCESS ENVIRONMENTAL SYSTEMS	D20
AEROFLOAT	C40
AGROTECH AUDOMATION	A35
ALEMLUBE	C1
AMCS GROUP	A3
AORA (AUSTRALIAN ORGANICS RECYCLING ASSOCIATION)	A27
APPLIED MACHINERY	G23
AUSTRALIA AND NEW ZEALAND RECYCLING PLATFORM LIMITED	B18
AUSTRALIAN INSTITUTE OF PACKAGING (AIP)	B37
AVWELD & ALLOYS INTERNATIONAL	C35
AWS (AUSSIE WEIGHBRIDGE SYSTEMS)	B38
B.K. SALES AUSTRALIA	H24
BARKER TRAILERS	A21
BEIER MACHINERY	B22
BIOBAG WORLD AUSTRALIA	A19
BIOELEKTRA AUSTRALIA	C11
BIOFEED	H16
BIOX ENVIRONMENTAL	A13
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BRENTWOOD RECYCLING SYSTEMS	B6
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CARDIA BIOPLASTICS (AUSTRALIA) LIMITED	A25
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CLEAN BINS	F50
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SUPERFY	E35
TELFORD SMITH ENGINEERING	A39
TIETJEN VERFAHRENSTECHNIK GMBH	H23
TOMRA COLLECTION	H18
TOMRA RECYCLING	F17
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TRUEGRID AUSTRALIA	E48
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WASTE MANAGEMENT & RECYCLING ASSOCIATION OF SINGAPORE	B24
WASTECH ENGINEERING	D22
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XTRALIS	F52
ZENOBE AUSTRALIA	F47

Key decision-makers to tackle nation's most urgent issues at AWRE 2023

26-27 July 2023
ICC Sydney

Australia is waste deep in a resource recovery crisis and there's never been a more urgent time for the resource recovery sector to come together.

Australasia Waste and Recycling Expo (AWRE), the nation's leading event dedicated to the sector, returns to the ICC Sydney from 26–27 July, with its largest showcase of waste and recycling solutions and education programs. The expo will be packed with insights from leading government and policy decision-makers and industry trailblazers to help drive a cleaner, more sustainable waste future.

This year, AWRE has expanded its Summit program, taking place on the first day of the event, in response to industry demand. It will bring together 250 Australian key decision-makers to participate in the Summit's program titled "Reality Check on Recovered Resources + Residuals".

Jointly hosted by the National Waste and Recycling Industry Council (NWRIC), the Waste Contractors and Recyclers Association of NSW (WCRA) and the Australian Council of Recycling (ACOR), the Summit will set the scene for robust and challenging discussions that ask the hard questions that must be raised if Australia is to meet its waste reduction targets.

Key speakers include:

- Richard Pittard, Head of Sustainability at Cleanaway
- Brett Lemin, Executive Officer at Victorian Waste Management Association
- Jelena Hercegovac, General Manager – Environment & Sustainability, Repurpose it
- Jim Fairweather, CEO, Tyrecycle
- And many more.

In addition to the Summit, this year AWRE has launched an Industry Breakfast opened by keynote speaker Peter Whish-Wilson, Greens Senator of Tasmania, who along with David Gerrard, CFO at Veolia, will discuss the future outlook for the industry.

To round out a packed education program, AWRE will also be running its regular free education program, across two theatres on the show floor, in partnership with the NSW EPA. The program will cover some of the industry's most challenging and compelling issues with panel discussions throughout the two days as well as bespoke networking events, awards, an Innovations Pitch Fest and more.

The exhibition show floor is also set to be the largest in AWRE's history, with dedicated zones for organic waste, recycled materials and innovation, alongside a record number of suppliers from all key sectors of waste and recycling including:

- Bins, waste collection + waste products
- Associations + governments
- eWaste
- Food + organic waste solutions
- Machinery + equipment
- Recycled products + materials (NEW)
- Services
- Software + technologies
- Vehicles
- Waste management, recycling + resource recovery services
- Medical waste (NEW)

Key exhibitors include:

- Isuzu Trucks
- Liebherr Australia
- Komatsu Australia
- BottleCycler Australia
- Telford Smith
- Method Recycling

AWRE will also honour leaders in the industry with an awards program. Two awards will be launched — Best Recycled Product + Best New Innovation. The winners will be announced at the end of day one in Seminar Theatre 1.

For more information, visit www.awre.com.au.

Diversified Communications Australia

www.divcom.net.au

SOLAR CLEANING ROBOT

Solar panel maintenance company Solar Shine Australia has partnered with Solar Cleano to bring its F1 solar cleaning robot to the Sydney market.

Built in Luxembourg, the robot is designed to overcome the challenges faced when cleaning large commercial and ground-mount solar systems.

The robot can improve safety as it can remove the need for personnel to be in high-risk environments.

Suitable for wet and dry solar panel cleaning, the robot can easily cross gaps up to 70 cm and provides a fast, consistent clean. Its specialised pads can clean at a 25° angle with water.

Solar Shine Australia
solarshineaustralia.com

OIL-FREE SCREW AIR COMPRESSORS

ELGi Equipments has enhanced the energy efficiency of its AB series oil-free screw air compressors, realising improvements in specific power consumption and increases in free air delivery across the range. For additional energy savings, the three larger models in the range now include a super-premium efficiency IE4 motor as standard.

Available from 11 to 110 kW, the water-injected AB series of oil-free screw air compressors from ELGi deliver certified 'Class 0' high-quality air in compliance with ISO 8573-1 and ISO 8573-7.

ELGi has recently enhanced the performance of the AB series models, delivering improvements in terms of both specific power consumption and free air delivery. This includes an average 10% improvement on the turndown ratio across the variable frequency drive (VFD) range. The result of these improvements is enhanced energy efficiency and reduced power consumption.

In addition, the 75 to 110 kW models are the first in the series to now come as standard with IE4 motors. These motors deliver further energy efficiency and reliability gains as well as a higher service factor and lower waste heat output.

Energy efficiency and zero mineral oil residue help to provide a minimal environmental impact, thereby lowering carbon footprint. The AB series produce high-quality air, free of microbiological contaminants, with free air delivery (FAD) from 0.82 to 15.85 m^3/min.

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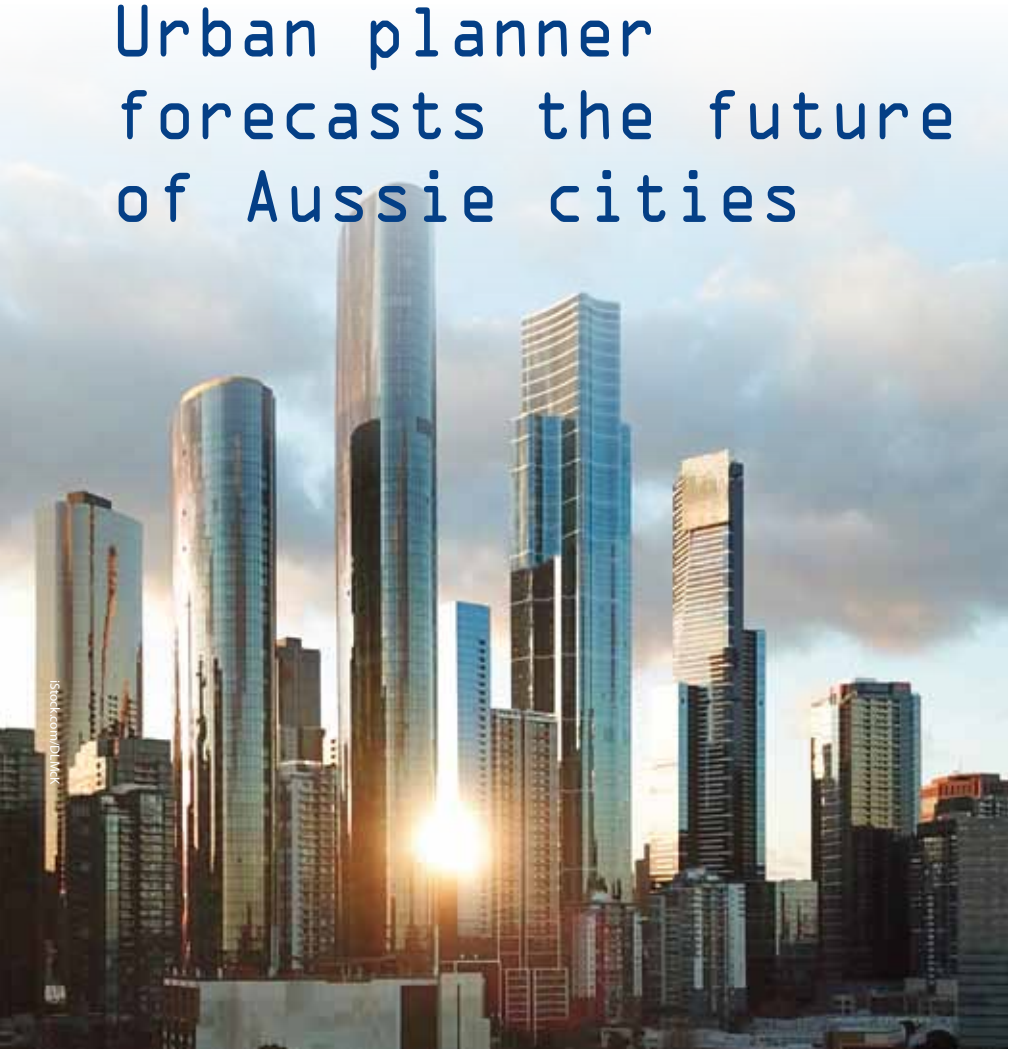
Urban planner forecasts the future of Aussie cities



Major cities house 72% of the Australian population, with the number of people living in capital cities across Australia growing by 17.1% over the last 20 years. Urban planners play a crucial role in designing areas years in advance of housing construction, to ensure the early provision of housing, schools, neighbourhood centres, infrastructure and amenities.

So, what will our cities look like over the next decade? Award-winning urban planner Mike Day, from Hatch RobertsDay, has provided insights into the future, his forecast for cities in the coming years and enhancements he believes cities need.

Private transport will become more unaffordable

The RACV and RACQ have found that the costs of owning and running a private vehicle range from $12,000 to $20,000 per year, about 15% of an average household's income. Day says private vehicle transport costs in disconnected suburban growth areas may become more expensive than housing in the future, with the notion of 'attainable living' contending that of 'attainable housing'.

The future success of growth areas will be dependent on a more 'urban' form of walkable neighbourhoods and varied modes of transport. The introduction of transit, schools and separated walking and cycling paths will be a feature of urban patterns. These neighbourhoods will be enhanced through the promotion of mixed-use developments such as courtyard housing, townhouses and residential apartments built above shops. This will lead to the formation of '15- and 20-minute neighbourhoods' that allow residents to leave their homes for daily essentials without relying on a car.

Mixed-use developments will become more popular

Day predicts that mixed-use developments will emerge to create self-contained communities framed around pedestrians, cyclists and diverse forms of micro-mobility, such as e-bikes, mid-tier transit and small-scale electric buses.

New cities need to emerge

The time to be thinking about potential sites for new cities and to provide attainable housing and jobs in new self-contained cities serviced by high-speed rail in rural areas is now. As Australia's fastest growing city, Melbourne increased by 806,800 people between 2011 and 2021, and is experiencing severe congestion, commuting and affordability issues. By 2041, the number of people living in the City of Melbourne is expected to double.

According to Day, there is potential for eight cities to be built along a Sydney–Melbourne high-speed rail line which could provide distributed workplaces and more attainable housing for residents.

"When developing these new cities, we must learn from history and consider major environmental factors, such as flooding. Building in resilience to environmental disasters requires transformative action years ahead of construction. Unprecedented floods in NSW and Queensland have resulted in devastating outcomes. While relocating existing flood-prone settlements to higher ground and creating new towns might be challenging and expensive, disastrous events years in the future can be avoided," Day said.

Day encourages the development of high-speed rail between Sydney, Canberra and Melbourne, citing countries such as France and China as examples. China has developed trains which reach speeds of 600 km per hour, which could see travel between Sydney and Melbourne take 1.5 hours.

The creation of a high-speed rail link between Sydney, Canberra and Melbourne presents an opportunity to explore value-creation-capture of rural landholdings near stations, including the provision of attainable housing and enterprises. Sale of land within close proximity of the stations will defray the cost of building these connections.

Read the full story online at https://www.sustainabilitymatters.net.au.

TAGGLE ADOPTS NB-IoT AS A SECONDARY RADIO FOR SMART WATER METERING

Taggle is the leading ecosystem for Smart Water Metering and Digital Water Management in Australia, with 67 Council and Water Utility customers and over 300,000 smart meters deployed.

To further extend this open ecosystem, Taggle has adopted NB-IoT as a secondary radio standard, and recently announced Taggle's first NB-IoT transmitting device, the NB3D. The NB3D is a battery-powered, add-on telemetry device that is suitable for use with residential, commercial and industrial water meters.

The NB-IoT radio supports low-cost, utility-scale deployments using existing NB-IoT cellular networks and is particularly suited to dense urban environments.

Taggle is well known for its proprietary radio network, the Taggle Byron LPWAN, which was designed by their engineering founders, who are some of the team who invented Wi-Fi. This network was an Australian innovation that helped position Taggle as the technology leader and first mover in the Smart Water industry.

Much has changed however since those early days where Taggle's business revolved around the network. Today, Taggle provides a complete end-to-end Smart Water Metering ecosystem which is open and interoperable, allowing data to flow from different sources through Taggle's Aqualus Water IoT Platform, into the client business applications where it is required, including third party vendor systems.

NB-IoT connectivity complements the Taggle Byron Network, offering flexibility and choice to Taggle customers for their Smart Water Meter deployments. Taggle also has satellite connectivity with Myriota satellite devices, for those remote applications where direct to satellite is the most cost-efficient way to monitor water assets.

Having the flexibility to choose between various radio technologies to suit different environments and applications, now provides Taggle customers with unrivalled choice and service options.

The NB3D records water flow from the connected meter every hour and transmits these readings daily. Taggle's engineering team have applied their radio innovation expertise in order to optimise the battery life, and hence the NB3D has an expected device life of 15 years*.

Taggle will continue to provide the end-to-end solution including "network as a service" to enable simple procurement and streamlined operations, so the NB3D contains a pre-integrated SIM and Taggle managed NB-IoT communications from existing telco network providers. For more information get in touch with the Taggle Team.

*Battery life – Conditions apply including radio environments, signal strength and temperature, get in touch for details.

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‘Plastic-eating’ enzymes to help combat textile waste

Approximately 60% of clothes worn today are made of synthetic textiles and they are often sent to landfill or incinerated at end of life.

Now, researchers at the University of Portsmouth’s Centre for Enzyme Innovation are using their enzyme technology (which has previously been used to recycle single-use plastics, including PET) to help combat polyester textiles in clothing waste.

Synthetic fabrics such as polyester are widely used for clothing due to their durability so the process of recycling them using enzymes will not be an easy one. The addition of dyes and other chemical treatments makes it even harder for these tough oil-based materials to be ‘digested’ in a natural process. Developing enzymes that can efficiently ‘eat’ polyester clothing, without energy-intensive pre-treatment, is the biggest challenge.

Professor Andy Pickford, Director of the Centre for Enzyme Innovation at the University of Portsmouth, said: “We will develop enzymes that can deconstruct the PET in waste textiles, tolerating the challenges that this feedstock poses, namely its toughness and the presence of dyes and additives.

“We will test the compatibility of our engineered enzymes with additives, dyes and solvents to select those enzymes that are best suited to polyester textile deconstruction. Then we will apply these enzymes to appropriately pretreated waste polyester textiles in laboratory-scale bioreactors to evaluate the potential and limitations of scaling up the technology.”

While it is possible to turn quality oil-based textiles into carpets and other products, current recycling methods are energy-intensive. Scientists hope that enzymes developed at the University of Portsmouth will help them create an environmentally friendly circular economy for plastic-based clothing.

Pickford said: “Our research will establish the feasibility of using enzymes to deconstruct the PET in waste textiles into a soup of simple building blocks for conversion back into new polyesters, thus reducing the need to produce virgin PET from fossil fuel-based chemicals. This will enable a circular polyester textiles economy and ultimately reduce our dependence on taking oil and gas out of the ground.

“We want a system that uses plastic in the same way we use glass or tin cans — infinitely recycled. The ultimate aim is to close the loop — however, this requires not only the technology but also the will to do so.”

The research, which is funded by the Biotechnology and Biological Sciences Research Council (BBSRC), started in January and is expected to last for 18 months. The university team will work with project partners Biomimicry Institute, who will provide expertise in natural solutions to sustainability challenges, and Endura Sports clothing, who will share their knowledge of fabric dyes and provide samples of end-of-life polyester textiles.

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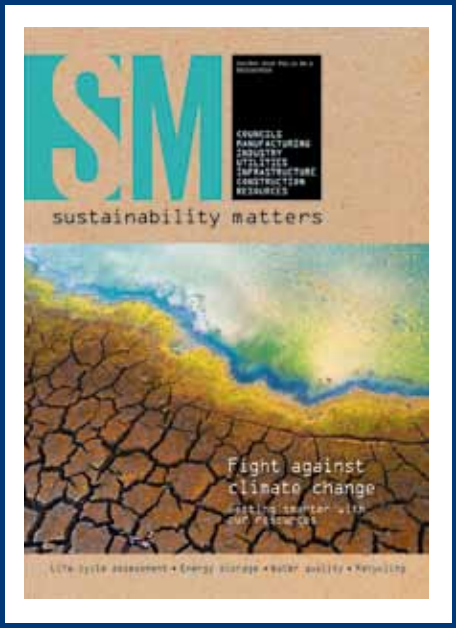

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